WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
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ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
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# DEVELOPMENT OF ENVIRONMENT AND HEALTH INDICATORS FOR EUROPEAN UNION COUNTRIES

# ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

# Final Report

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## Executive Summary

The Declaration of Fourth Ministerial Conference on Environment and Health in Budapest, June 2004, reaffirmed that the Environment and Health Information System (EHIS) is an essential tool to support policy-making. WHO, EEA and the European Commission were requested to further develop and manage the environment and health indicators, related data sets and the shared information infrastructure to establish a pan-European EHIS. The Declaration also stipulated that the progress be reported to the intergovernmental meeting by the end of 2007.

WHO started technical work to develop methods and tools for EHIS in 1999. The ECOEHIS project was a part of it, co-funded by the EC DG SANCO in the framework of its Health Monitoring Programme in 2002 (SPC 2002300). The project objective was to establish **a core set of environmental health indicators** for EU countries, focusing on the population's **exposure** to environmental hazards, their health **effects**, and policy **actions** to prevent the illnesses, injuries and deaths. The scope of the project was derived from the decision of the European Parliament and the Council, covering the topics of housing conditions, home and leisure activities, road accidents, and various aspects of external environment. Eleven Member States nominated national focal points to strengthen partnership for the project implementation. Working Groups of invited experts and national focal points identified indicators relevant for application in EU. Indicators thus selected were validated and tested for feasibility by the national partners of the project. WHO coordinated the work and contributed to its technical contents. The final consultation recommended the set of seventeen indicators on exposure, effects and actions that are ready for implementation in EU countries as a part of the EC Health Indicators (ECHI) set.

The project first evaluated the compatibility of the proposed 48 indicators with existing body of legislation and regulations at EU. These indicators at the outset were adopted from the core indicators identified by previous WHO projects. This step confirmed that 9 indicators would be non-compliant to existing EC legislation. Non-compliant indicators were not considered in the next step of the project, unless they were readily available in the existing international data sources on a voluntary basis. Therefore, most indicators considered in this project would not require new laws or regulations in order to be adopted as part of the EC health monitoring system. A comprehensive report, *Verification of Compatibility of WHO EH Indicators with the EC Body of Legislation*, was prepared by a consultant, and discussed by the Working Group at the project meeting in Berlin, May 2003.

The indicators on 'housing and health', 'noise and health', and 'road accidents' were recognized by previous WHO project to be in need of further elaboration. Therefore, the indicators on these three topics were developed and validated by the invited experts. For each area, experts held two technical meetings, and identified promising indicators based on their review of existing scientific evidence and approaches to the surveillance. These indicators were then validated and refined in a small-scale studies conducted by the experts before being proposed for pilot testing. For the indicators on other topic areas than the above three areas, core indicators previously developed by WHO's project were reexamined and updated by consulting experts. At the Working Group meeting in Luxembourg, January 2004, the national focal points and experts discussed the proposed set of indicators, selected 46 indicators to be subject to the pilot study in the participating Member States, and agreed on the protocol of the pilot study and the criteria for evaluating indicators.

The national project teams and network of experts collected information necessary for the implementation of selected indicators in their countries in accordance with the study protocol and a questionnaire. Indicators were graded as poor, fair, or good, for **four evaluation criteria: the availability, the quality, the comparability, and the policy-relevance**. Participating Member States submitted national reports summarizing their own assessments of readiness for the implementation of the proposed indicators.

At the Working Group meeting in Bonn, July 2004, participating countries reviewed the results of pilot study and reached an agreement on classification of indicators into three categories. Indicators that were both policy-relevant and readily available from existing international data sources with sufficient quality and comparability were recommended to the ECHI short list. When necessary, definition of indicators was adjusted to fit with the existing databases. In the end, the project produced essential guidelines regarding the definition and methodology of recommended indicators, including underlying concepts, specification of data, availability and quality of data sources, computation method and units of measurement, policy and regulatory context, interpretation and limitations, etc.

The following environmental health indicators on exposure, effects, and actions are recommended as the main outcome of the project.

**I. Ready and recommended for immediate implementation[*] (These indicators are recommended as 'core' European Community Health Indicators):**

*Air quality*:

- Population exposure to air pollutants: particulate matter, ozone, $NO_2$ and $SO_2$
- Existence of national policies to reduce environmental tobacco smoke exposure

*Housing and Health*:

- Crowding of the residence
- Dampness and mould growth in the residence
- Housing hygiene
- Crime and perception of crime in the neighborhood
- Deaths associated with extreme temperature

*Noise and Health*:

- Population exposed to various noise levels by different sources
- Existence of national policies to reduce exposure to leisure sounds

*Traffic Accidents*:

- Deaths due to road transport accidents
- Injuries due to road transport accidents

*Water and Sanitation*:

- Population supplied with safe drinking waters

*Chemical Emergencies*:

- Existence of regulatory requirements for land-use planning
- Existence of national registry of chemical incidents
- Government preparedness for chemical incidents

*Radiation*:

- Incidence of malignant melanoma
- Existence of effective environmental monitoring of radioactivity

**II. Ready, but not feasible for immediate implementation (These indicators are recommended for WHO project such as ENHIS):**

*Air Quality*:

- Years of Expected Life Lost due to air pollution

*Housing and Health*:

- Radon in dwellings
- Housing safety and accidents

[*] In addition, indicators on upstream determinants i.e. driving forces, pressures and state of the environment, were recommended to the core set when they are readily available and relevant to environmental health policies.

*Noise and Health*:
- Cardiovascular diseases and deaths due to noise exposure

*Traffic Accidents*:
- Potential Years of Life Lost due to traffic accidents

*Water and Sanitation*:
- Management of bathing waters

**III. Desirable though requiring further developmental work (These indicators are recommended for further elaboration):**

*Housing and Health*:
- Accessibility of the elderly or disabled people to the residence

*Noise and Health*:
- Annoyance and sleep disturbance due to noise

*Traffic Accidents*:
- Person time spent on the road
- Use of vehicle safety device
- Disability Adjusted Life Years (DALY) lost due to road accidents
- Deaths due to drinking driving

*Water and Sanitation*:
- Existence of water safety plans
- Outbreak of water-borne diseases

The participating Member States reported a very positive impact of collaboration in this project. For example, France reported that the ECOEHIS project activated a synergistic interaction between European countries and national experts for implementation of a harmonized European monitoring system. Italy reported that the technical reports by ECOEHIS project team would promote a regular environment and health reporting linked to European network. In the Netherlands, a steering committee of stakeholders was established for the project ensuring the progress towards the establishment of the national EHIS. Most of participating countries reported similarly positive experiences of capacity building for future adoption of EHIS.

In conclusion, this project developed, evaluated, classified and recommended environmental health indicators that can be readily applicable in most EU countries. These indicators will also serve as the main constitution of the pan-European EHIS as endorsed by the Budapest Declaration of 2004.

## Introduction

This report summarizes the main activities and results of the project, 'Development of Environment and Health Indicators for Europe (ECOEHIS),' conducted under the WHO leadership from 1 October 2002 to 30 September 2004. The project was co-sponsored by the EC DG SANCO in the framework of its Health Monitoring Programme in 2002 (SPC 2002300). Details of results are also presented in technical reports enclosed as Annexes.

### Objective of the Project

The main objective of the ECOEHIS project was to develop environmental health (EH) indicators to become part of the European Community Health Indicators (ECHI), which would serve as tools to:

- Measure the health impact of selected environmental risk factors, their determinants and trends therein throughout the Community
- Facilitate planning, monitoring and evaluation of Community programmes and actions
- Provide Member States and international organizations with information to make comparisons and evaluate their policies

Based on testing of the feasibility and usefulness and after approval by the EU Member States, the indicators were to be delivered according to the evidence, data and methodological limitations, in one of three categories:

1) ready and recommended for implementation
2) ready, but not feasible for immediate implementation, or
3) desirable though requiring further developmental work.

In addition, the project aimed at providing input to the ECHI process of selecting core set of indicators.

### Scope of the Project

The scope of the project to cover was set in Annex II of the decision N_1400/97/EC of the European Parliament and the Council to adopt a programme of Community action on health monitoring within the framework for action in the field of public health:

C3. Housing conditions;
C4. Home and leisure activities (the subset "accidents at home")
C5. Transport: Road accidents
C6. External environment: air pollution, water pollution, radiation, and other types of pollution, including noise but excluding food safety.

### Project Structure and Organization

Project activities were performed in three Work Packages (WP's):

**WP1:** Verification of compatibility of EH indicators with the EC legislation
**WP2:** Development of indicators for 'housing and health', 'noise and health' and 'road accidents'
**WP3:** Testing and expert approval of proposed set by participating EU Member States

The personnel involved in this project included the national focal points of eleven participating Member States, subject area experts, and WHO/ECEH staff. Eleven Member States nominated national focal points to strengthen partnership throughout the project implementation. However, two countries, Belgium and Austria, could not complete the project. The national focal points coordinated and assured a broad discussion of proposed indicators in the partner countries by consulting national experts and stakeholders. They also played a key role in collecting information necessary for evaluating indicators in their countries. Invited experts played a leading role in developing, validating, and proposing indicators on selected issues covered by the indicators system. The European Center for Environment and Health, Bonn Office, of the World Health Organization (WHO/ECEH), was the main implementing institution for the project. The names and affiliations of the personnel including national focal points, members of national teams and experts are listed in Annexes 1 and 2.

## Project Activities

### WP1: Verification of compatibility of EH indicators with EC legislation

The verification of compatibility of the EH indicators with EC body of legislation was carried out to assure the validity of the indicators for policy-oriented monitoring in the EU. The EH indicators proposed by the WHO in the previous project were used to identify the relevant EC legislation and confirm the reporting obligations of the legislation regarding the indicators. For each indicator, the relation to the EC legislation, reporting obligations to the legislation, planned modifications in legislation, and the need for modification in indicator were examined. The study on reporting obligations provided information about the mechanisms of reporting of the environmental data and also the relevant policy measures put in place by Member States to enact and comply with the EU legislation. They also provided a closer look at the mechanisms and measures precluded in the legislation to evaluate the policy effects and effectiveness. This step confirmed that 9 indicators would be non-compliant to existing EC legislation. Non-compliant indicators were not considered in the next step of the project, unless they were readily available in the existing international data sources on a voluntary basis. Therefore, most indicators would not require new laws or regulations in order to be adopted as part of the EC health monitoring system. A comprehensive report on the results of the crosscheck for each EH indicator, '*Verification of Compatibility of WHO EH Indicators with the EC Body of Legislation*', was prepared by a consultant, and became available upon request to info@ecehbonn.euro.who.int. This report was used as the background document. Detailed activities in WP1 are summarized below.

1. Identification of the relevant body of EC legislation (all types of regulatory texts)
    - 1.1 Initial list of EH indicators for EU countries based on the set of core indicators developed by WHO projects ( http://www.euro.who.int/EHindicators ) was selected.
    - 1.2 The relevant legislation was identified using the initial EH indicator list as the basis. In addition, the legislation useful for health-environment monitoring in the EU was also identified.
2. Cross-checking of the EH indicators for compatibility with the identified EC legislation: background document prepared by Øystein Solevåg.
    - 2.1 Each of the selected indicators was screened *vis-à-vis* the legislation focusing on the reporting obligations of legislation, including also future legal developments e.g. planned modifications.
    - 2.2 Analysis of compatibility was performed.
    - 2.3 The document summarizing the review results was prepared by consultant under a contractual agreement. The document served a background for discussion of the Working Group meeting convened in Berlin, 14-16 May 2003.
3. Creation of a network of national focal points: In parallel to the activities in 1) and 2), the following activities were implemented.
    - 3.1 Building the network: establishing contacts, defining the roles and responsibilities for the national partners and experts.
    - 3.2 Coordinating the work in the Member States concerning compatibility of the EH indicators *vis-à-vis* the EC legislation.
4. Meeting on EH indicators and EC legislation in Berlin, 14-16 May 2003 (For details, see Annex 3 or http://www.euro.who.int/Document/E81285.pdf)

4.1 Organizational aspects:
- Venue: Federal Environment Agency of Germany (UBA)
- Participation: twenty-seven participants – national focal points and invited experts focusing on selected issues covered by the indicators system and one observer from EC DG SANCO Unit G3.

4.2 Scientific preparation:
- Background papers on the review of EH indicator compatibility *vis-à-vis* the relevant legislation and on the ongoing work for 'housing and health', 'noise and health' 'road accidents' were presented
- The feedback from relevant national agencies evaluating the compatibility with the legislation was coordinated in the MS.

4.3 A set of environment and health indicators adequate for EH monitoring in the EU was identified.

4.4 The system adjustments, necessary for its harmonization with the requirements of the legislation, were agreed and determined.

4.5 Methodological developments of new indicators were recommended to fill the gaps identified from the verification of compatibility with the EC legislation.

4.6 ECOEHIS project network (national focal points and experts in the thematic areas) to steer the process was established.

5. Following the WG decisions, adjustment of the existing indicators for harmonization with the requirements of the legislation were finalized.
6. New indicators were developed to fill the gaps between the indicators and legislation identified by the WG.
7. The report, *Verification of Compatibility of WHO EH Indicators with EC Body of Legislation,* was prepared. The summary of this report is enclosed in Annex 3.

## WP2: Development of indicators for 'housing', 'noise' and 'road accidents'

Development of the indicators on 'housing and health' and 'noise and health' was carried out by the WHO/ECEH housing and noise programmes. Development of the indicators for road accidents was subcontracted to the Public Health Agency of the Lazio Region, Italy. Indicators on these topic areas were recognized by previous WHO project to be in need of further elaboration. For each topic area, invited experts held two major meetings, reviewed the existing scientific evidence and approaches to the surveillance. They formulated initial set of indicators, and validated in small-scale studies before selecting them for pilot testing. For the indicators on other topic areas than the above three areas, indicators previously developed by WHO's projects were reexamined by consulting experts. At the Working Group meeting in Luxembourg, January 2004, national focal points and experts discussed the proposed set of EH indicators, and agreed on 46 indicators to be tested by the pilot study in the participating countries. Detailed activities in sub-projects of WP2 are summarized below.

### WP2A: Development of indicators for 'housing and health'

1. Review of the existing approaches to the surveillance and identification of the housing-health issues as the basis of housing indicators.

1.1 Literature review, background material preparation of expert consultation. The work served as background for discussion and guidance in preparing a new set of housing indicators.

2. Meeting in Lisbon, 04-06 June 2003 (See Annex 4-1 for minutes):

2.1 Organizational aspects:
- Venue: Division General, Ministry of Health of Portugal

- Participation: fourteen invited experts on the different health aspects of housing and built-in environment, and three WHO staff members.

2.2 Scientific preparation:

- Preparation of the terms of reference of the expert proposals2
- Preparation of background papers by the experts (Dr. Freitas, Dr. Gundersen and Prof. Ormandy).

2.3 The initial set of fourteen housing indicators of most relevance for health was identified and agreed.

2.4 The scope and purpose of testing the indicator proposal for validity were determined.

3. Follow up of the First Working Group Meeting in Lisbon (See Annex 4-4 for details)

3.1 A total of 12 indicator templates for housing and health were selected.

3.2 The indicator sheets were reviewed within the group, by WHO and external experts.

3.3 The final set of indicator templates was sent out to the meeting participants for a data screening. Each indicator was assigned to at least two experts, trying to identify the availability of data for the indicator. Similar screening processes were undertaken in two local authorities in order to see data availability on the local level.

4. The Second Working Group Meeting in Rome, 14-16 January 2004 (See Annex 4-5 for details)

4.1 The expert group discussed the results of the screening process. Some indicators were dropped, and all indicators were scrutinized based on the results of the screening.

4.2 Nine housing and health indicators were recommended for the pilot study.

<u>WP2B: Development of indicators for 'noise and health'</u>

1. Review of the existing approaches to the surveillance and proposal for a set of indicators for 'noise and health' according with the EC legislation.

1.1 Literature review, background material preparation of expert consultation. The work served as background for discussion and work guidance to the Working Group Meeting.

2. Meeting in Brussels, 7-9 April 2003 (See Annex 5-1 for details):

2.1 Organizational aspects:

- Venue: European Commission (Brussels)
- Participation: twenty two participants – invited experts on the different aspects of noise pollution, WHO staff and an observer from the EC DG Environment

2.2 Scientific preparation:

- Preparation of the terms of reference and meeting
- Background papers on the indicators according to the DPSEEA model
- Proposal of a set of key indicators by the experts

2.3 The first proposal for a core set of indicators was agreed upon and the follow-up actions were defined.

3. Follow up of the First Working Group Meeting in Brussels

3.1 The template methodology sheets for 18 candidate indicators for pilot study were prepared and reviewed by the expert group, WHO, and some ECOHIS focal points.

3.2 A small group was established for defining the indicator "Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure". The indicator methodology sheet was fine-tuned by Dutch and German experts.

3.3 A set of methodology sheets for 15 indicators was proposed for testing. Noise experts and country focal points tested and validated the indicators to report at the second meeting. Eight countries checked the relevance and added values of the indicators and filtered them with real data. Each country expert tested a maximum of 3 indicators.

4. The Second Working Group Meeting in Bonn, 18-19 December 2003 (See Annex 5-2 for details)

4.1 The experts discussed the results of the preliminary testing. Some indicators were improved and/or merged, and others deemed not feasible and therefore dropped.

4.2 Six noise and health indicators were recommended for the pilot study.

WP2C: Development of indicators for 'road accidents'

This activity was coordinated by the Public Health Agency of the Lazio Region, Italy. The sub-project activity report is enclosed as Annex 6-1.

1. Determination of the work plan and terms of reference, creation of network of partnership.
2. Review of the existing surveillance systems and of the information reporting approaches used by Member States and the EU bodies.
3. Evaluation of compatibility of existing indicators on road accidents with the EC legislation (all types of regulatory texts) concerning road traffic and casualties prevention.
   - 3.1 The relevant body of EC legislation (all types of regulatory texts) was identified.
   - 3.2 Existing risk factor and road accident indicators were checked *vis-à-vis* the EC legislation.
   - 3.3 Document summarizing the results from 3.1) and 3.2) was prepared by Carlo Pasquariello.
4. Working Group meeting Rome, 31 March–1 April 2003 (See Annex 6-2 for details):
   - 4.1 Scientific preparation:
     - Background papers on the review of surveillance systems and on key issues and criteria for selecting road accidents indicators were presented.
     - The key issues to be covered by road accidents indicators within the DPSEEA-adjusted framework were identified.
   - 4.2 The initial set of road accident indicators was selected.
5. The Second Working Group Meeting in Rome, 17–18 November 2003 (See Annex 6-2 for details)
   - 5.1 The matrix evaluation criteria by each indicator were constructed.
   - 5.2 A standardised frame for the definition of the proposed indicators was developed.
   - 5.3 Follow-up to the meeting:
     - Evidence-based actions to prevent road accident health effects were reviewed.
     - A small-scale validation studies were performed for data sources and indicators.
   - 5.5 Eleven road accidents indicators were recommended for the pilot study.
   - 5.6 A scientific report on road accidents indicators was prepared and enclosed as Annex 6-3.

## WP3: Testing & expert approval of proposed set by EU Member States

In collaboration with national focal points and network of experts, WHO/ECEH completed a pilot study to test the proposed indicators for feasibility and applicability. With limited financial support, the national focal points collected the information on the data (meta-data) and the data, if applicable, in their own countries according to the study protocol and the structured questionnaire. The four main evaluation criteria (i.e., the availability, the quality, the comparability, and the policy-relevance) were scored as poor, fair, and good, and the overall readiness for implementation was assessed. Data availability from the international databases was reviewed by WHO/ECEH. The information thus collected was reviewed in accordance with four evaluation criteria and the expert consensus. Participating Member States produced separate national reports summarizing their assessment of the readiness of the country for application of the indicators. As a consequence of this collective process, the EH indicators were categorized into three levels of readiness for implementation, and the indicators most ready for implementation were recommended to the ECHI. Detailed activities in WP3 are summarized below.

1. Test feasibility and applicability of data collection for the proposed indicators
   - 1.1 ECOEHIS Meeting in Luxembourg, 29-30 January 2004: *Design of pilot study* (See Annex 7 for details):

- All indicators recommended by WP1 and WP2 were reviewed by the ECOEHIS partners.
- A total of 46 Indicators on Air, Noise, Housing, Traffic Accidents, Water and Sanitation, Chemical Emergencies, and Radiation were agreed for further pilot testing in participating countries.
- Decisions were made to revise and update the definition for selected indicators.
- The objectives and scope of the pilot study were agreed and a protocol of pilot study was drafted.
- Criteria to evaluate the indicators were discussed.

1.2 Implementation of the pilot study: February-July 2004 (Study protocol and questionnaire is presented as Annex 8)

- Methodology sheets were updated and distributed.
- Questionnaires for collecting meta-data and data were prepared and distributed.
- The protocol for pilot study was prepared and distributed.
- ECOEHIS partners in member states collected meta-data and data from April until July.
- For the countries having difficulties in identifying the meta-data, WHO/ECEH supported the data identification process by bringing in national experts identified through the WHO network.
- WHO/ECEH checked the availability of international databases for the indicators under study.

2. Review of pilot study results and formulation of Member States recommendation

2.1 ECOEHIS Meeting in Bonn 7-9 July 2004: *Results of pilot study* (See Annex 9 for details):

- The meeting was attended by twenty-seven project partners and invited experts.
- The experiences from implementation of pilot study in Member States were presented.
- The feasibility and applicability of the proposed indicators were assessed by reviewing results of pilot study from national and international perspectives.
- The final agreement on the core set EH indicators for EU countries were made.
- Fine adjustment of definitions of indicators was recommended to enhance the availability according to the decision at the meeting.
- Follow-up actions needed to enhance the use for recommended indicators were identified.

2.2 Secretariat and experts adjusted definition of selected indicators according to the meeting recommendation (Updated methodology sheets are presented as Annex 10)

2.3 Member States prepared national reports on the implementation and conclusion of pilot study in their countries (National reports are presented as Annex 11)

3. Preparation of final project report

3.1 Summary of project activities, meeting reports, and related documents were collected from the Working Groups of WP1, WP2, and WP3, and were compiled by WHO/ECEH.

3.2 WHO/ECEH drafted the final project report for review and approval by the ECOEHIS partners.

## Project Results

### Development of New Indicators

In the topic areas of housing, noise, and road accidents, the ECOEHIS project made a technical progress in the definition, methods and tools of indicators, developed new indicators, and checked for their compatibility with EU legislation in the Working Group. The methods and tools were updated to be able to use the available international databases for the indicators recommended for the ECHI as presented in Annex 10.

### Housing and Health

A total of nine housing indicators were developed and tested in the Member States. Background documents for these indicators are presented in Annexes 4-1 through 4-5. As compared to the previous ones, these indicators cover wider range of housing and health issues, and more realistically reflect important exposures to housing conditions. These indicators also integrate more innovative topics including accessibility of the disabled and elderly to the residence, deaths due to extreme temperature, domestic accidents, affordability issues, and crime/fear of crime in residential areas. Among nine indicators tested in the pilot study, six indicators were considered to be ready for immediate implementation in the EC, two were recommended for WHO use, and one for further recommendation.

### Noise and Health

A total of six noise indicators were developed and proposed by the Working Group on noise indicators, and tested in the Member States. Background documents for these indicators are presented in Annexes 5-1 and 5-2. These indicators cover the population exposure to noise, which was made possible by the scope of the recently adopted European Directive 2002/49/EC. As an innovative indicator, 'attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure' was newly developed after a meta-analysis on the issue in the Working Group. In selecting indicators for recommendation, the project considered the fact that European Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 will be fully implemented in 2007. Among six indicators tested in the pilot study, two were considered to be ready for immediate implementation in the EC, two were recommended for WHO use, and two were dropped from further consideration. Because some Member States will not have the national data until 2007, a gradual adoption was recommended for the noise indicators until 2007.

### Road Accidents

A total of eleven indicators were developed by subcontractor, and tested in the Member States. Background documents for these indicators are presented in Annexes 6-1 through 6-3. As compared to the previous set of indicators, these indicators cover wider range of causal chain including upstream determinants and action indicators. New indicators cover important risk factors of road accidents such as person time and distance on the road, cars exceeding speed limits, and use of safety devices. Public health effects of road accidents on mortality and injury rates were further elaborated by computing 'Years of Life Lost' and 'Disability Adjusted Life Years (DALY)' as separate indicators. An indicator on mortality due to drinking driving was proposed separately. The working group discussed the necessity to develop action indicators and decided not to propose them because it was agreed in the Working Group that the scope of the indicators was to monitor the changes introduced by policies, preventive programs, laws, and other actions in the field of road accidents and their health consequences. Among eleven indicators tested, five were considered to be ready for immediate implementation in the EU countries, the others were recommended for WHO use.

## Recommended Indicators

The main result of the project, the methodology sheets of the EH indicators proposed for implementation in EU countries, is presented in Annex 10. The indicators were categorized into three groups by the project participants as below.

1. *Indicators ready and recommended for implementation in the EC.*
   These indicators are recommended for inclusion in the ECHI short list.
2. *Indicators ready, but not feasible for immediate implementation in the EC.*
   These indicators are recommended for WHO project including ENHIS.
3. *Indicators desirable though requiring further development.*
   These indicators are recommended for further elaboration.

## I. Indicators recommended for ECHI

The indicators in this category have high policy-relevance, and are readily available from international databases adding little reporting burden to member states. Table 1 shows the environmental health indicators in this category dealing with **Exposure, Health effects, and Action** in the framework of DPSEEA.

*Table 1 . Indicators related to Exposure/Effects/Action recommended for the ECHI list*

| Topic area | Recommended indicator | Indicator code* |
|---|---|---|
| Air | • Exposure to air pollutants<br>o Population-weighted annual average concentration of $PM_{10}$<br>o Population-weighted annual average concentration of $PM_{2.5}$<br>o Population-weighted annual average concentration of $O_3$<br>o Exceedance of AQ limit values for $NO_2$<br>o Exceedance of AQ limit values for $SO_2$<br>• Composite index on national policies to reduce environmental tobacco smoke exposure | •AIR_Ex1<br>o AIR_Ex1_ $PM_{10}$<br>o AIR_Ex1_ $PM_{2.5}$<br>o AIR_Ex1_$O_3$<br>o AIR_Ex1_$NO_2$<br>o AIR_Ex1_$SO_2$<br>•AIR_A1 |
| Housing and Health | • Proportion of households living in crowded housing conditions<br>• Percentage of the population living in housing suffering from dampness/mould growth.<br>• Percentage of the population living in housing with missing hygienic amenities.<br>• Incidences and perception of theft, robbery and vandalism in dwellings and public spaces.<br>• The sum of excess deaths during periods of exposure to extremely high or low temperatures | •HOUS_Ex1<br>•HOUS_Ex3<br>•HOUS_Ex4<br>•HOUS_Ex6<br>•HOUS_E1 |
| Noise and Health | • Population exposed to various noise levels (Lden and Lnight) by different sources<br>• National regulations on maximum sound levels for indoor and outdoor leisure events | •NOISE_Ex1#<br>•NOISE_A1 |
| Traffic Accidents | • Mortality rate due to transport accidents<br>• Injury rate due to transport accidents | •TRAF_E1<br>•TRAF_E3 |
| Water and Sanitation | • Proportion of population with continuous access to adequate amount of safe drinking water in the home | •WATSAN_Ex1 |
| Chemical Emergencies | • Regulatory requirements for land-use planning<br>• Presence of an active, cumulative register of chemical incidents with national coverage<br>• Composite index of government preparedness for chemical incidents | •CHEM_A1<br>•CHEM_A2<br>•CHEM_A3 |
| Radiation | • Incidence of malignant melanoma<br>• Existence of effective environmental monitoring of radioactivity in compliance with quality assurance program | •RAD_E1<br>•RAD_A1 |

In addition, the following indicators dealing with **Driving Force, Pressure, and Status** in the framework of DPSEEA were selected as highly relevant to the EH policies, and readily available from international data sources (Table 2). These indicators were considered to add no more reporting burdens to the Member States.

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* Indicator codes in this report were assigned for the reference in the pilot study of ECOEHIS. Each indicator should be assigned a new permanent code at the stage of implementation for unique identification.

# Because some Member States will not have data representing the national level until 2007, a gradual adoption was recommended for these indicators until 2007.

*Table 2 . Indicators related to Driving Force/Pressure/Status recommended for the ECHI list*

| Topic area | Recommended indicator | Indicators code |
|---|---|---|
| Air | • Passenger-transport demand by mode of transport<br>• Freight-transport demand<br>• Road transport fuel consumption<br>• Air pollution emissions | • AIR_D1 (=TRAF_D1)<br>• AIR_D2<br>• AIR_D3<br>• AIR_P1 |
| Housing and Health | • Percentage of the population facing financial problems with the housing expenditures | • HOUS_P1 |
| Traffic Accidents | • Passenger-transport demand by mode of transport<br>• Age of vehicle fleet<br>• Road accident rate | • TRAF_D1 (=AIR_D1)<br>• TRAF_S1<br>• TRAF_S2 |
| Water and Sanitation | • Wastewater treatment<br>• Recreational water compliance<br>• Drinking water compliance | • WATSAN_P1<br>• WATSAN_S1<br>• WATSAN_S2 |
| Chemical Emergencies | • Industrial facilities under EU Seveso II Directive | • CHEM_P1 |

## II. Indicators recommended for WHO project including ENHIS

These are indicators relevant to EH policies, but require more efforts in data collection, computation, or interpretation. They are not feasible for immediate implementation in the EC, but are recommended for WHO project such as ENHIS. All indicators in this category were dealing with Exposure/Effects/Action in the framework of DPSEEA (Table 3).

*Table 3 . Indicators related to Exposure/Effects/Action recommended for WHO project*

| Topic area | Recommended indicator | Indicator code |
|---|---|---|
| Air | • Years of expected life lost due to Particulate Matter exposure | • AIR_E1 |
| Housing and Health | • Indoor radon in dwellings<br>• Housing safety and accidents | • HOUS_Ex5<br>• HOUS_E2 |
| Noise and Health | • Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure | • NOISE_E1 |
| Traffic Accidents | • Potential Years of Life Lost due to transport accidents | • TRAF_E2 |
| Water and Sanitation | • Management of bathing waters | • WATSAN_A1 |

## III. Indicators recommended for further elaboration

These indicators are desirable, but they are not ready yet for implementation. Except for an indicator on exceeding of speed limit (TRAF_S3), all indicators in this category were dealing with Exposure/Effects/Action in the framework of DPSEEA (Table 4).

*Table 4. Indicators related to Exposure/Effects/Action recommended for further elaboration*

| Topic area | Recommended indicator | Indicator code |
|---|---|---|
| Housing and Health | • Accessibility of disabled and elderly to the dwellings | • HOUS_Ex2 |
| Noise and Health | • Self reported noise health effects - Annoyance and sleep disturbance | • NOISE_E2 |
| Trafic Accidents | • Person time spent on the road<br>• Use of vehicle safety device<br>• DALY lost due to road traffic accidents<br>• Mortality due to drinking driving | • TRAF_Ex1<br>• TRAF_Ex2<br>• TRAF_E4<br>• TRAF_E5 |
| Water and Sanitation | • Outbreak of water-borne diseases<br>• Water safety plans | • WATSAN_E1<br>• WATSAN_A2 |

## Capacity Building in Member States

The process of ECOEHIS project had various positive impacts on national capacity building to establish a pan-European EHIS. By participating in the project as country representatives, establishing national networks of experts and stakeholders, and collecting metadata and data for the pilot study, the national focal points and project teams set off the capacity building in their countries for the implementation of EHIS. In their national reports, the participating Member States reported very positive experiences of collaboration in this project (See Annex 11 for national reports). For example, France reported that the ECOEHIS project gave national organizations the opportunity to exchange information and optimize national response to monitoring issues for Europe, activating a synergistic interaction between European countries and national experts for implementation of a harmonized European monitoring system. Italy reported that the technical reports by ECOEHIS project team would promote a regular environment and health reporting of identified national information needs linked to European network. In the Netherlands, a steering committee was created as an advisory body for the pilot study, which includes representatives of the ministries of environment, health, transport, as well as local health authorities, environment agencies and NGOs. It was pointed out that this steering committee, if permanently running, would ensure progress towards the establishment of the national EHIS. Other countries testified similarly positive progress in their countries, confirming that the implementation of the ECOEHIS project contributed to the capacity building in the Member States for future implementation of pan-European EHIS as endorsed by the Budapest Declaration of 2004.

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# Annex 1
# List of Personnel

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

# Annex 1: List of Personnel

## National Teams for ECOEHIS Project

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*****Detailed acknowledgements can be found in the national reports (See Annex 11)***

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Instituto Nacional de Saúde

Filomena Boavida and Margarida Marcelino
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SPAIN

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| Administration Assistant: | Andrea Rhein, Elizabeth McCall |

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# Annex 2
# List of Subject Area Experts

## DEVELOPMENT
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# Annex 3
# Report on the Berlin Meeting
# May 2003

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

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# DEVELOPMENT OF ENVIRONMENT AND HEALTH INDICATORS FOR EUROPEAN UNION COUNTRIES

## REPORT ON WHO-WORKING GROUP BERLIN, GERMANY 14 – 16 MAY 2003

# Development of Environment and Health Indicators for European Union Countries

## Report on WHO-Working Group

## Berlin, Germany
## 14-16 May 2003

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
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# ABSTRACT

The WHO - European Centre for Environment and Health is implementing a project to establish an environmental health (EH) indicator system. The system is designed to serve public health monitoring and environmental policies in Member States as well as to support multinational analyses. The methodology developed by the WHO project provides the basis for a set of core environment and health indicators for European Union (EU) countries as part of the European Community health monitoring system. An important characteristic of the proposed set is its consistency with the existing body of legislation and regulations at EU level. This Working Group was convened in the framework of the European Commission-sponsored WHO project "Development of Environment and Health Indicators for the EU countries" (ECOEHIS) to evaluate the EH indicators proposed by WHO vis-à-vis the relevant EC body of legislation. The Working Group identified a set of environment and health indicators adequate for EH monitoring in the EU, agreed on the system adjustments necessary for its harmonization with the requirements of the legislation and recommended indicators that need further methodological developments. The ECOEHIS project network was established to effectively steer the process through coordinating country activities, assuring broad discussion by the relevant stakeholders on the proposed environment and health indicators, testing for feasibility and reaching agreement on a set of 'core' indicators through consensus. The group decided on follow-up actions to further reinforce the efforts towards the establishment of European Community health information system in order to facilitate planning, monitoring and evaluation of the relevant policies.

**Keywords**

ENVIRONMENTAL HEALTH
HEALTH STATUS INDICATORS
ENVIRONMENTAL MONITORING - methods
EUROPEAN UNION

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# INTRODUCTION

The WHO - European Centre for Environment and Health in collaboration with several Member States (MS) is developing and testing a pan-European Environmental Health (EH) indicator system. There is a need for a harmonised information base to evaluate and monitor public health and environmental policies. The system includes all main environmental issues that are relevant to health and on which information is useful for policy-making across Europe. The EH indicators are designed to aid monitoring public health and environmental policies in Member States as well as supporting multinational analyses. Through their built-in system of international comparisons the EH indicators enable the effects of national efforts to be compared with the situation in other participating countries. This facilitates policy evaluation and planning (see report: "Environmental health indicators for the WHO European Region. Update of methodology, May 2002"[1]). The indicators will form a substantial component of the Environmental Health Information System currently in preparation for endorsement at the Fourth Ministerial Conference on Environment and Health, Budapest, 2004 for implementation across Europe.

The methodology developed by the WHO project on EH indicators provides the basis for establishing a set of core environment and health indicators for EU countries to become a part of the European Community health monitoring system. An important characteristic of the proposed set is its consistency with the existing body of legislation and regulations at EU level.

In the framework of the EC-sponsored WHO project "Development of Environment and Health Indicators for EU countries" (ECOEHIS) WHO/ECEH convened this meeting in Berlin, from 14-16 May 2003. The WHO Collaborating Centre on air quality management and control in UBA (UmweltBundesAmt - the Federal Environmental Agency) hosted the meeting and the German Ministry for the Environment provided some support with a small grant. The purpose of the meeting was to review the applicability of the WHO EH Indicator core set to support policies and actions on health protection and risk prevention in the EU. The indicators were 'screened' vis-à-vis the existing EC body of legislation relevant to the scope of the EH indicator system. A document summarizing the relevant EC legislation and crosscheck of the core EH indicator set was prepared in advance of the meeting to provide a background for discussion. The participants of the meeting included representatives of the ECOEHIS partners as well as invited experts focusing on selected issues covered by the indicators system (see list of participants in Annex 3). Dr Brigit Staatsen chaired the meeting and D. Ormandy acted as a co-chair. Kathy Pond was the rapporteur of the meeting.

## Objectives of the Meeting

- To identify the set of environment and health indicators adequate for policy-oriented monitoring in the EU

- To agree on the adjustments of the WHO EH indicator system necessary for its harmonisation with the EC legislation and

- To recommend indicators/ priority issues that need further methodological development

[1] http://www.euro.who.int/EHindicators/Methodology/20030527_2

The meeting established a 'control system' of the project, steering the development and testing the indicators for feasibility as well as assuring and providing feedback on the process from the relevant stakeholders in the participating countries.

## Project Implementation

The main objective of the ECOEHIS project was to develop indicators on environmental health to become part of the European Community Health Indicators (ECHI). These would serve as tools to:

- Measure the health impact of selected environmental risk factors, their determinants and trends therein throughout the Community
- Facilitate planning, monitoring and evaluation of Community programmes and actions
- Provide Member States and international organisations with information to make comparisons and evaluate their policies

Based on testing of the feasibility and usefulness and after approval by the EU Member States the indicators would be delivered according to the evidence, data and methodological limitations, in one of three categories:

1) ready and recommended for implementation
2) ready, but not feasible for immediate implementation, or
3) desirable though requiring further developmental work.

In addition, the project will provide input to the ECHI process of selecting core set of indicators.

The scope was set in Annex II of the decision N°1400/97/EC of the European Parliament and the Council, to adopt a programme of Community action on health monitoring within the framework for action in the field of public health i.e. to cover:

C3. Housing conditions;
C4. Home and leisure activities (the subset "accidents at home")
C5. Transport: Road accidents
C6. External environment: air pollution, water pollution, radiation, and other types of pollution, including noise but excluding food safety

A network of national focal points was created to coordinate and assure a broad discussion of the proposed environment and health indicators system, testing for feasibility and agreement on a set of 'core' indicators through consensus. The national focal points were officially nominated by the participating eleven Member States.

The ECOEHIS built on the WHO EH indicators project. The methodology has been developed through intensive discussion at WHO technical meetings and consultation with participating Member States, tested for feasibility and usefulness in a national context and accepted through a broad multinational consensus (see overview at
http://www.euro.who.int/EHindicators/Methodology/20030528_1 ).
The WHO project identified housing, noise and transport safety indicators as being in need of further developmental work. Relevant activities are included in the ECOEHIS. The WHO/Europe housing and noise programme is responsible for development of the indicators on housing and noise, and the Public Health Agency of the Lazio Region, Italy is responsible for transport safety indicators.

As regards the compatibility of the WHO EH indicators with EC legislation, the following approach was used. The EH indicators proposed by WHO were used to identify the relevant EC legislation and then to crosscheck the reporting obligations of the legislation vs. the indicators. The obligations provided information about the mechanisms of reporting of the environmental data and also the relevant policy measures put in place by Member States to enact and comply with the EU legislation. They also provided a closer look at the mechanisms and measures precluded in the legislation to evaluate the policy effects and effectiveness. Possible future developments of the relevant legislation e.g. planned modifications were also included in the review. A document summarizing the results of the crosscheck for each EH indicator was prepared by a consultant in advance of the meeting to provide a background for discussion. Summary of the document is given in Annex 1.

The background document together with a few questions to be discussed with the relevant national agencies was distributed in advance to the national focal points. General feedback was requested on:

- an overall evaluation of the 'compatibility' of the EH indicator with the existing national legislation,
- applicability of the indicator for monitoring the implementation of environmental measures/ policies and providing information on related population health impacts,
- the most relevant health- environment policy questions and public concerns in the country given the scope of the project.

# Summary of the Meeting Discussion

Discussion centred on the following issues:

a. Feedback from the Member States on the WHO EH indicators: compatibility with legislation, relevance, methodological issues
b. Identifying new issues/ indicators and ongoing ECOEHIS project developments
c. Identification of a set of EH indicators adequate for policy-oriented monitoring in EU

Discussions on a) and b) were carried out in plenary. Small working groups were used for discussions on the set of EH indicators for the EU countries and identification of the concrete system adjustments and to some extent - for the indicators/ issues in need of further methodological developments. Further plenary discussions included progress reports and exchange of experiences from the working groups as well as final discussions on the identified EH indicators.

Three **Working Groups** were identified – based on experiences of workgroup members and interrelations of the environmental health issues:

| | |
|---|---|
| **Working Group I:** | Health and air quality, noise and road accidents indicators |
| **Working Group II:** | Health – drinking and recreational water; and chemicals indicators |
| **Working Group III:** | Housing – health including radiation indicators |

Chairperson and rapporteur were identified for each group:

- **Group I** Chair: Hans-Guido Mücke; Rapporteur: Lis Keiding
- **Group II** Chair: Åsa Ahlgren; Rapporteur: Luciana Sinisi
- **Group III** Chair: David Ormandy; Rapporteur: Øystein Solevåg

## Feedback from the Member States on EH indicators applicability and feasibility

All national focal points had engaged in useful discussion in the partner countries involving many stakeholders. They reported extensive country feedback covering the following aspects:

- Compatibility of the WHO EH indicator system with national legislation;

- Policy context and relevance of the indicator system and important EH issues of concern at national level
- Problems and needs related to the EH indicator methodology
- Data collection, information-flow systems and institutional infrastructure

Participating experts from the United Kingdom provided feedback from the country on the EH indicators in the topic areas of housing and water. Some specific comments concerning particular indicators were received from Austria, Denmark and Sweden that were taken up in the working group discussions to shape recommendations on adjustments.

Italy, Spain and Netherlands had undergone a **crosscheck of the WHO indicator system with national legislation** by verifying at first the transposition of EU directives into national legislation, and then determining if additional indicator-specific legislation existed at national level. Many of the Directives pertaining to the indicators had been transposed or were pending transposition into Spanish legislation. With respect to the indicators where EU legislation was already in force, the indicator was also considered compatible with the Spanish legislation. Where the transposition of the legislation was pending, it is considered that the indicators would also be compatible once the legislation was in force. Concern was expressed where EU legislation did not exist, as it was considered that Spanish environmental health legislation is mainly driven by EU legislation.

In The Netherlands compliance with EC legislation was generally good except for health status indicators. Data collection and reporting focused on air pollution, living environments and transport. In Italy the compatibility of WHO EH indicators with the legislation was fairly good. Data collection and reporting on health and environment were shared among different subjects (health, statistical and environmental institutions) belonging to the National Statistical information network SISTAN. Specific laws defined reporting obligations (e.g. environmental monitoring, waste flows and policy, mortality data) as well as rules for data collection networks.

In general, country focal points reported that the WHO EH indicator system was considered **relevant and useful for national policies**. In Sweden, intensive discussion was currently underway to select indicators within the fifteen environmental quality objectives (see www.miljomal.nu ) in order to start testing in July 2003. The Swedish proposal for environmental health indicators for the workplace, along with the environmental quality objectives included several indicators of the WHO system in particular on noise and air pollution exposure.
Health was considered very important in Sweden and nationwide surveys were used to get public opinion on health aspects. Denmark also had a high interest in health and indicators should be used to communicate the environment and health aspects, both negative and positive, to the population. Air pollution, noise and housing are priority EH issues and the Danish Environmental Protection Agency considered the WHO system potentially useful to assess how well regulations are implemented including health measures and quantification of health effects. In addition, the WHO system could serve a guideline ‘catalogue of ideas’ for in-depth analysis in the countries.

Austria also considered the EH indicators to be useful as information tools to communicate relevant health concerns to the public. It was important to tackle the health effects related to transport in non-urban dwellers too and not to be restricted to the urban population only.

Finland, Netherlands and Belgium viewed the WHO indicators as useful for the evaluation and monitoring of National Environmental Health Action Plans (NEHAPs) and the system covered pretty well the same areas of interest. Despite the high standards achieved in Finland in e.g. water quality and radiation safety, indoor air pollution, accidents and disasters, societal aspects of the environment and identifying deteriorating issues remained a priority. The main goals of the national action programme in the Netherlands were a healthy and safe environment, a clean and attractive living environment, integrating environmental health into urban renewal plans, development and implementation of local health and environmental plans. Both the physical and perceived quality of the living environment as well as that of the dwelling including mould and dampness, evaluation of the limit-values of indoor climate were viewed as very important EH issues in the country.

In France, the health risks and pollution surveillance system (SS) used indicators, which were very similar to the WHO-proposed indicators and were based on networks at the level of main French cities. The National Institute for Health Surveillance (InVS) was in charge of ensuring effective system implementation as a basis for policy strategies to improve poor environmental quality policies and mitigate related health risks. EH Indicators set up the information needs to enable comparability and exchange of experience. Applying the WHO system based on the DPSEEA concept would certainly increase the policy relevance of the surveillance system though quantifying the causal links in respect to driving forces and pressures. It remained an open question whether they could be successfully incorporated into the surveillance of health impacts from air pollution.

Radon was considered important EH concern in almost all countries and indicators on exposure already existed in Sweden and France. Additional indicators might be necessary on detection and census of contamination with ionising radiation sites.

Several countries expressed the need for more information on health effects related to the environment, e.g. asthma and allergies but in many cases it was recognised that indicators are already included in the WHO EH indicator extended set. Existing instruments for collecting the data were largely not harmonised across Europe.

Concerning **methodological issues** more health indicators were necessary in addition to the core set e.g. number of hospital admissions for respiratory/cardiovascular disease (relevant for air and noise pollution areas) to enable health impact assessments to be undertaken in The Netherlands.

The group emphasized that the indicator system should provide more information on policy effectiveness. This could be expressed inter alia, as distance to target environmental quality or exposure, as spatial/ time trends in attributed fraction/exposed in relation to development measures and other relevant policies etc. Examples of best practice of actions being taken e.g. on accident prevention, allergy prevention, drinking water management collected and disseminated on a website could usefully contribute assessment of policy effectiveness.
Feedback on **methodology for concrete indicators:**

- In respect to air and noise, freight transport should be included in the driving forces (Austria).
- The WHO-proposed indicators on housing did not comply with the EC legislation and were not very useful for the United Kingdom with a lot of data already existing to enable better information and assessments.
- In general it was felt that the drinking water indicators were not particularly applicable to the EC in their current state. The main issue was the difference in approaches between the EC regulations and the WHO Guidelines. The revised WHO Guidelines will not propose limit values for microbiological parameters but instead will promote the development of water safety plans which will be verified by microbiological values.
- The recreational water indicators were applicable to the EC but currently did not take into account the new bathing water Directive proposals.

All participating countries reported that for the majority of the WHO EH indicators reliable and good quality **data collection systems** are already in place. At the same time there was a strong opinion that use of the indicators should be based on existing data collection with a few exception on indoor air quality and chemicals where survey and bio-monitoring were needed.

In Italy, environmental monitoring relied on the environmental information system, also connected to EIONET of EEA. National environmental indicators on different issues related to WHO EH indicators, like air quality, waste, water quality were regularly reported hence great problems in collection of the required data could not be expected except for chemicals and health indicators. A compact English edition of Italian environmental indicators was also available on the web: http://www.sinanet.apat.it/documentazione/annuario%202002/Annuario_Sintesi_Inglese.pdf .
There was a need to gather (and implement) the several referring institutions for issues such as housing.

In contrast to the overall feasibility, several countries indicated considerable **problems with data flows and institutional infrastructure of the information**. In France several organizations shared expertise on environmental health issues as well as responsibilities for the data sources (measurement of environmental conditions, morbidity data). These included the AFSSE, which was in charge of co-ordinating environmental health expertise but was not a data producer or centraliser and the InVS (National Institute for Health Surveillance) whose main mission was implementing surveillance of environmental health problems to support policy strategies.

In Belgium, the main difficulties were in collation and accessibility of data since the administrative power was divided between the federal state, free communities and free region. Environmental indicators mainly depended on regions whereas health indicators - on states. In Finland much data was collected but not collated centrally. Specific problems included data collection by a large number of agencies/authorities that were not centralised, and monitoring of environmental quality outside the health sphere etc.

Due to the strong federal structure of Germany, it was difficult to collect data from the states (Länder) and therefore essential to get a general agreement on data sources. Within ECOEHIS it is equally important to strengthen the collaboration with the European Environment Agency (EEA) in order to avoid duplication of work and also to make the best use of data collected through the EEA advanced information network in health-relevant assessments. It was pointed out that, where existent, the established reporting structures should be used and that the responsibilities for analysis and reporting should be clearly assigned. Moreover questions arose over which institution could provide the technical infrastructure of the database including its maintenance and regular update and how a regular analysis of the database could be ensured. These issues should be further taken up during indicator feasibility testing.
The experiences gained during the pilot testing of the WHO Environmental Health indicators in Germany had disclosed that the indicators were especially relevant in the areas of air pollution, noise and traffic, where the evidence of health impacts was widely accepted and appropriate epidemiological measures for health impact assessment existed. In contrast, the relations between health effects of housing conditions or long-term exposure to chemicals were less well understood. The main challenges are in identifying appropriate health outcomes and epidemiological measures as well as in harmonising the methods applied.
Concerning policy evaluation it was emphasized that policy evaluation would require additional information (e.g. cost-effectiveness analysis) in order to obtain meaningful statements about certain measures taken by the Member States. Health impact assessment could serve as one of the tools for policy evaluation. The proposed action indicators could also be useful in this context, on the presumption that a standardized assessment could be established.

In respect to housing, one of the main issues highlighted by the UK expert was that different definitions existed in different organizations collecting data related to housing issues and that there was very little co-operation or co-ordination between the institutions in the UK.

# Identifying new issues/ indicators and ongoing ECOEHIS project developments

The ongoing developmental work on indicators for noise and housing, and transport accidents was presented.

## *Noise*

At its last technical meeting in April 2003, the Working Group (WG) on noise agreed to consider the possibility of extending the indicator set to include assessment of cardio-vascular risk from noise pollution exposure. WHO was requested to coordinate the work on the estimates of the relative risk for cardio-vascular diseases related to noise exposure, and to provide guidelines for producing the indicator. WHO will coordinate the necessary work to review the evidence of existence of health-end points from sleep disturbance in view of the results of the latest studies.

It was desirable to have indicators to tackle other health end-points e.g. hearing impairment and effects of noise exposure on cognitive performance development in children, but this would require further developmental work. The WG proposed a highly aggregated composite noise index, which covered different noise and health aspects as well as actions to reduce and protect the population from noise exposure. Currently, preliminary testing was taking place in order to assess its significance and its representativeness. There was a need to collect success stories and good practices to be made available to MS as this was felt to be a powerful means for helping them to improve the noise conditions to which the population is exposed.
The usefulness of such a highly aggregated index was questioned by Austria and Denmark.

## *Housing*

The housing indicators were still in the early stages of development. The technical advisory group met from 4-6 June 2003 to discuss and further develop the indicators. The group identified the following housing-health issues which could potentially form the basis of indicators: CO & NOx; dampness & mould growth; excess winter deaths; excess high temperature; domestic water supply; housing hygiene and sanitation; housing accidents; crime & fear of crime and accessibility of housing.
Denmark, Sweden, France, Austria and the Netherlands raised concern that there was currently no indicator on radon. France pointed out that it may be difficult but it was necessary to have driving force, pressure and policy framework indicators. Domestic accidents should not be limited only to children: further work is required on data quality and comparability, and data collection practices, relying on the European work planned by DGSANCO. It was agreed that this should be discussed in the housing technical meeting. A systematic approach is required to tackle the entire issue of indoor air quality incl. environmental tobacco smoke exposure. It needs to be established whether this is included in connection with the dwelling – it is fundamental therefore to define what is the 'house/dwelling'.

Participants raised the need to assess the effectiveness of EH control actions such as building regulations. Building regulations solved problems in new houses but it is important to look more widely than these regulations in each country. It was suggested that regulations should be looked at in terms of individual problems within countries.

## *Road accidents*

The sub-project on road accidents had been running since February 2003 and aimed to develop a set of indicators. This formed part of the WHO EHI project to measure the phenomenon of road accidents, their determinants and their consequences on health thus facilitating an analysis of the sensitivity of specific indicators to preventive or legislative measures. This far, the relevant legislation and regulations on road traffic safety had been identified, and the indicators selected by applying the DPSEEA model to road accident /injuries cause-effect chain were being adapted and made more specific to road accidents and safety. In this respect, there was a need to collect case studies on road accidents and the potential effects of EC regulations such as driving licences, safety etc. The group will further work with all the relevant international organizations on harmonization and common definitions of 'accidents' and 'injuries'. The final set of indicators will be produced by the end of 2003. The indicators will then be tested for feasibility in Member States, using the WHO methods.

It is important to include an indicator on land-use and urban planning but this also depends on the policy developments at the EU level. Access to green areas should also be included in these action indicators. It would be useful to estimate global processes e.g. effects on transport in relation to EU enlargement using the indicators.

### *Chemicals*

Chemicals are a priority issue in need of an integrated indicator-based system for policy-oriented monitoring. Sweden for example had proposed within the non-toxic environment objective indicators on nickel allergies and bio-monitoring of cadmium. The Netherlands was considering bio-monitoring exposure to heavy metals and pesticides in the general population with a focus on children. The Danish Environmental Protection Agency stressed the need for more emphasis on collecting data on exposure to chemicals in everyday life rather than on accidents by cause, as is the current practice. Information that would allow an assessment of how well regulations are implemented including health measures and quantification of health effects is also necessary. Austria and Italy proposed to check the chemical indicators developed by Eurostat and EEA. At the same time it was recognised that 'consumption' and 'use' aspects provided rather limited information on health – environment risks, and a similar situation existed with the currently proposed indicators on waste.

The group concluded it would be difficult to provide a comprehensive information framework given the time frame of the project. For the time being it was proposed to include the 'regulatory' approach to tackle:

- the ability to identify fixed facilities qualifying as upper and lower tier establishments under the EU Directive 96/82/EC;
- the legal restrictions on land use planning in the safety zones, and
- the ability to maintain an active register of chemical incidents of national coverage and the government preparedness.

In the long term, monitoring of selected chemicals in the environmental media and specific measures to assess exposure in the population were recommended. "Tailor-made" monitoring should be guided by the chemical incidents register and should focus on food and water environmental media. For drinking water, monitoring of heavy metals and pesticides was strongly recommended. Specifically designed surveys are needed to assess human exposure to certain chemicals: the WHO-Euro survey on dioxins in the breast milk might serve a good example. The working groups needed to identify these and also to think about the framework for certain information.

## Identification of the EH indicators adequate for policy-oriented monitoring in EU

Four questions were generated to facilitate the evaluation of the indicators. They covered three interrelated arenas: public health relevance, usefulness for policy-making and applicability for policy evaluation and monitoring. The questions were:

Q1 – Are the proposed indicators useful for policy-making and environmental health monitoring in your country (are they related to priorities and actions in your country, are they of public health concern. Are they meaningful for the users)?

Q2 – Do we need additional indicators (if yes, please define)?

Q3 – Is national or EC legislation helpful in obtaining data for the proposed indicators?
If not: what needs to be done in terms of the project (e.g. redefining indicators)?

Q4 – Are the data available for the proposed indicators? (in a general sense, this will be formally assessed in the feasibility study, including criteria for assessing data quality).

The main points of discussion held in the small working group and in plenary, and the answers to the questions are given below. An overview of the evaluation results on the four questions is given in Annex 2.

## *Air quality, transport, noise indicators*

### *Passenger-transport demands and modal split (Air_D1)*

The indicator should be coded Traf_D1 as it is not an indicator related exclusively to air pollution and should be supplemented with a Traf_D2 to include also freight transport demands. The usefulness to include transit transport was emphasized since the associated pollution and noise is of public health relevance and some countries have a significant burden of transit transport. It was mentioned that aircraft transport might need an indicator too (starts and landings, transport of persons and of freight by aircraft).

### *Road transport fuel consumption (Air_D2)*

This could not be considered as an air indicator, as the kind and amount of pollution from fuel burnt depends on the technique used etc. so it was proposed to call it **Traf_D3**. Consumption of fuel is related to climate change, so – if climate change indicators are to be considered (effect-related) – it should be used and might be supplemented by an indicator on $CO_2$ (pressure-related).

### *Air pollutant emissions (Air_P1)*

PM2.5 should be added, as small particles are very important in relation to health effects. The majority of the group did not agree with the aggregation of emission data, as it might be misleading and difficult to interpret. So reporting of each of the parameters in the scheme presented by the working group should be done separately. This meant six indicators (Air_P1-P6) instead of one but not more work. CO and lead were proposed too, but to restrict the number of indicators these parameters were not included.

### *Exposure to ambient air pollutants (Air_Ex1)*

As Black Smoke and TSP are being replaced by PM measures, it was proposed to drop BS and TSP from the indicator set, and to supplement it with PM2.5. It was found that exceedances of limit values were not necessarily the most relevant measure of health relevance. Long-term background-mean levels should be used instead. The calculation of the indicator was not easy to understand. There was a wish from part of the working group not to restrict the indicator to urban areas. WHO was requested to make sure that this indicator be revisited by the experts in order to improve the methodology towards more health-relevant and understandable information. When modelling is required there should be specification of the model to be used.
For the future it is worth considering having air pollution mapping in line with noise mapping, as the data for traffic as a source could be used for both.

### *Health outcome indicators (Air_E1, Air_E2, Air_E3)*

For these three indicators air pollution was regarded as being one of many risk factors, so these effects were only partly caused by air pollution. Therefore they provided important input data, but were not effect indicators. The working group found that indicators on total mortality rates were not very meaningful, as they could not be interpreted in relation to air pollution on their own. As to infant mortality rate due to respiratory diseases the question was whether there are sufficient studies to calculate the fraction attributable to air pollution, indoors as well as outdoors. Regarding mortality due to respiratory diseases and to diseases of the circulatory system there is a better possibility to estimate the fractions attributable to air pollution. As there is an overweight of excess mortality from these causes among the elderly, it is desirable to have an indicator showing this aspect, such as years of life lost or reduction in life expectancy due to air pollution.

For the future an indicator on odour annoyance may be relevant and/or on odour emissions (e.g. pigs per area).

The WG discussed whether action indicators on ambient air pollution are desirable and meaningful. Thus it could be relevant to follow policies made on combating ambient air pollution. On the other hand it is seldom possible to interpret declines in air pollution as caused by single interventions. The group recommended the development of a new ambient air indicator on air quality management policies and actions to be further explored. Regarding health, the amount of emissions is the important measure and emissions reduction could be due to many different factors. It was also discussed whether the proportion of the gross product allocated to air pollution research could be a relevant indicator.

### *Policies to reduce ETS exposure (Air_A1)*

It was proposed that this indicator on ETS be included under housing.

### *Mortality due to traffic accidents (Traf_E1)*

It should be remembered that environmental factors formed only part of the determinants for traffic accidents. Concerning the indicator calculation, it was proposed to restrict the denominator to residents only since it would be too difficult to include visitors. To enable inter-country comparisons the mortality statistics reported should be complemented by the definition of death due to traffic accidents used in the country. The wording ‘traffic accidents’ should be used consequently, as this is well defined. It was agreed that the mortality rates should be age- and gender-specific as there is, for example a remarkable rate of severe traffic accidents among young men. The years of life lost could be calculated. Also the mortality from traffic accidents should be divided into modes of traffic.

### *Injuries due to traffic accidents (Traf_E2)*

The working group considered it important to have an indicator on injuries and clarification of the definition of ‘injury’ was needed. One of the problems is that policemen make subjective decisions on what was included under traffic damages as ‘injuries’. There may also be cultural differences from one country to another on the threshold of involving police in traffic accidents and thus different thresholds of which injuries are registered as due to traffic accidents. There was a need for more complete data on accidents. As an example only a few European countries collect data on accidents without injuries.

There is ongoing work in the technical working group on traffic accidents so additional indicators will be proposed especially indicators on policy and also in relation to behavioural risk modifiers (e.g. cycle helmets, alcohol etc.). There could also be a need for indicators on exposure (time spent on roads, passenger x kilometre by mode of transport) too.

### *Noise annoyance and sleep disturbance (Noise_E1 and Noise_E2)*

Some refinement of the methodology was considered. An example was differentiation in the passenger-transport demand by cars as source of noise, to account for different type of roads (include something in

between highways and urban roads: regional roads?). Further work is ongoing in the technical working group on noise indicators with a number of additional indicators proposed that would be piloted for validity.
The title of Noise_E2 should be changed into ‘Self-reported sleep disturbance by noise’.

Data availability in some countries might be a problem as surveys are not obligatory according to regulations. Concerning harmonization of the survey protocols, the recently published ISO technical specification ISO/TS 15666:2003 provides specifications for socio-acoustic surveys and social surveys on noise annoyance at home. Noise annoyance could also be estimated from noise mapping which should be ready according to the EC directive on noise in 2007, using $L_{den}$ for annoyance and $L_{night}$ for sleep disturbance. From a health point of view it is recommended that WHO advised the Commission to drop the lower limit of 55 db(A) for the noise mapping as part of the population was being annoyed under this limit.
Accordingly, the methodology should be modified to incorporate the noise mapping approach.

### *Policies and noise abatement measures (Noise_A1)*

The technical working group on noise indicators was considering the development of a composite noise index as a modification of Noise_A1 to include also other aspects. Participants recommended that the indicator should not be restricted to urban areas only. They also expressed concerns about making complicated indexes that may be difficult to communicate to policy makers and the public and requested the technical group to test carefully all the pros and cons of using such highly aggregated index. On the other hand, if the number of indicators are restricted and gave the impression of being the result of many interacting factors a composite indicator might be useful.

## ***Water and sanitation – health indicators***

There was considerable discussion regarding the water quality indicators and the need to amend these to ensure compatibility with EC regulations. When the core indicators were developed they were aimed at implementation throughout the WHO region and it was therefore considered more appropriate to use WHO Guidelines as benchmarkers. The WHO Guidelines for Drinking Water Quality had recently been revised and the approach of monitoring microbiological quality of drinking water had been radically changed. The new approach did not set limit values, instead promoting the development of water safety plans to be verified by microbiological standards testing/audits, and independent surveillance to ensure that health based targets have been developed and met.

### *Waste water treatment coverage (WatSan_P1)*

The Austrian representative strongly recommended that the percentage of people connected to waste water treatment plants (WWT) should be expressed separately from people not connected to them and using other methods of disposal such as cesspits. The group also considered the possibility for a composite or alternative indicator that will take into account seasonal variations in population connected to WWT plant because of the extra pressure experienced in some places from tourism.

### *Exceedence of recreational water limit values for microbiological parameters (WatSan_S1)*

There was a need to refine the methodology related to the revision of Directive 76/160/EEC to include e.g.:

- the shift from simply monitoring a bathing water towards management of a designated water.
- the introduction of risk-based monitoring frequencies.
- the new intestinal enterococci and *Escherichia coli* parameters.
- a more robust compliance assessment mechanism.
- requirements for increased availability of environmental information to the public.

### *Exceedance drinking water guidelines for microbiological parameters (WatSan_S2)*

WHO Guidelines on Drinking Water Quality were not compatible with EC regulations. Reporting to the EU was being done based on limit values of the drinking water Directive, while under the revised WHO Guidelines there would be 'proportion of drinking water supplies compliant with water safety plans'. Accordingly, the indicator should be amended.

### *Exceedance drinking water guidelines for chemical parameters (WatSan_S3)*

Major changes in the new WHO GDWQ will relate to categorization: new categories will be naturally occurring; agricultural activities; industry and human settlements; water treatment and distribution systems; larvacides used in water for public health; and cyanobacteria.

In conclusion, if the focus of the project was to propose indicators which must comply with EC legislation for drinking and bathing water quality it might be best to change the indicators to 'Exceedance of EC limit values for microbiological parameters for recreational waters'; 'Exceedance of EC limit values for microbiological parameters for drinking water quality' and 'Exceedance of EC limit values for chemical parameters for drinking water quality'. However, it was agreed that the approach of WHO set out in the Guidelines for Drinking water Quality and Safe Recreational Water Quality must somehow be considered in these indicators.

### *Access to safe drinking water (WatSan_Ex1)*

Modification of the methodology is needed: to remove the term 'adequate amount of water' since it is not possible to define a minimum volume of water required for protection of health. The volume used is dependent on the level of service.

### *Access to adequate sanitation (WatSan_Ex2)*

It was decided that this should be included in the housing – health indicators.

## *Chemicals and health indicators*

All the indicators related to chemical emergencies as well as to waste and contaminated lands were discussed together with additional proposals received from Austria and Denmark. For example, it was suggested that measurement of the amount of regulated chemicals could be a useful indicator. Similarly, useful information could be obtained from the trade statistics on pesticides, classified as dangerous (according to the classification systems of the EU, US or FAO, and later on the 'Globally Harmonised System for Hazard Classification and Communication').

Some questions were raised on the relevance of the existing indicators for monitoring environmental health effects. In most cases, e.g. sites containing large amount of chemicals (Seveso II directive), or the number of contaminated land sites etc, provide only a very rough indication on the potential health risks and no indication on possible risk reduction/ prevention due to active intervention (e.g. sanitated sites).

Currently there is ongoing work on indicators for contaminated land sites within the EU Soil Policy (a monitoring Directive is planned for 2004).

Given the limited time frame of the ECOEHIS project it would be difficult to find appropriate solutions for indicators to address potential health risks related to chemicals and waste. Participants recommended limiting the scope of the indicators to regulatory aspects for chemical safety and retaining the following from the existing EH indicators:

- sites containing large amount of chemicals;
- the legal restrictions on land use planning in the safety zones;
- the ability to maintain an active register of chemical incidents of national coverage, and
- government preparedness.

## *Housing – health indicators*

Participants agreed on a more comprehensive framework to translate the evidence and knowledge on the many health – housing linkages in a meaningful and measurable way to facilitate effective monitoring of policies and evaluation of their effects on health. These should cover a wide range of hazards and potential hazards; e.g. radon, landslide, earthquakes, flooding, threats from industry, etc. The metrics will be expressed in number of dwellings exposed and mapping of the hazards (Land Use Indicator) should be considered for risk and health impact assessment purposes. Equally, indicators on policies put in place to handle the risks (in terms of e.g. 'checklists') would complement this information. The importance of including perception of the quality of housing as well as some positive aspects of it e.g. access to green areas was emphasized. The accessibility aspect could be extended to include access to schools, shops and local transport but this would depend on the definition of "housing" adopted. Participants requested the technical group on housing to work on a definition of housing to be applicable at inter-national and national scale and also to co-ordinate efforts with the traffic indicators group on the issue of accessibility. The meeting considered the following indicators for development:

- Dampness and Mould Growth – it was thought more appropriate for this to be termed 'moisture damage'
- Carbon Monoxide and Oxides of Nitrogen – consider data on gas and gas appliances
- Extremes of indoor air temperature
- Domestic water supply
- Housing hygiene and sanitation
- Housing safety and accidents
- Substandard housing – consider the possibility of providing a useful definition that would be applicable inter-nationally as well as nationally.
- Radon
- Environmental Tobacco Smoke – exposure in the home.
- Noise – from neighbours only (liase with technical group working on noise indicators).

# Follow-up actions

This first meeting of the project considered organizational and managerial aspects as well as planning and timing for the following steps in the process. Key points are outlined below.

The meeting set up a project network, to act as a project 'control system', steering the development of the indicators. Its 'core' consisted of the National Focal Points, whose active involvement is of crucial importance for the project and its relevance to the Member States. They were nominated by the Member States to advise on the indicator set (direction of development and final decision), coordination of national actions and feedback from national experts and stakeholders. The steering group should review the existing indicator set and new indicators to be proposed and would decide which indicators are relevant, and feasible. WHO was requested to inform officially the relevant institutions in the countries about the project, the national focal points and their tasks in order to facilitate the collaboration and active involvement of the various agencies.

Concerning the direction of the project, it was confirmed that Michal Krzyzanowski was the project coordinator, Dafina Dalbokova was the project manager, Xavier Bonnefoy was responsible for the work of the technical groups on housing and noise indicators and Piero Borgia – for the sub-project on road accidents. The group agreed that for better interaction with the technical groups on noise, traffic and housing indicators, all specific comments should go to the co-ordinators of the groups, keeping the project manager informed and receiving all comments about the project. Therefore, the technical groups co-ordinators would communicate their meeting results as soon as they are finalized so that the steering group could keep track and evaluate the ongoing developments. The EC requested that the chairperson of each of the technical groups invite a representative of the EC to the meetings in order to have some input into the development of the indicators.

The project is designed as an information service and should provide case studies/examples of good practice across the EC. Therefore it identifies what data already exists and what is required in the future – existing data may need to be computed in a different way but there should not be any new data collection. The next phase of the project is **feasibility testing** – identifying and contacting data providers. The national focal points network will coordinate the activities in the Member States: experience from the WHO project has shown that with good organization and using effective protocol and questionnaires the feasibility testing could be conducted with no substantial additional workload. WHO EH indicators project had developed the questionnaires, in addition limited funding is available for the technical work.

However, the indicators had to be fully defined before this process. For this purpose WHO, together with the different technical programmes e.g. on air quality, water and sanitation etc, and in collaboration with the experts in the Member States will refine the methodology based on the indicator adjustments agreed by the meeting. It was recommended that a section in the methodology sheets be included, describing the reasons for eventual redefinition. The technical groups on noise, housing, transport indicators would be sent the suggestions on additional indicators as quickly as possible to enable them to follow-up with the necessary methodological work.
Concerning the chemicals issue the meeting agreed that national focal points should discuss and report back to WHO if there is a need for new indicators.
All the documents for the next meeting e.g. indicator methodological proposals will be distributed well in advance in order to provide the national focal points enough time for feedback with national institutions/ministries and local EEA focal points.

The **next meeting** of the steering group will take place at the end of January 2004 in Luxembourg.

To improve communication a web-discussion forum for the project will be established e.g. using the CIRCA or the WHO/Europe web. The project manager will circulate earlier documents of relevance to the further development of EH-indicators and information system (e.g. questionnaire for the feasibility studies, national reports on the feasibility and usefulness of the core indicator set, reports from working groups etc).

The meeting was also informed that, to progress with the implementation of the system, WHO, in partnership with institutions in 12 countries, had submitted a proposal to DG SANCO within the framework of the new European Community programme for action in the field of public health for a comprehensive system of environmental health information. Main tasks include further work on the indicator set, data-collection and data warehouse-development, harmonisation of instruments (e.g. surveys in collaboration with EUROSTAT), guidelines/case studies of health impact assessment and cost-benefit analysis, indicator-base policy-analyses and reporting.

In parallel to the on-going technical work, a political process has started to prepare the ground for endorsement at the upcoming Fourth Ministerial Conference on Environment and Health, Budapest, 2004, of the common information system on environmental health across Europe, which builds on the elements proposed and being tested in several WHO Member States. The steering group was invited to provide input to the preparatory political process – intergovernmental meetings involving the broadest possible representation of national decision-makers and experts, nominated by the Member States. The group was requested in parallel to participate fully in the technical work on the system needed for demonstration of its feasibility and the "value added" of its products, to facilitate internal discussion on it in the countries. The level of country involvement, expressed in the Budapest Declaration, will determine if and when the System would be established in the service of European public health.

# CONCLUSIONS AND RECOMMENDATIONS

➢ Participants reported feedback on the usefulness and compatibility of the WHO-proposed EH indicator system with existing national legislation and policies. They concluded that the system is relevant and useful for national policies. The participants agreed to further advance the process of indicator system refinement and to propose indicators to support policy-oriented public health reporting for national and European Community-wide implementation.

➢ The meeting agreed on a set of indicators that would enable the collection of data on health impact assessment while complying with EC legislation to aid health impact reporting. The experts identified adjustments, necessary for harmonization with the requirements of the legislation as well as indicators that needed further methodological developments. They requested WHO to coordinate the refinements of the methodology involving the experts in the Member States and the technical groups – to adjust and develop topic-specific EH indicators on road accidents, housing and noise. Participants recommended that the work be implemented and coordinated in a way, which enabled the best involvement of the Member States and their timely feedback on the process.

➢ The ECOEHIS project network was being established to provide mechanisms for the effective implementation of the project and its relevance to the MS. The involvement of the national focal points network was of crucial importance to the project in coordinating country activities related to the discussion of the proposed environment and health indicators with the relevant stakeholders, and testing for feasibility and agreement on a set of 'core' indicators through consensus. The project management was requested to provide the national focal points with the Terms of Reference, the overall project plan and time-schedule to enable them to organize the work.

➢ The next stage of the implementation is a feasibility study. The ECOEHIS meeting is to be held in Luxembourg, end January 2004 to agree on the refined EH indicator set and the protocol for testing the feasibility. WHO will officially inform the relevant institutions in the countries about the project and the national focal point tasks in order to facilitate the collaboration of the various agencies.

➢ The steering group recommended the establishment of a web discussion forum to improve communication and coordination using the CIRCA platform or WHO Euro web. This website will provide the group with access and possibilities to comment on working documents and information of relevance for the further development of EH-indicators and information system coordinator (e.g. questionnaire for the feasibility studies, national reports on the feasibility study and usefulness of the indicator set by participating in the WHO project countries).

➢ Participants noted that more efforts were needed to improve interagency cooperation and sharing of information. They recommended that WHO further strengthen the collaboration with the relevant agencies e.g. EEA and EUROSTAT to streamline current activities on policy-oriented reporting and assessments in the EU.

# ANNEX 1: SUMMARY OF THE BACKGROUND DOCUMENT AND COMPATIBILITY REVIEW

## INTRODUCTION

The WHO European Centre for Environment and Health is developing a system of indicators to support the monitoring of public health and environmental policies. When established the system will provide the Member States with appropriate information to make comparisons and support their national policies. It will also allow tracking of the progress in environment and health across Europe, and contribute to the broader objective of reporting on sustainable development. The latest proposal for WHO EH Indicators was published in May 2002.

The objective of this report is to crosscheck the applicability of the proposed WHO EH Indicators in the context of the EC body of legislation and where relevant propose necessary adjustments.

The author of the report is Øystein Peder Solevåg of Bergfald & Co as, an environmental consulting company based in Norway. The author takes sole responsibility of the content of this report.

## OVERVIEW OF EC LEGISLATION AND ORGANIZATION

### EC LEGISLATION

EC legislation consists of several levels, which are relevant to environmental health, especially:

- The Treaty on European Union
- The Treaty Establishing the European Atomic Energy Community.
- The directives and other legislative regulations regarding environmental health issues.
- The directives and other legislative regulations regarding EC statistics.

EC legislation is available on the web, in the Eur-Lex application : http://europa.eu.int/eur-lex/en/index.html.

It must be underlined that EC legislation is developing rapidly. This report only contains a "snap-shot" of EC legislation during the winter of 2003.

### RELEVANT EC INSTITUTIONS

The structure of the European Union is well known, with the Parliament, Council and Commission. A part of the Commission, **Eurostat – the Statistical Office of the European Communities** is developed as the Commission department responsible for carrying out the tasks devolving on the Commission as regards the production of Community statistics. Eurostat's web page is available at http://europa.eu.int/comm/eurostat/

**EEA – the European Environment Agency** has as its main task to provide policy relevant environmental information for the Commission, Parliament, Member States and the population. As environmental health issues are being integrated into EC environmental policy, EEA is also providing more information on this subject. EEA's web page is found at http://www.eea.eu.int/.

**EFSA – the European Food Safety Authority** is being set up as the coordinating unit for food safety and food safety monitoring in the EU.

In addition several other institutions have tasks within environmental health. These are mentioned under the relevant indicator sections.

# METHODOLOGY

Starting out from the proposed WHO EH indicators, relevant EC legislation has been identified. Where possible, the legal basis of existing statistical presentations regarding the indicators published by Eurostat or EEA has been explored. The next step has been to identify proposed changes to the existing legislation.

Based on this an overview of the different indicators and their compatibility with EC legislation has been presented, and possible modifications proposed. In addition, there are some suggestions as to indicators to be included.

It is outside the scope of this report to consider the wider policy relevance of each indicator. In some cases, however, the author has highlighted this aspect.

FORMAT OF RESULTS PRESENTATION

The proposed core indicators and their compatibility are presented in the same order as in the WHO report of May 2002. Each indicator is presented with the same sub-headings including:

- Explanation to the indicator: taken from the WHO report of May 2002.
- Relation to the EC legislation: the name of the relevant EC legislation, and in some cases also a short presentation of the legislation.
- Reporting obligations to the legislation: overview of the reporting obligations within the legislation mentioned above using the following typology:

| | |
|---|---|
| ***Legal transposition*** | Details on how Member States' national laws should be designed to enact EU legislation |
| ***Practical compliance*** | Data on exceedances of environmental standards, limit values, national derogations, interval of reporting, start of reporting etc. |
| ***Environmental data*** | Data on environmental pressures and state of the environment; |
| ***Descriptions of policy measures*** | Plans, programmes, instruments put in place by Member States to comply with EU legislation; |
| ***Policy effects and effectiveness*** | The effects of these measures and the extent to which they achieve their objectives. |

- Planned modifications in legislation: where applicable, a presentation of proposed EC legislation
- Need for modification in indicator: the compatibility between the proposed WHO EH Indicator and EC legislation is determined. In some cases proposals for changes in the proposed WHO EH Indicators as well as for new indicators are given.
- References: references to relevant EU legislation, and publications from EU.

# RESULTS OF THE CROSSCHECK

Summarized in the following table 1. The difference between the column "Not compliant to existing EC legislation" and the column "Outside the scope of EC legislation" could briefly be described like this:

- **Not compliant to existing EC legislation:** EC legislation covering the subject exists, but the proposed EH indicator is not in compliance with the legislation.
- **Outside the scope of EC legislation:** There is no EC legislation covering the scope of the proposed EH indicator.

In some cases, indicators are collected by other international organizations than EU, like WHO, OECD or UN ECE. It has been outside the scope of this report to investigate these reporting obligations further.

**Table 1: Summary results of the crosscheck for compatibility**

| Proposed EH Indicator | | Compliant to existing EC legislation | Not compliant to existing EC legislation | Outside the scope of EC legislation | Discussed separately |
|---|---|---|---|---|---|
| Air_D1* | Passenger transport demand by mode of transport | | X | | |
| Air_D2* | Road transport fuel consumption | ? | | | |
| Air_P1* | Emissions of air pollutants | X | | | |
| Air_Ex1* | Exposure to ambient air pollutants (urban) | | X | | |
| Air_E1* | Infant mortality due to respiratory diseases | | | X | |
| Air_E2* | Mortality due to respiratory diseases | | | X | |
| Air_E3* | Mortality due to diseases of the circulatory system | | | X | |
| Air_A1* | Policies to reduce environmental tobacco smoke exposure | ? | | | X |
| Hous_S1* | Living floor area per person | | | X | |
| Hous_Ex1* | Population living in substandard housing | | | X | |
| Hous_E1* | Mortality due to external causes in children under 5 years of age | | X | | |
| Hous_A1* | Scope and application of building regulations for housing | | X | | |
| Hous_A2* | Land use and urban planning regulations | | X | | X |
| Traf_E1* | Mortality from traffic accidents | X | | | |
| Traf_E2* | Rate of injuries by traffic accidents | X | | | |
| Noise_E1* | Population annoyance by certain sources of noise | X | | | |
| Noise_E2* | Sleep disturbance by noise | | X | | |
| Noise_A1* | Application of regulations, restrictions and noise abatement measures | X | | | |
| Waste_P1 | Hazardous waste generation | X | | | X |
| Waste_S1 | Contaminated land sites | | | X | X |
| Waste_A1 | Hazardous waste policies | X | | | |
| Rad_E1* | Incidence of skin cancer | | | X | |
| Rad_A2* | Effective environmental monitoring of radiation activity | X | | | |
| WatSan_P1* | Waste water treatment coverage | X | | | |
| WatSan_S1* | Exceedance of recreational water limit values for microbiological parameters | X | | | |
| WatSan_S2* | Exceedance of WHO drinking water guidelines for microbiological parameters | X | | | |
| WatSan_S3* | Exceedance of WHO drinking water guidelines for chemical parameters | | X | | |
| WatSan_Ex1* | Access to safe drinking water | | | X | |
| WatSan_Ex2* | Access to adequate sanitation | | | X | |
| WatSan_E1* | Outbreaks of water-borne diseases | | | X | |
| WatSan_E2* | Diarrhoea morbidity in children | | | X | |
| WatSan_A1* | Effective monitoring of recreational water | | X | | |
| Food_Ex1 | Monitoring chemical hazards in food: potential exposure | ? | | | X |
| Food_E1 | Outbreaks of food-borne illness | ? | | | X |
| Food_E2 | Incidence of food-borne illness | ? | | | X |

| Proposed EH Indicator | | Compliant to existing EC legislation | Not compliant to existing EC legislation | Outside the scope of EC legislation | Discussed separately |
|---|---|---|---|---|---|
| Food_A1 | General food safety policy | ? | | | X |
| Food_A2 | Effectiveness of food safety controls | | X | | X |
| Chem_P1* | Sites containing large quantities of chemicals | X | | | |
| Chem_E1* | Mortality from chemical incidents | ? | | | X |
| Chem_A1* | Regulatory requirements for land-use planning | X | | | |
| Chem_A2* | Chemical incidents register | ? | | | X |
| Chem_A3* | Poison centre service | | | X | |
| Chem_A4* | Medical treatment guidelines | | | X | |
| Chem_A5* | Government preparedness | X | | | |
| Work_E1 | Occupational fatality rate | X | | | |
| Work_E2 | Rates of injuries | X | | | |
| Work_E3 | Sickness absence rate | | | X | |
| Work_A1 | Statutory reports of occupational diseases | X | | | |

NOTE: * scope of the ECOEHIS project

## PROPOSAL FOR TOPICS TO BE FURTHER EXPLORED

ENVIRONMENTAL TOBACCO SMOKE (ETS)
EC legislation is now being developed on protection of the population against ETS. The task of developing policy relevant EH indicators on exposure as well as the effectiveness of policies European countries chose to implement in their fight against tobacco is an area where WHO and EU should work closely together.

LAND USE AND URBAN PLANNING
The specific regulations for building permits etc. are national legislation within EU. However, EC legislation on environmental impact assessments, both on a project level (EIA) and on a strategic level (SEA), has increasing impact in Member States. At the same time, WHO is working to integrate health issues into both EIA and SEA. The need to develop indicators to describe more closely the actual integration of health issues into impact assessments should be explored.

FOOD SAFETY
With the setting up of the European Food Safety Authority, the responsibility for the task of developing indicators to describe the actual development within EU Food Safety is clearly pointed out. This is an area where there are excellent opportunities for close cooperation between WHO and EU, as WHO is already closely involved in this subject, for instance through Codex alimentarius.

CHEMICALS AND HEALTH
EC legislation on chemicals is being revised at the moment. There is a development where the former product orientated strategy, e.g. classification of each chemical, and accident orientated strategy, e.g. the Seveso regulations, are being supplemented with a risk oriented strategy, where the impact of chemicals on the population and groups at risk, as well as on the environment, is becoming the focus. Thus, there is also a need to develop new, environmental health based indicators.

## ADDITIONAL PROPOSAL FOR SOCIAL COHESION INDICATORS

Eurostat collects indicators on Social Cohesion among Member States. These indicators should be considered for implementation in the Environmental health indicator system of WHO, as social factors are important to health, and not thoroughly covered in the core indicators.
INEQUALITY OF INCOME DISTRIBUTION

AT-RISK-OF-POVERTY-RATE
- Risk-of-poverty rate is defined as the share of persons with an equalised disposable income below the risk-of-poverty threshold, which is set at 60% of the national median equalised disposable income (after social transfers). This share is calculated before social transfers (original income including pensions but excluding all other social transfers) and after social transfers (total income).

AT-PERSISTENT-RISK-OF-POVERTY RATE
- Persistent-risk-of-poverty rate is defined as the share of persons with an equalised disposable income below the risk-of-poverty threshold in the current year and in at least two of the preceding three years. The threshold is set at 60% of the national median equalised disposable income.

REGIONAL COHESION Coefficient of variation of employment rates across regions

EARLY SCHOOL-LEAVERS NOT IN FURTHER EDUCATION OR TRAINING
- **Early school leavers** refers to persons aged 18 to 24 in the following two conditions: the highest level of education or training attained is ISCED 0, 1 or 2 and respondents declared not having received any education or training in the four weeks preceding the survey (numerator). The denominator consists in the

total population of the same age group, excluding no answers to the questions 'highest level of education or training attained' and 'participation to education and training'.

LONG-TERM UNEMPLOYMENT RATE

Unemployed persons are those aged at least 15 years not living in collective households who are without work within the next two weeks, are available to start work within the next two weeks and who are seeking work (have actively sought employment at some time during the previous four weeks or are not seeking a job because have already found a job to start later). The total active population (labour force) is the total number of the employed and unemployed population. The duration of unemployment is defined as the duration of a search for a job or as the length of the period since the last job was held (if this period is shorter than the duration of search for a job).

POPULATION IN JOBLESS HOUSEHOLDS

- Persons aged 0-60
- Persons aged 0-65

Population living in **jobless households** is calculated by dividing the number of persons aged 0-65 (and additionally 0-60) living in households where none is working out of the persons living in eligible households. Eligible households are all except those where everybody falls in one of these categories:

- aged less than 18 years old
- aged 18-24 in education and inactive
- aged 65 (60) and over and not working

More information on these indicators is available at
http://europa.eu.int/comm/eurostat/newcronos/info/notmeth/en/theme1/strind/socohe.htm.

# ANNEX 2: OVERVIEW OF THE WHO EH INDICATOR EVALUATION

Formulation of the questions:

**Q1 –** Are the proposed indicators useful for policy-making and environmental health monitoring in your country (is it related to priorities and actions in your country, is it of public health concern. Are they meaningful for the users)?

**Q2** – Do we need additional indicators (if yes, please define).

**Q3** – Is national or EC legislation helpful to obtain data for the proposed indicators?
If not: what needs to be done in terms of the project (eg, redefining indicators)?

**Q4** – Are the data available for the proposed indicators? (in a general sense, this will be formally assessed in the feasibility study, including criteria for assessing data quality).

The answers to the questions for individual indicators are summarized below:

| | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| **Air_D1** | Yes | Yes | | |
| | | Traf_D1 (passenger) | Yes | (Yes) |
| | | Traf_D2 (freight) | Yes | (Yes) |
| Under discussion: aircraft; trespassing traffic | | | | |
| **Air_D2** | Yes | Yes | | |
| | | Traf_D3 | Yes | Yes |
| | | Or | | |
| | | Clim | Yes | Yes |
| | | *If climate change indicators are considered (effect related); $CO_2$ indicator (pressure related)* | | |
| **Air_P1** | Yes | Yes | | |
| | | Air_P1 (SO2) | Yes | Yes |
| | | Air_P2 (NOx) | Yes | Yes |
| | | Air_P3 (NH3) | Yes | Yes |
| | | Air_P4 (NMVOC) | Yes | Yes |
| | | Air_P5 (Prim PM10) | Yes | Yes |
| | | Air_P6 (Prim PM2.5) NEW | Yes | Yes |

| | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| *General discussion on use of indexes needed.* | | | | |
| **AIR_Ex1** | No | Yes<br>***Back to experts!*** *Better indicator as to health relevance. Currently not understandable, new proposal should drop BS and TSP and add PM2.5, and consider not only urban people. For the future: air pollution mapping in line with noise mapping.* | | |
| **Air_E1** | No | | | |
| **Air_E2** | No | Yes | | |
| **Air_E3** | No | Yes | | |
| ***Note:*** *The three provide important input data, but are not effect indicators. New indicator specifically related to air pollution, Years Life Lost, reduction of life expectancy (AP attributable fraction). For the future: odour indicators.* | | | | |
| **Air_A1** | Yes<br>*Development of a new ambient air indicator. Action/policies on ETS move to WGIII (Housing).* | | | |
| **Traf_E1** | Yes | No<br>*Age and gender specific, divided into modes of traffic. Too difficult to include visitors, measure total residents only.* | Yes | Yes |
| **Traf_E2** | Yes | Yes<br>*Modifications of the indicator needed: better definition of injury. Collection of more complete data on accidents. Ongoing work of the working group on new indicators (D, P, Ex, A).* | | |
| **Noise_E1** | Yes | Yes<br>*Modification of methodology needed. Use Lden noise maps to estimate noise annoyance. Drop lower limit (Lden = 55)* | No | No |
| **Noise_E2** | Yes | Yes<br>*Additional indicators are needed – task of the technical group!* | No<br>*Surveys are not obligatory; need for harmonisation, some countries have no data. Use $L_{night}$ noise maps for estimate of sleep disturbance. Drop lower limit.* | No |
| **Noise_A1** | No<br>*Ongoing work on development of Noise Composite Index. Noise technical group to consider that indicators measure not only urban people; also the pros and cons of such composite indicators* | No | Yes | |
| **WatSan_P1** | Yes | Yes | Yes | Yes |

| | | Q2 | Q3 | Q4 | Q1 |
|---|---|---|---|---|---|
| | | *Need to be refined to distinguish clearly people connected to waste water treatment plants separately from people not connected to those and using the other ways of disposal* | | | |
| **WatSan_S1** | Yes | Yes<br>*Modification to reflect the EC Directive 76/160/EEC (revision in progress, proposal adopted October 2002: COM(2002)581)* | No | Yes | |
| **WatSan_S2** | Yes | Yes<br>*Rename the indicator: Exceedance according to EC Water Framework Directive EC 200/60/CE* | Yes | Yes | |
| **WatSan_S3** | Yes | Yes<br>*Rename the indicators as above; refinement to distinguish organics and inorganics* | Yes | Yes | |
| **WatSan_Ex1** | Yes | Yes | No | | |
| **WatSan_E1** | Yes | Yes<br>*Refinement according to revised notification system; include also Legionellosis* | Yes | Yes | |
| *NB: EU notification system has to be improved!* | | | | | |
| **Chem_P1** | Yes | Yes<br>*Rename: Industrial facilities registered under the SEVESO II Directive* | Yes | Yes | |
| **Chem_A1** | Yes | Yes | Yes | Yes | |
| **Chem_A2** | Yes | Yes | Yes | Yes | |
| **Chem_A5** | Yes | Yes<br>*Refinement to complement by frequency of exercises in handling accidents.* | Yes | Yes | |
| **Rad_E1** | Yes | Yes<br>*Check if data on one cancer (melanoma) sufficient to infer/extrapolate incidence of others.* | No | ?? | |
| **Rad_A2** | Yes | Yes | Yes | Yes | |

*Additional indicators to be considered by the Housing-Health Group*

**Radon** – Two types of Indicators – Exposure and Action; consider reporting requirements and surveys for exposure

**Dampness** –termed Moisture Damage.

**Access to Green Areas**

**Home Accidents** – Include accidents resulting in death separate data collected).

**Environmental Tobacco Smoke** – Exposure in the home.

**Noise** – From neighbours only (liase with Noise Group).

**NOX and CO**

# ANNEX 3: LIST OF PARTICIPANTS

| | |
|---|---|
| Ingeborg Fiala | Ministry of Agriculture, Forestry and Environment<br>1010 Vienna<br>Austria |
| Francis Sartor | Scientific Institute of Public Health<br>B-1050 Brussels<br>Belgium |
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| | |
|---|---|
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| Joao de Quinhones Levy | Instituto Superior Tecnico<br>Departamento de Engenharia Civil<br>1049-001 Lisboa<br>Portugal |
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| Manuel Posada de la Paz | CISATER - Instituto de Salud Carlos III<br>28029 Madrid<br>Spain |
| Luis Soldevilla Benito | CISATER - Instituto de Salud Carlos III<br>28029 Madrid<br>Spain |
| Åsa Ahlgren | The National Board of Health and Welfare<br>Socialstyrelsen<br>Stockholm<br>Sweden |
| David Ormandy | University of Warwick Law School<br>Coventry CV4 7AL<br>United Kingdom |
| Kathy Pond | Robens Centre for Public and Environmental Health<br>University of Surrey<br>GU2 5ZX Guildford Surrey<br>United Kingdom |

## Observer

Horst Kloppenburg

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## World Health Organization

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Xavier Bonnefoy, Noise and Housing
WHO European Centre for Environment and Health

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Michal Krzyzanowski, Air Quality and Health
WHO European Centre for Environment and Health, Bonn Office

Jürgen Schneider, Air Quality and Health Project Manager
WHO European Centre for Environment and Health, Bonn Office

**Meeting Secretariat**
Elizabeth McCall
WHO European Centre for Environment and Health, Bonn Office

WORLD HEALTH ORGANIZATION
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**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 4-1
# Minutes of WHO Meeting
# Lisbon, 4-6 June 2003

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

**World Health Organization Regional Office for Europe**
**European Centre for Environment and Health**
**Bonn Office**

# Housing and Health Indicators

# Minutes of the WHO Meeting

## 4 - 6 June 2003, Lisbon, Portugal

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for
Europe

**Abstract**

This document reports about the discussions and agreements of the first meeting on housing-health indicators in Lisbon, Portugal, from June 4 to 6 2003. The housing-health indicator set is a sub-set topic of the overall Environmental Health indicator set (EHI) developed by the WHO, co-sponsored by the European Commission DG SANCO (SPC 2002300). The meeting reviewed the existing housing and health relationships and proposed a tentative set of indicators to be developed and tested by countries.

These minutes were prepared for internal use of the working groups. A final report will be issued at a later stage of this project.

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## Scope and Purpose of the meeting

The WHO ECEH (Bonn) is developing a system of Environmental Health Indicators based on internationally agreed methodology and comparable data. These Indicators are intended to describe the state of environmental health and so inform decisions, monitor programmes and allow for comparisons nationally and internationally. It was decided that, as housing is complex issue, the development of a set Housing-Health Indicators should be investigated as a sub-project.

The aim of the Lisbon meeting was to discuss proposals for Housing-Health Indicators, and to identify and agree around 10 Indicators to be piloted over six months. From these, a set of around four core Housing-Health Indicators will be finalised and adopted. The finalised Indicators will be put forward within the set of Environmental Health Indicators to the Conference for Ministers of the Environment and Health in Budapest in 2004.

The meeting was convened as part of the WHO project *Development of Environment and Health Indicators for EU countries*, co-sponsored by the European Commission DG SANCO (SPC 2002300).

## Summary of the Meeting

The Director General of the Ministry of Health of Portugal welcomed the working group. Xavier Bonnefoy outlined the programme for the meeting and the objectives.

Dafina Dalbokova gave a review of the Environmental Health Indicators project, and the role of the Housing-Health Indicators within that project. Brigitte Moissonnier presented some of the findings from the analyses of data from the Housing and Health Survey carried out in Ferreira do Alentejo.

David Ormandy summarised the main points from the background paper on the Housing-Health Indicators project (circulated previously), including the proposals for consideration by the meeting. He also reminded the meeting that the prime objective of Indicators was to provide a tool for monitoring – measuring changes – not to set any form of standards.

Gert Gundersen gave a short resume of his paper discussing the implica-tions of Indicators in the applicant/transition countries. He also added some further considerations, including suggestions for an approach to defining "housing" as an alternative to the WHO definition. This proposed four main elements of housing –

a) Dwelling unit.
   This element to include –
   i) objective/technical data, such as number of rooms, floor area, facilities, structural quality, and quality of materials;
   ii) subjective/use data, such as temperature conditions.

b) Commonly owned/used parts of building.
   To include objective/technical data, such as form of ownership, parking facilities etc, and expenditure on maintenance and on utilities (gas, electricity etc).

c) Socio-economic.
   To include –
   i) social issues, such as household characteristics;
   ii) economic issues, such as amount and breakdown of household income;
   iii) cultural issues, including national identity.

d) Environment.
   To include –
   i) the general environment, such as air quality, noise etc;
   ii) the local environment, including traffic safety and noise, play and recreation facilities and space, and land use.

Maria João Freitas presented a paper on perception aspects of housing, including the immediate environment. The proposed issues which should be considered in the development of Indicators –

e) Spatial use and appropriation –
   i) time-space issues – mobility issues in residential areas, driving and walking; time involved in commuting and daily life activities, leisure, health services, work/education.
   ii) physical adequacy – spatial functions/use having regard to age, disabilities, family structures etc.
   iii) physical pleasure to use – streets, car parking, ratio of green to concrete etc

f) Perceptions –
   i) feeling safe, having regard to conditions (equipment, commuting, public lighting, etc), the use (litter, graffiti, fly-posters etc), and management (maintenance performance, accessibility, etc);
   ii) feeling "at home";
   iii) feeling independent (not constrained to choose and act);
   iv) feeling empowered (able to participate).

There followed a general discussion on Housing-Health Indicators and issues raised by the presentations.

It was explained that the Piloting of the proposed Indicators was to include checking the availability of data, and testing the viability and usefulness of the Indicators. It was agreed that WHO secretariat would prepare a short paper setting out the terms of reference for Piloting which could be copied and used by members of the Working Group when trying to involve others in their countries in the Piloting.

The Working Group divided into two sub-groups, one to consider primarily building/structure related Indicators, and the other primarily human / beha-viour related Indicators. Each sub-group discussed the viability and use-fulness of potential Indicators proposed in the background paper, and whether there were any other possible Indicators which should be investigated.

The two sub-groups reported back to the full Working Group. A total of fifteen potential Indicators were agreed for further developing and piloting. It was agreed that Fact Sheets would drafted for each of these, and named contacts would be responsible for co-ordinating the drafting (see Annex 2 attached).

There was a general discussion on aerosols, VOCs and environmental tobacco smoke. It was proposed that matters which could impact on health fall into one of the following three categories –

   v) those solely attributable to the design, construction and/or maintenance of the dwelling and related structures;
   vi) those solely attributable to the behaviour of the occupiers; and
   vii) those which are a combination of the two.

It was further proposed that Housing-Health Indicators should be limited to those matters which fell into (i) and (iii); and that matters in category (ii), while they may be important (such as environmental tobacco smoke and the non-essential use of aerosols), could not be controlled or affected by housing policies and programmes and so should not be included in the Housing-Health Indicator set.

It was acknowledged that it was unfortunate that there were no experts on housing finance present, and that this was a particularly important aspect which should be considered and investigated. Other issues which were felt needed further investigated included Homelessness, Access to Housing (in terms of allocation and affordability) and Sub-Standard Housing.

The timetable for the project and for the piloting stage of the preliminary Indicators was suggested and agreed.

# Annex 1: Participant list

Christian Cochet
Centre Scientifique et Technique du Bâtiment
France

Maria João Freitas
Labortório Nacional de Engenharia Civil
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Rossana Giacomoni
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ECE Housing and Urban Management Advisory Network
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University of Lund
Sweden

Didier Louis
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Dafina Dalbokova
WHO ECEH Bonn Office
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Brigitte Moissonier
WHO ECEH Bonn Office
Germany

## Annex 2: Indicator methodology development

**WHO Project on Housing-Health Indicators**
**04-06 June 2003 – Lisbon, Portugal**

Methodology sheets are to be drafted for the following proposed Housing-Health Indicators, and the named person(s) is to be responsible for co-ordinating the drafting. The methodology for each Indicator to be completed and submitted to WHO ECEH by 30th June 2003.

| Proposed Indicator | Co-ordinator(s) |
|---|---|
| Child Development<br>(Relationship between child education development/ achievements and housing conditions) | Irene van Kamp<br>irene.van.kamp@rivm.nl |
| Dampness and Mould Growth etc<br>(Common definitions necessary) | Simon Nicol<br>nicols@bre.co.uk |
| Carbon Monoxide and Oxides of Nitrogen<br>(Should also investigate ETS and other Indoor Air Quality issues) | Peter Rudnai<br>rudnai.oki@antsz.gov.hu |
| Extremes of Indoor Air Temperature<br>(To include excess cold, excess high temperature, and the effects of lack of heating in transition seasons) | Gert Gundersen<br>gert.gundersen@grieghallen.no |
| Domestic Water Supply<br>(To include availability, water management, and water quality) | Christian Cochet<br>cochet@cstb.fr |
| Housing Hygiene etc<br>(To be divided into separate Indicators – (a) Facilities within dwelling units; and (b) Facilities in common areas. Pests to be excluded) | Simon Nicol<br>nicols@bre.co.uk<br>Gert Gundersen<br>gert.gundersen@grieghallen.no |
| Pests<br>(Access and harbourage for pests) | David Ormandy<br>david.ormandy@warwick.ac.uk |

| | |
|---|---|
| Housing Safety and Accidents<br><br>(Should include injuries from falls etc, electrical injuries, poisonings etc. Should differentiate between environmental (building) causes and behaviour. Define “in” and “around” dwelling) | David Ormandy<br>david.ormandy@warwick.ac.uk<br><br>Rossana Giacomoni<br>giaro@comune.forli.fo.it |
| Environmental Design in relation to persons with Disabilities<br><br>(Definition to delineate housing and immediate environment) | Susanne Iwarsson<br>siw@arb.lu.se |
| Radon<br><br>(Consider data/mapping, and policies) | Dafina Dalbokova<br>dda@ecehbonn.euro.who.int<br><br>Christian Cochet<br>cochet@cstb.fr<br><br>Jaroslava Zapletalova<br>instbyv@psgnetba.sk |
| Fire Safety | Secretariat – WHO<br>bmo@ecehbonn.euro.who.int |
| Crowding<br><br>(Consider persons/room, persons/bedroom, households/dwelling etc) | Jaroslava Zapletalova<br>instbyv@psgnetba.sk |
| Affordability<br><br>(Relationship between income and housing costs) | Gert Gundersen<br>gert.gundersen@grieghallen.no |
| Neighbour Noise<br><br>(To be linked with work by Noise Working Group) | Maria João Freitas<br>mjfreitas@lnec.pt<br><br>Celia Rodrigues<br>cer@ecehbonn.euro.who.int |

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ORGANISATION MONDIALE DE LA SANTÉ
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ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
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# Annex 4-2
# Follow up on the Lisbon Meeting: Progress Report

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

# EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH BONN OFFICE

## Follow-up on the Lisbon meeting:

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
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## Progress report, 12.09.2003

Since the Lisbon meeting, the following steps of work have been accomplished:

(a) A letter was drafted in order to provide terms of reference for the process of indicator piloting through national governments. In this letter, the procedures of piloting and data collection are standardized (see *Housing Enclosure A2*)

(b) WHO defined their understanding of "housing", while David Ormandy developed a short note on the potential approach to "sub-standard housing" (see *Housing Enclosure A3*)

Both of these papers were sent out to all meeting participants.

(c) For the 14 indicators that were proposed for development in Lisbon, following progress was made:

| Indicator | Status |
|---|---|
| Child development | First draft received<br>To be revised and redrafted |
| Dampness and Mould Growth | Second draft received<br>Currently under revision |
| Carbon Monoxide and Oxides of Nitrogen | No draft received yet |

| | |
|---|---|
| Extremes of Indoor Air Temperature | Second draft received<br>Currently under revision |
| Domestic Water Supply | No draft received yet |
| Housing Hygiene etc | Second draft received<br>Currently under revision |
| Pests | Second draft received<br>Currently under revision |
| Housing Safety and Accidents | Second draft received<br>Currently under revision |
| Environmental Design in relation to persons with Disabilities | Second draft received<br>Currently under revision |
| Radon | First draft currently under development |
| Fire Safety | No draft received yet |
| Crowding | First draft received<br>To be revised and redrafted |
| Affordability | Second draft received<br>Currently under revision |
| Neighbour Noise | First draft currently under development |

It was agreed that – once all drafts are returned – they are sent out to everyone involved in this exercise for common review.

The natural housing stock variations within the European Region of WHO make it necessary to define the indicators in a very broad way in order to make them applicable in all countries. Major challenges, therefore, lie within the definition of the indicators, the availability of empirical data, and the development of easy computable but meaningful indicator scores based on the accessible data.

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# Annex 4-3
# Follow up on the Lisbon Meeting: Terms of Reference for Piloting

## DEVELOPMENT
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## Follow-up on the Lisbon meeting:

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## Terms of Reference
## Piloting Experimental set of Housing-Health Indicators

### A – Scope and purpose of the work to be performed:

The WHO European Centre for Environmental Health Bonn Office is developing a system of Environmental Health Indicators based on internationally agreed methodology and comparable data. These Indicators are intended to describe the state of environmental health and so inform decisions, monitor programmes and allow for comparisons nationally and internationally.

Housing is one of the basic necessities, but many housing conditions can have a severe impact on the health of the occupants, particularly the very young and the elderly. As housing is complex issue, a core set of Housing-Health Indicators is being developed.

A group of experts met in Lisbon and discussed proposals for Housing-Health Indicators. They have agreed upon a first set of Indicators which have now to be piloted. After this piloting exercise, a set of around four core Housing-Health finalized Indicators will be adopted by the same expert group.

Once the Housing-Health Indicators have been adopted at expert level, they will be put forward within the set of Environmental Health Indicators to the Conference for Ministers of the Environment and Health in Budapest in 2004.

### B - Content :

The major questions that have to be answered during the piloting phase are the following:

1. **Are the data needed to calculate or describe the indicator available?**

   If so, over which period of time are they available?
   If not readily available –

2. **What are the chances of the data becoming available over the next three years?**

Are there any restrictions on obtaining the data?
Are there any costs involved in obtaining the data?

**3. If it is possible, use the data to calculate the indicator (for your country), and discuss with colleagues -**

Does the Indicator work?
Does the Indicator need adjustment?
Is it understandable?
Does it call for Action? If yes which ones?
Is it attractive?

**4. Is the indicator useful, relevant, available at sub national level (local, regional)?**

**C - Time frame and follow up activities**

Once all the comments on each indicator are received by the WHO Secretariat, the results will be consolidated and proposed for discussion to the expert group.

The proposed time frame is as follows:

- Month 0* — Final indicator sheets for piloting received by WHO Secretariat from experts
- Month 0 + 15 days — Piloting commences through partners identified by the WHO co-ordinators in each country
- Month 4 — Results of the piloting sent to the WHO Secretariat
- Early 2004 — Final expert meeting in Madrid to identify core set of Indicators (tentative date).

The WHO co-ordinators are also invited to discuss the possibility of including new Indicators to the existing set for discussion by the expert group at its next meeting. However, so that such proposals will receive enough attention from all the other member of the groups, they should be sent to the WHO Secretariat before the 1st of October 2003. If received by that date, the Secretariat will circulate them to all partners in the piloting exercise for comment and, if possible, piloting.

For any additional information that may be needed please contact:

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*Month 0 equals the date when all draft versions for piloting have been received by WHO

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# Annex 4-4
# Follow up on the Lisbon Meeting: Defining Housing and Substandard Housing

**DEVELOPMENT**
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## Follow-up on the Lisbon meeting:

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## Defining Housing and Sub-Standard Housing

1. Devising an acceptable and understandable definition of "housing" is not simple. The WHO definition states that –
"housing" is the conjunction of

    - *the house (the physical, material shelter),*
    - *the home (the psycho-social meaning of the shelter, and the social dimension of households),*
    - *the immediate housing environment (social, material and infrastructural aspects of the near neighbourhood)*
    - *the community (people living in the same area).*

2. To attempt a definition of "sub-standard housing" it is assumed that the aim is to identify when the physical aspects of housing could have a negative impact on the household and/or the community.

3. Initially, it is proposed to limit the definition to the "house", and, for clarity, to use the term "dwelling" – ie, to attempt a definition for "sub-standard dwelling". A simple definition of a "dwelling" could be –

    ***any form of accommodation which is used for human habitation, or is intended or available for such use.***

    Such a definition would include any form of construction, whether temporary or permanent, and any type of dwelling – eg, house, apartment etc. Ideally, it should also include any paths, gardens, and outbuildings etc that are associated or for use with, or give access to the dwelling, whether or not they are for the exclusive use of that dwelling or shared with other dwellings. And, if necessary, this extension could be added to the main part of the definition.

4. To determine whether a dwelling is sub-standard it is necessary to define the standard. Any definition of standard should be as clear and precise as possible so that, whoever applies the standard, it will be obvious whether or not it has been met.
This is relatively straight-forward for some aspects which are primarily factual and quantitative. For example, stating that there should be a wash hand basin, a supply of hot water, a kitchen, etc. It is less straight-forward, however, for qualitative matters such as the state of repair, the presence of dampness, the air quality, etc.
Setting a standard raising other issues. Once set, a specific and clear standard can become out-of-date, but, where it applies to existing housing, politically difficult to revise as housing previously deemed satisfactory may fail to meet the revised standard. There is also a tendency for minimum standards to become the norm – practically and economically, there can be good arguments why a minimum standard need not be exceeded.
Setting an inter-nationally useful standard raises additional issues. The design and construction of dwellings in each country will reflect and have been influenced by political, social, cultural, geographic and climatic factors. This means that what is considered a basically satisfactory dwelling in one country could be seen as unacceptable in another. Setting a standard to the lowest common denominator would be a disincentive for countries with housing generally well above that standard.

5. A possible solution, but not one without draw-backs, would be to set health based criteria to be satisfied, and to require countries to define how those criteria should be met. Explanations and guidance could be given for each of the criteria to encourage compliance.
This approach would have the benefit of emphasising the health based approach, and, as knowledge on threats to health in the domestic environment increases, allow this to be incorporated. While inter-national comparisons would be faulted, nationally this would be useful.

This approach does not, however, provide a clear and precise definition. Although it would be clear which dwellings were grossly unhealthy, it would become less apparent for those close to the borderline. Providing the precision would depend on each country and how it specified how the criteria should be met.

An outline suggestion for this approach is as follows –

Basic physiological requirements
Capability to avoid exposure to excessive low or high indoor temperatures
Maintenance of indoor air quality
Provision for natural and safe artificial lighting while avoiding glare
Protection against excess noise
Provision of internal and external amenity and recreation space

Basic psychological requirements
- Provision for privacy for individuals
- Provision for family life
- Provision for maintenance of domestic hygiene
- Provision for maintenance of personal hygiene

Protection from infection
- Provision of a supply of safe water, sufficient for domestic purposes
- Provision of sanitary accommodation
- A safe means for removal and disposal of sewage and waste water
- Exclusion of pests from the interior of the dwelling
- Provision for the safe storage, preparation and cooking of food

Protection from accidental injuries
- The construction of the structure to be of adequate strength
- The design and installations to reduce the likelihood of fires, and incorporate fire precautions and means of escape
- The installations for gas to avoid explosions and poisonings
- The installations for electricity to avoid shocks and burns
- Avoidance of features which increase the likelihood of falls and mechanical injuries

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# Annex 4-5

# Summary of WHO Meeting

# Rome, 15 January 2004

**DEVELOPMENT**
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**ECOEHIS**

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**Development of Environment and Health Indicators for EU Countries (ECOEHIS)**

WORLD HEALTH ORGANIZATION
EUROPE

# WHO technical meeting on "Housing-Health Indicators"

# Results of review and data availability screening in Member States

Rome, Italy, 15-16 January 2004

Summary report

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
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# ABSTRACT

At this second meeting on housing and health indicators, held as part of the environmental health indicator project (ECOEHIS) co-sponsored by EC DG SANCO (SPC 2002300), environment and health indicators in the housing and health field were agreed for the WHO European Region. The work accomplished at the meeting was based on the development of a housing and health indicator set at the first meeting in Lisbon (June 2003), the drafting and reviewing of indicator templates, and the screening process of available data. The results of the screening process, identifying the implementability of the developed indicators, was at the centre of discussion at the Rome meeting. During the meeting, the group reviewed participants' reports on their own countries' data on selected housing and health indicators and their preliminary testing of indicators. A main set of indicators was proposed for suggestion to the European Commission and the participating countries, covering (a) driving forces for, (b) exposure to and (c) health effects of inadequate housing conditions. In addition, some indicators cover the policy and action steps to address the identified housing and health challenges.

**Keywords**

HOUSING
ENVIRONMENTAL HEALTH
INDICATORS
EUROPEAN UNION

## CONTENTS

# Meeting Summary

**Report of the 2nd WHO technical meeting on Housing-Health Indicators**
**(Rome, January 15-16 2004)**

The second meeting on housing and health indicators was held as part of the environmental health indicator project (ECOEHIS) led by the WHO and co-sponsored by EC DG SANCO (SPC 2002300). This summary is divided into two sections: (a) a short description of the work accomplished prior to the meeting, and (b) the summary of the discussions and the conclusions drawn at the meeting.

*Part A: Work steps prior to the meeting*

Based on the first WHO technical meeting on housing-health indicators in Lisbon (June 2003), the WHO secretariat has received 17 suggested draft templates for housing-health indicators. These drafts were sent out for peer review within the housing indicator expert group, and selected indicators were reviewed by external experts as well.

Based on the comments and recommendations submitted by the reviewers, the experts were asked to update their indicator drafts including the suggestions of the reviewers. In total, review comments were received from eight countries.

The final proposals were then sent out to all experts two days prior to the meeting in Rome, during which a selection process for the most relevant and feasible indicators was planned.

In addition to the review, WHO asked each expert to “pre-test” his or her proposed indicator, using the available data of a country of their choice. The reviewers were asked to also compute the reviewed indicators, so that it was possible during the Rome meeting to have a first look into the potential results of some of the proposed indicators at country level, and discuss the difficulties arising from the application of the indicator.

Next to the testing of the indicators, WHO arranged a preliminary data availability screening in various countries in order to collect information on the availability of the needed data. The basic data needs for the indicators were split up into categories (demographic data, housing stock data, morbidity and mortality data, regulation and other data), and answers were received from Sweden, Germany, Portugal, Hungary, Lithuania, Italy, and Kyrgyzstan. Furthermore, for the UK and Italy it has also been possible to have two local authorities reporting data availability for their municipality.

Based on the coordination work of WHO and the contributions of the expert group, the Rome meeting was then using the following documents and information sources for the final discussion and selection of the core set of housing-health indicators:

- updated and revised indicator draft sheets
- comments of reviewers
- preliminary tests of the indicators on country level
- data availability review on country level
- data availability review on local level

*Part B: Conclusions drawn at the meeting*

The 2nd WHO technical meeting on Housing-Health Indicators in Rome (January 15-16 2004) had the major objective to discuss and prioritize the 17 proposed indicator draft sheets, and select a reduced list of housing-health indicators to be suggested for integration into the general Environmental Health Indicator set.

The expert group discussed each indicator based on a short presentation of the author and the review comments provided by the other experts. For the individual indicators, following recommendations were made:

1) Extremes of Indoor Air Temperatures

The indicator was deemed useful and important. It was suggested to separate the two extremes of cold and heat in order to have a more precise data reporting for the indicator. The data needed for computation was confirmed. Necessary changes were listed and the WHO secretariat committed to updating the draft sheet and distributing it for final review.

2) Radon indicators

For Radon, three separate fact sheets were proposed of which two were covering similar data. Radon was deemed as an important indicator although national reporting systems are already installed in most countries. It was agreed that the responsible experts would merge the three Radon indicators into one, focusing on the existence of national policies, guideline values and remediation programs.

3) Housing safety and accidents

The housing safety and accidents indicator was discussed controversially, as it was deemed as a very relevant indicator but reviewers were doubtful regarding the data availability. It was agreed that the author would make several amendments to the indicator and reduce the amount / detailedness of data needed for the computation. It was also agreed that the indicator would be restricted to the effects of accidents and home-based injuries, as valid data on housing conditions triggering such accidents was mostly not available.

4) Dampness / mould growth

The dampness and mould growth indicator was welcomed by the experts although it was noted that further development was needed regarding the measurement of the required data. It was agreed that this indicator was important enough to ask for the integration of one or two specific questions into national surveys, and to substitute required data by regional or local surveys if necessary. Furthermore, it was added that this indicator would have to be restricted to exposure data. The WHO secretariat committed to making the necessary changes and then provide the draft to the author for approval.

5) Accessibility

The indicator was discussed extensively as all participants felt that it was strongly needed, but had doubts regarding the availability of data. Based on the discussion with the author and the review comments, it was decided that the indicator was to be changed towards a more pragmatic approach, restricting the indicator to the most important environmental barriers and functional limitations, or using % of elderly residents as a proxy for functional limitations. Also, it was decided to include the policy dimension into the indicator in order to get information on the treatment of this problem in the countries. The WHO secretariat committed to updating the draft sheet and have the changes approved by the author.

6) Affordability

The affordability indicator was understood as a relevant pressure indicator, aiming at the identification of households not able to afford housing of adequate standard. It was therefore agreed that this indicator was important, and discussion focused on the measurement of affordability. It was decided that instead of the price level of housing on the market, the construction cost should be used, and that this should be compared to the national defined levels of poverty. Aspects of maintenance and running costs were also discussed, but it was agreed that it would make the computation to complex and should be considered for a later time, possibly leading to the development of a secondary indicator on affordability. The WHO secretariat committed to redrafting this indicator in agreement with the author.

7) Food safety

The food safety indicator was deemed to be very detailed and complex, and data availability was doubtful. Also, it was agreed that it was hard to link health data with information on food safety conditions, and keep data collection consistent. It was therefore decided to drop this indicator, and include the provision of cooking facilities and a safe food storage (fridge) into the hygiene indicator.

8) Hygiene and sanitation

The indicator on hygiene and sanitation was positively perceived although it was agreed that data availability may be a problem in some countries. The data requirements were therefore reduced, and it was decided that the indicator would need to be updated in the light of the revision of the latest revision of the indicator set on water and sanitation which covered similar areas to some extent. Finally, it was suggested to distinguish between the lack of hygiene equipment, and an inefficient quality of the equipment. The WHO secretariat committed to redrafting this indicator on the basis of the comments made, and adapt the content in relation to the revised water and sanitation indicator set.

9) Fire safety

The indicator was accepted in general as it was reasonable and data availability could be demonstrated. Nevertheless, it was decided that it was more suitable to transfer the issue of fire safety in dwellings and related health outcomes into the Housing safety and accidents indicator in order to aggregate all effects of home safety and accidents within on indicator. The author of the housing safety and accidents indicator committed to merging these two indicators, including all comments received regarding the streamlining of the data needs. It was agreed that for fire safety, the issue of fire deaths was to be highlighted.

10) Crowding

There was strong agreement from the beginning that such an indicator had to be developed, and the discussion centered mostly on the various approaches for measuring crowding. It was concluded that the number of rooms per person was more appropriate than the floor area, and the meeting therefore agreed that the primary indicator result should be room availability, which could then be further qualified by a secondary indicator result on space availability. The participants also recommended that – to avoid confusions – national definitions of habitable rooms and floor area are to be applied. The WHO secretariat committed to including the proposed changes and get the final approval of the author.

11) Water supply in dwellings

As the meeting participants were informed on the recent revision of the water and sanitation indicator set, it was agreed that no separate indicator on water supply was needed. It was decided to merge the question of water supply into the hygiene and sanitation indicator (to be done by WHO secretariat).

12) Pests and infestations

The indicator was discussed as a relevant contribution, especially as it was closely related with health risks and exposures. Due to problems with data availability, it was decided to drop the indicator.

13) Crime and fear of crime

The indicator was presented with a variety of computations based on an European survey which is regularly undertaken. Due to the data availability, it was agreed that the indicator would be relevant and the suggested definitions and computation methods were accepted. It was discussed whether it was possible to link health data with the data on objective crime rates, but in the end consensus was reached that this indicator would have to be restricted to the exposure to crime and the linked perception of crime. Therefore, it was agreed that the WHO secretariat just had to do some final editing.

14) Noise indicators

Two indicators on noise (noise perception in neighbourhoods and noise regulation policies) were suggested but in the discussion it became evident that it would make more sense to include them into the noise indicator set, although the indicators are closely linked to residential noise sources and perception, and regulation approaches for residential neighbourhoods. The noise indicators were therefore dropped from the list of housing-health indicators.

# Housing –Health indicators

## Suggested list of indicators for a housing subset to be piloted within the EHI framework

**Draft version prepared by**
**Braubach, M. / Bonnefoy, X. / Ormandy, D.**

From a list of 17 indicators that had been suggested, the participants of the 2nd WHO technical meeting on Housing-Health Indicators (Rome, January 15-16 2004) selected the following three overall indicators to be considered within the EHI set.

These three overall indicators (comfort, safety and use/ economy) cover nine sub-indicators and provide information on the current status quo of a housing stock and its related health effects. This recommended indicator core set includes data and concepts combining architectural, functional, hygienic, physical, biological, thermal, social, and socio-economic dimensions of housing.

| **Indicator** | **Sub-Indicator** |
|---|---|
| Comfort | Extremes of indoor air temperature; Radon; Dampness / Mould; Household hygiene |
| Safety | Housing safety and accidents; Crime / Fear of crime |
| Use / Economy | Accessibility; Affordability; Crowding |

The indicators attempt to aggregate and compute data in a pragmatic way in order to provide insight into the standard of housing conditions and to quantify the magnitude of potential health problems due to housing conditions. This quantification is most often done by the calculation of the percentage of residents, households or dwellings being exposed to a specific risk or exposure.

The indicators aim at identifying national, regional or local challenges but cannot provide the reasons for the respective situation or housing stock problem. It is therefore functioning as a monitoring system, and it will be the responsibility of the national, regional or local authorities to interpret the given results, and develop a suitable strategy for mitigation. However, each indicator contains a paragraph on interpretation and opportunities for action, which is meant to provide some support for the practical application of the indicator.

The data requirements for the indicators have been subject of intense discussion. It is assumed that most of the necessary data is available from routine data sources such as censuses and national statistics within the housing or the health sector. However, the indicators also suggest that for few data requirements, national surveys could be adjusted by including specific questions regarding e.g. the quality or functionality of hygiene equipment or the presence of dampness and moulds.

Finally, policy elements have been included in some of the indicators. This aims at the identification of national strategies and policies in the context of housing and health, and highlights the wide field of regulation and legal frameworks which can be used for setting minimum standards or providing public support – be it financial or administrative – to guarantee equal access to quality housing.

**Indicator overview**

**"Comfort"**

| EXTREMES OF INDOOR AIR TEMPERATURE |
|---|

This indicator combines data on extreme climate conditions with health data (mortality and hospitalization cases), assuming that housing quality will be an essential element in maintaining acceptable indoor temperature levels. Low insulation quality, inadequate ventilation opportunities and ineffective or expensive heating systems can be relevant factors linking the indoor temperature level, housing conditions and health.

| RADON |
|---|

This indicator aggregates data from in situ Radon measurement and from mitigation work. It combines this quantification of exposure conditions with the existence of national policies on Radon in housing. As radon-prone areas, based on their geology, are the first reason for Radon exposure, the policy context is a most suitable tool for the reduction of residential Radon exposure. The case of use of radon-emitting building materials has been consciously overlooked.

| DAMPNESS/MOULD |
|---|

This indicator uses data on dampness and – on a second level – mould growth and tries to assess the amount of persons / dwellings being exposed. It is based on the quality of the dwelling (low tightness of windows, inadequate design, inefficient ventilation equipment) and can also be affected by an increasing number of residents per dwelling. As it seems difficult to directly link dampness with health effects on household level, this indicator is only dealing with the exposure conditions and does not include health data.

| HOUSEHOLD HYGIENE |
|---|

This indicator aggregates data on the presence – and quality – of selected hygiene amenities such as water supply, shower/bath or toilet. It includes data on dwellings, households or persons not being equipped with these amenities, and – if available – data on dwellings, households or persons being equipped with substandard amenities that do not provide efficient service. As it seems difficult to directly link the non-existence or substandard quality of hygiene amenities with health effects on household level, this indicator is only dealing with the exposure conditions and does not include health data.

***"Safety"***

### HOUSING SAFETY AND ACCIDENTS

This indicator deals with the quantity of health effects and death cases as a result of accidents and injuries in and around the private home. This includes (a) the occurrence of burns, injuries and poisonings, and (b) the occurrence of deaths by home accidents, poisonings and – especially – fires. It is assumed that design and quality of housing is a relevant cause of home accidents leading to a wide range of health outcomes. This indicator deals almost exclusively with health data and tries to identify the number of housing-related injuries and deaths, as it seems difficult to access valid data on housing safety conditions per se.

### CRIME / FEAR OPF CRIME

This indicator deals with physical and mental health effects related to the occurrence of crime, and more generally fear of crime. It aggregates available data on crime rates within residential areas and distinguishes between crime against persons and objects, and describes the number of persons perceiving subjective fear of crime within their neighbourhood or the number of persons taking precautionary action. As it seems difficult to access data on the health effects of such crime and fear of crime, this indicator is restricted to the exposure level.

***"Use / Economy"***

### ACCESSIBILITY

This indicator focuses on the accessibility of the housing stock and compares the amount of physical environmental barriers with the number of persons with functional limitations. In case the required data on number of people with functional limitations does not exist, it takes the age group of 75 years and over as the main population at risk. The indicator also includes a policy dimension, asking whether national polices on housing adaptation exist and how many dwellings have been adapted in total. This indicator does not use health data as the effect of inadequate housing, but includes health data on functional limitations as a cause for specific housing needs.

## AFFORDABILITY

This indicator looks at the financial resources that are required for purchasing a square meter of construction, and combines the cost for a 60 square meter dwelling with the percentage of the population living in absolute or relative poverty. The comparison of the required resources and the poverty level gives insight into the affordability level of housing and can explain the pressure households may face on the housing market. The indicator assumes that low affordability of housing will often lead to inadequate housing conditions for the less affluent part of the population, and be a relevant cause for many housing problems affecting health. The indicator does not include health data in the computation.

## CROWDING

This indicator combines data on households and residents with the statistical information on room number and floor area. Using national definitions, it identifies the number of households with less than one room per person and – on a second level – the number of households with less than 14 square meter per person. As it is difficult to obtain data linking the occurrence of crowding with health effects on household level, this indicator is restricted to the identification of exposure to crowding.

# Annex 1

## Scope and purpose

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**WHO technical meeting on "Housing-Health Indicators”** **/**
**5 December 2003**

**15-16 January 2004 – Rome, Italy**

## SCOPE AND PURPOSE

The WHO European Centre for Environmental Health Bonn Office is developing a system of Environmental Health Indicators based on internationally agreed methodology and comparable data. These Indicators are intended to describe the state of environmental health and so inform decisions, monitor programmes and allow for comparisons nationally and internationally[1].

Housing is one of the basic necessities, but many housing conditions can have a severe impact on the health of the occupants, particularly the very young and the elderly. As housing is complex issue, it is intended that the development of a set of core indicators for housing should be investigated.

The Meeting in Rome will discuss the indicator drafts proposed for Housing Health Indicators as agreed upon at the first indicator meeting in Lisbon in June 2003. The objective is to identify from the set of 17 proposed indicators a core set of 4-5 housing indicators that will then be piloted and – according to their success – be suggested for integration into the global Environmental Health Indicator set.

Background for the meeting are the suggested housing-health indicator drafts, which have already been sent out to all participants of the Lisbon meeting and the Rome meeting for their review.

The meeting is being convened as part of the European Union project “Development of Environment and Health Indicators for EU countries”. Once the Housing Health Indicators have been finalised they will be put forward within the set of Environmental Health Indicators to the Conference for Ministers of the Environment and Health in Budapest in 2004.

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1 “Environmental health indicators for the WHO European Region. Update of methodology, May 2002” - http://www.euro.who.int/EHindicators/Indicators/20020319_1

# Annex 2

# Indicator templates – draft version

The annex lists the available draft sheets of the indicators (as of January 27th, 2004) in the following order:

*Economy / Use indicator*

- Affordability
- Crowding
- Accessibility

*Comfort indicator*

- Extremes of Indoor Air Temperature
- Dampness and Mould growth
- Household hygiene
- Radon *(still under preparation, not included)*

*Safety indicator*

- Housing safety and accidents
- Crime / Fear of crime

| **Affordability** | DPSEEA |
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| Issue | Housing and Settlements – Use and Economy |
| Definition of indicator | Affordability –<br>Percentage of population having an income below the income level that is needed to purchase the construction of a 60 square meter residential building of normal quality |
| Underlying definitions and concepts | The indicator deals with the general affordability of housing. It is based on the assumption that 15% of the income over a time span of 25 years should be sufficient for such an investment. This does not include the cost of purchasing the ground, which may differ extremely within countries, regions and cities.<br>The indicator requires the existence of nationally defined poverty levels and the ability to document percentiles of the population living below such levels. It further requires the ability to statistically define affordability of housing, i.e. the number of annual average household incomes necessary to afford the construction of, or purchase of a defined dwelling size. |
| Potential health effect | Households living below the poverty level, in situations where affordability of housing is generally low, will normally have to accept dwellings in the absolutely poorest parts of the housing stock. Within this stock will normally be found a combination of all the exposures and effects of the Housing and Health Indicators.<br>There will also be a detrimental effect on the mental well-being of such households, both because of being unable to afford decent housing and their lack of control of their housing conditions. |
| Vulnerable groups | The most vulnerable groups covered by this indicator are young children, women and the elderly. |
| Specification of data needed | Cost of the construction of one square meter of residential building of standard quality (C)<br>Income distribution of population (I)<br>Definition of a nationally defined poverty level (PL)<br>Percentage of population with income (household or persons) falling below the nationally defined relative or absolute poverty level (P) |
| Data sources and availability | Required data should be available within all countries. |
| Computation | The indicator can be computed on three levels:<br>**1) A (Affordability)** = % of households or persons with an income level below S<br>S = 60 x C / 25 x 0,15<br>S being the annual income level that is needed to afford the construction of a 60 square meter dwelling;<br>**2) P (Poverty)** = % of households or persons affected by relative or absolute poverty levels (according to national definitions) |

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| | **3) PA (Poverty affordability)** = PL / C<br>PL = annual income defined as relative or absolute poverty level<br>C = cost of the construction of one square meter of residential building of standard quality |
| Units of measurement | 1) Percentage<br>2) Percentage<br>3) square meter |
| Opportunities for action | - Improving the affordability of housing in general to reduce selection mechanisms<br>- Introducing targeted programs to supply social housing to low-income households.<br>- Introduce targeted economic support and financial subsidies to improve the competitiveness of low-income households in the housing market. |
| Relationship to other Indicators. | The affordability indicator could cover the suggested indicator on "Inequality of income distribution" which was suggested for a potential indicator set on Social Cohesion |
| Scale for application | Local, Regional, National |
| Interpretation | 1) Affordability (A): shows the percentage of persons or households that cannot easily cover the cost of housing construction based on their income. The higher the percentage, the higher the expenses needed for the purchase or construction of housing.<br>2) Poverty (P): shows the percentage of persons or households falling below the relative or absolute poverty threshold. Interpretation of difference between A and P will provide with an insight of the affordability of construction for low-income people: the bigger the gap between A and P, the more difficult it is for persons or household below the poverty line to purchase housing.<br>3) Poverty affordability (PA): shows the amount of square meters of a normal quality-building that can be built with the amount of money corresponding to the annual relative or absolute income level.<br>This indicator is not global, but must be considered nationally specific. As it reflects socio-economic conditions in each country at a given point in time, it should be generally applicable. |
| Linkage with other indicators in the set | Crowding<br>Household hygiene |
| Related indicator sets | |

| Crowding | | DPSEEA |
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| Issue | Housing and Settlements – Use and Economy | |
| Definition of indicator | Crowding –<br>Proportion of households living in overcrowded housing conditions | |
| Underlying definitions and concepts | Crowding has two dimensions:<br>1. objective measurement (floor area or number of inhabitable rooms available per person);<br>2. subjective perception and awareness of sufficient or insufficient space for daily living.<br>The objective assessment of density does not necessarily reflect the subjective perception of crowding, which is influenced by variety of factors including culture. It is furthermore necessary to distinguish between voluntary coexistence and enforced living together. | |
| Potential health effect | Crowded housing conditions pose a threat to the mental well-being of an individual, and reduce opportunities of his/her healthy development (social decline of families, alcoholism, drug addictions, growth of criminality)<br>Crowding creates conditions for the emergence of population groups at risk, resulting in adverse social, health and economic consequences.<br>Crowding in living areas allows the rapid spread of infectious diseases, and increases the likelihood of accidental injuries within dwellings. | |
| Vulnerable groups | Households in disadvantaged social groups, and those on low income (including the unemployed).<br>Multi-generation and multi-member families including children and elderly. | |
| Specification of data needed | • Number of households by number of household members to be linked with<br>• Number of dwellings by habitable room number<br>• Number of dwellings by dwelling floor area ($m^2$) | |
| Data sources, availability and quality | Country statistical information<br>Census and national surveys | |
| Computation | The indicator can be computed as:<br>**1) RA (Room availability)** = (H1 / H2) * 100<br>• H1 = number of households that live in dwellings where – according to the national legislation / definition – the number of habitable rooms per person is below one<br>• H2 = total number of households | |

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| | **2) SA (Space availability)** = (H1 / H2) * 100<br>• H1 = number of households that live in dwellings where – according to the national legislation / definition – the dwelling floor area per person is below 14m2<br>• H2 = total number of households<br><br>It is important that the indicator is computed on individual household- and dwelling-basis, and then aggregated to national level. Using national average values of rooms / floor area per dwelling and average household size will not be able to identify the problem of housing shortage and crowding for the advantaged part of the population. |
| Units, measurement | Percentages |
| Opportunities for action | It is important to identify why overcrowding has occurred:<br>• Lack of appropriate (size, quality, price) dwellings (question of planning and urban planning regulations for construction and renovation of housing fund on the municipal level)<br>• Lack of financial resources to procure the housing of adequate quality by households and individuals (question of social exclusion and regulations for social assistance and housing allowances)<br>Long-term planning of appropriate solutions to prevent health complications through housing and to improve social cohesion and regional development (considering national conditions and policies) can include<br>1. Definition for the lowest living area standard for social housing in European countries<br>2. Development of an effective support system through housing allowances for larger households |
| Scale for application | National |
| Interpretation | • **RA (Room availability)**<br>This variable indicates if there are enough rooms for all residents. A value below one usually indicates overcrowding conditions, since one cannot isolate him/herself in a room.<br>• **SA (Space availability)**<br>This variable indicates if dwellings have enough floor area for all residents. The standard value varies significantly across countries and evolves in time. The following ranges can be used:<br>- Below 8 m²: is considered to be unacceptable (e.g. physical and psychological problems can appear in children),<br>- Between 8 m² and 14 m²: comfort problems regarding |

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| | acoustical and environmental aspects and functional aspects (e.g. incorrect use of rooms such as sleeping in living room),<br>- Above 14 $m^2$: housing satisfaction increases.<br><br>The interpretation of this indicator can be crossed with following information:<br>• Hygienic conditions of respective dwellings<br>• Voluntary or enforced coexistence in respective dwellings<br>It is necessary to distinguish between voluntary coexistence and enforced living together.<br><br>In addition, it should be noted that every country may have a different method for the collection of data on rooms in the dwelling, some including kitchens in general, some including kitchens above a specific size, and others excluding kitchens by definition. It is important that the method of data collection is explained in order to interpret and compare the indicator. |
| Linkage with other indicators in the set | Household hygiene<br>Housing safety and accidents<br>Affordability |
| Related indicator sets | UN Economic and Social Council – Economic Commission for Europe<br>Committee on Human Settlements (Building regulations in ECE countries)<br>UN Urban Observatory |

| **Accessibility** | DPSEEA |
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| Issue | Housing and Settlements – Use and Economy |
| Definition of indicator | Accessibility –<br>Environmental design details defined as physical environmental barriers in relation to persons with functional limitations. This indicator can be measured from the *accessibility* perspective, i.e. based on objective, professional assessments, or from the *usability* perspective, i.e. based on subjective user perceptions.<br>The indicator is delimited to the dwelling unit and the immediate housing environment. The immediate housing environment consists of the collectively shared spaces of / around the residential building (such as stairwell, cellar rooms, parking lot, entrance area, outdoor spaces), plus the private outside spaces such as gardens and balconies. |
| Potential health impact | Activity limitations, restricted participation and social isolation, potentially leading to negative psychological reactions and mental health problems (e.g. stress, depression), impaired body function and other negative health effects (e.g. osteoporosis). |
| Vulnerable groups | Elderly people and/or persons with functional limitations (including all ages). |
| Underlying definitions and concepts | *Physical environmental barrier*: Any design feature that acts as a barrier for persons with functional limitations. The demands made by the environment on the individuals are so high that it has a negative influence on their performance of daily activities and participation in society.<br>*Functional capacity:* A person's ability to perform fundamental physical and mental actions in daily life.<br>*Functional limitation*: Restriction in a person's ability to perform fundamental physical and mental actions in daily life.<br>*Accessibility*: The relationship between functional capacity and environmental demands. Accessibility comprises 1) a personal component and 2) an environmental component. |
| Specification of data needed | 1) Prevalence of one or more of the three following physical environmental barriers in dwelling units and their immediate environment<br>➢ height differences within dwelling<br>➢ narrow doors<br>➢ staircase without lift<br>2) Number of persons, and households with at least one person with one or more of the three following functional limitations<br>➢ loss of upper extremity skills<br>➢ difficulty bending/kneeling<br>➢ blindness |

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| | 3) Number of citizens with an <u>age</u> of 75 years and more (as a proxy information for functional limitations)<br>4) Existence of <u>national policies</u> on housing adaptation for people with functional limitations<br>5) <u>Number of dwellings</u> built or adapted to meet the specific needs of persons with functional limitations.<br>6) Amount of <u>money invested</u> in the construction or adaptation of dwellings suitable for the specific needs of persons with functional limitations<br>7) Total population<br>8) Total number of dwellings<br>9) Gross Domestic Product |
| Data sources, availability and quality | <u>Census and surveys</u>. Some information is most likely available in most countries, while its quality in relation to the definitions in this document is doubtful.<br><u>Numbers and types of housing adaptation measures.</u> Statistics on housing adaptations are most likely available in those countries having this kind of support system.<br>Prevalence on single <u>functional limitations</u> should be available, at least to some extent. It should be noted that epidemiological data on <u>combinations of functional limitations</u> is scarce if at all available. |
| Computation | The indicator contains a technical and a policy dimension.<br><br>**Technical dimension:**<br>**1) Accessibility** = 100* DEB / DT<br>with DEB being the number of dwellings units with one or more of the three environmental barriers; and DT the total number of dwellings.<br>**2) Functional limitations** = 100* FLP / TP<br>with FLP being the number of persons with one or more of the three functional limitations; and TP the total population.<br>**3) Ageing** = 100* OP / TP<br>with OP being the number of persons with an age of 75 and higher, and TP the total population.<br><br>**Policy dimension:**<br>**4) Policy** = Existence of any regulation or mechanism through which the specific needs of persons with functional limitations are supported and met (e.g. through the adaptation and construction of dwellings specifically designed for residents with functional limitations)<br>**5) Housing adaptation** = 100* AD / DT compared to 100* FLH / TH<br>with AD being the number of adapted dwellings and DT being the total number of dwellings; and FLH being the number of |

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| | households with at least one member with a functional limitation and TH being the total number of households.<br>**6) Adaptation investment** = 100* AI / GDP<br>with AI being the amount of money invested in housing adaptation and construction of persons with functional limitations, and GDP being the Gross Domestic Product |
| Units of measurement | Percentages<br>Ratio of percentages |
| Interpretation | This indicator is based on information that may be collected through regional or local surveys, or aggregated and extrapolated data. Age as a proxy for functional limitations, as well as the selected choice of environmental barriers or functional limitations (if data exists) is applied in order to provide an informed estimation, indicating whether there are specific conditions in countries under which accessibility problems could arise. The results of the indicator therefore demonstrate the scope of potential problems, indicating a need to look into this area in detail.<br>The results of the indicator do not represent scientific results. |
| Opportunities for action | Guidelines on accessibility standards for housing construction<br>Implementation of administrative and/or financial support systems to enhance the adaptation of housing conditions for persons with functional limitations<br>Increased integration of the specific needs of persons with functional limitations into urban planning and design |
| Scale of application | Descriptive statistics on the prevalence of environmental barriers can be presented on different levels; for individual dwelling units, local districts, regions, and nations. |
| Linkage with other indicators in the set | Housing safety and accidents<br>Affordability |
| Related indicator sets | Data on functional limitations in the population. |

| Extremes of Indoor Air Temperature | DPSEEA |
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| Issue | Housing and Settlements – Comfort |
| Definition of indicator | Extremes of Indoor Air Temperature -<br>The average sum of excess deaths and excess hospital admissions during periods of exposure to (a) excessive high or (b) excessive low temperatures within the dwelling. |
| Underlying definitions and concepts | The indicator requires the ability to identify and measure the likelihood of extreme high or low temperatures occurring for prolonged periods of the winter (low temperature), or the summer (high temperature) seasons.<br>It assumes a direct causal link between the physical standard and condition of the housing stock, and the inhabitants´ exposure to extreme indoor temperatures caused by extreme climatic conditions.<br>It further assumes a direct causal link between housing conditions and excess deaths and hospital admissions during periods of excess climatic conditions.<br><br>Extreme indoor temperatures following from extreme climatic conditions will, in broad terms be caused by one or more of the following:<br>➢ Unsatisfactory housing conditions, e.g. low thermal insulation characteristics, lack of ventilation possibilities, lack of heating possibilities, etc.<br>➢ Lack of household economic resources to compensate for extreme climatic conditions (high and low).<br>➢ Lack of external, infrastructural provision to existing internal infrastructure, e.g. external failure in supply of central heating, or external failure in supply of electricity.<br>➢ Individual failure to utilise available means to compensate for extreme indoor temperatures, e.g. lack of knowledge, realisation, or willingness.<br><br>Periodic and limited exposure to high/low indoor temperatures will not be prejudicial to health, even for generally vulnerable groups. Therefore only exposure events longer than set by the indicator should be recorded. |
| Health effects | The health effects of excess indoor temperatures are:<br>**(a) for high temperature:**<br>➢ Cardiovascular strain with increase risk of stokes and death is caused by prolonged exposure when temperatures remain above 24°C during the whole night<br>➢ Dehydration<br>➢ Vulnerable groups in the population are the elderly, people with cardiovascular problems, and the very young. |

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| | NB – There appears to be a delay between the onset of a heat wave and the related increases in mortality and morbidity. The delay can range from 1 to 3 days depending on health effect and vulnerability.<br>**(b) for low temperature:**<br>➢ Temperatures between 19°C and 16°C for substantial periods of time cause only a small risk of adverse health effects.<br>➢ Below 16°C there is a serious risk to health, including increased risk of respiratory and cardiovascular conditions.<br>➢ Below 10°C there is a risk of hypothermia, especially for the elderly (65 years or older).<br>➢ Cold air streams can affect the respiratory tract and the immune system and can reduce the resistance to infections.<br>➢ Vulnerable groups in the population are the elderly, people with cardiovascular problems, and the very young.<br>NB – There appears to be a delay between the onset of a cold spell and the related increases in mortality and morbidity. For deaths from heart attacks the delay is about 2 days, about 5 days for deaths from stroke, and about 12 days for respiratory deaths. |
| Specification of data needed | **Climate data**<br>Number of periods of two or more consecutive days when outdoor temperatures remain above 24 degrees C in 24 hour period (over a 12-month period)<br>Number of periods of two or more consecutive days when outdoor temperatures remain below 5 degrees C in 24 hour period (over a 12-month period)<br>**Health data**<br>(1) Hospital admission cases<br>(2) Mortality (Total death cases) from cardiovascular conditions, strokes and respiratory diseases (if possible, separating out the periods two days from the start of a hot or cold period) |
| Data sources, availability and quality | Data for relevant extreme outdoor temperatures will normally be available from national / local meteorological statistics.<br>Data on hospital admissions and mortality should be available through national health services. |
| Computation | The indicator can be calculated separately for (a) heat and (b) cold:<br><br>**1) Indoor heat - absolute excess cases**<br>Absolute excess mortality (AEM) = Ma - Mb<br>Absolute excess hospital admission cases (AEH) = Ha - Hb<br>**2) Indoor heat - relative increase**<br>Relative mortality increase (RMI) = ((Ma – Mb) / Mb) * 100<br>Relative hospital admission increase (RHI) = ((Ha – Hb) / Hb) * 100 |

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| | with<br>Ma being the monthly mortality including the period of extreme heat;<br>Mb being the average monthly mortality calculated from the previous five years;<br>Ha being the monthly number of hospital admissions including the period of extreme heat;<br>Hb being the average monthly number of hospital admissions calculated from the previous five years.<br><br>**3) Indoor cold - absolute excess cases**<br>Absolute excess mortality (AEM) = Ma - Mb<br>Absolute excess hospital admission cases (AEH) = Ha - Hb<br>**4) Indoor cold - relative increase**<br>Relative mortality increase (RMI) = ((Ma – Mb) / Mb) * 100<br>Relative hospital admission increase (RHI) = ((Ha – Hb) / Hb) * 100<br>with<br>Ma being the monthly mortality including the period of extreme cold;<br>Mb being the average monthly mortality calculated from the previous five years;<br>Ha being the monthly number of hospital admissions including the period of extreme cold;<br>Hb being the average monthly number of hospital admissions calculated from the previous five years. |
| Units of measurement | Case numbers<br>Percentages |
| Interpretation | The absolute excess cases show the absolute number of cases that can be defined as excess events due to the extreme temperature conditions, and demonstrate the absolute increase of health effects based on extreme climate conditions and consequent thermal stress inside of dwellings. It can be used for assessing the additional demand for health services within affected countries or regions.<br>The relative increase shows the degree of variability that can be attributed to extreme climatic conditions. With a value of 20% it can be estimated that roughly 20% more death or hospitalisation cases have occurred within the period of extreme temperature exposure.<br>It is important for an effective interpretation to look at the climate data that has been used. As the effect of cold and heat exposure may be delayed by few days from the onset of the extreme temperature phase, it is necessary to identify whether the health effects of extreme temperatures fall within the same month. If mortality and hospitalisation data can be provided by weeks or days, the indicator could be calculated more accurately. |

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| Opportunities for action | Improving insulation / technical qualities of the housing stock<br>Installing / improving facilities for indoor temperature regulation<br>Improving regularity of external supply of heating<br>Introduction of targeted economic support to enable households to consume more energy.<br>Installing national "warning systems" and action plans on informing the public about the most suitable behaviour (for cold: e.g. maximum time outdoors, clothing; for heat: e.g. physical exercise restrictions, water consumption etc. |
| Linkage with other indicators in the set | *Dampness and Mould Growth* – A cold dwelling may be more prone to condensation and decreased thermal insulation quality.<br>*Housing Safety and Accidents* – Cold can impair the mobility, particularly of the elderly, and may increase the severity of the outcome from any accident. |

| Dampness and Mould Growth (Moisture damage) | DPSEEA |
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| Issue | Housing and Settlements – Comfort |
| Definition of indicator | Dampness and Mould Growth (Moisture damage) –<br>Percentage of the population living in housing suffering from dampness which is prejudicial to the health of the occupants due to exposure to humidity, mould spores and house dust mites |
| Underlying definitions and concepts | The indicator requires an agreed definition of dampness – dampness sufficient to pose a threat to the health of occupants. Some dampness will not necessarily be prejudicial to health. It may be small scale, intermittent in nature, or located in a part of the dwelling that will not unduly affect the occupants (ie not a living room or occupied bedroom).<br><br>The cause of the dampness within the housing context could be:<br>• Moisture penetration due to inadequate design, construction and or maintenance of the housing, or<br>• Moisture rising through floors and/or walls because of a lack of or defects to damp proof courses or membranes, or<br>• Condensation due to poor housing design, construction, insulation or ventilation, or.<br>• Condensation due to overcrowding or heavy household use of the dwelling – such as washing/airing clothes without opening windows. |
| Health effects | The health effects of serious dampness include:<br>• Increased humidity, which encourages the growth of mould and the production of fungal spores, and household dust mites – both known respiratory allergens.<br>• An inability to keep clothing and soft furnishings dry, which can lead to discomfort, skin conditions, and hypothermia in extreme cases.<br><br>Dampness has also been linked with nausea and vomiting and general ill-health, as well as respiratory conditions. |
| Vulnerable groups | Respiratory conditions occur especially in children and elderly residents.<br>Specific risk may exist for allergic people being more vulnerable for specific allergens and fungal spores |
| Specification of data needed | Total number of occupied dwellings in housing stock<br>Total number of persons in housing stock<br>Number of occupied dwellings suffering from serious dampness |

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| | Number of persons living in dwellings affected by serious dampness<br>If available:<br>Number of occupied dwellings suffering from mould growth<br>Number of persons living in dwellings affected by mould growth |
| Data sources, availability and quality | Data on the number of seriously damp dwellings will not be available from routine sources. Sample surveys by trained inspectors can be used to produce estimates of the percentage of affected dwellings in the total housing stock. Developmental work would be needed to harmonise the definition of dampness, the survey methodology and briefing for inspectors/interviewers.<br>Household interview surveys (particularly those that include photographs of damp/mould affected areas), can be used to produce estimates of the number of people affected by damp dwellings.<br>Censuses will provide information on total population and total housing stock.<br><br>NB: Dampness represents the source of the problem, while moulds represent the potential consequence of increased dampness. If data on mould presence is more readily available than data on dampness, the indicator can be calculated based on the mould data instead of dampness data. |
| Computation | The indicator can be computed on dwelling or person level:<br>**1) Persons affected**<br>100 * (R / P)<br>where R is the number of residents living in damp housing and P is the total residential population.<br><br>**2) Dwellings affected**<br>100 * (D / H)<br>where D is the number of damp dwellings and H is the total number of dwellings in the housing stock.<br><br>NB: the computation can be done with “mouldy housing” instead of “damp housing” in case no data is available for dampness but for the occurrence of mould growth as a consequence of dampness. |
| Units of measurement | Percentage |

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| Scale of application | Ideally, the information should come from sample national surveys. However, it is equally applicable at local level, and rough estimates at national level might be produced by extrapolating trends from available local or regional data. |
| Interpretation | Increasing percentage values indicate an increasing problem of dampness and an increasing vulnerability of housing for degradation trends. Based on scientific evidence it must be followed that the increased exposure also leads to increased health effects.<br>The assumption of health effects is even stronger in case the indicator is calculated based on mould data instead of dampness.<br><br>A dwelling that is damp is not only proven to have an effect on the health of the occupants, it is an indication of the quality and condition of the housing. Work to rectify problems in dampness will have the benefit of improving the health of the household and reducing the deterioration to the housing stock. Thus work should be undertaken urgently to rectify problems identified. |
| Opportunities for action | • Rehabilitation – improvement works.<br>• Intervention – action to require remedial works.<br>• Subsidy – grants/loans to fund remedial action> financial subsidies to occupiers towards cost of heating.<br>• Regulation to control standards for new housing construction.<br>Future surveys will identify whether there has been an improvement in the percentage/number of dwellings affected by dampness. From this it should be able to estimate the health gains and the reduction in deterioration to the housing fabric. |
| Linkage with other indicators in the set | • *Extremes of Indoor Air Temperature* - A cold dwelling, which is also damp, will increase the likelihood of discomfort, skin conditions, and hypothermia in extreme cases. A hot dwelling, which is also damp, will increase the level of humidity, condensation and mould/mite reproduction.<br>• *Household Hygiene* - A damp dwelling will be hard to keep hygienic.<br>• *Housing Safety and Accidents* – Damp floors can lead to accidents, while dampness may increase electrical shorting with resulting fire safety hazards.<br>• *Crowding* - Overcrowding leads to moisture production, condensation and resulting mould growth. Also, there will be no opportunity for household members to avoid damp |

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| | rooms. |
| Related indicator sets | UN Human Settlements Programme: list of key urban indicators and database.<br>UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America 1998. |

<table>
<tr><th colspan="2">Household hygiene</th><th>DPSEEA</th></tr>
<tr><td>Issue</td><td colspan="2">Housing and Settlements - Comfort</td></tr>
<tr><td>Definition of indicator</td><td colspan="2">Household hygiene –<br>Percentage of the population living in housing conditions with missing or substandard hygienic amenities. Standard equipment includes (a) a safe and continuous water supply in the dwelling, and (b) the exclusive use of a toilet, shower or bath, cooking facilities, and a fridge.</td></tr>
<tr><td>Underlying definitions and concepts</td><td colspan="2">The indicator requires the ability to identify, and measure the number of households / persons living in housing conditions with missing or substandard hygienic amenities. Hygienic conditions are to a large extent environmentally and culturally dependent, and thus are liable to vary from one area (or one time) to another.<br>Inadequate household hygiene conditions are defined as housing units without<br>a. safe and continuous water supply in the dwelling, and<br>b. the exclusive use of a toilet, shower or bath, cooking facilities, and a fridge.<br><br>In case valid data is available, the indicator should also integrate the housing units in which the quality and functionality of the water supply system, toilet, shower or bath, cooking facilities, and fridge are substandard (i.e. the respective equipment exist but does not provide residents with the expected service).<br>Reasons for such substandard household hygiene conditions can e.g. be<br>• adequate hygienic conditions exist but have to be shared with other households<br>• poorly constructed, or inadequately maintained services (e.g. electricity or gas) which do not work properly or even may be dangerous to occupants<br>• low technical or constructional quality or obsolete products which do not provide reliable service or work inefficiently<br>• unreliable or intermittent water supply conditions<br>• water supply from unsafe or uncontrolled sources</td></tr>
<tr><td>Specification of data needed</td><td colspan="2">Number of dwellings / persons with safe water supply - substandard water supply - no water supply<br>Number of dwellings / persons with adequate – substandard – lacking hygienic equipment:<br>- toilet<br>- shower or bath<br>- cooking facilities<br>- food storage / fridge<br>Total number of dwellings<br>Total residential population</td></tr>
<tr><td>Data sources, availability and quality</td><td colspan="2">Data on the quality of the housing stock hygienic conditions, and the number of people living in substandard hygienic conditions is rarely available from routine sources. In some countries, an approximation to this may be available</td></tr>
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| | from the census statistics (e.g. housing lacking basic amenities). Generally, however, data will need to be obtained by household surveys. Further developmental work is needed to harmonise the definitions and survey methodology.<br>Data on the total residential population and the number of dwellings should be available from national censuses and should be reliable. |
| Computation | The indicator can be computed on two levels. The first looks at the general provision of hygiene amenities, identifying dwellings not being equipped. The second looks at the quality of the amenities, identifying those where the quality level is not acceptable.<br>**1) Inadequate household hygiene conditions due to a lack of amenities**<br>Water supply lacking = (WS / PD) * 100<br>Toilet lacking = (T / PD) * 100<br>Shower/bath lacking = (SB / PD) * 100<br>Cooking facilities lacking = (CF / PD) * 100<br>Fridge lacking = (F / PD) * 100<br>with<br>WS = number of dwellings, or people living in dwellings without water supply<br>T = number of dwellings, or people living in dwellings without toilet<br>SB = number of dwellings, or people living in dwellings without shower/bath<br>CF = number of dwellings, or people living in dwellings without cooking facilities<br>F = number of dwellings, or people living in dwellings without fridge<br>PD = total number of dwellings, or total residential population<br>**2) Aggregated score of inadequate household hygiene conditions**<br>((WS + T + SB + CF + F) / PD) * 100<br><br>**3) Substandard household hygiene conditions due to low quality / functionality of amenities**<br>Substandard water supply = (SWS / PD) * 100<br>Substandard toilet = (ST / PD) * 100<br>Substandard shower or bath = (SSB / PD) * 100<br>Substandard cooking facilities = (SCF / PD) * 100<br>Substandard fridge = (SF / PD) * 100<br>with<br>SWS = number of dwellings, or people living in dwellings with substandard water supply<br>ST = number of dwellings, or people living in dwellings with substandard toilet<br>SSB = number of dwellings, or people living in dwellings with substandard shower or bath<br>SCF = number of dwellings, or people living in dwellings with substandard cooking facilities<br>SF = number of dwellings, or people living in dwellings with substandard |

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| | fridge<br>PD = total number of dwellings, or total residential population<br>**4) Aggregated score of substandard household hygiene conditions**<br>((SWS + ST + SSB + SCF + SF) / PD) * 100 |
| Units of measurement | Percentage |
| Scale of application | Local to national and with care international |
| Interpretation | Increasing percentage values show an increasing exposure of the housing stock / population to inadequate or substandard hygiene conditions.<br>It is important to note that the computation of the aggregated score is based on a simple aggregation of all dwellings with a reported lack, or reported substandard conditions of hygiene amenities. It is therefore necessary to keep in mind that it is often the same household or person that is affected by several shortcomings at the same time. A figure of 20% of households reporting problematic hygiene conditions may therefore be based on only 10% of all households. However, the indicator is efficient in assessing the quality of the hygiene conditions, and gives a true picture of the exposure to hygiene threats as persons living in dwellings with three missing hygiene amenities are also exposed to three various risks.<br>It is likely that in most countries, the existing data will only cover the existence / non-existence of the listed hygiene amenities. The results will therefore be an under-estimation of the problem of hygiene conditions, as not all existing hygiene amenities will provide adequate service.<br>In case both types of data (quantitative and qualitative) are available, the two indicator levels need to be distinguished. The aggregation of both dimensions will then allow a better understanding of the respective problems and whether action is needed for installing new amenities, or renovating existing systems.<br><br>Like all general-purpose indicators, this one needs to be interpreted carefully. The driving forces, which render a housing substandard may clearly vary as they are strongly interlinked with socio-economic factors. The definition therefore should enable flexibility for highly developed countries in setting their "reference levels" and at the same time ensuring between-country comparability |
| Opportunities for action | This is a housing indicator which has wide-ranging significance for policy. In providing a measure of the condition of the housing stock, it also acts as an indicator of health risks associated with basic sanitation, poor sanitation, and access to safe water inside the dwelling.<br>Opportunities for action include:<br>• Rehabilitation campaigns<br>• Supporting policies with provision of subsidies or grants/loans to fund remedial action<br>• Regulation to control standards for new housing construction<br>• Information campaigns targeting risk groups for inadequate and substandard hygiene conditions, aiming at behaviour changes and risk awareness |

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| Linkage with the other indicators | Crowding<br>Affordability<br>Diarrhoeal disease in children (WatSan indicator set) |
| Related web-sites | UN Human Settlements Programme: list of key urban indicators and database http://www.unhabitat.org/guo/index1.asp<br>UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America, 1998 http://www.unece.org/env/hs/bulletin/cnt2_e98.htm |

| Housing Safety and Accidents | DPSEEA |
|---|---|
| Issue | Housing and Settlements - Safety |
| Definition of indicator | Housing Safety and Accidents –<br>Accidental (unintentional) injuries and fatalities from external causes (including poisonings) in and around the dwelling, measured by the number of fatalities and injuries requiring medical attention related to dwellings; and if possible, related to dwelling characteristics. |
| Underlying definitions and concepts | Includes –<br>Fatalities and physical injuries resulting from falls, being struck by objects, cuts and lacerations from the structure or equipment.<br>Fatalities and burn injuries caused by unintentional dwelling fires.<br>Poisonings includes those resulting from unintentional or mistaken (or inquisitive in the case of small children) ingestion of medicines, cleaning products, pesticides etc.<br>Toxic effects of gases, whether poisoning or asphyxiation (eg, from carbon monoxide).<br>The dwelling should include the private internal and external space and any commonly shared internal and external space, associated with the dwelling.<br>Data on dwelling characteristics (eg, age, type) may provide a proxy for features likely to increase or reduce the risk of accidents.<br><br>Accident and poisoning data should be comparable to the following ICD-10[2] codes (or equivalent ICD-9) –<br>**Physical Injuries and poisonings**: ICD-10 codes S00 to T32; T36 to T60; T64 to T65; T71; and T75.1<br>**Fatalities:** death as a direct result of an accidental injury or poisoning<br>**External Causes:** ICD-10 codes W00 to X19; and X40 to X49<br>**Dwelling**: (ICD-10 fourth code .0) |
| Specification of data needed | Number of burns, physical injuries and poisonings requiring medical attention and which resulted from external causes in and around the dwelling per annum.<br>Number of fatalities resulting from external causes in and around the dwelling per annum.<br>Number of reported dwelling fires per annum.<br>Number of occupied dwellings.<br>Population living in dwellings.<br>Condition and/or characteristics of dwellings. |
| Data sources, availability and quality | Hospital and health records should provide data on medical attention given for injuries etc. National data could be extrapolated from samples. (Similar data collected and provided for Injury Surveillance System[3].) |

2 International Statistical Classification of Diseases and Related Health Problems, 10th Revision. (1992) WHO.

3 Previously European Home and Leisure Accident Surveillance System (EHLASS). Now part of the Injury Prevention Programme of the Public Health Programme.

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| | Mortality data from death certificates and coroners' records. Should be available locally and nationally.<br>Dwelling and population numbers from census and housing records. Should be available locally and nationally.<br>Dwelling condition and/or characteristics could be obtained through censuses and surveys. |
| Computation | **1) Health effects and injuries**<br>I per 10,000 N<br>where I is the total number of burns, injuries and poisonings from external causes, and N is dwellings (or population).<br>**2) Mortality**<br>F per 10,000 N<br>where F is the number of fatalities from accidents, poisonings or fires, and N is dwellings (or population).<br><br>As a secondary indicator – related to housing type, material and electrical safety – the number of deaths due to home fires is computed separately.<br>**3) Fire deaths**<br>Total: FF per 10,000 N<br>Relative: FF / FR * 100<br>where FF is the total number of fatalities from fires, N is dwellings (or population), and FR is the number of reported home fires. |
| Units of measurement | Number per 10,000 dwellings.<br>Or, number per 10,000 population. |
| Scale of application | Locally, regionally, nationally, and internationally.<br>Locally, it could be further refined as the Number of injuries, poisonings and deaths per dwelling type. |
| Interpretation | The computations for mortality and injuries aggregate all health effects of various home accidents, poisonings and fires. For each value, it is necessary to take a detailed look into the distribution of accident types leading to the health effects or death cases.<br>For death cases, the secondary indicator on home fire deaths gives already a first insight into the relevance of home fires for home accident fatalities. The percentage of home fire events leading to death shows the potential vulnerability of the housing stock.<br>Home accidents and fires can be a result (i) solely of the design, construction and maintenance of the dwelling; (ii) solely of the behaviour of the person (negligence, risk-taking, impaired mobility, impaired vision, lack of experience and knowledge); or (iii) a combination of (i) and (ii). The Indicator does not distinguish between these.<br>There may be under-estimations of the numbers of injuries and poisonings because of accessibility to medical services. However, at local, regional |

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| | and national levels, the Indicator can be used to monitor the effectiveness of actions and policies. Internationally, the Indicator may be less reliable because of reporting procedures and provision of medical services. |
| Opportunities for action | Campaigns and education programmes – to inform and make residents more aware of home safety and safety precautions/safe behaviour.<br>Control of new building – regulating for safer design and construction of new dwellings.<br>Controls for existing dwellings – legislation for enforcement and/or subsidies to ensure safety measures in existing dwellings. |
| Linkage with other indicators in the set | Crowding<br>Household hygiene |
| Related indicator sets | WHO Children's Environmental Health Indicators - http://www.who.int/peh/ceh/activities_indicators.htm<br>Sustainable Measures Indicators - http://www.sustainablemeasures.com/Database/Housing.html<br>http://www.sustainablemeasures.com/Database/Health.html<br>ISS – http://europa.eu.int/comm/health/ph_determinants/environment/IPP/ipp_en.htm |

| **Crime and fear of crime** | DPSEEA |
|---|---|
| Issue | Housing and Settlements - Safety |
| Definition of indicator | Crime and fear of crime –<br>Incidences and perception of theft, robbery and vandalism in dwellings and public spaces. |
| Underlying definitions and concepts | This indicator is based on:<br>▪ actual and reported crime by type;<br>▪ crime perception and fear of crime;<br>▪ how people act to face crime and its perception.<br>Measurements incorporate both the dwelling and its residential environment. |
| Potential health impact | Potential health impacts include general dissatisfaction, stress, sleep deprivation, shock, and physical injury. There can also be increased feelings of social isolation, such as a decline in social networks and contacts and the ‘shell’ effect (where more time is spent inside the home and less outside it), depression and phobias. |
| Vulnerable groups | Risks of crime and fear of crime vary between groups and are dependent on many factors, including age and socio-economic circumstances. For example, most vulnerable to heightened levels of anxiety about entry by intruders are those in poor health. Other vulnerable groups include children, the elderly, handicapped, and people living alone (mainly in urban areas with weak neighbourhood networks and isolated rural areas). Identifying those at high risk is important as it allows for those at risk to be defined and targeted with prevention techniques. |
| Specification of data needed | ▪ Number of thefts in dwellings;<br>▪ Number of crimes against people in public space (*includes: theft by pull, pickpocket, robbery in the public space*);<br>▪ Number of crimes in public space (*includes: theft by pull, pickpocket, robbery in the public space, theft in motorized vehicle, theft of motorized vehicle, damage against cultural patrimony, other damage, set fire to building or motorized vehicle*)<br>▪ Number of citizens reporting "fear of crime" inside the dwelling ("*How safe do you fell when walking alone after dark in the area?*");<br>▪ Number of citizens reporting "fear of crime" outside the dwelling ("*How safe do you fell when you are at home alone after dark?*")<br>▪ Number of dwellings with burglar alarms; number of dwellings with special door locks<br>▪ Total number of dwellings |

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| | ▪ Total number of persons |
| Data sources, availability and quality | ▪ Crime records / police statistics (related to events in and around the dwelling / living area)<br>▪ National census (housing and demographic data)<br>▪ Housing and social surveys including data on perception and fear of crime<br>▪ Victimisation inquiries |
| Computation | The indicator has three dimensions for computation:<br>**1) Crime rate = (T+PC+C) * 1000**<br>**Theft (T)** = Number of thefts in dwellings / total number of dwellings<br>**People crime (PC)** = Number of crimes against people in public space / total number of residents<br>**Crime (C)** = Number of crimes in public space / total number of residents<br><br>**2) Fear of crime = (FCH + FCR) * 100**<br>**Fear of crime at home (FCH)** = Number of citizens reporting fear of crime at home / total number of residents<br>**Fear of crime in residential area (FCR) =** Number of citizens reporting fear of crime in the residential environment / total number of residents<br><br>**3) Prevention steps = (DA + DL) * 100**<br>**Dwellings with alarms (DA)** = Number of dwellings with burglar alarms / total number of dwellings<br>**Dwellings with locks (DL)** = Number of dwellings with special door locks / total number of dwellings |
| Units of measurement | Per-one thousand<br>Percentage |
| Scale of application | Local, national or international |
| Interpretation | The number of crimes in dwellings and in public space allows the interpretation of general prevalence of crime.<br>The number of citizens reporting fear of crime at home and in the immediate environment allows the interpretation of people's perception of crime.<br>The number of dwellings with burglar alarms and with special door locks allows the interpretation of how people act to face crime and its perception.<br>The indicator can be useful for various investigations, for example of correlations between unemployment rates and crime incidence. |
| Opportunities for action | The indicator can base interventions to prevent and reduce crime and fear of crime in three main areas: |

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| | ▪ physical environment – orientation for urban planning and architectonic design, identification of areas that need rehabilitation (e.g., public space activities, lighting); grants/loans to fund security action;<br>▪ social intervention – identification of areas for special social intervention regarding security or safety problem;<br>▪ security forces – better management of police resources.<br>An improvement in these areas will have direct or indirect impact on resident's health and well-being. |
| Related indicators sets | Further information and method approaches are available at:<br>European Forum for Urban Safety (http://www.urbansecurity.org/)<br>Home Office (http://www.homeoffice.gov.uk/)<br>NSCR – Netherlands Institute for the study of crime and law enforcement (http://www.nscr.nl/overnscr/overviewE.htm)<br>United Nations Crime And Justice Information Network (http://www.uncjin.org/) |

# Annex 3

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ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# ANNEX 5-1

# REPORT OF WG FIRST MEETING

# BRUSSELS, 7-9 APRIL 2003

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

**World Health Organization Regional Office for Europe**

**European Centre for Environment and Health**
**Bonn Office**

EUROPE

# WHO technical meeting on noise and health indicators
# 07 - 09 April 2003 - Brussels, Belgium
# Meeting report

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

**Abstract**
This document summarizes the discussions and results of the meeting on noise and health indicators in the framework of the environmental health (EH) indicator project co-sponsored by the EC DG SANCO (SPC 2002300). The meeting was held in Brussels in April 2003. The meeting reviewed the existing indicators on noise and health and proposed a tentative core set of indicators to be integrated into the EH set. The experts agreed on the list of the indicators to be tested and on follow-up activities.

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## Background

Within the framework of the project co-funded by the European Commission (SPC 2002300): "Development of environment and health indicators for EC countries" and of the WHO ECOEHIS project, the WHO European Centre for Environment and Health, Bonn office convened an international meeting of experts in the field of environmental noise and health indicators, at the European Commission in Brussels.

The ECOEHIS[1] project has as its main objectives, measuring the environmental health situation, facilitating the planning, monitoring and evaluation of the programmes and action and making international comparisons.

This project includes several environmental themes and its main results are expected to be an internationally agreed set of indicators that will provide information for monitoring public health and environmental policies (including the NEHAPs – National Environmental Health Action Plans). These indicators should

i) be evidence-based, using the valid exposure – effect relationships;
ii) ii) have a clear structure for communicating to policy-makers how each part of the information is related to the various processes (determinants, population health effects, actions);
iii) iii) provide meaningful (population relevant) comparability, be usable at different geographical scales;
iv) iv) always use the existing data and suggest priorities for data collection; and
v) v) take into consideration the existing international indicator sets, avoiding duplication of efforts.

Noise is one of the targeted environmental health areas for the ECOEHIS. It deserves special attention.

1) The impact of noise on health has been for too long limited to annoyance and sleep disturbance, and other health effects have been overlooked;
2) There are new legal developments within the European Union that should be taken into account when designing indicators;
3) Trends in transport and urban planning are likely to lead to major changes in exposure; a new assessment of the existing indicators is needed to ensure they work for the new environmental situation;
4) Noise pollution and its abatement are rising up the agenda of both politicians and the public.

## Summary of the meeting

The WHO representative welcomed the participants and introduced the meeting objectives and the general agenda. Various speakers gave an overview of the ECOEHIS indicators process and the perspective of the DG Environment in the field of noise protection, followed by an introduction to the meeting objectives and work guidance.

Four invited speakers presented their papers, followed by discussions in plenary. More detailed analysis of these papers took place during working groups. On the last day the participants agreed on the conclusions and recommendations and on follow up actions for the testing of the indicators.

[1] For more information please consult "www.euro.who.int/eprise/main/WHO/Progs/EHI/Home"

## Objectives of the meeting

The meeting was convened in order to:

- Agree on the indicators that will best reflect and monitor the health impact of noise;

- Devise and plan the next steps for testing and piloting the noise and health indicators.

18 experts and an observer from DG environment joined WHO staff at the meeting. They came from different European countries and Institutions working in public health issues, environmental epidemiology, environmental psychology, health impact of noise on humans and more technical issues related to noise exposure (see participants list in Annex 3).

The following issues were proposed for discussion:

a) Health effects - What were the effects of noise exposure that can be expressed with indicators? How could the key role of human perception be accurately taken into consideration?

b) Metrics - We should have appropriate metrics to make international comparisons and be able to translate the « localities » of noise pollution at national level;

c) How could indicators best answer and translate the importance of noise pollution? How could we make sure that indicators will provide guidance to policy makers and help identify strategies?

d) Children and other Risk groups: Which were the population groups considered most vulnerable to noise exposure? What were the best indicators to translate their susceptibility? The indicators should as much as possible take into account the behavioural and physical differences of children;

e) Data, feasible and realistic indicators: The countries may already have the necessary data, or the resources for gathering them.

## Presentation of papers and discussion

The invited speakers presented their papers, which are annexed to this report.

- Driving forces, Pressure and state indicators (Prof Jacques Beaumont);
- Exposure and effect indicators of Environmental Noise (Prof Harmunt Ising);
- Noise Action indicators (Prof João Levy);
- Noise exposure and cognitive performance – children and the elderly as possible risk groups (Prof Staffan Hygge).

## General discussion and working groups

After having heard the presentations of the background papers and the subsequent discussion the experts split into two working groups - Working group 1 - Brainstorming of new ideas to construct an aggregated indicator; and Working group 2 - Establishment of the core and secondary set based on the proposed indicators. The groups' mandate was to explore in more detail the indicators proposed and to agree on the noise and health indicators that would be tested. The groups were also asked to study in depth the construction of an aggregated index that could convey the noise situation in one single figure.

**DRIVING FORCES, PRESSURE**

The proposed indicators were related to definition and perception of a soundscape according to the following characteristics:

- Site characteristics: described main land use (urban area, rural environment,...),
- Source quantities: it translated the existence of noise sources (it could be represented by a noise index as $L_{Aeq}$(6h-22h) or $L_{den}$ for example),
- Target: characterization of the environment where a noise exposure occurred (population, dwellings, urban area,...),
- Impact: took into account the effects of the noise emissions on the “target”. This implied an impact function, which could be a dose-response function.

Four types of zoning were proposed:

- Rural areas: not exposed to important transport traffic noise or/and to industrial noise;
- Quiet areas;
- Urban areas: mainly exposed to traffic noise;
- Urban areas mainly exposed to human noise (pedestrian street, leisure places, streets with restaurants, auditorium, cinemas, theatres,…)

Six indicators were proposed, the use of the metrics Lden, Lmax and Lnight was accepted.

1) Traffic flow of transport infrastructures: $Q = Q_{LC} + Q_T$,
2) Leisure facilities of the quarter: $N_{leisure}$ ,
3) Working attraction of the quarter: $N_{work}$,
4) Acoustical “cost” of different means of transport: SELP,
5) Sound emission class of a transport infrastructure (Noise level over 24 hours)
6) Emergences during sensitive periods: $N_{emerg}$.

Participants raised several questions about the representativeness of the indicators proposed and their feasibility (mainly because of data collection). The classification of the areas and the notion of emergences were considered interesting concepts. The “Acoustical energy of passenger mobility per person of the different means of transport” was endorsed by the group. The same concept was proposed for goods transport (of great importance during the night period). The site classification led to the proposal of an indicator “access to quiet areas”. The indicators final list endorsed by the group were the following:

**1. Acoustical energy of passenger mobility per person of the different means of transport**

This indicator aimed to compare different means of transport from an acoustical point of view. It represented a way of assessing the “acoustical cost per passenger” of each transport mean.

Main questions raised:

The main questions behind this indicator related to its applicability. What did it really mean in terms of health?

Solutions proposed:

Some changes were proposed by the group in order to make this indicator more transparent. It had been suggested that, for the time being, data for public transport should be analyzed carefully in order to avoid misunderstanding of the results.

It was agreed that the best and most reliable way to address all the questions and doubts this indicator generates would be during testing and when comparing the results for different situations.

The complete name of the indicator should be mentioned when presenting results and not the acronym SELP (as it may lead to confusion with SEL).

### 2. Acoustical energy per unit of freight transport

This indicator was based on the same concept as the previous one but for transport of freight. It would assist comparison between freight transport modes and attribute to each of them an "acoustical cost".

### 3. Population exposed to various noise level ranges per source (air, road, rail, industrial others) (Lden and L night)

This indicator follows the European metrics and suggested methodologies of the Environmental Noise Directive. The population exposed to different noise ranges of values calculated in $L_{den}$, $L_{night}$ are expressed as a total in number of people or as a percentage of the total population.

### 4. Population having access to quiet areas (within a 500 m distance)

This indicator was proposed at the meeting. One of the issues behind noise pollution was the ability of having access to quiet when desired.
Starting from a proposal of having zone classification, the group endorsed an indicator aiming at estimating the population accessibility to "quiet areas". The group proposed also to study the possibility of linking the number who have access to quiet places with the number of people exposed to various noise levels.

This indicator could be a tool at the disposal of local authorities who want to establish quiet zones.

The description of its computation is described in a more detailed way in the technical annex 1.

## EXPOSURE AND EFFECTS

The proposed indicators for effects were traditionally based on two main health effects of environmental noise exposure - annoyance and sleep disturbance – that were accepted as representative effects of environmental noise exposure. Other effects were also of importance and the working group agreed that they should be taken into account by one or more additional indicators. The major effects quoted were cardiovascular risk, interference with cognitive development, hearing impairment (inner ear damage) and tinnitus.

For annoyance and sleep disturbance the European Union and WHO had produced exposure-response curves that were suitable as a basis for these indicators calculation. For the other two effects WHO would convene sub-working groups to reach an agreement on the design for their computation.

The working groups endorsed the following indicators:

**5. Percentage of the population highly annoyed by traffic noise**

This indicator was one of the most consensual one but some questions about its "form" were raised.

Main questions raised:

Could we adopt the same indicator for both southern and northern countries, for rural and urban areas? Did cultural differences play a crucial role?

Solutions proposed:

The group generally agreed that there are differences and that they can be important. Nevertheless these differences were already taken into account in the exposure-response curves which had been developed so far, based on observation in different countries (including non-European).

**6. Percentage of population suffering from sleep disturbance**

The complexity of the phenomenon of "sleep disturbance" led to a specially detailed discussion for this indicator.

Main questions raised:

The question was raised of whether participants could think of any indicator that would convey increased risks of children's accidents caused by sleep deprivation and whether there were ways of quantifying the special vulnerability children have to noise. This idea was welcomed by the group, but for children at present, the evidence was still very scarce. Except for the impact on cognitive development, there was at present very little evidence that children are more vulnerable to noise, or differently affected, especially during night time. The group welcomed the idea that WHO, ECEH Bonn office would trigger the development of new research on this very important question.

The idea of having two indicators for sleep, one reflecting the sleep quantity and a different one to describe sleep quality was discussed by the working group. The first indicator would be based on the duration of the sleep and the second one on changes in sleep stages. This proposal of having two indicators would allow different effects of noise during night time to be taken into consideration, on one hand awakenings (very important for loud noise events) and on the other one arousals and changes in the sleep architecture (important for noise events with lower levels and continuous noise).

Solutions proposed:

Despite the very interesting points raised, the present state of knowledge did not allow proposals for new developments in the near future. Only the indicator of sleep disturbance based on the dose-effect curves resulting from the European Commission study "Night time transportation noise and sleep disturbance" could be used in a practical way. The current study established the relationships between noise-induced sleep disturbance and night-time noise exposure expressed in terms of $L_{night}$ for aircraft, road traffic and railway noise[2]. This appeared to be the best possible solution for the time being.

### 7. Attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure

The working group discussed the possibility of having ready for implementation an indicator describing cardiovascular morbidity and mortality that could be attributed to environmental noise exposure. The group endorsed the importance of this indicator and expressed special interest in having it as a part of the core set of indicators.

Main questions raised:

The main issue was to ensure that the existing knowledge and evidence on the attributable fraction of risk is sufficient at present to enable the indicator to be calculated.

Solutions proposed:

WHO offered to organize a sub meeting to establish agreement, if possible on the attributable fraction and then the indicator will be ready for testing. This meeting took place on 2 July 2003 in Rotherham, the Netherlands and the minutes will be available in the near future.

## ACTIONS

The indicators proposed for the Action stage were divided into three groups.
1) accurate characterization of the noise situation,
2) action plans, and
3) implementation of measures.
These three groups of actions could be "aggregated" into: characterization of actions, planning actions and effective implementation of the measures. Following this division the following indicators were proposed:

**First group** - characterization of actions which are needed:

I.1 - Noise Maps;
I.2 - Characterization and monitoring of the noise emission along roadways and railways;
I.3 - Sound characterization near airports.

**Second group** - Action plans:

II.2 - Existing land use plans paying consideration to acoustical aspects.

[2] "Elements for a position paper on night time transportation noise and sleep disturbance"- H.M.E Miedema; W. Passchier- H. Vos, January 2003.

**Third group** – implementation:

III.1 - Monitoring of implementation / installation of noise barriers;
III.2 - Monitoring of implementation / installation of noise insulation;
III.3 - Effective control of the motor vehicle fleet.

After discussion and in order to be as pragmatic as possible the indicators recommended for testing were:

**8. Ratio of the urban population living in areas covered with a noise map to the total urban population of the country.**

The population covered by a noise map would be assessed with this indicator. This would indicate a first level of political willingness to take action and describe the level of implementation of the EU directive.

**9. Population living in areas for which there is a plan taking into consideration the acoustical situation.**

The population living in areas where noise protection measures had been identified during the urban planning phase were in principle more protected that the ones living in areas where there was no acoustical concern. This proportion of the population was considered to be better "protected".

**10. Monitoring of implementation / installation of noise barriers**

The most common abatement measures for traffic noise were barriers. This indicator could provide a measurement of the efforts to protect population highly exposed. It did not imply that noise barriers were the ideal solution, but it recognised that they were a possible means for improving some very difficult situations.

**11. Effective control of the motor vehicle fleet**

Another current noise abatement measure consisted in reducing noise emissions at the source. Annual inspections of vehicles of 5 years old and more was a common practice. This indicator would provide information on whether Member States were considering noise emissions during the fleet inspections or not.

**12. Existing national legislation on maximum sound levels of leisure open air events and discotheques and its effectiveness**

The entire group considered hearing impairment and tinnitus resulting from exposure during leisure activities as major health effects. Since indicators on hearing impairment as a environmental noise health effect still needed a considerable amount of developmental work (see the description of the indicator below) an indicator showing the concern of a country about the prevention of such diseases was proposed by the WG and endorsed by the plenary.

This indicator was based on the existence and enforcement of measures regulating sound emissions of sound equipment during public events.

### 13. National Action plans on noise

In 1994, at the second ministerial conference on Environment and Health, Ministers committed their governments to prepare NEHAPs. Some countries have prepared thorough plans that take noise into consideration. The task would be to identify the Action plans, such as NEHAPs, that incorporate a developed noise component with a clearly stated health protection objective.
The indicator would then translate the commitment at political level to action on environmental noise reduction.

## AGGREGATED INDICATOR

### 14. Noise composed indicator (NCI)

This aggregated indicator was the result of the compilation of different indicators reflecting the various stages of the DPSEEA model, aggregated into a global one. It covered Pressure, Impact (Exposure and Effect) and Actions issues. The indicator was designed to reflect changes.

Concerns were raised about whether such an indicator would be easy to understand, or whether it would be necessary to disaggregate it quickly to explain the elements, for example to politicians.

Despite the risk of oversimplifying a complex issue it was been agreed to test this indicator and check if it was meaningful to non-experts.

Its calculation is described in detail in the technical table in the annex 1.

## FOR FURTHER DEVELOPMENT

### 15. Noise Environmental Burden of disease

This indicator would be based on the results of the WHO study on “Global estimates of burden of disease caused by the environment”. This study would express the noise fraction in *Disability-Adjusted Life Year* (DALY), combining the burden due to death and disability in a single index. Using such an index would allow the comparison with other environmental risk factors or diseases.

This indicator would estimate the burden of disease caused by environmental noise. It would provide an important input into development and evaluation of policies by the health sector. Other sectors, which directly managed or influenced noise, would then have a chance to see how their decisions and actions impact on the global health status of the population.

### 16. Cognitive development

One way to develop an indicator for the sound cognitive development of children, was to gather archive data on the performance of individual children through nationwide tests on a few subjects in the curriculum, for example on the national language, a foreign language, and mathematics and perhaps one or two more subjects. By following the same individuals from e.g. the ages of 9 to 13 years, and by comparing children in living areas and school areas which have been mapped in the EC-manner for noise levels and noise sources, it would be feasible to see whether noise was a strong determinant in children's cognitive development and whether different noise sources had selective impacts on different school subjects.

The participants noted that to some extent, this longitudinal approach of following the same children across several years, avoided the pitfalls of cross-sectional approaches, which were basically plagued by and confounded with socio-demographic background variables.

The RANCH study would also provide exposure effect relationships for chronic noise exposure and cognitive function and health, exposure effect relationships and children's psychological restoration and sleep. So the indicator was desirable but needed further development and work.

**17. Hearing impairment and tinnitus on young people**

Very loud sound/noise, such as at concerts, discotheques, car-races, computer-cafés and through headphones, was a health risk. Such loud noise could trigger the development of tinnitus and hearing impairment among young people. It was estimated that 20% of young people across Europe were overexposed to loud music and so at immediate risk of hearing loss of more than 25dB.

It was also important to gain recognition that loud noise is a public health issue affecting children and young people in order to create more political and community interest in all European Member States.

<u>Main questions raised:</u>

The definition of deafness and hearing impairment varies across Europe. An additional challenge was that the hearing loss caused by exposure to loud noise when young only starts to impair the quality of life many years after the exposure, during the ageing period when it comes on top of the normal biological degrading of hearing.

<u>Solutions proposed:</u>

The indicator was, by consensus, considered as very important. The current state of knowledge and the several difficulties behind the existing data mean that it is not ready for testing and further work on computation and data gathering should be developed. WHO was urged to develop work on this issue. One step than could be envisaged was checking the hearing and tinnitus on children entering and leaving school.

## Follow up actions

A protocol for testing the feasibility and validity of the proposed set of indicators would be established. Italy, France, Germany, Portugal, Czech Republic and Poland agreed in principle to proceed with the testing of some of the indicators. In addition to this all Member States were most welcome to send their success stories and good practices that will be made available to other countries. The testing was open to all countries and was expected to last three months.

A second meeting would be held once the indicator testing had been completed, to endorse and adopt the Environment Health Indicators in the noise and health field for the WHO EURO Region. This meeting was planned to happen at the earlier in November 2003.

Meanwhile two parallel meetings would be organized to agree on the attributable fraction of cardiovascular morbidity and mortality of environmental noise exposure and possibly on the cognitive indicators.

## Conclusions and Recommendations

The group endorsed the following conclusions and recommendations:

1. The DPSEEA model is a valid methodology for identifying the environmental noise – health indicators;

2. The effects on quality of life and the health end-points to be monitored with the core set indicators will cover:
   - Annoyance (as described in the EU environmental noise directive);
   - Sleep disturbance (as described in the EU environmental noise directive);
   - Cardio vascular morbidity and mortality (to be described by a WHO working group);
   - Effects on cognitive performance development (to be described by a WHO working Group).

3. The development of an indicator on hearing impairment and tinnitus was considered desirable but will require further developmental work;

4. When possible, the noise maps will be the preferred tool for providing data for the computation of exposure to various noise sources and levels;

5. When data exists in international regulations, standards or recommendations for the exposure-response for noise and health, it should preferably be used for the computation of the health impacts;

6. The group considered that further work was needed to reach a consensus on an indicator for cognitive development of children;

7. The meeting designed an aggregate noise index covering the different aspects of environmental noise and health, and agreed to proceed with testing it in order to assess its significance and its representativeness;

8. WHO should convene a group of experts to agree on the estimates for assessment of the relative risk for cardio-vascular diseases related to noise exposure, and to provide guidelines for computing the indicator;

9. WHO should coordinate the necessary work to review all the evidence substantiating the existence of health end points from sleep disturbance in view of the results of the latest studies;

10. If new evidence is found on sleep disturbance, WHO together with the Member States should undertake necessary work to validate the use of a "penalty" factor of 10 dB(A) to be added to night noise when computing Lden;

11. A protocol for testing the feasibility and validity of the proposed set of indicators will be established by the WHO. The secretariat was requested to send a letter to the Ministries of Health and Environment of the participants' countries to get a formal agreement on this protocol;

12. The issue of indoor noise and insulation should be addressed by the housing-health indicators group;

13. Success stories and examples of good practice should be collected and made available to Member States as this was felt to be a powerful means to help them to improve the noise conditions to which the population is exposed;

14. A second meeting will be held once the indicator testing has been completed, to endorse and adopt the Environment Health Indicators in the noise and health field for the WHO EURO Region;

15. The participants agreed on a preliminary set of indicators according to the following 3 groups for future testing and monitoring:

1) Ready and recommended for implementation
2) Ready, but not feasible for immediate implementation
3) Desirable though requiring further developmental work

| Title of the indicator | Work needed | Type | Category |
|---|---|---|---|
| Acoustical energy of passenger mobility per person of the different means of transport | Check significance and applicability when testing | 2 | Driving Forces Pressure |
| Acoustical energy per unit of freight transport | Check significance and applicability when testing | 2 | Driving forces, Pressure |
| Population exposed to various noise level ranges per source (air, road, rail, industrial others) | | 1 | State, Exposure |
| Population having access to quiet areas | Agreement on the definition of quiet area | 1 | State, Exposure |
| Percentage of the population highly annoyed by traffic noise | | 1 | Effects |
| Percentage of population suffering from sleep disturbance | Check the appliance of the EC dose-effect curves | 1 | Effects |
| Attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure | Agree on the attributable risk / meeting in July | 2 | Effects |
| Ratio of the urban population living in areas covered with a noise map to the total urban population of the country. | | 1 | Action |
| Population living in areas for which there is a plan taking into consideration the acoustical situation. | | 1 | Action |
| Monitoring of implementation / installation of noise barriers | | 1 | Action |
| Effective control of the motor vehicle fleet | | 1 | Action |
| Existing national legislation on maximum sound levels of leisure open air events and discotheques and its effectiveness | | 1 | Action |
| National Action plans on noise | | 1 | Action |
| Noise composed indicator (NCI) | Check significance and applicability when testing | 1 | Compose index |
| *Noise Environmental Burden of disease* | *Further development* | *2* | Effects |
| *Effectiveness of Implementation actions* | *Assess the effectiveness of the noise reduction actions How to measure them?* | *3* | Action |
| *Cognitive development* | *Further development* | *3* | Effects |
| *Hearing impairment / Tinnitus on young people* | *Further development* | *3* | Effects |

**Table 1** - Preliminary list of environmental noise-health indicators for testing

## Annex 1 – templates

| Acoustical energy of passenger mobility per person of the different means of transport | DPSEEA |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Acoustical level due to a passenger of a given transport mode |
| *Underlying definitions and concepts* | This indicator aims to facilitate comparison between different means of transport from an acoustical point of view. It assesses the "acoustical cost" of each transport mode.<br>**Passenger**: person inside a mean of transport (car, truck, motorcycle, public transport, plane, train,…),<br>**Transport mode**: any transport mode crossing important infrastructures, which are roadways (Average Annual Daily Traffic AADT exceeding 5000 vehicles per day), railways (AADT exceeding 50 vehicles per day) or airports (more than 20000 movement per year). |
| *Specification of data needed* | To assess a noise situation, one has to measure the SEL (Sound Exposure Level) of each vehicle passage.<br>The emission values of each transport mode studied are needed, as well as the vehicle speed (to assess the length of the passage).<br>An assessment of the total number of passengers using each transport mode is also required. |
| *Data sources, availability and quality* | To calculate the value of the actual indicator today, measurements will have to be performed. To forecast the changes on the noise situation, we will have to compute the SEL with the forecast data with a computation tool that will assess the propagation effects.<br><br>To calculate the number of passengers present in a given transport mode, there are several possibilities:<br>- roadways: with surveys and calculation of foreseen emissions made by local government or using physical count mode led during the study,<br>- railways and aircraft: with data given by those in charge of the infrastructure (i.e.: SNCF for French railways). |
| *Computation* | $SEL = 10 \log \left( \int_{t1}^{t2} \frac{p_A^2}{p_0^2} \cdot dt \right)$, $t_2$-$t_1$ = duration of a passage<br>The SEL is assessed at a based point (25m from the line, 4m above the ground for example)<br>N = number of passengers,<br>$SELP = 10 \log \left( \frac{1}{N} \int_{t1}^{t2} \frac{p_A^2}{p_0^2} \cdot dt \right)$ |
| *Units of measurement* | dB(A) per passenger |
| *Scale of application* | Local as well as national or international to compare different transport modes |
| *Interpretation* | This indicator represents the acoustical contribution of a passenger for one vehicle passage.<br><br>It may allow comparison between different alternatives of transport and provide a tool for transport management from the acoustical point of view. It may influence the choice of the transport mode which has "fewer costs" in terms of noise level per passenger. It could be a tool to support sustainable transport planning. |
| *Linkage with the other indicators* | *State, Exposure:* Population having access to quiet areas<br>*Effects:* Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>*Actions:* Monitoring of implementation / installation of noise barriers; Effective control of the motor vehicle fleet |
| *Related data, indicators* | French advocated proposals for sustainable development:<br>http://www.environnement.gouv.fr/actua/com2003/developpement_durable/default.htm |

| Acoustical energy per unit of freight transport | | DPSEEA |
|---|---|---|
| *Issue* | Noise | |
| *Definition of indicator* | Acoustical level due to goods transport | |
| *Underlying definitions and concepts* | This indicator is intended to facilitate comparisons between different means of goods transport from an acoustical point of view. | |
| *Specification of data needed* | For each transport mode, the computation of this indicator will need noise emissions data and quantity of goods transported (in tons) per day.<br>The SEL is computed using:<br>- the number of vehicles per day,<br>- the type of vehicle<br>- the speed of the vehicles,<br>- the type of lanes (for terrestrial transports).<br><br>The noise levels at various points (4m above the ground for example), are calculated using an acoustical software. | |
| *Data sources, availability and quality* | | |
| *Computation* | $\mathrm{SEL} = 10 \log \left( \int_{t1}^{t2} \frac{p_A^2}{p_0^2} \cdot dt \right)$, $t_2$-$t_1$ = duration of a passage<br>The SEL is assessed at a specific point (25m from the line, 4m above the ground for example)<br>T = number of tons,<br>$SELT = 10 \log \left( \frac{1}{T} \int_{t1}^{t2} \frac{p_A^2}{p_0^2} \cdot dt \right)$. | |
| *Units of measurement* | dB(A) per Ton | |
| *Scale of application* | Local as well as national or international to compare different transport modes | |
| *Interpretation* | It will allow comparison between different alternatives of freight transport providing a tool for transport management from the acoustical point of view. It could be a tool to support sustainable transport planning. | |
| *Linkage with the other indicators* | *State, Exposure*: Population having access to quiet areas; Population exposed to various noise levels ranges per source<br>*Effects:* Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>*Actions:* Monitoring of implementation / installation of noise barriers; Effective control of the motor vehicle fleet | |
| *Related data, indicators* | | |

| Population exposed to various noise levels ranges per source | DPSEEA |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Estimated population living in dwellings that are exposed to the noise ranges of values from different sources of environmental noise in urban areas and along major transport infrastructures |
| *Underlying definitions and concepts* | This indicator is a basic one for noise and health, it allows assessing exposure and has a direct connection to the other indicators.<br>The ranges of values are the ones from the European Directive (2002/49/EC of 29 June 2002) as well as the noise sources (road traffic, Air traffic, Railway traffic and Industry). |
| *Specification of data needed* | Estimation on the number of people exposed to the following ranges of values of $L_{den}$ in dB 4 m above the ground on the most exposed façade:<br><br>50-54, of $L_{den}$ in dB<br>55-59, of $L_{den}$ in dB<br>60-64, of $L_{den}$ in dB<br>65-69, of $L_{den}$ in dB<br>70-74, of $L_{den}$ in dB<br>> 75 of $L_{den}$ in dB<br>Separately for noise from road, rail and air traffic, and industrial sources. |
| *Data sources, availability and quality* | Noise mapping.<br>Sound characterization near airports.<br>Characterization and monitoring of the noise emission along roadways and railways.<br>Surveys. |
| *Computation* | The indicator can be computed for each range of values. Absolute number and percentage of the city population can be provided:<br><br>$100 * (N_a / N_t)$<br>Na – population living in dwellings that are exposed to each of the 6 bands of values<br>Nt – total population of the city |
| *Units of measurement* | Number of people exposed, and percentage of a given population exposed |
| *Scale of application* | National as well as local – residential settings |
| *Interpretation* | This indicator is the basis for the calculation of the total health effects as it provides data on exposure. It is the rough "portrait" of the noise situation on a country. |
| *Linkage with the other indicators* | *State, Exposure:* Population having access to quiet areas<br>*Effects:* Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>*Actions:* Monitoring of implementation / installation of noise barriers; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Noise composed indicator |
| *Related data, indicators* | European Directive 2002/49/EC of 29 June 2002 |

| Population having access to quiet areas (in a 500 m distance) | DP**S**EEA |
|---|---|
| Issue | Noise |
| Definition of indicator | Percentage of the population with pedestrian access to a public “quiet area” within a range of 500 metres |
| Underlying definitions and concepts | Quiet areas – areas where no major transport infrastructure and no industrial noise sources exist. It has to be freely accessible to the general public. It is not necessarily an open area. A quiet area is not a silent zone, it is more to be seen as a relaxing “soundscape” area.<br>It includes:<br><br>- Public parks, gardens, …<br>- Pedestrian areas<br>- Museums<br>- Riverside pedestrian paths<br>- Cultural centres, public libraries<br>- others, |
| Specification of data needed | Noise maps;<br>Identification of quiet zones and their area;<br>Surveys of population. |
| Data sources, availability and quality | The ideal way to calculate this indicator would be with a geographical support of the city. The quiet areas have to be identified and the population living within a 500m range has to be estimated trough the national census, questionnaires, data of the local authorities, … |
| Computation | $P_{qa} = [\left[\sum_{qa=1}^{n} P_{qai}\right] * 100 \ ] / P_{agglom}$<br><br>$P_{qa}$ – Population living in 500 m range from a quiet area<br>qa – quiet area a<br>$P_{qa}$ – estimated population living in the defined quiet areas<br>$P_{agglom}$ – total population of the agglomeration (town or city) |
| Units of measurement | Percentage of urban population |
| Scale of application | Local. Can be translated at national level |
| Interpretation | One of the issues behind noise pollution is also related to the ability of having access to quietness when desired. The assessment of the population exposed should be crossed with existence of quiet and easily accessible public spaces when people can “rest” and relax”<br><br>This indicator could also provide a tool for local authorities to establish quiet zones. |
| Linkage with other indicators in the set | *State, Exposure*: Population exposed to various noise levels ranges per source<br>*Effects:* Percentage of population suffering from sleep disturbance Percentage of the population highly annoyed by traffic noise at day time<br>*Actions:* Monitoring of implementation / installation of noise barriers; Population living in areas for which there is a plan taking into consideration of acoustical aspects;<br>*Aggregated indicator:* Noise composed indicator |
| Related indicator sets | |

| Population annoyance by traffic noise | | DPSEEA |
|---|---|---|
| *Issue* | Noise | |
| *Definition of indicator* | Percentage of the population annoyed and highly annoyed by traffic noise | |
| *Underlying definitions and concepts* | The indicator is based on the assumption that exposure to traffic noise (road, railway and air), induces annoyance in people who are awake. Using dose effect relationship (Miedema & Vos, 1998, 2002) the percentage of highly annoyed population can be calculated from exposure data. | |
| *Specification of data needed* | *Road traffic*:<br>Percentages of the population exposed to Lden = 50-54, 55-59, 60-64, 60-64, 65-69, 70-74, > 75 of Lden in dB<br>*Air traffic:*<br>Percentages of the population in areas with $L_{den}$ = 45-49, 50-54, 55-59, 60-64, 60-64, 65-69, 70-74, > 75 of Lden in dB<br>*Railway traffic:*<br>Percentage of the population exposed to $L_{den}$ = 55-59, 60-64, 65-69, 60-64, 60-64, 65-69, 70-74, > 75 of Lden in dB | |
| *Data sources, availability and quality* | National models of traffic noise exposure. Noise maps of cities. Maps of flight noise areas around airports.<br><br>Alternative: Representative annoyance surveys<br>Population: total population | |
| *Computation* | The indicator can be computed for each traffic noise source following the exposure-response formulas:<br><br>Exposure-response curves formulas (Miedema, 2002):<br>Aircraft: %A = 8.588*10-6 $(Lden-37)^3$ + 1.777*10-2 $(Lden-37)^2$+ 1.221 (Lden-37);<br>Road traffic: %A = 1.795*10-4 $(Lden-37)^3$ + 2.110*10-2 $(Lden-37)^2$+ 0.5353 (Lden-37);<br>Railways: %A = 4.538*10-4 $(Lden-37)^3$ + 9.482*10-3 $(Lden-37)^2$+ 0.2129 (Lden-37);<br><br>Aircraft: %HA=-9.199*10-5 $(Lden-42)^3$ + 3.932*10-2 $(Lden-42)^2$+ 0.2939 (Lden-42);<br>Road traffic: %HA = 9.868*10-4 $(Lden-42)^3$ - 1.436*10-2 $(Lden-42)^2$+ 0.5118 (Lden-42);<br>Railways %HA = 7.239*10-4 $(Lden-42)^3$ - 7.851*10-3 $(Lden-42)^2$+ 0.1695 (Lden-42).<br><br>Percentage of population annoyed = ∑%A * %Ci<br>Percentage of population highly annoyed = ∑%HA * %Ci<br>Ci – Noise band values (indicator “Population exposed to different noise level ranges) | |
| *Units of measurement* | Percentage | |
| *Scale of application* | National as well as local | |
| *Interpretation* | The indicator provides a measure of the long-term substantial disturbances related to exposure to traffic noise. | |
| *Linkage with the other indicators* | *Driving forces, Pressure*: Acoustical energy of passenger mobility in person of the different means of transport; Acoustical energy per unit of freight transport<br>*State, Exposure:* Population having access to quiet areas; Population exposed to various noise levels ranges per source;<br>*Actions:* Monitoring of noise actions - Population in cities with noise maps/Urban Population; Sound monitoring along major transport infrastructures in residential areas; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Monitoring of implementation / installation of noise barriers; Effective control of the motor vehicle fleet; National noise action plans;<br>*Aggregated indicator:* Noise composed indicator | |

| Sleep disturbance by night time environmental noise | | DPSEEA |
|---|---|---|
| *Issue* | Noise | |
| *Definition of indicator* | Percentage of the population with decreased quality of sleep | |
| *Underlying definitions and concepts* | The indicator is based on the assumption that exposure to night time noise from different sources, e.g. traffic (road, railway and air), industry, entertainment facilities, neighbours induces sleep disturbance. Underlying definitions are:<br>Sleep disturbance: arousal reactions and change of sleep phases, duration of deep sleep and REM sleep, irregularity of heart rate, stress hormone dysregulation, body movements; alternative: subjective quality of sleep and mood in the morning .<br>Population: total population surveyed | |
| *Specification of data needed* | Road traffic:<br>Percentages of the population exposed to Lnight = 40-44, 45-49, 50-54... dB(A)<br>Air traffic:<br>Percentages of the population in areas with Lnight = 35-39, 40-44, 45-49,... dB(A)<br>Railway traffic:<br>Percentage of the population exposed to Lnight = 45-49, 50-54, 55-59... dB(A)<br>Industry:<br>factories and manufacturers; building activities; load/ unload facilities<br>Entertainment:<br>bars/ discos ; luna-parks etc ; noisy sports<br><br>Total population of the sample surveyed | |
| *Data sources, availability and quality* | National models of traffic noise exposure. Noise maps of cities. Maps of flight noise areas around airports.<br><br>Alternative: Representative surveys of sleep disturbance | |
| *Computation* | The indicator can be computed for each traffic source of noise as:<br>∑ (Rlevel * Nlevel / Nt )<br>where Nlevel is the number of population exposed to a noise level category, R level is the regression coefficient of dose-effect-relationship (for arousals, awakenings and self-reported sleep disturbance) and Nt is the total number of population.<br><br>aircraft<br>$M_{night} = 0.000192 \text{ x } (L_{night} - \text{Ldiff1} - \text{Ldiff2})^{b}$<br>road<br>$\%HSD = 20.8 – 1.05L_{night} + 0.01486L_{night}^2$<br>$\%SD = 13.8 – 0.85L_{night} + 0.01670L_{night}^2$<br>$\%LSD = -8.4 + 0.16L_{night} + 0.01081L_{night}^2$.<br>rail<br>$\%HSD = 11.3 – 0.55L_{night} + 0.00759L_{night}^2$<br>$\%SD = 12.5 – 0.66L_{night} + 0.01121L_{night}^2$<br>$\%LSD = 4.7 – 0.31L_{night} + 0.01125L_{night}^2$.<br><br>a outdoor at the most exposed façade<br>b Ldiff1 : difference between $L_{night}$ en $L_{Aeq}$ most exposed façade. default = 0 dB(A)<br><br>Alternative: The indicator can be computed for each source of noise as:<br>100 * (Nsd / Nt )<br>where Nsd is the number of sleep disturbed people and Nt is the total number of surveyed population | |
| *Units of measurement* | Percentage | |
| *Scale of application* | National as well as local | |

| | |
|---|---|
| *Interpretation* | The indicator provides a proxy of the long-term health effects related to exposure to different sources of environmental noise at night time |
| *Linkage with the other indicators* | *Driving forces, Pressure*: Acoustical energy of passenger mobility in person of the different means of transport; Acoustical energy per unit of freight transport in tons.<br>*State, Exposure:* Population exposed to various noise levels ranges per source;<br>*Actions:* Monitoring of noise actions - Population in cities with noise maps/Urban Population; Sound monitoring along major transport infrastructures in residential areas; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Monitoring of implementation / installation of noise barriers; Effective control of the motor vehicle fleet; National noise action plans;<br>*Aggregated indicator:* Noise composed indicator |
| *Related data, indicators* | Dose-effect relations for transportation noise and sleep disturbance can be find in the study carried out by the European Commission. http://europa.eu.int/comm/environment/noise/home.htm .<br>http://europa.eu.int/comm/environment/noise/noisesleepdisturbance.pdf |

| Population in cities with noise maps / urban population | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | This indicator represents the percentage of population covered by noise assessment tools |
| *Underlying definitions and concepts* | Urban population – total population living in the areas that are covered by a noise map plus the ones that should be by law covered but are not yet. |
| *Specification of data needed* | Total population |
| *Data sources, availability and quality* | Local authorities<br>Authorities responsible by the noise mapping<br>Surveys of population; |
| *Computation* | Population living in an area covered with a noise map / total population living in areas that should be covered with a noise map according to the EC directive 2002/49/EC. |
| *Units of measurement* | Percentage |
| *Scale of application* | Local and national |
| *Interpretation* | This indicator will translate the level of implementation of noise mapping. It can be used for the calculation of the Noise Composed indicator |
| *Linkage with other indicators in the set* | *Driving forces, Pressure*: Acoustical energy of passenger mobility in person of the different means of transport; Acoustical energy per unit of freight transport in tons.<br>*State, Exposure:* Population having access to quiet areas; Population exposed to various noise levels ranges per source;<br>*Effects:* Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>*Actions:* Sound monitoring along major transport infrastructures in residential areas; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Monitoring of implementation / installation of noise barriers;<br>*Aggregated indicator:* Noise composed indicator |
| *Related indicator sets* | |

| Population living in areas for which there is a plan taking into consideration of acoustical aspects | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Percentage of the population living in areas covered by urban plan or another tool that takes into consideration the acoustical aspects. |
| *Underlying definitions and concepts* | The existence of planning for urban areas for controlling and reducing the level of environmental noise in areas with different land use.<br>The existence, the implementation and the strengthening of measurements and limits of noise levels for given types of sources.<br>The restriction of noise levels during nigh-time hours. |
| *Specification of data needed* | Demographic and geographical data of municipalities. |
| *Data sources, availability and quality* | The analysis of the Different Municipal Master Plans and of Urban Development Plans.<br>The analysis of strategic plans at the national level. |
| *Computation* | Population living in an area with acoustical planning / total population of the municipality or city in question |
| *Units of measurement* | Percentage |
| *Scale of application* | Local or national level. |
| *Interpretation* | This indicates the level of commitment for reducing the noise in sensitive or mixed areas at the planning stage.<br>The result of this indicator will also be a component of the Noise Composed indicator |
| *Linkage with the other indicators* | Driving forces, Pressure: Acoustical energy of passenger mobility in person of the different means of transport; Acoustical energy per unit of freight transport in tons.<br>State, Exposure: Population having access to quiet areas; Population exposed to various noise levels ranges per source;<br>Effects: Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>Actions: Monitoring of noise actions - Population in cities with noise maps/Urban Population; Sound monitoring along major transport infrastructures in residential areas; Monitoring of implementation / installation of noise barriers; Effective control of the motor vehicle fleet; National noise action plans<br>Aggregated indicator: Noise composed indicator |

| Installation of noise barriers according to the legislation of each country | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Monitoring of implementation / installation of noise barriers according to the legislation of each country, with the aim of reducing the population exposed to high noise levels. |
| *Underlying definitions and concepts* | Exposure to high noise levels affects health.<br>Acoustic barriers are applied for decreasing the level of noise to which the population is exposed. |
| *Specification of data needed* | Performed traffic surveys taking into account the following sources of noise:<br>Road traffic,<br>Air traffic,<br>Railway traffic,<br>Maritime traffic.<br>Total population. |
| *Data sources, availability and quality* | Noise assessment nearby the above-mentioned sources of noise. Local authorities. |
| *Computation* | Area of installed acoustic barriers / population exposed to high sound levels. |
| *Units of measurement* | $Km^2$/inhab. |
| *Scale of application* | National or local. |
| *Interpretation* | This indicator may serve as a basis for the implementation of future noise decrease regulations. |
| *Linkage with the other indicators* | Driving forces, Pressure: Acoustical energy of passenger mobility in person of the different means of transport; Acoustical energy per unit of freight transport in tons.<br>State, Exposure: Population exposed to various noise levels ranges per source;<br>Effects: Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>Actions: Monitoring of noise actions - Population in cities with noise maps/Urban Population; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Monitoring of implementation / installation of noise barriers; Effective control of the motor vehicle fleet; National noise action plans; |

| Effective control of the motor vehicle fleet | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Effective control of the motor vehicle fleet. |
| *Underlying definitions and concepts* | Exposure of the population to high noise levels affects health.<br>High levels of noise caused by motor vehicles affect the environment and consequently public health. |
| *Specification of data needed* | Survey of the number of motor vehicles undergoing annual inspection.<br>National motor fleet. |
| *Data sources, availability and quality* | Number of vehicles undergoing annual inspection must be provided by a reliable source (e.g. Ministries of Transport).<br>National competent entities on vehicle fleet. |
| *Computation* | 100 * the number of motor vehicles inspected / the entire number of motor vehicles. |
| *Units of measurement* | Percentage |
| *Scale of application* | National or International. |
| *Interpretation* | This indicator may serve as a basis for the implementation of future regulations concerning the reduction of noise caused by motor vehicles. |
| *Linkage with the other indicators* | Driving forces, Pressure: Acoustical energy of passenger mobility in person of the different means of transport; Acoustical energy per unit of freight transport in tons.<br>State, Exposure: Population having access to quiet areas; Population exposed to various noise levels ranges per source;<br>Effects: Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>Actions: Monitoring of noise actions - Population in cities with noise maps/Urban Population; Sound monitoring along major transport infrastructures in residential areas; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Monitoring of implementation / installation of noise barriers;<br>Aggregated indicator: Noise composed indicator |

| **Existing national legislation regulations on maximum sound levels of leisure open-air events and discotheques.** | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Composite index of ability to implement regulations, restrictions and noise abatement measures in leisure activities that involve high music levels |
| *Underlying definitions and concepts* | The existence, implementation and enforcement of regulatory instruments to control the exposure in leisure activities<br><br>Has the Member State adopted sound emission levels at open-air concerts or/and discotheques? What level?<br>Has the Member State adopted sound emission levels at discotheques? What level? |
| *Specification of data needed* | Evidence of existence and enforcement of regulations to regulate the music levels<br>Evidence of the appliance (control) of this regulations |
| *Data sources, availability and quality* | Information on the existence and scope of the legislation and efficiency |
| *Computation* | The index is computed as a sum of the following 6 variables<br><br>*SUM* (Ci)<br>Where:<br>i is the legislation<br>and Ci is the score for component i<br><br>For each component Ci the following scoring is accepted:<br><br>0 – Not existing, not clearly stated<br>1 – Clearly stated, partly (not) implemented or enforced;<br>2 – Clearly stated and obeyed, implemented and enforced<br><br>The full list of components (Ci) is as follows:<br>1 Legislation for maximum sound levels in discothèques, bars and other similar settlements<br>2 Building regulations for acoustical insulation of discothèques, bars and other similar settlements<br>3 Legislation for open-air events, fairs markets and similar<br>4.Regulations for music concerts<br>5 Local authorities required to deal with noise complaints<br>6.Regulations for music appliances (walkmans, Discmans, ..) and computer games |
| *Units of measurement* | Ordinal score (0 – 12) |
| *Scale of application* | National to international |
| *Interpretation* | This indicator provides a general measure of the ability to implement policies for reducing the exposure to leisure noise: an increase in the score should be taken as a broad indication of increased ability, a reduction the reverse. Like all compound indicators, however, this one needs to be interpreted with care for the final score is the sum of many different components: areas with the same indicator score, therefore, do not necessarily have the same capability profile. It is equally important to examine the components of the indicator and handle appropriately the lack of data before drawing conclusions.<br>. |
| *Linkage with the other indicators* | Effects: *hearing impairment and tinnitus* |
| *Related data, indicators* | |

| National action plans on noise | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Consideration of noise on the NEHAPs (National Environmental Health Action Plans) or existence of a specific noise action plan.<br>Consideration of noise as a health determinant in any Plan related to public health. |
| *Underlying definitions and concepts* | The indicator expresses the commitment at political level to solve noise problems. |
| *Specification of data needed* | Existence of the noise and health action plans |
| *Data sources, availability and quality* | Information on the existence of the action plans and their implementation and fields of action. |
| *Computation* | This indicator is calculated by the description of the existing plan and if it is:<br><br>0 – Not existing, not clearly stated<br>1 – Clearly stated, partly (not) implemented or enforced;<br>2 – Clearly stated and obeyed, implemented and enforced |
| *Units of measurement* | National or regional noise action plans |
| *Scale of application* | Ordinal score (0-2) |
| *Interpretation* | Noise is analyzed in almost every country as an environmental problem, but its consideration as a health determinant is still not always visible.<br>This indicator will express the commitment of the countries to abate noise. Other kinsd of national plans that take into consideration the relationships between noise and health should also be considered. |
| *Linkage with other indicators in the set* | *State, Exposure:* Population having access to quiet areas; Population exposed to various noise levels ranges per source;<br>*Effects:* Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>*Actions:* Population in cities with noise maps/Urban Population; Sound monitoring along major transport infrastructures in residential areas; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Monitoring of implementation / installation of noise barriers; Effective control of the motor vehicle fleet; Existing national legislation on maximum sound levels of leisure open air events and discotheques and its effectiveness; |
| *Related data, indicators* | |

| Noise Composed Indicator | DPS**EEA** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | This indicator takes into consideration different aspects of noise characteristics and several aspects of noise pollution. |
| *Underlying definitions and concepts* | Urban population – population living around major transport infrastructures or agglomerations with noise maps<br>Population exposed<br>Population protected |
| *Specification of data needed* | For the calculation of this indicator we will need the calculation of the indicators for action that were presented previously. |
| *Data sources, availability and quality* | Noise maps, sound characterization around airports<br>Demographic and geographical data of municipalities. |
| *Computation* | NCI=100*A1*A2*A3<br><br>A1=1- (Pexp above Lmax / Pexp)<br><br>A2=1- (Pexp/ Urbain People<br>A3=$a_1$*A31+$a_2$*A32+$a_3$*A33<br><br>A31=Population in cities with noise maps/ Urban Population<br>A32=Population in zoning site/Urban Population<br>A33=Population protected/Population exposed<br><br>$a_1$=0.2 $a_2$=0.2 $a_3$=0.6 |
| *Units of measurement* | 0-100 (0 is the worse case, 100 the better) |
| *Scale of application* | National and international |
| *Interpretation* | This indicator reflects the actions in terms of which part of the population is protected. The higher the indicator value bigger part of the population is protected by noise abatement actions. |
| *Linkage with other indicators in the set* | *Effects:* Percentage of population suffering from sleep disturbance; Percentage of the population highly annoyed by traffic noise at day time<br>*Actions:* Monitoring of noise actions - Population in cities with noise maps/Urban Population; Sound monitoring along major transport infrastructures in residential areas; Population living in areas for which there is a plan taking into consideration of acoustical aspects; Monitoring of implementation / installation of noise barriers |
| *Related indicator sets* | |

**For further development**

| **Cardiovascular morbidity and mortality attributable to environmental noise exposure** | DPSE**E**A |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Number of cases of cardiovascular problems attributable to noise exposure<br>Number of deaths attributable to noise exposure. |
| *Underlying definitions and concepts* | The indicator is based on the assumption that exposure to high levels of environmental noise (road and air), has the potential to increase the cardiovascular risk.<br>Population: total population exposed to various noise levels<br>Attributable fraction of risk for each noise levels interval<br>Mortality and morbidity of noise cardiovascular effects |
| *Specification of data needed* | Total population<br>Average number of strokes, dead from cardiovascular per 100 000 |
| *Data sources, availability and quality* | National models of traffic noise exposure. Noise maps of cities. Maps of flight noise areas around airports.<br><br>Disease mortality and morbidity<br><br>Attributable risk to the different noise levels |
| *Computation* | |
| *Units of measurement* | Number of cases |
| *Scale of application* | National as well as local |
| *Interpretation* | The indicator provides a measure of the population percentage with increased cardiovascular risk due to traffic noise exposure. |
| *Related data, indicators* | |
| Work needed | Review the evidence to agree on the value of the risk – meeting in July 2003 |

| **Assessment of disease burden associated with exposure to environmental noise** | | DPSE**E**A |
|---|---|---|
| *Issue* | Noise | |
| *Definition of indicator* | Assesses the burden of disease due to environmental noise at national or local level. Aggregated health impact indicator used by WHO for several environmental risks. | |
| *Underlying definitions and concepts* | This indicator will estimate the burden of disease caused by the environment, providing an important input to the rational development and evaluation of policies by the health sector and activities of other sectors that directly manage or influence the determinants of health. Additional information required for the rational development of such policies and activities includes the effectiveness and cost-effectiveness of interventions, the availability of resources and the type of policy environment.<br>Disease burden can be expressed in *Disability-Adjusted Life Year* (DALY), combining the burden due to death and disability in a single index. Using such an index permits the comparison of the burden due to various environmental risk factors with other risk factors or diseases. (WHO, 2003) | |
| *Specification of data needed* | Definition of the risk factor (e.g. exclusion of occupational risk factors, loud music, noise from neighbours etc.) Requires also a discussion on applicability | |
| *Data sources, availability and quality* | | |
| *Computation* | | |
| *Units of measurement* | DALYs | |
| *Scale of application* | National and international | |
| *Interpretation* | | |
| *Linkage with other indicators in the set* | | |
| *Related indicator sets* | | |
| *Work needed* | Waiting for the WHO headquarters publication | |

| Hearing impairment on young people/ people suffering from tinnitus | DPSE**E**A |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Percentage of the population under 25 years old with hearing impairments |
| *Underlying definitions and concepts* | The indicator is based on the knowledge that the risk of noise induced permanent hearing impairment increases with increasing noise dose if certain acoustic limits are exceeded. Since it is difficult to determine the percentage of critically exposed population, it is suggested that hearing symptoms should be used, that are related to inner ear damage or behaviour, which are known to be related to dangerous noise exposure. |
| *Specification of data needed* | Probably data will only be available through specific surveys in countries where there is a systematic hearing check for military service or for example, when children enter and leave school. |
| *Data sources, availability and quality* | ? |
| *Computation* | Number of people below 25 years old having hearing deficiency of more than 30 dB(A) in at least one ear in the range of 1 to 4000 Hz<br>Number of people below 25 years old suffering of tinnitus |
| *Units of measurement* | Percentage and number of cases |
| *Scale of application* | |
| *Interpretation* | |
| *Linkage with other indicators in the set* | |
| *Work needed* | |
| *Related indicator sets* | |

## Annex 2 –Participants List

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**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 5-2

# Report of WG Second Meeting

# Bonn, 18-19 December 2003

**DEVELOPMENT**
**OF**
**ENVIRONMENT AND HEALTH INDICATORS**
**FOR**
**EUROPEAN UNION COUNTRIES**

**ECOEHIS**

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

**Development of Environment and Health Indicators for EU Countries (ECOEHIS)**

WORLD HEALTH ORGANIZATION
EUROPE

# WHO technical meeting on noise and health indicators Second meeting - Results of the testing and piloting in Member States

Bonn Germany, 18th, 19th December 2003
Summary report

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

# ABSTRACT

At this second meeting on noise and health indicators held as part of the environmental health indicator project (ECOEHIS) ) co-sponsored by EC DG SANCO (SPC 2002300), environment and health indicators in the noise and health field were agreed for the WHO European Region. This followed participants' reports on their own countries' data on noise and their preliminary testing of indicators. A main set of indicators was proposed on the exposure of the population, self-reported effects of noise on health, national legislation on sound levels for open-air events, and the attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure. A second set included national action plans for noise and the enforcement of the EU Directive. The meeting recommended that EU legislation covering motor vehicles should include standardized acoustical levels, including for second-hand vehicles. The meeting also agreed that it would be useful for WHO to draw up recommendations on maximum sound levels for outdoor events.

**Keywords**

NOISE
ENVIRONMENTAL HEALTH
INDICATORS
EUROPEAN UNION

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# Background

Within the framework of the European Commission's Health Monitoring Programme, and more specifically the sub-programme on the development of environment and health indicators for European Union countries (ECOEHIS), the WHO European Centre for Environment and Health, Bonn Office, is developing a system of **Environmental Noise and Health** indicators based on internationally agreed methodology and comparable data. These indicators are intended to describe the state of environmental health; to inform decision makers; monitor programmes and allow for comparisons nationally and internationally. The project is co-sponsored by the EC DG SANCO (SPC 2002300).

A group of experts met in Brussels in April 2003 and discussed proposals for the noise and health indicators. They agreed upon a first set, which were then proposed to health and environment authorities in the WHO European Region for piloting and testing.

As a result of the first meeting, a protocol for testing the feasibility and validity of the proposed set of indicators was established. Experts from Germany, Italy, Poland, Portugal, the Netherlands, Switzerland and the United Kingdom, looked at their national data and tested the indicators that the secretariat requested (see annex 3). In addition a letter with the indicators and the template for testing was sent to European health ministries for informal consultation. This intermediate phase was of crucial importance to filter out the first proposed set and set up the meeting discussion.

The indicator on cardiovascular morbidity and mortality attributable to environmental noise exposure was discussed in depth with a Dutch meta--analysis and the German example of calculation as background (annex 1) and agreement was reached on the fact sheet's final shape.

# Objectives of the meeting

This meeting was convened to report on and discuss the results of the testing for endorsement and adoption of the final set of the environment and health indicators system in the noise and health field for the WHO European Region. The following points were discussed during the meeting:

- Availability of data for the calculation of indicators and their usefulness and relevancy for Member States;
- Which indicators should be proposed to the European Commission;
- The relevancy and feasibility of the indicator on cardiovascular morbidity and mortality attributable to environmental noise exposure.

# Meeting discussion - Indicator by indicator

The meeting was planned to have an indicator-by-indicator discussion. The experts who tested the indicators presented their results to the group and after a short discussion about the participants' opinion on the indicators' relevancy and the conclusions of how to proceed took place.

**1st Indicator - Acoustical energy of passenger mobility per person of the different means of transport**
**2nd Indicator - Acoustical energy per unit of freight transport**
The participants agreed to drop these two indicators. The testing has demonstrated that they are very difficult to calculate. The concept behind them could be interesting, but as proposed they are not meaningful to policy-making; they are probably best used for research purposes in the transport area.

**3rd Indicator - Population exposed to various noise level ranges per source (air, road, rail transport, industrial, others**)
The participants were all of the opinion that an indicator on exposure is essential. The way this indicator was designed did not appear to be the most efficient one. The following points should be taken into account:

1. Data on indoor levels do not exist and will not be available in the near future. Therefore only outdoor levels should be considered.
2. The noise maps as described in the EU directive will not be fully operational all over Europe within 10 years and even then will only cover a small part of the population (e.g in Italy the population covered by noise maps will represent 23% in 2012)
3. Acoustical Surveys may be a better tool for evaluating exposure
4. Calculate the absolute number of people exposed in a country
5. Pay attention to the exposure of specific groups (e.g Children, schools, ..)
6. Exposure to high levels only could be the relevant indicator

An indicator calculation was fine-tuned (see list of indicators) and the experts agreed that if a country already calculates an indicator of exposure with another methodology, it should report its results with a detailed explanation of the methodology used.

**Note on experts' opinions**

Italy
- The noise maps as described in the EU directive do not give an accurate assessment of exposure, as the maps are not representative of the country situation
- A good acoustical survey would be better

Austria
- The data exists: the Austrian Environmental report uses a combination of noise maps and surveys
- The only places where there is a measurement of the exposure are those with the worst exposure

- The LAeq does not always follow people's perception (e.g. noise barrier, the level is the same but people feel better)
- One way of having a feasible indicator would be to focus on the "hot spots and risk groups"

Portugal
- Only a very limited part of the country will be covered by noise mapping according to the EU directive
- Surveys exist for the cities that will have noise mapping

Germany
- An empirical research model is available for exposure calculation for road and rail

The Netherlands
- A model for national basis exists for road, rail and air based on databases of traffic, not measurements

**Conclusions**
The way the indicator for exposure was designed through noise maps seems not to be the best possible way to acquire the information needed.
As it is a very important indicator and as it has to be considered in the main set, a new proposal is made.

**4th Indicator - Population having access to quiet areas**
The participants agreed to drop this indicator. The piloting phase has shown:
1. Several problems with the definition of a quiet area.
2. Experts think that it is not attractive as it is. If it was, conveying for instance the surface of green areas per capita, it can give the wrong messages.
3. The calculation requires data which are sparse in most of the countries which did the piloting.

A recommendation could be drawn from the meeting to local authorities emphasizing the fact that quiet zones are important and that the population should be able to "rest" from noise.

**5th Indicator – Percentage of the adult population annoyed by traffic noise**
This is a very important indicator. Dose-effect curves are not the best method for the computation. Keep the indicator but collect information from regular surveys. Most countries have these data available.

**6th Indicator Percentage of the adult population suffering from sleep disturbance**
As for annoyance, the group found the indicator a very important one, but with the same problem as with the annoyance indicator. It would be better to use survey data. Modify the title to "self-reported sleep disturbance".

It was recommended by the group to merge these two indicators into a "self – reported noise effects" The template has been fine-tuned accordingly to expert recommendations.

The expert from Hungary commented that surveys and punctual measurements are the only way to calculate this indicator.

**8th Indicator - Ratio of the urban population living in cities covered by a noise map to the total urban population of the country**

This was seen as a very interesting indicator to indicate the willingness of a country to solve its noise problems. It has to be fine tuned. This indicator could be part of the "secondary" set.

It has been suggested that this indicator is composed of two figures, showing how much the countries are following the directive and the percentage of population covered by a noise map.

- Population covered with noise maps according to the definition given by the EU directive as a proportion of the total population that should be covered according to the directive (this indicator gives an implementation rate of the directive).

- Population living in areas covered with a noise map or covered by a noise plan as a proportion of the population living in urban areas according to EUROSTAT (this indicator shows how much further countries are willing to go than the requirements of the directive in the field of noise planning).

**9th Indicator - Population living in cities for which there is a plan taking into consideration the acoustical situation**

The participants agreed to drop this indicator from the main list because it does not say much about a country. But since its calculation is quite easy with land planning zoning, it will be merged with the indicator 13 (the discussion around it is described in this indicator).

**10th Indicator - Monitoring of implementation / installation of noise barriers**

The participants agreed to drop this indicator, because its calculation is difficult and it does not represent the situation in a country. In addition it is misleading, as noise barriers are only one very limited way to protect against noise. In addition the message should be to give priority to the prevention of noise emission reduction and not to the development of noise insulation measures!

**11th Indicator - Effective control of the motor vehicle fleet**

Interesting concept in most countries, the regular and legally binding technical control of cars does not include a noise control. The group agreed that it should not be an indicator but there should be a recommendation to the EC and Member States saying that standards for inspecting the noise emitted by vehicles should be considered in the already existing legislation.

**12th indicator -Existing national legislation on maximum sound levels of leisure open air events and discotheques and its effectiveness**

The group considered this indicator very interesting and useful. Its utility is mainly for country comparison and to encourage political action. However. the experts suggested some changes on its design in order to separate indoor and outdoor regulations. The question of complaints and follow-up of the cases (e.g. bars closing) in order to evaluate the effectiveness of the legislation was also discussed, but the group reached the conclusion that with a 3 scale this would be a minor issue.

The group strongly advised WHO to draw up a recommendation of maximum sound levels on these type of events (specially for indoors).

**13th indicator - National Action Plans on noise**
Participants were of the general opinion that this is a useful and pertinent indicator, but not so understandable in its current definition. The group proposed merging it with the indicator No. 9. The two indicators were merged and its template is presented below.

**14th indicator - Noise composed indicator (NCI)**
The participants agreed to drop the 14th indicator from the set. It was considered too complicated. The priority is having good data on exposure.

**Reporting of noise success stories**
When reporting on the indicators the group agreed to add some examples of good practice regarding noise abatement at country or local level. It is important to be in a position to invite countries to share good practices. This also would indicate the current concern with noise and the encourage going beyond legislation alone to promote healthier environments.

**7th Indicator - Attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure**
This indicator was discussed at the end of the set due to the difficulties that had been encountered when developing it. The discussion had as starting point the meta-analysis of Netherlands's colleagues from RIVM. The difficulties were due to the uncertainty deriving from a lack of very "solid" studies. The existence and the importance of such an indicator were deeply discussed. The group agreed that it is a very important health-related indicator and is crucially important in political terms. The template was then redrafted according to the comments made. Its final form is attached.

# Conclusions and Recommendations

- The group agreed on and endorsed the following indicators for the **main set** (see following tables):

    1. Population exposed to various noise level ranges per source (air, road, rail, neighbours, and industrial others); **[Exposure indicator]**
    2. Self reported noise annoyance and sleep disturbance; **[Effect indicator]**
    3. Attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure; **[Effect indicator]**
    4. Existing national legislation regulations on maximum sound levels outdoor and indoor leisure events. **[Action indicator]**

- The group agreed on and endorsed the following indicators for the **secondary set** (see following tables) that were included in the main set after the ECOHIS partners in the project meeting in Luxembourg:

    1. Existing national legislation regulations on maximum sound levels outdoor and indoor leisure events; **[Action indicator]**

    2. Willingness to enforce and implement the Environmental noise European Directive and to enforce noise abatement measures. **[Action indicator]**

- Local authorities should consider quiet and silent zones when planning neighbourhoods. Having a place to "escape" from noise could be very important in reducing people's daily stress related to noise exposure;

- The European Commission is invited to review its legislation on vehicles technical inspection and to standardize acoustical limits for used vehicles;

- WHO should coordinate the necessary work to review all the evidence regarding leisure exposure and give guideline values for maximum sound levels during leisure activities that involve high music levels for indoor and outdoor leisure events.

**Noise and Health Indicators resulting from the 1st meeting – summary of the discussion**

| N° | Name of the indicator | Results |
|---|---|---|
| 1 | Acoustical energy of passenger mobility per person of the different means of transport | Dropped from the set |
| 2 | Acoustical energy per unit of freight transport | Dropped from the set |
| 4 | Population having access to quiet areas | Dropped from the set |
| 10 | Monitoring of implementation / installation of noise barriers | Dropped from the set |
| 11 | Effective control of the motor vehicle fleet | Dropped from the set |
| 14 | Noise composed indicator (NCI) | Dropped from the set |
| 7 | Attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure | Yes, but needs adjustment |
| 3 | Population exposed to various noise level ranges per source (air, road, rail, industrial others) | Yes, but needs adjustment |
| **5** Percentage of the population annoyed by traffic noise.<br>**6** Percentage of population suffering from sleep disturbance | | Merged into one indicator |
| 12 | Existing national legislation on maximum sound levels of leisure open air events and discotheques and its effectiveness | Yes, but needs adjustment |
| **9** Population living in areas for which there is a plan taking into consideration the acoustical situation; **13.** National Action Plans on noise | | Merged into one indicator<br>Not part of the main set |
| 8 | Ratio of the urban population living in areas covered with a noise map to the total urban population of the country. | Yes, but needs adjustment<br>Not part of the main set |

**Table 1 – Results of the Second meeting on noise and health indicators**

# Methodology templates on the noise and health indicators

1. Population exposed to various noise level ranges per source (air, road, rail, neighbours, and industrial others)

2. Self reported noise annoyance and sleep disturbance

3. Attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure

4. Existing national legislation regulations on maximum sound levels outdoor and indoor leisure events

5. Existence and effectiveness of national, regional or local action plans for noise reduction

6. Willingness to enforce and implement the Environmental noise European Directive and to enforce noise abatement measures

| Population exposed to various noise levels ranges per source | DPSEEA |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | This indicator is in line with the requirements of the European **directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002**<br>Estimated population living in dwellings that are exposed to the noise ranges of values from different sources of environmental noise in urban areas and along major transport infrastructures<br><br>Taking into consideration the existing situation on European countries regarding data collection and the diversity of methodologies and models, the data needed for computing this indicator can be derived from any of the models existing in countries. In addition if a country has only the exposure for cut-off points (e.g. high noise levels) they should report these data and explain this in a special note.<br>When models are used to provide the data, the model assumptions and calculation method should described in detail. |
| *Underlying definitions and concepts* | This indicator is a basic one for noise and health, it allows assessing exposure and has a direct connection with the other indicators.<br>The ranges of values are the ones from the European Directive (2002/49/EC of 29 June 2002) as well as the noise sources (road traffic, Air traffic, Railway traffic and Industry). |
| *Specification of data needed* | Estimation on the number of people exposed to the following ranges of values of $L_{den}$ in dB 4 m above the ground on the most exposed façade:<br>Lden<br>55-59, of $L_{den}$ in dB ; 60-64, of $L_{den}$ in dB ;65-69, of $L_{den}$ in dB<br>70-74, of $L_{den}$ in dB ; > 75 of $L_{den}$ in dB<br>Separately for noise from road, rail and air traffic, and industrial sources.<br><br>L night<br>50-54, 55-59, 60-64, 65-69, > 70,<br>Separately for road, rail and air traffic, and for industrial sources. |
| *Data sources, availability and quality* | Acoustical surveys; noise mapping; estimation models<br>Sound characterization near airports.<br>Characterization and monitoring of the noise emission along roadways and railways. |
| *Computation* | When possible the methodology of the Directive 2002/49/Ec should be followed, if not the country could use their one models to estimate exposure and report their methodology |
| *Units of measurement* | Number of people exposed, and percentage of a given population exposed |
| *Scale of application* | National as well as local – residential settings |
| *Interpretation* | This indicator is the basis for the calculation of the total health effects as it provides data on exposure. It is the rough "portrait" of the noise situation on a country. |
| *Related web sites* | Noise DG environment policy : http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit : www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |
| *Policy/ regulatory context* | European directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 |
| *Reporting obligations* | Practical compliance: Member States report on the implementation of limit values of Lden and Lnight for some sources of noise<br>*Member States inform regularly the EC of major roads, railways, airports and agglomerations with more than 250,000 inhabitants*<br>Environmental data: noise maps to assess the number of people annoyed and sleep disturbed throughout Europe. MS apply Lden and Lnight |

| **Self reported noise annoyance and sleep disturbance** | DPSE**E**A |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | The easiest effects of noise to assess are annoyance and self-reported sleep disturbance, because these effects are measured by standardised questions in a population survey. They are not the most serious and health end points but they give a good picture of the existing situation and alert for more serious problems.<br><br>Percentage of the population reporting annoyance by certain sources of environmental noise<br>Percentage of the population with self-reported sleep disturbance by environmental noise |
| *Underlying definitions and concepts* | The indicator is based on the assumption that exposure to high levels of noise originated from different sources, e.g. traffic (road, railway and air), industry, entertainment facilities, induce general annoyance and sleep disturbance. Underlying definitions are:<br>**Annoyance**: “a feeling of displeasure associated with any agent or condition, known or believed by an individual or group to adversely affect them” (cf. Guidelines for Community Noise: B. Berglund, T. Lindvall, D. Schwela Ed, WHO, Geneva, 1999). It can be assessed by standardised questionnaires.<br><br>**Sleep disturbance**: self-reported noise-induced sleep disturbance and increase of noise-induced awakenings during the habitual sleeping time. Sleep disturbance is seen as a health effect on its own, but may cause also after effects like mood changes, fatigue (and there with related accidents) and other impaired functions.<br>**Population:** total population surveyed |
| *Specification of data needed* | Self-assessment of the extent of annoyance and self-reported sleep disturbance on a standardised questionnaire by source.<br>The subdivision of the source type can be the following:<br>***Road traffic:***<br>▪ highway<br>▪ urban road<br>▪ vans<br>▪ heavy trucks<br>▪ motor bikes<br>▪ mopeds/ scooters<br><br>***Air traffic:***<br>civil aviation<br>military flight<br>general aviation<br><br>***Railway traffic:***<br>▪ passenger trains<br>▪ freight trains<br>▪ metro<br><br>***Industry:***<br>▪ factories and manufacturers<br>▪ building equipment<br>▪ load/ unload facilities<br><br>***Neighbourhood noise***<br><br>Total population of the sample surveyed |
| *Data sources, availability and quality* | Data are collected by surveillance of a representative sample of the population, preferably by trained interviewers, although in some circumstances a telephone survey is a viable alternative. Postal surveys are not recommended. Preferably only persons living longer then one year on the address should be selected.<br>Follow ICBEN’s standardized annoyance and self-reported sleep disturbance questionnaires and scales. More information in<br>http://www.xs4all.nl/~rigolett/ENGELS/quest/questionnaire.htm . |
| *Computation* | **Annoyance**: the indicator can be computed for each source of noise as:<br>$100 * (N_a / N_t)$<br>where $N_a$ is the number of annoyed people and $N_t$ is the total number of surveyed population<br>Two numerical scales can be used<br>A 10 number scale |

| | |
|---|---|
| | The number of **annoyed people** is counted by adding the subjects **scoring 6, 7, 8, 9 and 10**.<br>The number of **highly annoyed people** is counted by adding the subjects **scoring 8, 9 and 10**.<br><br>or a 5 point verbal scale.<br>The number of **annoyed people** is counted by adding the subjects **scoring 3, 4, 5**<br>The number of **highly annoyed people** is counted by adding the subjects **scoring 4 and 5**.<br><br>Information on annoyance should be supplied with description on grouping of the noise sources<br><br>**Sleep**: the indicator can be computed for each source of noise as:<br>$100 * (N_{sd} / N_t)$<br>where $N_{sd}$ is the number of sleep disturbed people and $N_t$ is the total number of surveyed population<br>The number of **sleep-disturbed people** is counted by adding the subjects **scoring 6, 7, 8, 9 and 10**.<br>The number of **highly sleep-disturbed people** is counted by adding the subjects **scoring 8, 9 and 10**.<br>Information on sleep disturbance should be supplied with description on grouping of the noise sources |
| *Units of measurement* | Percentage |
| *Scale of application* | National as well as local – residential settings |
| *Interpretation* | The indicator provides a measure of health effects related to exposure to high levels of environmental noise by some sources when the survey is carefully designed and the above methodology is used. |
| *Related web sites* | Noise DG environment policy : http://europa.eu.int/comm/environment/noise/<br>Position paper on dose/effect relationships<br>http://europa.eu.int/comm/environment/noise/noise_expert_network.pdf<br>WHO noise and health Unit : www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf<br>ISO/TS 15666:2003 Acoustics -- Assessment of noise annoyance by means of social and socio-acoustic surveys: http://www.iso.ch/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=28630 |
| *Policy/ regulatory context* | European directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 |
| *Reporting obligations* | Practical compliance: MS report on the implementation of limit values of Lden and Lnight for some sources of noise<br>Environmental data: noise maps to assess the number of people annoyed and sleep disturbed throughout Europe. MS apply Lden and Lnight<br>Description of policy measures: strategic noise maps showing the situation for all agglomerations with more than 250,000 inhabitants, all major roads, railways and airports<br>MS adopts measures to ensure regular strategic noise maps for all agglomerations in particular to the most important areas as established by the strategic noise mapping<br>MS ensure action plans by the competent authorities to address priorities on exceeding limit values or other criteria for the agglomerations, major roads and railways.<br>Policy effects and effectiveness: EC reports to EU Parliament and Council on the measures relating to noise sources |

| Attributable fraction of risk of cardiovascular morbidity and/or mortality to noise exposure | DPSE**E**A |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Number of cases of cardiovascular problems attributable to noise exposure<br>Number of deaths attributable to noise exposure. |
| *Underlying definitions and concepts* | This indicator is based on the evidence of experimental noise effects research carried out in the laboratory that noise acts as a stressor on the human organism.<br>Epidemiological data exists for road traffic noise and cardiovascular endpoints, including high blood pressure and ischaemic heart diseases.<br>This template is based on 2 examples of calculation presented in the annex and it is a simplified model was used because it applies to very high noise levels.<br>For a more detailed calculation for the different calculation please use the Dutch methodology described in the annex 1.<br><br>Concepts:<br><br>1) The biological plausibility of an increase in cardiovascular risk due to noise exposure has been shown in numerous noise-stress experiments.<br><br>2) There is qualitative evidence from many epidemiological noise studies that persistent noise exposure increases the risk for cardiovascular diseases.<br><br>3) Quantitative estimates of the relative risk for highly exposed subjects can be taken from a few reasonably good studies (current status).<br><br>4) The development of a continuous risk function is a dynamic process that incorporates new results of present and future studies (future status).<br><br>5) Calculation of the attributable fraction (AR%) and the population attributable risk percentage (PAR%). |
| *Specification of data needed* | For relative numbers:<br>Estimation of the number of people exposed to $L_{den}$ > 65 dB(A) for traffic noise (road and rail)<br><br>For absolute numbers:<br>Estimation of the number of people exposed to $L_{den}$ > 65 dB(A) traffic noise (road and rail)<br>Prevalence/incidence of cardiovascular diseases (international classification of diseases, ICD codes) |
| *Data sources, availability and quality (examples for Germany and Netherlands)* | In Germany the distribution of noise exposure during day and night is regularly estimated on the basis of a computer model ("Lärmbelastungsmodell").<br>Annual statistics about the occurrence of diseases are available.<br><br>In the Netherlands the distribution of noise exposure during day and night is estimated on the basis of a computer model (EMPARA) (Dassen et al, 2001).<br>Annual statistics about the occurrence of diseases are available from the Continuous Morbidity Registration (CMR) and the Registration network of General practitioners (RNH). Demographic data from the Central Bureau of Statistics.<br>Relative risks per 5 dB(A) (see table 1) (van Kempen et al., 2002). |
| *Computation* | Empirical data suggest a relative risk of RR = 1.2 for ischaemic heart diseases when the sound level exceeds 65 dB(A).<br><br>**AR% = (RR-1) / RR * 100**<br>**PAR% = $P_e$/100 * (RR-1) / ( $P_e$/100 * (RR-1) + 1)  * 100**<br><br>(AR%) - the attributable fraction<br>$P_e$ – Population exposed |

| | |
|---|---|
| | PAR% - population attributable risk in percentage<br><br>Absolute cases per year due to road traffic noise:<br>**PAR = PAR% * $P_d$**<br><br>Disease occurrence ($P_d$) :<br>Lethal cases from ischaemic heart diseases (ICD 9, 410-414)<br>Lethal cases from acute myocardial infarction (ICD 9, 410) |
| *Units of measurement* | Number of cases |
| *Scale of application* | National as well as local |
| *Interpretation* | The indicator provides a measure of the population percentage with increased cardiovascular risk due to traffic noise exposure. |
| *Related web sites* | Noise DG environment policy : http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit : www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |
| *Policy/ regulatory context* | None |
| Reporting obligations | None |

| Existing national legislation regulations on maximum sound levels outdoor and indoor leisure events | DPSEEA |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Composite index of ability to implement regulations, restrictions and noise abatement measures in leisure activities that involve high music levels for indoor and outdoor leisure events. |
| *Underlying definitions and concepts* | The existence, implementation and enforcement of regulatory instruments to control the exposure in leisure activities<br><br>Has the member state adopted sound emission levels at open-air concerts or/and discotheques? What level?<br>Has the member state adopted sound emission levels at discotheques? What level? |
| *Specification of data needed* | Evidence of existence and enforcement of regulations to regulate the music levels<br>Evidence of the appliance (control) of this regulations |
| *Data sources, availability and quality* | Information on the existence, scope and efficiency of legislation |
| *Computation* | The index is computed as a sum of the following 6 variables (for indoor and for outdoor separated)<br><br>*SUM* (Ci)<br>Where:<br>i is the legislation<br>and Ci is the score for component i<br><br>For each component Ci the following scoring is accepted:<br><br>0 – Not existing, not clearly stated<br>1 – Clearly stated, partly (not) implemented or enforced;<br>2 – Clearly stated and obeyed, implemented and enforced<br>The full list of components (Ci) is as follows:<br>1 Legislation for maximum sound levels in discothèques, bars and other similar settlements<br>2 Building regulations for acoustical insulation of discothèques, bars and other similar settlements<br>3.Regulations for music appliances (walkmans, Discmans, ..) and computer games<br>and for outdoor:<br>4 Legislation for open-air events, fairs markets and similar<br>5.Regulations for music concerts<br>6 Local authorities required to deal with noise complaints |
| *Units of measurement* | Ordinal score (0 – 6) for outdoor and ordinal score (0 – 6) for indoor |
| *Scale of application* | National to international |
| *Interpretation* | This indicator provides a general measure of the ability to implement policies for reducing the exposure to leisure noise: an increase in the score should be taken as a broad indication of increased ability, a reduction the reverse. Like all compound indicators, however, this one needs to be interpreted with care for the final score is the sum of many different components: areas with the same indicator score, therefore, do not necessarily have the same capability profile. It is equally important to examine the components of the indicator and handle appropriately the lack of data before drawing conclusions. |
| *Related web sites* | Noise DG environment policy : http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit : www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |
| *Policy/ regulatory context* | National and regional laws |
| *Reporting obligations* | None |

| Existence and effectiveness of national, regional or local action plans for noise reduction | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Noise is analysed in almost every country has an environmental problem, but its consideration as a health determinant is still not always visible.<br><br>- Existence and efficiency of urban plan or another tool regarding acoustical aspects at local, municipal or regional level (e.g zoning)<br><br>- Consideration of noise on the NEHAPs (National Environmental Health Action Plans)<br><br>- Consideration of noise as a health determinant in any Plan related to public health. |
| *Underlying definitions and concepts* | The indicator expresses the commitment at political level to solve noise problems. |
| *Specification of data needed* | Data of municipalities and from ministries of health and/or environment |
| *Data sources, availability and quality* | The analysis of the Different Municipal Master Plans and of Urban Development Plans.<br>The analysis of strategic plans at the national level. |
| *Computation* | This indicator is calculated by the description of the existing plan and if it is:<br><br>0 – Not existing, not clearly stated<br>1 – Clearly stated, partly (not) implemented or enforced;<br>2 – Clearly stated and obeyed, implemented and enforced<br>Population living in an area with acoustical planning / total population of the municipality or city in question |
| *Units of measurement* | Ordinal score (0- 4) for the national level (NEHAPs and Public health plans) and Ordinal score (0 – 2) for plans at local or regional level<br><br>When used at national scale it should be based on the **national laws.** |
| *Scale of application* | Local, regional and national level. |
| *Interpretation* | This indicator will express the commitment of the countries to abate noise. Other kind of National Plans that take into consideration the relationships between noise and health should also be considered. |
| *Related web sites* | Noise DG environment policy : http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit : www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |
| *Policy/ regulatory context* | European directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002<br>National legislation |
| *Reporting obligations* | None |

| **Willingness to enforce and implement the Environmental noise European Directive and to enforce noise abatement measures** | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | This indicator shows the willingness of a country to enforce the European noise directive and solve its noise problems. |
| *Underlying definitions and concepts* | Population living in an area covered with a noise map / total population living in areas that should be covered with a noise map according to the EC directive 2002/49/EC.<br><br>This indicator is composed of two figures, showing how much the countries are following the directive and the percentage of population covered by a noise map. |
| *Specification of data needed* | Total population<br>Municipality data about noise mapping |
| *Data sources, availability and quality* | Local authorities<br>Eurostat<br>Authorities responsible by the noise mapping<br>Acoustical surveys of population; |
| *Computation* | - Population covered with noise maps according to the definition given by the EU directive / total population that should be covered according to the directive (this indicator gives an implementation rate of the directive).<br><br>- Population living in areas covered with a noise map or covered by a noise plan/ population according to eurostat living in cities with more than 2000 inhabitants (this indicator shows how much countries are willing to go further than the requirements of the directive in the field of noise planning). |
| *Units of measurement* | Percentage |
| *Scale of application* | Local and national |
| *Interpretation* | This indicator will translate the level of implementation of the European directive and the actions developed concerning noise abatement. |
| *Related data, indicators* | European Directive 2002/49/EC of 29 June 2002 |
| *Related web sites* | Noise DG environment policy : http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit : www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |
| *Policy/ regulatory context* | European directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 |
| *Reporting obligations* | None |

# Annex 1 - Examples of the cardiovascular morbidity and mortality attributable to environmental noise exposure indicator calculation in for the Netherlands and Germany

## For the Netherlands

| Cardiovascular morbidity and mortality attributable to environmental noise exposure | DPSEEA |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Number of cases of cardiovascular problems attributable to noise exposure<br>Number of deaths attributable to noise exposure. |
| *Underlying definitions and concepts* | Decades of experimental noise effects research carried out in the laboratory showed that noise acts as a stressor on the human organism. Physiological endpoints such as the autonomic nervous system, stress hormones and cardiovascular endpoints were affected.<br>In 2002 a meta-analysis on the effects of noise exposure on blood pressure on cardiovascular disease was published (van Kempen et al., 2002). For this study 43 epidemiological studies published between 1970 and 1999 that investigate the relation between noise exposure and blood pressure and ischaemic heart disease were included. Responses included increased blood pressure, hypertension, use of anti-hypertension drugs, consultation of GP or specialist, use of cardiovascular medicines, Angina pectoris, myocardial infarction and prevalence of ischaemic heart disease (see table 1). The results of the meta-analysis were consistent with a slight increase of cardiovascular disease risk in populations exposed tot community noise and showed that a range of observed endpoints is consistent with known cardiovascular disease progression. Small, transient, stress-related hemodynamic responses that are harmless on the individual level, may result in slight but relevant shifts in blood pressure on the level of populations. In a smaller, susceptible proportion of the population, this shift may lead to an increase in diagnosed hypertension, medication use, visits to the GP, and eventually the prevalence of IHD, including angina pectoris and myocardial infarction. In this perspective, additional cases of myocardial infarction attributable to noise exposure can be regarded as the tip of the iceberg.<br>From the data that were available for the meta-analysis it was not possible to indicate a threshold value or a specific shape for the dose-response relations. Therefore, we decided to use two models in the meta-analysis: and additive model and an exponential model. The additive model assumes that the increase in prevalence per dB(A) is constant. The exponential model assumes a constant RR per unit noise, which suggests an exponential relation between noise exposure and the prevalence of the effect concerned. Both the additive and the exponential model fitted the data. Because an exponential model is most commonly used in meta-analyses, the results of this model were presented and used for calculations.<br>Looking at table 1, the presented endpoints can be interpreted in terms of aggravation. We can distinguish between (i) effects for which we find a significant or non-significant increase of the risk and (ii) effects with a tendency to protect. We will only do calculations for effects belonging to the first group. Although it is difficult to estimate its exposure, most studies investigated the effect of road traffic noise.<br>Using the results of this meta-analysis, an estimate of the cardiovascular risk (ischaemic heart disease including myocardial infarction) due to road traffic noise was calculated for males in the Dutch population. Because these effects were only studied in the range of 50 - 80 and 50 -70 dB(A) LAeq, 6-22, respectively, and because the shape of the dose-response curve below 50 db(A) is not known, we only included these exposure ranges in our calculations. The lowest exposure level used in the studies, is used as a reference level.<br><br>Concept:<br><br>1) The biological plausibility of an increase in cardiovascular risk due to noise exposure has been shown in numerous noise-stress experiments.<br><br>2) There are indications from many epidemiological noise studies that persistent noise exposure increases the risk for cardiovascular diseases. |

| | |
|---|---|
| | 3) Quantitative estimates of the relative risk for highly exposed subjects can be taken from a few reasonably good studies (current status).<br><br>4) The development of a continuous risk function is a dynamic process that incorporates new results of present and future studies (future status).<br><br>5) Calculation of the attributable fraction (AR%). |
| *Specification of data needed* | We combined the RR's derived in the meta-analysis with information on exposure distributions from our National Noise Exposure Model (EMPARA), and Dutch morbidity data (prevalence of cardiovascular disease) to arrive at estimates of the absolute number of noise attributive cases. |
| *Data sources, availability and quality* | In the Netherlands the distribution of noise exposure during day and night is estimated on the basis of a computer model (EMPARA) (Dassen et al, 2001).<br><br>Annual statistics about the occurrence of diseases are available from the Continouous Morbidity Registration (CMR) and the Registration network of General practicioners (RNH). Demographic data from the Central Bureau of Statistics.<br>Relative risks per 5 dB(A) (see table 1) (van Kempen et al., 2002). |
| *Computation* | *Myocardial infarction*<br>Input:<br>- Exposure distribution see table 2.<br>- Disease occurrence ($P_d$) for the Netherlands (1994) (Hoogeveen et al., 2000):<br>Prevalent cases for acute myocardial infarction (ICD 9, 410): 33.26 per 1,000, male (30-70 years)<br>- Absolute number of exposed (table 2): 1,359,471 (male, 30-70 years) This is calculated by means of the total number of males (aged 30-70 years) and the exposure distribution<br><br>The calculation of the number attributable cases has the following steps:<br>1. By means of the total prevalence of myocardial infarction (33.26 per 1,000) and the population (1,359,471), the total number of prevalent persons is estimated that occurs at the noise levels of 1994: 45,216<br>2. For every exposure category a relative risk is calculated. For this purpose a relative risk of RR = 1.03 for myocardial infarction (table 1) per 5 dB(A), within a range of 51-80 dB(A) is used. Using the number of exposed , we estimate a ‘weighted average’ RR: 1.05<br>3. Then an attributive risk percentage is calculated using the following formula:<br>AR% = (RR-1) / RR * 100 = 4.38%<br>4. The attributable number of cases is calculated by multiplying the AR% with the number of prevalent cases that is calculated in step 1 : 1,982 (95% CI: 0 to 5,119) for male 30-70 years.<br><br>*Ischeamic heart diseases*<br>Input<br>Exposure distribution see table 2.<br>- Disease occurrence ($P_d$) for the Netherlands (1994) (Hoogeveen et al., 2000):<br>Prevalent cases for ischeamic heart disease: 41.13 per 1,000, male (45-63 years)<br>- Absolute number of exposed: 606,336 (male, 45-63 years).<br>- A relative risk per 5 dB(A) of 1.09 within the range of 51 - 70 dB(A) (LAeq, 6-22)<br><br>The results of the calculation (step 1-4):<br>1. total number of prevalent persons: 24,936<br>2. RR = 1.12<br>3. AR% = 10.71<br>4. Total number of prevalent cases attributable to road traffic noise is 2,644<br>(95% CI: 1,485-3,764) for male 45-63 years<br><br>These figures are crude estimates based on a few available data. Table 3a and b show the results of a sensitivity analysis. One can see how the numbers change in case you apply the |

| | |
|---|---|
| | results of the meta-analysis on other noise ranges and populations. A probabilistic analysis (monte-carlo simulations) of possible uncertainties revealed that the estimated attributable numbers are mostly influenced by the value of the Relative Risk and not so much by the exposure distribution. |
| *Units of measurement* | Number of cases |
| *Scale of application* | National. But if you have the disposal of more local data you can apply this also local |
| *Interpretation* | The indicator provides a measure of the population percentage or absolute numbers with increased cardiovascular risk due to traffic noise exposure. |

*Table 1 Summary estimates, expressed as $RR_{5\,dB(A)}$, for the association between noise exposure, hypertension, and ischemic heart diseases, adjusted for sexe and age (van Kempen et al., 2002).*

| Noise exposure[a] | Outcome | $RR_{5\,dB(A)}$ | 95% CI[d] | # estimates | Measurement range (dB(A)) |
|---|---|---|---|---|---|
| Occupation | Systolic blood pressure mmHg/5dB(A) | 0.51 | 0.01-1.00 | 14 | 55 – 116 |
| Occupation | Hypertension[b] | 1.14 | 1.01 – 1.29 * | 9 | 55 – 116 |
| | Hypertension | 0.95 | 0.84 – 1.08 | 2 | <55 – 80 |
| | Use of antihypertensives | 0.96 | 0.76 – 1.22 | 2 | >50 – 73 |
| | Consultation of GP/specialist | 0.91 | 0.73 – 1.12 | 1 | 55 – 70 |
| | Angina Pectoris | 0.99 | 0.84 – 1.16 | 2 | 51 – 70 |
| | Myocardial Infarction[c] | 1.03 | 0.99 – 1.09 | 3 | 51 – 80 |
| Road traffic | IHD-total[c] | 1.09 | 1.05 – 1.13 * | 2 | 51 – 70 |
| | Hypertension | 1.26 | 1.14 – 1.39 * | 1 | 55 – 72 |
| | Use of antihypertensives | 0.99 | 0.87 – 1.14 | 1 | 55 – 72 |
| | Consultation of GP/specialist | 1.10 | 0.95 – 1.27 | 2 | 55 – 77 |
| | Use of cardiovascular drugs | 1.05 | 0.99 – 1.11 | 2 | 38 – 77 |
| | Angina Pectoris | 1.03 | 0.90 – 1.18 | 1 | 55 – 72 |
| Air traffic | | | | | |

[a] The noise exposure measures differed between the noise exposure sources: occupational noise exposure expressed in $L_{Aeq,\,8h}$,in dB(A), road traffic noise exposure expressed in $L_{Aeq,\,6\text{-}22h}$,in dB(A) and air traffic noise exposure expressed in $L_{Aeq,\,7\text{-}19h}$,in dB(A). [b] Adjusted for age, sexe and worktype. [c] Only prevalence estimates. [d] CI = Confidence Interval * Significant, p<0.05

Table 2. Example of the calculation of noise attributable myocardial infarction in the Dutch male population (30-70 years) for 1994

| **Exposure category (Laeq 7-23hr)** | **Exposure distribution (%)** | **Absolute number of people exposed** | **RR** | **RR*number exposed** |
|---|---|---|---|---|
| < 40 | 28,68 | | | |
| 41 – 45 | 16,94 | | | |
| 46 – 50 | 19,23 | | | |
| 51 – 55 | 16,87 | 652.236 | 1,02 | 665.838 |
| 56 – 60 | 12,76 | 493.334 | 1,06 | 521.248 |
| 61 – 65 | 4,98 | 192.539 | 1,09 | 210.554 |
| 66 – 70 | 0,55 | 21.264 | 1,13 | 25.069 |
| 71 – 75 | 0,00 | | | |
| 76 – 80 | 0,00 | | | |
| > 80 | 0,00 | | | |
| **Total** | **1.359.374** | | | **1.421.707** |

*Table 3.a Attributale cases of myocardial infarction calculated for different exposure ranges, for men in the age of 30-70 years for 1994*

| Exposure range (LAeq, 6-22 hr) | Attributable cases |
|---|---|
| 51-80 | 1982 (0 - 5119) |
| 51-70 | 1982 (0 - 5119) |
| 51-60 | 1333 (0 - 3447) |
| 61-80 | 631 (0 - 1551) |

*Table 3.b. Attributable cases of myocardial infarction, using different populations for 1994.*

| Population | Prevalence (per 1000) | Attributable cases |
|---|---|---|
| M, 30-70 years | 33.26 | 1982 (0 - 5119) |
| M&F, 30-70 years | 20.56 | 2437 (0 - 6293) |
| M&F, > 30 years | 38.97 | 5453 (0 - 14082) |
| Dutch population | 14.06 | 3325 (0 - 8587) |

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## For Germany

| Cardiovascular morbidity and mortality attributable to environmental noise exposure | DPSE**E**A |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Number of cases of cardiovascular problems attributable to noise exposure<br>Number of deaths attributable to noise exposure. |
| *Underlying definitions and concepts* | Decades of experimental noise effects research carried out in the laboratory showed that noise acts as a stressor on the human organism. Physiological endpoints such as the autonomic nervous system, stress hormones and cardiovascular endpoints were affected. Scientists in Germany carried out a few well-respected epidemiological studies on the association between road traffic noise and cardiovascular endpoints, including high blood pressure and ischaemic heart diseases. These studies have been reviewed in the literature [1,2], and the first results of new studies were reported [3,4]. These studies are of reasonable validity because possible confounding factors were largely considered in the statistical analyses. Furthermore, these studies considered wide ranges of semi-continuous noise exposure using 5 dB(A) sound categories which enabled dose-response reflections. The studies did not always show regular associations between exposure and outcome, which makes it difficult to derive a linear exposure-effect relationship. However, subjects from the highest noise categories exposed to sound levels higher than 60 to 70 dB(A) outdoors at the facades, during the day showed consistently higher risks compared with subjects from the reference categories (50-60 dB(A)). (Note: with respect to road traffic noise, the average sound pressure level during day is a good approximation of the $L_{den}$ as proposed in the EU directive 2002/49/EC). Using the results of these studies, an estimate of the cardiovascular risk (ischaemic heart disease including myocardial infarction) due to traffic noise was calculated [5,6]. A 20% increase in risk (relative risk 1.2) was considered for subjects living in houses where the outdoor noise level exceeds 65 dB(A) during day.<br><br>Concept:<br><br>1) The biological plausibility of an increase in cardiovascular risk due to noise exposure has been shown in numerous noise-stress experiments.<br><br>2) There is qualitative evidence from many epidemiological noise studies that persistent noise exposure increases the risk for cardiovascular diseases.<br><br>3) Quantitative estimates of the relative risk for highly exposed subjects can be taken from a few reasonably good studies (current status).<br><br>4) The development of a continuous risk function is a dynamic process that incorporates new results of present and future studies (future status).<br><br>5) Calculation of the attributable fraction (AR%) and the population attributable risk percentage (PAR%). |
| *Specification of data needed* | For relative numbers:<br>Estimation of the number of people exposed to $L_{den}$ > 65 dB(A).<br><br>For absolute numbers:<br>Estimation of the number of people exposed to $L_{den}$ > 65 dB(A).<br>Prevalence/incidence of cardiovascular diseases (international classification of diseases, ICD codes) |
| *Data sources, availability and quality* | In Germany the distribution of noise exposure during day and night is regularly estimated on the basis of a computer model (“Lärmbelastungsmodell”).<br>- See previous comments regarding Indicator No. 7<br><br>Annual statistics about the occurrence of diseases are available.<br>- See previous comments regarding Indicator N. 7. |
| *Computation* | Approx. $P_e$ = 16% of the German population (“old” federal states) are exposed to noise levels above 65 dB(A) during the day [7]. |

| | |
|---|---|
| | Empirical data suggest a relative risk of RR = 1.2 for ischaemic heart diseases when the sound level exceeds 65 dB(A).<br><br>AR% = (RR-1) / RR * 100 = 16.7%<br>PAR% = $P_e$/100 * (RR-1) / ( $P_e$/100 * (RR-1) + 1) * 100 = 3.1%<br><br>Disease occurrence ($P_d$) for Germany 1995 [8]:<br>Lethal cases from ischaemic heart diseases (ICD 9, 410-414): 183,736 of 773,538<br>Lethal cases from acute myocardial infarction (ICD 9, 410): 87,739 of 133,311<br><br>Absolute cases per year due to road traffic noise:<br>PAR = PAR% * $P_d$<br>Example, lethal cases from myocardial infarction: 2,720<br><br>It should be stated that these figures are crude estimates based on a few available data. The figures reflect the efficiency of the health system as well as the particular impact of the noise source.<br><br>Since cardiovascular diseases affect primarily older people, the calculation of lost life years would be more reasonable for risk comparisons with other diseases and exposures. This requires the age-dependent calculation of lifetime risks for the specific diseases. |
| *Units of measurement* | Number of cases<br><br>Lost life years |
| *Scale of application* | National as well as local |
| *Interpretation* | The indicator provides a measure of the population percentage with increased cardiovascular risk due to traffic noise exposure. |
| *Related data, indicators* | |

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## 1. INDICATOR TITLE

NO. 7 – ATTRIBUTABLE FRACTION OF RISK OF CARDIOVASCULAR MORBIDITY AND/OR MORTALITY DUE TO NOISE EXPOSURE

## 2. VALUE OF THE INDICATOR (RESULTS)

Year: 2001
Country: Germany

The indicator requires 3 data sources: 1) noise distribution (for all noise sources considered), 2) prevalence or incidence rates in the general population, 3) exposure-response curves. From 3) relative risks for cardiovascular diseases (CVD) due to noise exposure can be estimated. Using 1), fractions can be calculated (what percentage of morbidity is attributable to noise either amongst the noise-exposed (attributable fraction) or the total population (population attributable risk percentage). With the aid of 2) absolute numbers of people affected and average lost years of life can be calculated.

Absolute numbers can be useful for comparisons between countries (time trends) assuming that the total population remains constant. Furthermore, absolute numbers are useful for comparisons with other hazardous factors (priority setting). For cross-country comparisons, relative numbers are relevant because of different population sizes.

Regarding 2)
Nation-wide statistical data about disease occurrence are available:

| **ICD 9** | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|
| Cardiovasular Diseases (ICD 390-459) | 2288764 | 2413429 | 2511855 | 2580989 | 2728033 | 2764146 |
| Acute rheumatic fever (ICD 390-392) | 2038 | 1887 | 1515 | 1421 | 1391 | 1292 |
| Chronic rheumatic diseases (ICD 393-398) | 34295 | 30222 | 26678 | 24608 | 23744 | 22718 |
| Hypertension and high blood pressure (ICD 401-405) | 148692 | 154640 | 159122 | 166656 | 185083 | 186822 |
| Ischaemic heart diseases (ICD 410-414) | 703996 | 773538 | 794615 | 813294 | 855563 | 849557 |
| Diseases of the pulmonary circulatory system (ICD 415-417) | 34898 | 34817 | 34497 | 34785 | 37758 | 38481 |
| Other heart diseases (ICD 420-429) | 493463 | 522327 | 561507 | 582354 | 625543 | 638996 |
| Cerebral-vascular diseases (ICD 430-438) | 385059 | 397573 | 420697 | 439138 | 462885 | 476441 |
| Diseases of arteries, arteriols and capillaries (ICD 440-448) | 184437 | 189142 | 193638 | 198684 | 207743 | 215100 |
| Venous and other vascular diseases. (ICD 451-459) | 301886 | 309283 | 319586 | 320049 | 328323 | 334739 |

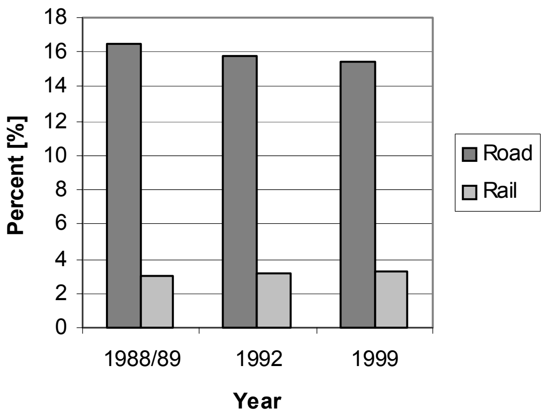
Regarding 1)
Nation-wide estimates of noise exposure from road and rail traffic are available for Germany:

Based on a computer model ("Lärmbelastungsmodell") the distribution of the noise exposure during day (6-22 h) and night (22-6 h) can be calculated for the general German population, with respect to road and railway traffic. The model is based on complex information about acoustical, traffic-related, sociological, infra-structural and statistical data and parameters, which are regularly assessed in representative communities. The calculations consider the German standards of the assessment of emission and immission noise levels, and account for community size, distance from the noise source and the height of buildings in typical settings of housing using sound propagation models. Sound levels are estimated/calculated with respect to the facades of the houses.

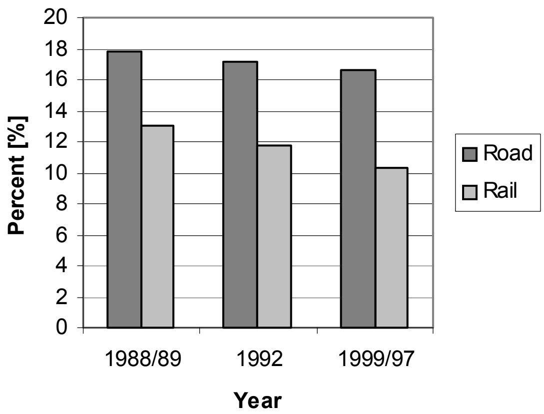
Estimates of exposure using updated input information are calculated in approx. 5 years intervals. The model itself is updated in longer intervals. At present the model is only valid for the old federal German states (before the reunification). Attempts are being undertaken to extend the model for the whole of Germany.

Examples: Noise exposure from road and railway traffic in Germany

**Sound level during day >65 dB(A)**




**Sound level during night >55 dB(A)**




| | Percentage of the Population [%] | | | |
|---|---|---|---|---|
| Average Sound Pressure Level [dB(A)] | Road traffic day 1999 | Road traffic night 1999 | Rail traffic day 1997 | Rail traffic night 1997 |
| >45 - 50 | 16,4 | 17,6 | 12,4 | 15,5 |
| >50 - 55 | 15,8 | 14,3 | 14,9 | 10,8 |
| >55 - 60 | 18,0 | 9,3 | 10,4 | 6,2 |
| >60 - 65 | 15,3 | 4,2 | 6,2 | 2,7 |
| >65 - 70 | 9,0 | 2,9 | 2,3 | 0,9 |
| >70 - 75 | 5,1 | 0,2 | 0,7 | 0,4 |
| >75 | 1,5 | 0,0 | 0,1 | 0,1 |

Regarding 3)
Dose-response curves

The Federal Environmental Agency has carried out a number of epidemiological studies on the association between road traffic noise and CVD-outcomes (other noise sources are missing, but inferences can be made with respect to any kind of community noise, as long as specific studies are missing). These studies are of reasonably good methodological standard and provide semi-continuous estimates of the relative risk over a wide exposure range (see Indicator No. 15). Although no clear and linear dose-response relationship has been established yet, there is reasonable agreement amongst noise researchers and politicians in Germany that living in highly noise polluted areas increases the risk for CVD. The studies suggest a relative risk of RR=1,2 when $L_{day}$ is > 65 dB(A).

Considering that 15-20% of the German population are exposed to road traffic with sound levels of more than 65 dB(A) during daytime (this corresponds to approx. 55 dB(A) during night), it was estimated that 17-23% of the exposed (attributable risk percent) are at risk for ischaemic heart disease throughout their lifetime. Based on the general population, the respective figure (percentage of population attributable to risk population attributable risk percent) would be 2-4%.

It is part of the WHO-project to evaluate whether a common risk function can be drawn from the available literature.

## 3. TECHNICAL INFORMATION

### 3.1. Data source
Federal Statistical Office (health data according to ICD)
Federal Environmental Agency (computer-model for the estimation of exposure)
Federal Environmental Agency (research data)

### 3.2. Geographical coverage
Total population, Federal States

### 3.3. Temporal coverage
Yes

### 3.4. Methodology and frequency of data collection
Annually, whole population

## 5. OTHER COMMENTS

A limitation which applies to all indicators that rely on exposure data is the fact that global noise maps for the whole country are not yet available. Computer models such as in Germany may not be available in other countries.

To overcome this problem, it may be a thinkable approach for the purpose of the development of a noise & health indicator to examine whether inverted annoyance curves could be used to estimate the exposure of populations.

# Annex 2 - Noise and hypertension: an update

***Background document for development of WHO-indicator cardiovascular effects attributable to noise exposure: hypertension***

In 2002 a meta-analysis on the effects of noise exposure on blood pressure and the cardiovascular system was published. For this study 43 epidemiological studies published between 1970 and 1999 that investigate the relation between noise exposure and blood pressure and ischaemic heart disease were included. A wide range of effects was studied. The outcomes for hypertension and the use of antihypertensives are summarised in table 1.

*Table 1. Summary estimates expressed as RR per 5 dB(A) for the association between noise exposur, hypertension and the use of antihypertensives, adjusted for age and sex (from: Kempen van et al., 2002)*

| Noise exposure | Outcome | $RR_{5\ dB(A)}$ | 95% CI | No. of estimates | Measurement range (dB(A)) |
|---|---|---|---|---|---|
| Occupational noise | Hypertension | 1.14 | 1.01 - 1.29 | 9 | 55 - 116 |
| Road traffic noise | Hypertension<br>Use of antihypertensives | 0.95<br>0.96 | 0.84 - 1.08<br>0.76 - 1.22 | 2<br>2 | <55 - 80<br>> 50 - 73 |
| Air traffic noise | Hypertension<br>Use of antihypertensives | 1.26<br>0.99 | 1.14 - 1.39<br>0.87 - 1.14 | 1<br>1 | 55 - 72<br>55 - 72 |

Table 1 shows that the association between occupational noise exposure and hypertension is statistically significant: a $RR_{5\ dB(A)}$ of 1.14 (1.01 - 1.29) was estimated. Road traffic noise exposure was not associated with hypertension nor with the use of antihypertensives. Only one study was available investigating the effects of air traffic noise exposure on hypertension and the use of antihypertensives. Both effects were found to be associated with air traffic noise exposure.

In the period 2000 - 2003 some new community noise studies have been carried out and published (Lercher et al, 2000),(Rosenlund et al, 2001),(Matsui & Miyakita 2001) (Bluhm, Nordling and Berglind, 2001) (Maschke, Wolf & Leitmann, 2003). In a cross-sectional study in Stockholm area, Bluhm and colleagues investigate the possible association between road traffic noise exposure and hypertension among 631 persons 19-80 years old, living in a municipality north of Stockholm. Persons living near a railway were excluded. Individual noise exposure was assessed by means of a noise prediction model. On the base of this estimation, the participants were divided into 4 exposure categories of $L_{Aeq,24hr}$. Hypertension was measured by means of a questionnaire. The results were adjusted for age, sex, smoking habits, type and length of residence. Table 2 shows the results:

*Table 2. The association between road traffic noise exposure and hypertension: prevalence and adjusted OR derived from Bluhm et al (2001).*

| Noise exposure | N | # with hypertension | % hypertension | OR adjusted * | 95% CI |
|---|---|---|---|---|---|
| 40 -45 dB(A) | 119 | 6 | 5.0 | 1.0 | |
| 45 -50 dB(A) | 116 | 14 | 12.1 | 2.0 | 0.71 - 5.71 |
| 50 - 55 dB(A) | 285 | 41 | 14.4 | 2.0 | 0.79 - 5.10 |
| More than 55 dB(A) | 111 | 24 | 21.6 | 3.0 | 1.10 - 8.36 |

* Adjusted for age, sex, smoking habits, education, type and length of residence

Recently, Maschke and colleagues also investigated the effects of road traffic noise exposure on cardiovascular disease: As part of the Spandauer Gesundheits-Survey (SGS), the health status of 1718 persons (18-90 years, average 60 years) was examined. The exposure to noise by road traffic was gathered from noise maps for both day (6:00 - 22:00) and night periods (22:00 - 6 :00). Together with site-information (distance to road, location of living room and bedroom) the study subjects were grouped into 5 dB(A) categories of the averaged A-weighted continuous sound pressure level. Validation took place by means of 24 hrs facade measurements on a subsample. By means of a questionnaire several cardiovascular outcomes were measured. The subjects had to fill in whether a physician had diagnosed hypertension, Angina Pectoris or Myocardial infarction and/or whether they had received a medical treatment for these diseases. Table 3 shows the results for hypertension.

*Table 3. The association between road traffic noise exposure during the day and hypertension (from: Maschke et al, 2003)*

| Exposure group | OR adjusted * | 95 % CI |
|---|---|---|
| Below 55 dB(A) | 1.0 | |
| 55 - 60 dB(A) | 1.25 | 0.67 - 2.25 |
| 60 - 65 dB(A) | 1.17 | 0.50 - 2.29 |
| More than 65 dB(A) | 1.58 | 0.75 - 3.25 |

* Adjusted for BMI and age

The researchers found an increase of the OR of 3% per dB(A). For exposure during the night period a stronger association was found. This is shown in table 4.

*Table 4. The association between road traffic noise exposure during the night and hypertension (from: Maschke et al., 2003)*

| Exposure group | OR adjusted | 95% CI |
|---|---|---|
| Below 50 dB(A) | 1.00 | |
| 50 - 55 dB(A) | 1.659 | 1.073 - 2.563 |
| More than 55 dB(A) | 1.883 | 1.101 - 3.219 |

An increase of the OR of 9% per dB(A) was found for the association between road traffic noise exposure during the night and hypertension. The researchers also investigated the effects of moving, bedroom window open/close. It appeared that the OR rose to 6.1. The effect of air traffic noise exposure was also investigated in relation to hypertension: however no significant association was found.

In the Tyrol-study, Lercher et al investigated the possible effects of transportation noise on blood pressure. Participants were persons living in the Inn valley, aged 20 - 75 years old. Primary noise sources were road and rail noise. By means of GIS, validated with measurements, for every participant the $L_{dn}$ (in dB(A)) was estimated. Furthermore, the participants had to fill in a questionnaire and their blood pressure was measured twice within 2 days. Eventually 572 persons were included into the data-analysis. Several definitions for hypertension were used. However, neither one of these did show any reasonable interpretable relationship with either railway or highway noise.

Another study around Stockholm (Rosenlund et al, 2001) investigated the effects of air traffic noise exposure on hypertension among 2959 persons of 19-80 years residing in the vicinity of Arlanda Airport for at least 1 year. Persons living in Stockholm city were excluded. Individual noise exposure was estimated by means of noise contours. For every participant a $L_{Aeq,24\ hrs}$ was calculated. Note that for the evening and night periods multiplication with a factor 3 and 10 was done, respectively. The particpiants had to fill in a questionnaire. In this questionnaire the subjects were asked whether they had a medical diagnosis of hypertension during the past 5 years. After adjustment for age, sex, smoking and education, the researchers estimated a POR of 1.6 (1.0 - 2.5) among those with $L_{Aeq,\ 24hrs}$ > 55 dB(A).

The Okinawa study (2001) investigated the effects of military air traffic noise exposure on blood pressure and hypertension. Included were subjects older than 40 years. Systolic and diastolic blood pressures were obtained from health examination records in the period 1994-1995. Hypertension was defined in accordance with the WHO criteria. Noise exposure was determined from noise contours and expressed as $L_{dn}$ (in dB(A)). As table 5 shows, an increase of the OR was detected.

*Table 5. The association between militairy aircraft noise exposure and hypertension. Adjusted OR derived from Matsui et al, 2001*

| Noise category | # subjects | OR | 95 % CI |
|---|---|---|---|
| Less than 60 dB(A) | 8752 | 1.00 | |
| 60 - 65 dB(A) | 13168 | 1.1 | |
| 65 - 70 dB(A) | 4102 | - | |
| More than 70 dB(A) | 2759 | 1.37 | 1.19 - 1.57 |

When comparing persons exposed to more than 70 dB(A) to persons exposed to less than 60 dB(A), an OR of 1.37 (1.19 - 1.57) was found.

In order to make the results of the new studies comparable with what was already found into the meta-analysis of 2002, RR per 5 dB(A) were estimated. During this estimation several problems were noticed. These have to be taken into account when interpreting the results. To mention a few: All studies presented OR's (with the exception of Lercher et al); only one study presented prevalences and number of people per noise group and the studies used different noise metrics. Therefore the results of this 'quick-and-dirty' - estimations can *only* be used as indicative.
Figure 1 summarizes the results from the meta-analysis and the results of the new studies. The results found in the new studies fall more or less in the same range of what was found in the meta-analysis. Looking at air traffic noise we see that the new studies both find positive associations for hypertension. For road traffic noise, no or very weak associations were found in the new studies.

Therefore we stick to the conclusion that the epidemiologic evidence on noise exposure and hypertension is still limited. With respect to road traffic noise, results are contradictory. Explanations might be found in among others the design (only cross-sectional studies) and the exposure characterization. As already concluded in the meta-analysis, the noise exposure was often poorly characterized. However, in the new studies exposure characterisation seemed to be improved. The statistics in these studies are weak. Health outcomes of people living in proximity tend on average to be more alike than they are to those form other areas. This is also the case in noise studies such as the Stockholm studies. The statistical models used assume independence between the observations, but in a hierarchical study, observations with areas are not independent. Studies don't always adjust for this in their model (Pattenden, 2001).

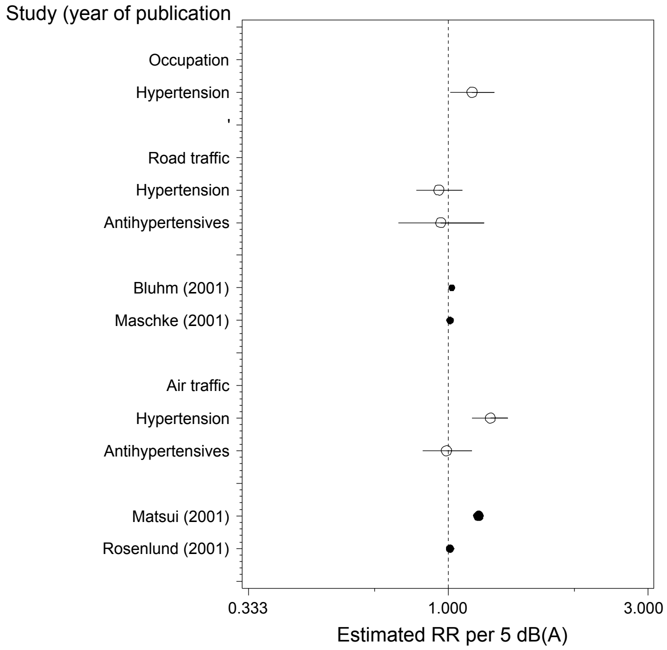



*Figure 1. The association between occupational, road traffic and air traffic noise exposure and hypertension and use of antihypertensives, respectively. The presented estimates are at least adjusted for age and sex. The dotted line corresponds to no effect of noise exposure. The open circles are estimates derived from the meta-analysis. The black circles are estimates for hypertension for newly published studies.*

Like already observed in the meta-analysis, the noise-metrics used in the different studies make the comparison between the studies more difficult.

## Conclusions

The results of recent studies are in accordance with the results of the meta-analysis (Van Kempen et al., 2002). For aircraft noise results are consistent with a slight increase of the risk of hypertension (1.10-1.40 per 5dB(A)), which cannot be detected with respect to the consumption of anti-hypertensives. For road traffic the results are inconsistent, which is probably at least partly due to inadequate exposure assessment (Maschke et al., 2003). So, there is still no clear evidence for an influence of exposure to road traffic noise on hypertension, nor for anti-hypertensive use.

As hypertension is one of the best investigated cardiovascular endpoints, for the moment we propose to refrain from defining noise-*indicators* in terms of cardiovascular risk. In our opinion official *indicators* should be based on reliable, undisputed quantitative science. With respect to cardiovascular health risk comprehensive evidence is simply not available yet. On the other hand, we do not want to discourage calculations of disease burden with respect to environmental noise in a scenario context. The answer to questions such as: what if the association between noise exposure and cardiovascular disease is true, what would be the burden of disease? For this type of calculations the results of the meta-analysis published in 2002 can be used as the best available quantitative estimates of relative risk for the different endpoints.

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# Annex 3 – Template for testing

WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR EUROPE

WELTGESUNDHEITSORGANISATION
REGIONALBURO FÜR EUROPA

ORGANISATION MONDIALE DE LA SANTÉ
BUREAU REGIONAL DE L'EUROPE

*ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ*
ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**Bonn Office**

**1. INDICATOR TITLE**

**2.VALUE OF THE INDICATOR (RESULTS)**
Year
Country
You may consider attaching a graph showing trends over a given period of time or spatial or demographic distribution, or any other visual aid (map, diagram, …).

**3. OVERALL ASSESSMENT**

**3.1 Does the Indicator work?**

**3.2 Is it understandable?**

**3.3 Is it attractive?**

**3.4 Are the data needed to calculate or describe the indicator available?**

**3.5 Is the indicator useful, relevant, and available at sub national level (local, regional)?**

**3.6 Is it relevant for identifying trends?**

**3.7 Is it relevant for developing or implementing policies?**

**3.8 Does the Indicator need adjustment?**

**4. TECHNICAL INFORMATION**

**4.1. Data source**
**4.3. Geographical coverage**
**4.4. Temporal coverage**
**4.5. Methodology and frequency of data collection**

**5. OTHER COMMENTS**

# Annex 4 - Participants List

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ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 6-1
# Sub-project on Road Accidents
# Activity Report

**DEVELOPMENT**
**OF**
**ENVIRONMENT AND HEALTH INDICATORS**
**FOR**
**EUROPEAN UNION COUNTRIES**

**ECOEHIS**

**Obligation EU/03048301**
Between the World Health Organization, Regional Office for Europe
And Agenzia di Sanità Pubblica, Regione Lazio

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

Agenzia di
Sanità Pubblica
ASP

Regione Lazio



# DEVELOPMENT OF ENVIRONMENT AND HEALTH INDICATORS FOR EU COUNTRIES: ROAD ACCIDENT SUBPROJECT

# ECOEHIS

**Obligation EU/03048301**
Between the World Health Organization, Regional Office for Europe
And Agenzia di Sanità Pubblica, Regione Lazio
(Agency for Public Health, Lazio Region)

# Final Report

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

Table of contents

# 1. Introduction

This report summarizes the sub-project activities implemented in the project, 'Development of Environment and Health Indicators for Europe (ECOEHIS),' conducted under the WHO leadership from 1 October 2002 to 30 September 2004, and co-sponsored by the EC DG SANCO in the framework of its Health Monitoring Programme in 2002 (SPC 2002300). Details of the results are presented in technical reports resulting from project activities enclosed as Annexes.

## 1.1. Objective of the Project

The objective of the project is:
To define a set of health indicators concerning trauma and injuries caused by road accidents, to be used as support instrument to the planning of specific public health actions.
Specific objectives are:
-to compare the existing information systems (emergency wards i.s., police database, Fire Brigade database etc.) concerning road accident injuries in all partner countries and the evaluation of their ability to describe the phenomenon
-to define indicators enabling the knowledge of risk factors and of the consequences of road accidents traumas

The project aims have been delivered trough the following task:

- Development of operational specification for the identified set of indicators using the WHO/ECEH methodology
- Testing reliability of information sources and indicator sensitivity to legislative and preventive actions.
- Pilot testing of the indicators in all the 15 MS using uniform methodology of the WHO/ECEH EH indicator project
- Adjusting definitions and proposing revised set of road accident indicators
- Finalization of the report upon the consultation with the MS

## 1.2. Scope of the Project

The scope of the project to cover was set in Annex II of the decision N_1400/97/EC of the European Parliament and the Council to adopt a programme of Community action on health monitoring within the framework for action in the field of public health:

C5. Transport: Road accidents

## 1.3. Project Structure and Organization

According to the project work plan, activities to be performed were in five Work Packages:

**WP1:** Review of the existing information systems existing used by the MS and EU bodies relevant to the road accident.
**WP2:** Identification of the existing body of EC legislation as well as the preventive actions implemented in selected EU MS relevant to the objectives of the project
**WP3:** Identification of the interlinked indicators on road accidents, which cover the DPSEEA framework, are suitable for policy-oriented monitoring and are consistent with the EC legislation
**WP4:** Proposal of operational indicators, defining their role, definition, linkage with other indicators, methods of calculation, interpretation and web-links.
**WP5:** Test feasibility and applicability of the data collection for the proposed indicators in all 15 MS.

**WP6:** Proposal of case examples for policy-oriented reporting. Analisys of the sensitivity of the proposed indicators to preventive actions and policies

**WP7:** Adjusting definitions and proposing revised set for expert approval in the MS

**WP8:** Final consultation with the MS

**WP9:** Finalization of the report

The personnel involved in this project included experts in the field of road accident injury prevention of Universities, Public Health Institutes, Municipalities and consumer safety institutes. The experts covered also a good representative ness of different geographical and socio-economic contexts. The Agency for Public Health of Lazio Region was the coordination center. The names and affiliates of the personnel and experts are listed in Annex 1.

## 1.4. Project Activities

### WP1: Analysis of the information systems existing in the partner countries

The WG produced two systematic reviews about the existing information systems on road accidents in each MS and about the indicators actually used in that information systems. A third non systematic review was targeted to the most relevant experiences of Surveillance Systems using health services sources. The WG produced also a review of the related projects to avoid duplications and redundant products.
The Working Group finalized the work Package during the first meeting in Rome, 31 March–1 April 2003.

### WP2: Identification of the existing body of EC legislation as well as the preventive actions implemented in selected EU MS relevant to the objectives of the project

The relevant body of EC legislation (all types of regulatory texts) was identified and analyzed for the state of enforcement in the MS. The principal anomalies in the MS have been also individuated.
Some important policies implemented in the MS in the field of the road safety have been reported.
The results of this work package are summarized in the first part of the document prepared by the consultant Carlo Pasquariello.

### WP3: Identification of the interlinked indicators on road accidents, which cover the DPSEEA framework; are suitable for policy-oriented monitoring, are consistent with the EC legislation

Working Group had a first meeting in Rome, 31 March–1 April 2003 (Report is included in Annexes). During the meeting the WG produced a DPSEEA-adjusted framework for the road accidents. The key issues to be covered by road accidents indicators within the model were identified. The initial set of road accident indicators was selected.
The indicators have been classified into the following categories according to their compatibility with EU legislation:
Not compatible (None)
Compatible (the majority)
Compulsory not harmonized (accidents, injuries)
Compulsory and harmonized (deaths)

The indicators have also been analyzed for their relevance to the privacy legislation of the member States. The document summarizing the results was prepared by the consultant Carlo Pasquariello.

## WP4: Proposal of operational indicators, defining their role, definition, linkage with other indicators, methods of calculation, interpretation and web-links.

During the second Meeting in Rome, 17–18 November 2003: (Meeting report is included in Annexes), the Working Group built a matrix of the evaluation criteria by each indicator. This tool helped in the selection of the indicators to be proposed for the feasibility study. A standardized frame for the definition of the proposed indicators was developed. The formulae for the indicator calculation were explicitly defined. For each indicator the available source of information was individuated and reported.

Eleven road accidents indicators were recommended for the pilot study.

## WP5: Test feasibility and applicability of the data collection for the proposed indicators in all 15 MS.

During the ECOEHIS Meeting in Luxembourg, 29-30 January 2004 the ASP collaborated with WHO/ECEH in the design of the pilot study to test the proposed indicators for feasibility and applicability: evaluation criteria (i.e., availability, quality, comparability, and policy-relevance) and the scoring system. The meeting participants from the National Focal Points asked the working group to make clearer and to update some indicator definition (time spent on the road, use of safety devices).

Data availability from the international databases of the road accident indicators was reviewed by ASP.

During the implementation of the pilot study (February-July 2004) the ASP was involved in the Italian National Focal Point.

The ASP collaborated with WHO/ECEH in summarizing the results of the pilot study in Member States for the road accident indicators.

Finally in the ECOEHIS Meeting in Bonn, 7-9 July 2004, the results of pilot study were summarized and presented to all the MS delegates.

## WP6: Proposal of case examples for policy-oriented reporting. Analisys of the sensitivity of the proposed indicators to preventive actions and policies

In order to validate the proposed indicators as policy oriented monitoring tools, the following case studies have been conducted by the road accident WG:

1. Driving forces of road accidents health consequences: ecologic study based on the EuroIndy database.
2. Analysis of the effect of the compulsory helmet legislation for people over 18 in Rome.
3. Analysis of the effect of the new road code (point license) in Italy.
4. Mulder
5. Vallet

## WP7 & WP8: Adjusting definitions and proposing revised set for expert approval in the MS; Final consultation with the MS

The indicators as a consequence of the collective process culminated in the ECOEHIS Meeting in Bonn, 7-9 July 2004, were finally revised and selected according to the results of the feasibility study. The final set included indicators categorized in the following categories, according to the level of readiness for implementation: 1) ready and recommended for implementation in the EC;

2) ready, but not feasible for immediate implementation in the EC; 3) desirable though requiring further development.

### WP9: Finalization of the report

The reporting of the project includes: the present activity report and the scientific document with the technical annexes.

The interim reports of the project have been presented to the scientific community with the following publication:

1. WHO, Development of environmental and health indicators for European Union Countries, ECOHEIS. Report on the WHO Working Group Meeting. Interim Technical Report, October 2002 – September 2003. WHO ECEH, Bonn, 2003.
2. WHO, Development of environmental and health indicators for European Union Countries. Report on the WHO Working Group Meeting. Berlin, 14-16 May 2003. Geneva, WHO, 2003.
3. Borgia P, Giorgi Rossi P, Farchi S, Molino N, di Giorgio M, Romano V, Guasticchi G and the Road accident indicator working group* Development of Environment and Health Indicators for EU Countries: The road accident subproject. EUPHA, 2003, Rome.
4. Borgia P, Dalbokova D, Farchi S, Giorgi Rossi P, Guasticchi G, Kryzanowski M. and the road accident indicator working group. Environment and Health Indicators for EU Countries: The road accident subproject. 7th world conference on Injury Prevention and Safety Promotion, Vienna 2004.

# 2. Project Results

## 2.1. Review of existing information systems and indicators

The WG produced two systematic reviews:

1. The existing information systems on road accidents in each MS.
2. The indicators actually used in the national information systems.

The WG also produced a non systematic reviews:

1. The most relevant experiences of Surveillance Systems using health services sources.

The main outcome was the underreporting of the databases collecting information based on the police reports, and the existence of local road traffic injury surveillances, based on health data sources or on the integration between health and police databases. A table with the relevant characteristics of the official road traffic databases have been prepared according to the pre-meeting work and to the discussion during the meeting.

## 2.2. Review of related projects

The WG has focussed on the need to take into account all the experiences related to this project, with different aims and scopes but which deal with similar issues. The working group agreed to use the results of these projects to give a correct definition to some of the injury-related matters under consideration.

## 2.3. Review of EU legislation

The discipline for vehicle circulation and road safety legislation do not pose new juridical issues but rather employ already existing juridical institutions belonging to criminal, civil, administrative, and international law.
International legislation for road circulation has two objectives:

- to facilitate the use of one's own vehicle for travellers going abroad (as tourists, on business or else);
- to establishing a common framework of reference which includes rules common to any country.

The field of legislation relevant to the traffic accident indicators are:

- EU legislation about road
- EU legislation about vehicles
  - The overhaul of vehicles
  - Devices and equipment
  - The antipollution devices
  - The safety devices
  - Prescriptions for the commercial vehicles
- EU legislation about driving licence
- EU legislation concerning safety
- Legislation about privacy.

## 2.4. Scope and target of indicators

As a first step, the group has acknowledged the objective of the project "EU environmental indicators": to provide a set of indicators concerning road accidents that helps to set priorities for policy makers.
The group decided that a limited number of indicators is more effective to this scope, keeping in mind that each indicator has its own aims, and it has different meanings to another. It was decided that the proposed set of indicators should be about 10 as maximum.
The specific objectives of the indicators are:

- to provide an overview of the state of the situation concerning road accidents
- to give indications for planning preventive actions
- to monitor the phenomenon over time
- to compare the phenomenon among countries

The experts have highlighted the fact that the indicators must be meant as markers of the phenomenon, and rarely are the measure of the phenomenon itself, so, most of them are proxies that should help us to describe and to understand what is happening with the road accidents causes and effects.

## 2.5. Process and criteria for evaluating the indicators

The working group agreed that the criteria for evaluating the indicators should be clarified a priori. The criteria proposed are the following:

- A clear and commonly accepted definition of the indicator
- The association with other public health indicators
- Relevance
- Power of discernment (ability to detect small changes in the phenomenon)
- Sensitivity (depending on the source: % of the detected cases on the total of existing cases)

- Comparability in time
- Comparability among countries
- Timeliness (time span from the event to the publication of the indicator)
- Stability (how much is influenced by other factors, not regarding the road accident field?)
- Continuity (how long are the historical series for the indicator available?)
- Cost effectiveness
- Teorethical validity (how well does the indicator represent what we are interested in, independently of the flows of the sources)
- Reliability (depending on the source: how good and valid is the figure given by the indicator)
- Interpretability
- Coverage

## 2.6. Application of the DPSEEA model to the road accidents field

The Driving-forces Pressure State Exposure Effect Action (DPSEEA) model is a cause-effect conceptual framework.
Accidents and injuries are quite a new field for public health and epidemiology.
The application of this model to acute events such as injuries related to road accidents is new and needs an effort in conceptualising accidents and injuries cause-effect chain. The working group agreed on the need to make minor modifications to the original model. In order to adapt road accidents to DPSEEA, the group decided to go bottom to upwards. The working group then started the discussion on the health effects of road accidents.

The DPSEEA model for road accidents

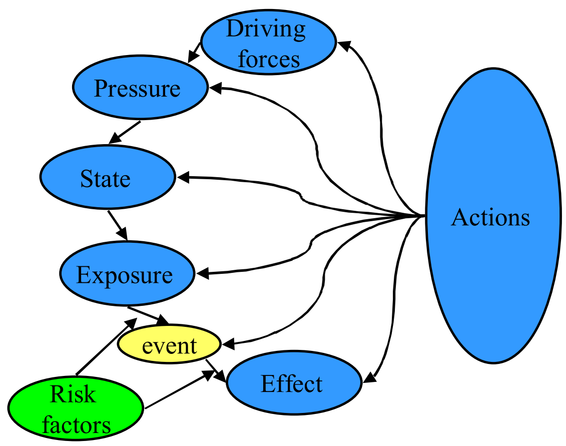


Table 1 summarise the topics included in the DPSEEA model for road accidents

Table 1. The DPSEEA MODEL. **Bold** = topics relevant to the project aim; *italics*= other topics, not directly relevant to the project

| **Driving Force** | **Pressure** | **State** | **Exposure** | **event** | **Effect** | **Action** |
|---|---|---|---|---|---|---|
| *Economic status of the country* | *Cultural and social norms* | *Degree of urbanisation* | **Time of exposure to the road** | **accident** | **Mortality** | *Legislation* |
| *Distribution of wealth* | | *Relative location of homes schools, services.* | **Distance travelled** | | **Injury** | *Enforcement* |
| *Distribution of population on the land and urbanisation* | | *Climate* | | | **Disability** | *Health intervention* |
| *Physical geography of the country* | | **Age and quality of vehicle fleet** | | | **Psychological effect** | |
| | | **Extent and quality of road net** | **Risk factors** | | | |
| | | **Public transport** | **Primary** | **Secondary** | | |
| | | | **Use of mobile phones and driving** | **Airbag and other passive car devices** | | |
| | | | **Use of walkman for drivers, cyclists and pedestrians** | **Use of seat belts** | | |
| | | | **Hearing, seeing and walking impairments** | **Use of helmets** | | |
| | | | **Tiredness** | **Child restraints** | | |
| | | | **Driving at night** | | | |
| | | | **Medical conditions, mental illness** | | | |
| | | | **New licensed** | | | |
| | | | **Driving in rural/urban roads** | | | |
| | | | **Primary and secondary** | | | |
| | | | **Drunk driving, legal and illegal drug assumption and driving** | | | |
| | | | **Older road user** | | | |
| | | | **Not supervised children on the road** | | | |

## 2.7. Review of the indicators related to the issues relevant to the road accidents.

The steps of the model examined in detail were: health effects, exposure and two topics included in state, quality and age of vehicle fleet and extension and quality of the roads. A list of the major risk factors has been filled. The discussion about specific indicators for each risk factor has been postponed because the tools for collecting data are far from being well defined in the vast majority of countries. The other topics included in the model are of general interest. For some topics, indicators already exist and are well defined; in other cases, the fields identified are too far from our competences and working on them is not included in the group's aims. The working group discussed the necessity to develop action indicators and took the decision to not propose them. This decision raised because it was agreed that the scope of the indicators was to monitor policies, preventive programs, as actions able to decrease road accidents and its health effects.

## 2.8. The selection process.

In order to select the final set of indicators, the WG screened through all the proposed indicators according to the criteria defined. During the second meeting, the criteria had been redefined and the definitions were agreed on by the experts. All experts filled independently in the cross-check table and finally a synthesis was done.

## 2.9. The final set of indicators

At the end of one year work, the WG has selected 11 indicators as being extremely useful to measure the health effects of road accidents and to monitor the cause-effect chain of the phenomenon. One of the proposed indicators was already proposed in the Air pollution core set of indicators. The "years of life lost" as well as the "DALY lost", are indicators computable using the mortality and morbidity data. The indicators reported here are classified by their position in the DPSEEA modified model.

## 2.10. Cross-check of the EU legislation compatibility

We report a summary table of the results the cross-check between EU legislation and the proposed indicators:

| | **Topic of the indicator** | **Compatibility with EU legislation** |
|---|---|---|
| **State** | | |
| | Age of vehicle fleet | compatible |
| **Exposure** | | |
| | Time and km traveled | compatible |
| **Risk factors** | | |
| | % of car exceeding speed limits | compatible (focus point of EU actions) |
| | Mortality due to drunk driving rate | compatible (focus point of EU actions) |

| | | |
|---|---|---|
| | Use seat belts, child restrains, helmets | compatible |
| **Event** | | |
| | Road accident rate | compulsory only if generate injury, not harmonised |
| **Effect** | | |
| | Death, | compulsory for MS |
| | Years of life lost | computed using mortality |
| | Injury, | compulsory for MS, but not harmonised |
| | Disability | computed using mortality and morbidity |

## 2.11. The results of the feasibility study

Among eleven indicators tested, five were considered to be ready for immediate implementation in the EC: passenger km by mode of transport, age of vehicle fleet, road accident rate, mortality and injury rate due to road accidents. The others were recommended for WHO use: speed limit exceeding, person time spent on the road, use of vehicle safety devices, potential years of life lost, DALY lost for road accidents, mortality due to drinking and driving.

Table 2. The final set of indicators

| Driving Force | Pressure | State | Exposure | event | Effect | Action |
|---|---|---|---|---|---|---|
| GDP1 | | % of vehicle fleet renewal / year | Time spent on the road by mode of use | Accident rate, by mode of use | Mortality rate, by age and mode of use | |
| | | | Million Km person travelled[1] | | Years of life lost[2] | |
| | | | | | Injury rate | |
| | | | | | DALY lost[3] | |
| | | | **Risk factors** | | | |
| | | | **Primary** | **Secondary** | | |
| | | | | % of use seat belts, child restrains, helmets | | |
| | | | | | | |
| | | | % of car exceeding speed limits | | | |
| | | | Mortality due to drunk driving rate | | | |

1. GDP was not treated by the WG
2. This indicator is included in the air pollution set.
3. The years of life lost are directly computed from the mortality data.
4. In the absence of analytical data, the Disability Adjusted Life Years lost are computed directly from mortality and morbidity data.

## 2.12. Review of evidence

The relation between transport and health is very complex and not always results are ease to read. Some of the interventions that, in a first instance, could appear to be effective have resulted, analysing several trials, to be not effective or, in same cases, to conduct to opposite effect. In order to study the sensitivity of indicators to different programmes, it appeared to the Working Group necessary to provide a summary table reporting the most recent reviews on traffic accident reduction interventions, with their effectiveness. Different electronic databases have been analysed to find recent reviews: Pubmed, Cochrane library and world wide web. A synthesis of the evidences about road traffic intervention should contain the following categories of intervention:

1. Health promotion
2. Engineering interventions
3. Environmental interventions
4. Legislative modifications.

## 2.13. Results of the Case studies

Indicators should serve as monitoring tools, to observe structural, behavioural and environmental changes, to make comparison among several countries and to give a synthetic picture of the situation in a specified geographical context.
In order to analyze the sensitivity of these indicators to actions and interventions that have been shown to be effective in reducing the health consequences of road traffic accidents, the working group has performed some specific studies, using different data sources and focussing on the capability of the indicators to react to changes.

1. The first case study is an ecological analysis of the driving forces of road traffic accident health consequences, and an attempt to perform international comparisons on the effect of different strategies in term of prevention of road traffic accidents. This ecological study gave good results on the sensitivity of indicators, but highlighted the necessity to harmonise definitions and data sources among different countries.
2. The second study is a before and after study, performed using health based indicators and comparing them with official statistics, aimed at observing the changes occurred after the extension of the compulsory helmet law to people over 18 year old. Interesting results have been obtained, on the use of health-based information systems, and in particular, on the sensitivity of specific diagnoses.
3. The third case study has been considering the policy modifications and health effects in France during the 2002-03 period of time. It is interesting to observe different results on the indicators when considering some stratifications of them. Indicators seems to react to some actions in different ways, if considering different ages, or road users or type of road.
4. The forth example of indicator based studies is an analysis of several action aimed at reducing road traffic accident in the Netherlands and the sensitivity of the indicators. This analysis is based on very local experiences, and it's interesting observe that reducing the area of observation doesn't modify the role of the indicators.

## 3. The Partners in the Road Accident subproject

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- Department of Child Health,University of Newcastle upon Tyne, Newcastle, UK.
- Centre for Transport Studies, University College London, London, UK.
- Consumer Safety Institute, Department of Epidemiology, Amsterdam, The Netherlands.

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WORLD HEALTH ORGANIZATION
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ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 6-2
# Report of the First and Second Working Group Meetings

## Rome, 31 March-1 April 2003
## Rome, 17-18 November 2003

**DEVELOPMENT**
**OF**
**ENVIRONMENT AND HEALTH INDICATORS**
**FOR**
**EUROPEAN UNION COUNTRIES**

**ECOEHIS**

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

Agenzia di Sanità Pubblica

Regione Lazio

# DEVELOPMENT OF ENVIRONMENT AND HEALTH INDICATORS FOR EU COUNTRIES (ECOEHIS)

**Sponsored by the EC DG SANCO (SPC 2002300) and WHO/EURO**

## THE ROAD ACCIDENTS SUB-PROJECT

**Proceedings of the Working Group:**
**Rome, 31 March – 1 April 2003**
**Rome, 17 – 18 November 2003**

**Agency for Public Health Lazio Region, Rome**

***Grant Agreement SPC 2002300***
*Between the European Commission, DG Sanco*
*and the World Health Organization, Regional Office for Europe*

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5. ANNEXES

Appendix 1.a. Systematic review of the existing National information systems on road accidents in the EU members.
Appendix 1.b. Review of national, regional or local experiences of road accidents health effects surveillance.
Appendix 1.c. Review of existing indicators of road accidents.
Appendix 2. Review of the projects or working groups relevant to the scope of the road accident indicator project.
Appendix 3. Evaluation of risk factor indicators.
Appendix 4. Cross-check indicators - criteria

## 1. Frame of the road accidents subproject

### 1.1. The Main project

*Title*: Development of Environment and Health Indicators for EU Countries (ECOEHIS)

*Funding organization*: EC DG SANCO (SPC 2002300) and World Health Organization

*Project leader*: Michal Krzyzanowski, WHO European Centre for Environment and Health, Bonn, Germany.

*Main subject area*: Health Surveillance

*Project duration*: October 2002 – September 2004

#### *1.1.1. Project aims*

The objective of the project is to establish a core set of environmental health indicators for EU countries. To achieve this objective, the project will propose, validate and test feasibility for the collection of the indicators from the core set. These indicators will contribute to the establishment of a "community health monitoring system" in order to:

1. Measure environmental health situation, its determinants and the trends therein throughout the community
2. Facilitate the planning, monitoring and evaluation of the relevant community programs and actions
3. Provide member states and other international organizations with appropriate information to make comparisons and support their policies.

One of the important aims of this project is to assure that the proposed set is consistent with the existing body of regulation and legislation at EC level.
This project aims at covering the areas related to '*living and working conditions'*, as described in point C of the annex II of the 'Decision N°1400/97/EC of the European Parliament and of the Council adopting a programme of Community action on health monitoring within the framework for action in the field of public health':

C.3 . Housing conditions
C.4 . Home and leisure activities (only the subset regarding "accidents at home")
**C.5 . Transport**
- **Road accidents (competence of the road accidents subproject)**

C.6 . External environment:
- Air pollution
- Water pollution
- Other types of pollution (including noise)
- Radiation

This project does not cover aspects related to food safety, under the heading of 'Other types of pollution', and will not deal with leisure related accidents.

*1.1.2.Time schedule*

The tasks are performed within three Work Packages:

*WP1. Verification of compatibility of EH indicators with EC body of legislation*

1. Identification of the existing EC body of legislation (all types of regulatory texts) relevant to the above mentioned scope of work (mo.1-6)
2. Identification of a set of environmental health indicators that would be needed for EH monitoring in EU (mo 3-6),
3. Cross-check that these indicators are compatible with the existing needs required by and for the fulfilment of the existing body of legislation (mc 7-8)
4. Make necessary adjustments either in definition, or in collection methodology, as needed, for available indicators (mo 8-10)
5. Develop new indicators necessary to fill the gaps identified, using uniform methodology of WHO/ECEH project on EH Indicators (mo 10-14)

*WP2. Development of indicators for "housing and health", "noise and health" and "road accidents"*

1. Review the existing approaches for surveillance and information systems (mo. 1-6)
2. Propose the core set of indicators for "housing and health", "noise and health" and "road accidents" using uniform methodology of WHO/ECEH project on EH Indicators and consistent with the EC legislation (mo 6-15)

*WP3. Testing and expert approval of proposed set by EU MS*

1. Test feasibility and applicability of data collection for the proposed indicators in all 15 MS. Test sensitivity of the indicators in policy-oriented monitoring (mo 12- 18)
2. To adjust definitions and propose revised set for expert approval in the MS (mo 18-21)
3. Final consultation with the Member States (mo 22)
4. Final reporting (mo 22-24)

*1.1.2. Partnership*

The WHO has gathered a group of partners committed to national focal points, covering almost all the member states, and a panel of topic-specific experts. A subcontract has been signed with the Agency for Public Health of Lazio Region for the road accidents field (see paragraph "1.2. Road accidents subproject").

1.1.3. *Expected results*

This project delivers a documented and tested set of indicators that cover the aspects listed in the scope of the project. Each of these indicators will fall into one of the following three categories:

1 – Ready and recommended for implementation in the member states
2 – Ready but not feasible for immediate implementation
3 – Desirable, although requiring further developmental work.
For each indicator a one page document will provide definition, specification, data collection procedures, computation, interpretation and possible presentation methods.

### 1.1.4. Methods

The project is implemented through:

1. Working Group meetings gathering experts from the MS representing individual technical disciplines described by the indicators, information scientists, data providers and representatives of decision makers (users of the indicators);
2. Preparation of reviews and other background material to the workshops by experts working under a contract with the WHO;
3. Feasibility testing implemented in the MS according to the protocol established by the Working Groups.

## 1.2. The road accidents sub-project

*Title*: Road Accidents Indicators

*Juridical frame*: subcontract between WHO/EU and ASP, Agency for Public Health, Lazio Region.

*Project leader*: Piero Borgia, ASP Lazio Region.

*Main subject area*: Health Surveillance

*Date and number of contract between WHO and ASP*: EU/03/049072

*Beginning of the project*: February 2003

### 1.2.1. Project aims

To define a set of health indicators concerning trauma and injuries caused by road accidents, to be used as a support instrument to the planning of specific public health actions. Specific objectives are:
-to compare the existing information systems (emergency wards i.s., police database, Fire Brigade database etc.) concerning road accident injuries in all partner countries and to evaluate their ability to describe the phenomenon
-to define indicators enabling the knowledge of risk factors and of the consequences of road accidents traumas

### 1.2.2. Time schedule

| Tasks | Sequence of work | Corresponding main project WP | Time |
|---|---|---|---|
| Analysis of the information systems existing in the partner countries | -to analyse and to compare the existing information systems (their methods and contents) of the partner countries, both from Police and insurance databases and from emergency wards databases | WP1, point 2<br>WP2, point 1 | 0-4 months |
| Identification of the existing EC body of legislation relevant to the road accidents field | -to collect all the regulatory texts regarding road accidents.<br>-To compare the legislation with the existing of indicators and sources of data | WP1, points 1, 3 | 4-6 months |
| Identification and definition of the indicators to be used for health | -to analyse the international literature in order to define the most suitable indicators | WP2, point 1<br>WP2, point 2 | 6-9 months |

| | | | |
|---|---|---|---|
| monitoring and policy making | -definition of indicators, through the advice of experts from the partner countries | | |
| Comparison and test of the reliability of sources and indicators (resulting from the sources) | -creation of a subset of compatible variables<br>-gathering of the legislation regarding road safety in the partner countries, produced during the period covered by the information systems<br>- validation of the set of indicators and study of its sensitivity to preventive actions and policies<br>-analysis of specific indicators' sensitivity to legislative and preventive actions, previously experimented in the partner countries<br>-the proposed set of indicators will be tested for feasibility using the WHO questionnaire for member states | Specific of the subproject WP3, points 1, 2 | 9-20 months |
| Drawing up of a final document containing analysis and evaluation of the sources and of the indicators | -collection of the results<br>-preparing and printing the document<br>-dissemination of recommendations | WP3, points 2, 3, 4 | 20-24 months |

### *1.2.3. Partnership*

- Gilles Vallet, INRETS-UMRETTE (Unité mixte de recherche épidémiologique transport travail environnement), Bron cedex, France.
- Javier Quiroga, Ayuntamento de Madrid, Dept. SAMUR (area de salud y consumo), Madrid, Spain.
- Elisabeth M.L.Towner, Department of Child Health, University of Newcastle upon Tyne, Newcastle, UK.
- Heather Ward, Centre for Transport Studies, University College London, London, UK.
- Saakje Mulder, Consumer Safety Institute, Department of Epidemiology, Amsterdam, The Netherlands.

### *1.2.4. Expected results*

The project will produce the parts of the document regarding road accidents, to be delivered by the main project (see expected results of the main project).
Outputs specific to the subproject will also be produced: a research report about the results of the sensitivity analysis.

## 2. Methods

### 2.1. The systematic reviews of Information Systems and indicators

A review of the existing Information Systems collecting data on road accidents in the Member States has been performed. The review consists of two parts: a systematic review of the official information systems used for the official statistics on road accidents; a review non systematic of the more relevant experiences of other systems collecting relevant information for the road accidents.

During the project, the partners organised a Working Group, gathering experts from the MS representing individual technical disciplines described by the indicators, information scientists, data providers.

### 2.2. The review of the relevant EU legislation

The attached document, entitled "European Community Road traffic Law and verification of compatibility of (WHO) Road Accidents Indicators with EC body of legislation" by Carlo Pasquariello, is part of the results of this project. The methodology used to produce it is extensively reported in the document.

### 2.3. First meeting, Rome, 31/3-1/4 /2003.

The first meeting of the subproject took place about one month before the first meeting of the main project, that took place in May 2003 in Berlin, in order to present a first set of indicators to the EU Environmental Health Indicators Working Group in that occasion.

#### *2.3.1. Meeting participants*

All the partners of the subproject participated in the meeting :

- INRETS-UMRETTE (Unité mixte de recherche épidémiologique transport travail environnement), Bron cedex, France.
    - Gilles Vallet,
    - Mireille Chiron
- Ayuntamento de Madrid, Dept. SAMUR (area de salud y consumo), Madrid, Spain.
    - Juan Carlos Medina,
    - Javier Quiroga
- Department of Child Health,University of Newcastle upon Tyne, Newcastle, UK.
    - Elisabeth M.L.Towner
- Centre for Transport Studies, University College London, London, UK.
    - Heather Ward
- Consumer Safety Institute, Department of Epidemiology, Amsterdam, The Netherlands.
    - Saakje Mulder
- Agency of Public Health of Lazio Region, Prevention and Training Department, Rome, Italy.
    - Piero Borgia
    - Valeria Romano,
    - Sara Farchi,
    - Paolo Giorgi Rossi,
    - Nunzio Molino,
    - Maurizio Di Giorgio.

Some experts of this field, not included as partners, also participated in the meeting:
- Alessandra Marinoni Torre, Statistica Medica Università di Pavia, Italy
- Francesca Racioppi, WHO Transport and Health Rome
- Raffaella Amato, ISTAT (Italian Central Institute of Statistics), Rome
- Carlo Pasquariello, Ministry of the Internal Affairs, Italy.

### *2.3.2. Aim of the meeting*

The working group was convened with the following objectives:
- To define the scope and the target of the indicators, according to the objectives of the project.
- To define the evaluation criteria for the indicators
- To perform an application of the DPSEEA model interpreting the phenomenon of road accidents
- To establish the main topics related to the road accidents DPSEEA model
- To produce a first set of indicators related to the main topics defined.

During the pre-meeting work, all the participants contributed to the construction of a systematic review of existing Information Systems about road accidents in the EU Member States, and a review of interesting experiences of national, regional or local surveillance of road accidents (the appendixes 1a and 1b summarise the results).

The working group agreed that the output of the meeting will be integrated by the EU legislation review and that the list of indicators will be submitted to the cross check of the EU legislation producing a short comment on them. The present document includes the EU legislation analysis produced by the consultant from the Italian Internal Affairs Ministry as requested by the project and by the working group.
The results of the WG have been presented by a speaker of the *road accidents working group* and acknowledged by the panel of experts of the main project during the meeting in Berlin.

## 2.4. Second meeting, Rome, 17-18/11/2003.

The second meeting of the subproject took place about two months before the second meeting of the main project, January 2004 in Luxemburg, in order to present this document to the EU Environmental Health Indicators Working Group in that occasion.

### *2.4.1. Meeting participants*

The following partners of the subproject participated in the meeting:
- INRETS-UMRETTE (Unité mixte de recherche épidémiologique transport travail environnement), Bron cedex, France.
    - Gilles Vallet
- Ayuntamento de Madrid, Dept. SAMUR (area de salud y consumo), Madrid, Spain.
    - Juan Carlos Medina,
    - Javier Quiroga
- Department of Child Health,University of Newcastle upon Tyne, Newcastle, UK.
    - Elisabeth M.L.Towner
- Centre for Transport Studies, University College London, London, UK.
    - Heather Ward
- Agency of Public Health of Lazio Region, Prevention and Training Department, Rome, Italy.

- Piero Borgia,
- Valeria Romano,
- Sara Farchi,
- Paolo Giorgi Rossi,
- Nunzio Molino.

### *2.4.2. Aim of the meeting*

The working group was convened with the following objectives:

- To complete the set of indicators related to risk factors
- To discuss the opportunity of action related indicators
- To crosscheck the indicators proposed with the selection criteria
- To produce the final set of indicators

The results of the WG will be presented by a speaker of the *road accidents working group* and acknowledged by the panel of experts of the main project during the main project meeting in Luxemburg.

## 3. Results

The project produced the following results:

- o A review of the existing information systems in the Member States.
- o A review of the existing projects related to this field or to the tools needed for the indicator definition.
- o A review of the existing indicators used in the road accident field.
- o The aims, the target and the evaluation criteria for the indicators to be proposed
- o The application of the DPSEEA model to road accidents.
- o Review of the existing EU legislation about road traffic and accident reporting.
- o A cross-check of EU legislation with road accident indicators.
- o The final set of proposed indicators.

### 3.1. Review of existing information systems and indicators

Appendix 1 illustrates the existing Information Systems in the 15 Member States.

A focus discussion about the Information Systems represented by the partners participating in the Working Group (France, Italy, Spain, The Netherlands, UK) took place during the first meeting and is reported here.

The expert representing the Italian Central Institute of Statistics (ISTAT) explained the characteristics of the Italian national information system for road accidents. It is a database collecting all road accidents reports filled in by the police. During the discussion of the results presented, several problems regarding the adopted definition of "*accident*" (an accident for which the police produced a report and which had as a consequence at least one injured person) and the definition of *injury* (on the discretion of the policeman) were focussed. There is no systematic linkage between the death cause and the road injury databases. The Agency of Public Health of Lazio Region (ASP) presented the results of an emergency-based surveillance, linking data from Emergency admissions, hospital admissions and mortality registry: the incidence of injuries reported by this surveillance was five times higher than the one reported by the National Institute of Statistics.

The experts from INRETS presented the information systems collecting data on road accidents in France (the police records and the death cause). In France, the presence of different sources allows the comparison of data and the linkage between the databases. The French experts also presented a local experience conducted in the Lyon District. It collects data on health effects from hospitals producing a trauma registry, and it collects data about the place, dynamic and risk factors of the accidents from police records. This surveillance allowed to estimate the police underreporting of injuries by the police: the estimate number of injuries collected only by police reports was ¼ of the estimate number of injuries produced using this integrated surveillance.

The expert from the University of Newcastle, presented the UK Information System: it is based on police reports and it is coordinated by the Department of Transports. The problems identified in France and Italy, about the poor quality of data on health effects and about the underreporting of data collected by the police were also confirmed as for UK. The expert from the UCL presented a study conducted in the city of Gloucester concerning police and emergency linkage using non-nominative records, where a significant underreporting of injuries by both the two sources was found.

In Spain, the Information System has by itself integrated information from police reports and health systems: it is based on a compulsory notification by both road police and physicians with emergency wards; the notification may start from any policeman who reports an accident and is addressed to the emergency medical system in order to ascertain the health consequences, or, on the

other hand, if a physician or an emergency doctor assigns a diagnosis of injury due to road accident, he must send the notification to the police, in order to start an investigation on the accident.
In The Netherlands there are six systems providing statistics on road accidents: mortality statistics; hospital admission registry; Dutch injury surveillance; sample surveillance of emergency departments, reporting also the direct medical costs of injuries; households surveys; police reports. The Emergency department database has been linked with the hospital admission registry. Self reported questionnaires ensure a detailed information about some of the most problematic issues of injuries due to road accidents: mild injuries usually affected by underreporting and cyclists and pedestrians often neglected by the police because of the absence of insurance and of legal relevance.

### 3.2. Review of related projects

The WG has focussed on the need to take into account all the experiences related to this project, with different aims and scopes but which deal with similar issues. The working group agreed to use the results of these projects to give a correct definition to some of the injury-related matters under consideration. For example, it is important to establish exactly what we would like to measure when considering an injury, which is the correct definition of severe injury. Is there an international agreement on this field?
Appendix 2 shows a review of the projects that the working group has judged useful to our purposes. Some of these projects have came to an end, such as STAIRS, some others are constituted of subprojects and are ongoing (ICE project). The working group decided to refer not only to EU projects, but also to mention worldwide projects.

### 3.3. Preliminary discussion for the definition of indicators

The participants decided to constitute two sub-groups in order to obtain a detailed discussion about the preliminary and basic issues of the project. The first group discussed about the aims, the target of indicators, and the criteria to evaluate the final set of indicators. The second group worked on the application of the DPSEEA model to the road accident field. The two groups produced short documents and presented them to the plenary session for further discussion. The final conclusions are reported below.

#### *3.3.1. Scope and target of indicators*

As a first step, the group has acknowledged the objective of the project "EU environmental indicators": *to provide a set of indicators concerning road accidents that helps to set priorities for policy makers*.
The group decided that a limited number of indicators is more effective to this scope, keeping in mind that each indicator has its own aims, and it has different meanings to another. It was decided that the proposed set of indicators should be about 10 as maximum.

The specific objectives of the indicators are:

- o to provide an overview of the state of the situation concerning road accidents
- o to give indications for planning preventive actions
- o to monitor the phenomenon over time
- o to compare the phenomenon among countries

The project should provide a definition of the basic concepts in the field of road accidents, when already available, if there is no agreement in the scientific community about the definition of a basic concept the working group will give all the newest references of literature or will address the question to other international related projects.
The project should also provide a definition for each proposed indicator.
The experts have highlighted the fact that the indicators must be meant as markers of the phenomenon, and rarely are the measure of the phenomenon itself, so, most of them are proxies that

should help us to describe and to understand what is happening with the road accidents causes and effects.

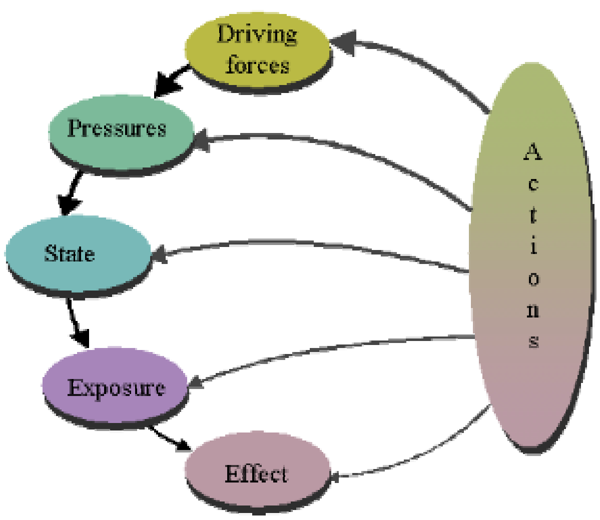
### *3.3.2. Process and criteria for evaluating the indicators*

The working group agreed that the criteria for evaluating the indicators should be clarified *a priori*. The criteria proposed are the following:

- A clear and commonly accepted definition of the indicator
- The association with other public health indicators
- Relevance
- Power of discernment (ability to detect small changes in the phenomenon)
- Sensitivity (depending on the source: % of the detected cases on the total of existing cases)
- Comparability in time
- Comparability among countries
- Timeliness (time span from the event to the publication of the indicator)
- Stability (how much is influenced by other factors, not regarding the road accident field?)
- Continuity (how long are the historical series for the indicator available?)
- Cost effectiveness
- Teorethical validity (how well does the indicator represent what we are interested in, independently of the flows of the sources)
- Reliability (depending on the source: how good and valid is the figure given by the indicator)
- Interpretability
- Coverage

### *3.3.3. Application of the DPSEEA model to the road accidents field*

The Driving-forces Pressure State Exposure Effect Action (DPSEEA) model is a cause-effect conceptual framework. The figure summarises the model and table 1 in the annexes shows the position of some topics relevant to the road accidents field in the framework of the model.

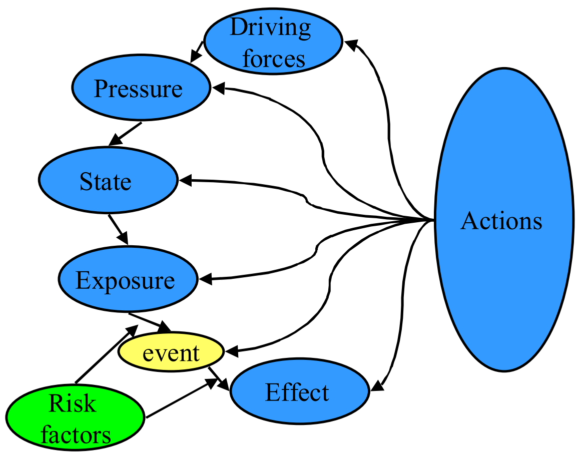



from: www.euro.who.int/EHindicators

In this project, we focus on the possibility to gather reliable and valid information about the topics proposed in the model in a standard and comparable format for EU countries.

During the meeting the working group underlined the need to discuss the application of this model to the road accidents field. Accidents and injuries are quite a new field for public health and epidemiology. Until few years ago, road accidents and the related injuries were considered as consequences of the fate and the analysis of causal links between driving forces, pressure, state, exposure and effects on health, has been considered a mix of obvious and not useful.
As it can be easily understood, the DPSEEA model had been raised from the experience of classical environmental exposures and the chronic diseases as effect on health, like air pollution and respiratory diseases, for which there is a rich epidemiological literature. The application of this model to acute events such as injuries related to road accidents is new and needs an effort in conceptualising accidents and injuries cause-effect chain. The working group agreed on the need to make minor modifications to the original model. In order to adapt road accidents to DPSEEA, the group decided to go bottom to upwards. The working group then started the discussion on the ***health effects*** of road accidents.

The DPSEEA model for road accidents




- *Health Effects*

Four different health effects have been proposed: **death, injury, disability and psychological effects** (as consequences of a road accident with or without a physical injury).

- *The "event"*

The working group thoroughly discussed on the position of "*road accident"* in the DPSSEA chain, and has not found a proper place to it. On the one hand, it could be considered as a proxy of the health effect, because it is an undesirable effect of travelling and it has often some physical (injury) or psychological health effects. On the other hand, the *road accident* could be considered an exposure by itself. It has been decided then to extrapolate the road accident from the conceptual framework and to consider it as a necessary event for the occurrence of an health consequences.
The group also mentioned that the *road accident* is the target of the actions, preventive measures or legislative rules.
The use of a standardised definition of accident in term of transformation of kinetic energy has been proposed.
Three problems arose:

1. Should the Information Systems also include pedestrian falls occurred on the road? Pedestrian falls may be caused by a vehicle even if there is no direct, physical contact. The group agreed that, in theory, this is a "proper" road accident.

2. Is it useful to include road accidents without health consequences in the relevant indicators? It is extremely difficult to gather information about accidents not causing health effects, this information is strongly driven by the insurance and rules about legal responsibility in each country. As a counterpart of such difficulties, the need for this information is weak.
3. What is the most useful and suitable classification of road user? In how many categories could the "road customer" be split? Should pedestrians be distinguished from cyclists? Is the distinction between driver and front /rear passenger always useful and easily achievable?

- *Risk factors*

The WG defined as risk factors all the exposures that modify the risk of having a road accident, given that you are exposed to the road, or, that modify the risk of having an injury given that you are exposed to an accident. They include individual, mostly behavioural, risk factors, and environmental risk factors.
It is extremely difficult to measure the exposure to these factors as person-time, in order to produce incidence rates. They can be the topic of specific studies, but also they can be measured, using sample surveys, to monitor the efficacy of specific actions.
The group discussed if the speed should be considered as a risk factor or an exposure. The final decision was to consider speed as a risk factor, because of the behavioural component and difficulty in calculating exactly the person-time spent in travelling by speed of the vehicle.

- *Exposures*

The exposures proposed can be used as denominators of all the health effects, obtaining indicators of the actual risk for any activity in the road.
Two main axis to measure the exposure have been individuated:
  - The time of exposure to the road
  - The distance travelled

These two quantities can be stratified for different covariates such as by mode of road user, by type and condition of the road.
For pedestrians, other measures of the exposure can be useful: number of road crossed by type of road (main/secondary road).
The group also suggested to analyse the validity of the number of registered vehicles, a common, and easy to obtain, measure, as proxy indicator of the exposure, that can be grossly converted in distance travelled using estimates of the average distance travelled by car.
The fuel consumption is also a commonly used source of information to calculate the distance travelled.

- *State*

In the model proposed, *state* was represented by several topics regarding all that conditions influencing the quantity of exposure to the road and the probability of an accident:
  - Degree of urbanization
  - Relative location of homes, schools, shops, work places.
  - Age and quality of the vehicle fleet
  - Extension and quality of road net
  - Climate

- *Pressure*

The pressures identified are factors deriving from the driving forces listed below, and influencing the state and the behavioural risk factors:
Cultural and social norms creating the willingness to have a car, and to drive anyway and anywhere.

- *Driving forces*

The principal driving forces identified were the factors creating the need to travel and to move:

- Economic status of the country
- Physical geography of the country
- Distribution of the population on the land and urbanization
- Distribution of wealth

- *Actions*

Actions can be considered all the preventive measures, policies and lows aimed to reduce, directly or indirectly, the health consequences of road accidents. There are no widely-used indicators of actions.

Table 1. The DPSEEA MODEL. **Bold** = topics relevant to the project aim; *italics*= other topics, not directly relevant to the project

| **Driving Force** | **Pressure** | **State** | **Exposure** | **event** | **Effect** | **Action** |
|---|---|---|---|---|---|---|
| *Economic status of the country* | *Cultural and social norms* | **Degree of urbanisation** | **Time of exposure to the road** | **accident** | **Mortality** | **Legislation** |
| *Distribution of wealth* | | *Relative location of homes schools, services.* | **Distance travelled** | | **Injury** | *Enforcement* |
| *Distribution of population on the land and urbanisation* | | *Climate* | | | **Disability** | *Health intervention* |
| *Physical geography of the country* | | **Age and quality of vehicle fleet** | | | **Psychological effect** | |
| | | **Extent and quality of road net** | **Risk factors** | | | |
| | | **Public transport** | **Primary** | **Secondary** | | |
| | | | **Use of mobile phones and driving** | **Airbag and other passive car devices** | | |
| | | | **Use of walkman for drivers, cyclists and pedestrians** | **Use of seat belts** | | |
| | | | **Hearing, seeing and walking impairments** | **Use of helmets** | | |
| | | | **Tiredness** | **Child restraints** | | |
| | | | **Driving at night** | | | |
| | | | **Medical conditions, mental illness** | | | |
| | | | **New licensed** | | | |
| | | | **Driving in rural/urban roads** | | | |
| | | | **Primary and secondary** | | | |
| | | | **Speed, as an individual and collective risk factor** | | | |
| | | | **Drunk driving, legal and illegal drug assumption and driving** | | | |
| | | | **Older road user** | | | |
| | | | **Not supervised children on the road** | | | |

## 3.4. Review of the indicators related to the issues relevant to the road accidents.

The working group decided firstly to give a standardised definition of what should be measured.

The steps of the model examined in detail were: health effects, exposure and two topics included in state, quality and age of vehicle fleet and extension and quality of the roads. The event *road accident* was considered as a non essential information, to be collected independently from the health consequences because of both the technical problem of availability of data and the small relevance of the information about accidents without health consequences. A list of the major risk factors has been filled. The discussion about specific indicators for each risk factor has been postponed because the tools for collecting data are far from being well defined in the vast majority of countries. The other topics included in the model are of general interest. For some topics, indicators already exist and are well defined; in other cases, the fields identified are too far from our competences and working on them is not included in the group's aims.

### *3.4.1. Health effects*

- *Mortality.*

Aspects to be considered:

a. Deaths of tourists could be found in the numerator of the mortality rate, while in the denominator only resident population is counted ;
b. Indicators could regard countries of different population density and dimension, it is then agreeable to consider three years mortality rates, which are more stable;
c. An important way to use mortality rates is to observe ten years trends. Especially for children, these trends could tell us if morality is increasing or not.
d. It is important to determine the *years of life lost* that give a measure not only of the impact of mortality but also of the age composition. Road accidents are all over Europe affecting young people, this measure should perhaps work better than the mortality rate.

- *Injuries.*

Aspects to be considered:

a. The working group strongly recommended to use Health System-based data sources to collect indicators on injury;
b. The ICE project paid great efforts to give a correct definition of injury and its classification according to severity, therefore the working group would like to refer to the ICE results. It is anyway difficult to find an international consensus on the definition of injury, despite the common need to use a standardized scoring system or classification system.
c. An important aspect about injuries to consider is that Health Care Systems of different countries could affect the computation of indicators regarding injury, especially for mild injuries in some countries the emergency is the most common solution while in other countries there are general practitioners or primary care centres; hospital admission for not severe injuries can be driven also by the insurance system.

- *Disability.*

a. The Working group decided to look to the ECOSA project, aimed to quantify post-injury levels of functioning and disability.

- *Psychological effects.*
    a. We would like to cite psychological effects, which are not an acute consequence of a road accident, but which could modify behavioural aspects with respect to mobility, the mode to travel and so on.

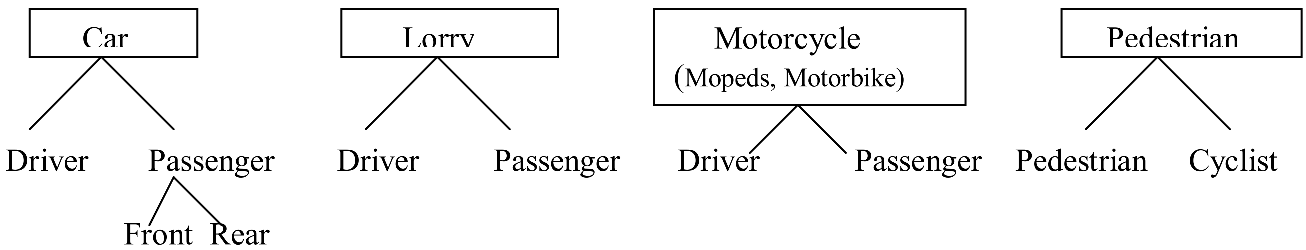
All these health effects should be measured taking into account also economic and other aspects. For example, social costs of disability should be estimated; measures such as quality-adjusted life year (Q.A.L.Y) taking into account both quantity and the quality of life generated by healthcare interventions, or D.A.L.Y. – "Disability Adjusted Life Year" a combination of years of life lost and years lived with a disability that reflects the real burden of non-fatal illness or injury, would be very interesting.
Two different projects have been cited, one developed by the ETSC (European Transport Safety Council) on the estimation of the economic impact of the prevention of road accident deaths, and another, the EURO-COST project, working on the economic costs of Q.A.L.Y.

*3.4.2. The event*

The group decided that the number of accidents causing at least an injury must be gathered. Several problems involving the definition of accident are at the moment affecting the indicators about the event: the first order of problem is the definition of road accident as "any collision between road users involving at least one vehicle in motion on a public roads normally open to traffic and causing the death of and/or injury to one or more of the road users" which is difficult to apply to pedestrian accidents; the second order of problems is linked to the definition of injured person, as mentioned in the paragraph about health effects.

*3.4.2.1 Road user type*

The most used classification distinguishes road users in four main categories: car, lorries, motorcycle, pedestrian (including pedestrian and cyclist). According to the working group, this classification could be considered as a good reference level because it is suitable for the project purpose and easy to get , and any further specification ( driver/passenger; front/rear, etc..) should be added when needed by the indicator on the basis of information system potentiality. Therefore the selected road user classification is as follows:




*3.4.3. Risk factors*

The following list of risk factors has been proposed as useful to quantify, what follows:

**risky behaviours**

Speed, as an individual and collective risk factor

Drunk driving

legal and illegal drug assumption and driving

New licensed

Tiredness

Driving at night

Use of mobile phones and driving

Use of walkman for drivers, cyclists and pedestrians

Hearing, seeing and walking impairments

Medical conditions

mental illness

**vulnerable subjects**

Older road users

Not supervised children on the road

**Protective behaviours**

Use of seat belts

Use of motorcycle helmets

Use of bike helmets

Child restraints

**Airbag and other passive car devices**

**Environment**

driving in rural/urban roads

road infrastructures

These factors act as primary risks, i.e. they increase or decrease the probability of an accident happening, or as secondary risks or preventive tools, i.e. they reduce the damage after the accident. Some of them influence both links of the cause-effect chain, such as speed. This classification is reported in appendix 1.

Poverty and low educational level have been individuated as important risk factors, but also as effect modifier for other risk factors and exposures. They also act as driving forces and pressures. Similarly, driver's gender acts as risk factor and effect modifier.

The WG performed a first evaluation of this list of risk factors, based mostly on the strength of the scientific evidence of the effect of the factor. A second step was to obtain a sound definition of the measure of the risk factors. The results of this first evaluation are reported in appendix 3. A reduced list of eligible risk factors has been produced. Four of these risk factors can be monitored by using data already collected for mortality statistics; in fact mortality rates can be calculated for the following subpopulations: children, older road user, and new licensed for motorbikes and cars.

*3.4.4. Exposures*

- *Person-time spent on the road*

These kinds of information are gathered by national surveys or censuses by mode of road user. Information about pedestrians and cyclists are rarely available.

- *Distance travelled*

Almost all countries collect “hundred million person Km travelled by car and lorry”. This measure is usually calculated using the number of circulating vehicles and applying an estimate of the km travelled yearly and of the persons transported on average.

A common, and easy to obtain, proxy of exposure is the number of registered vehicles. This measure, if used as a proxy of person time or person travelled distance is affected by several biases: it also includes non circulating vehicles; in different countries the number of persons transported per vehicles can be very different; and the distances travelled can be very different depending on the urbanization, geographical conformation and development of road net.
The total fuel consumption, used to calculate the distance travelled, can also be affected by several biases: the number of person transported by each vehicle can vary among countries, so as the composition of the vehicle fleet can influence this data.

*3.4.5. State*

An indicator of the **age of vehicle fleet** is the renewal rate of vehicle fleet and it can be calculated for all countries. Data, in some cases, can be not timely or updated, for example, the vehicle fleet resulting from the registry could include a significant proportion of vehicles not circulating anymore.
The **extent of the road net** can be obtained for all the countries, even if the definitions of the different types of roads are not homogenous.

*3.4.6. Actions*

Actions include a very wide range of preventive interventions, policies, laws, structural changes etc. they can be aimed at reducing the health effects of accidents, or to reduce the prevalence of a risk factor in the population, to reduce the person-time of exposure or to reduce the number of accidents. For some actions there is an evidence of being effective in different contexts, for some other, there is proof of efficacy obtained in very peculiar situations, but for most of them there is no scientific evidence. The effectiveness of specific actions changes rapidly because of the technological improvement in vehicles, socio-economic and behavioural changes. The difference between theoretical efficacy and practical effectiveness, for some of the actions relevant to this field, generates the need to measure the level of implementation and enforcement of law and policies, and not only of their promulgation. Furthermore, the administrative competence for these actions varies from the EU Commission to the health district, making it impossible to produce a synthetic indicator valid for the entire State.

Taking into account the limits considered above, the WG agreed that indicators of the actions, for this specific field, can be proposed only after the production of an updated review of the effective actions to prevent road accident health consequences. An updated review of the evidence based preventive actions about road accidents will be produced by the WG in the second part of the project.

The WG, coherently with the objective of the EHI for EU project, agreed that the intent of this set of indicators is to monitor the effect of actions on their target, more than to measure the presence of the action itself.

### 3.5. The selection process.

In order to select the final set of indicators, the WG screened through all the proposed indicators according to the criteria defined. During the second meeting, the criteria had been redefined and the definitions were agreed on by the experts. All experts filled independently in the cross-check table and finally a synthesis was done. The Appendix 4 shows the results of this screening process.

### 3.6. The final set of indicators

At the end of one year work, the WG has selected 11 indicators as being extremely useful to measure the health effects of road accidents and to monitor the cause-effect chain of the phenomenon. One of the proposed indicators was already proposed in the *Air pollution* core set of indicators. The “years of life lost” as well as the “DALY lost”, are indicators computable using the mortality and morbidity data. The indicators reported here are classified by their position in the DPSEEA modified model.

Table 2. The final set of indicators

| Driving Force | Pressure | State | Exposure | event | Effect | Action |
|---|---|---|---|---|---|---|
| | | % of vehicle fleet renewal / year | Time spent on the road by mode of use | Accident rate, by mode of use | Mortality rate, by age and mode of use | |
| | | | Million Km person travelled[1] | | Years of life lost[2] | |
| | | | | | Injury rate | |
| | | | | | DALY lost[3] | |
| | | | **Risk factors** | | | |
| | | | **Primary** | **Secondary** | | |
| | | | | % of use seat belts, child restrains, helmets | | |
| | | | **Primary and secondary** | | | |
| | | | % of car exceeding speed limits | | | |
| | | | Mortality due to drunk driving rate | | | |

1. This indicator is included in the air pollution set.
2. The years of life lost are directly computed from the mortality data.
3. In the absence of analytical data, the Disability Adjusted Life Years lost are computed directly from mortality and morbidity data.

| **Traf_E1** | **Mortality rate due to road traffic accidents** | DPSEEA |
|---|---|---|
| *Issue* | Transport, housing and human settlements | |
| *Definition of indicator* | Mortality rate due to transport accidents | |
| *Underlying definitions and concepts* | This indicator is based on the following definitions:<br>All deaths directly or indirectly attributable to involvement in a traffic accident however caused. It includes immediate and delayed deaths (within 30 days).<br>Total resident population stratified by gender and age. | |
| *Specification of data needed* | - Total number of deaths due to road traffic accidents<br>- Total resident population by gender and age | |
| *Data sources, availability and quality* | Data on deaths come from official statistics, death cause registries or police statistics. These data could suffer from limitation due to death cause definitions (reference may be made only to the nature of the injury causing death not its source) and to lack ness of a commonly agreed definition of person killed in a traffic accident.<br>Data on residents should be available from national censuses and should be reliable. Deaths of tourist could be find in the numerator of the mortality rate, while in the denominator only resident population is counted.<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm | |
| *Computation* | Numerator: deaths stratified by: age, gender, mode of road user (pedestrians, cyclists, motorcyclist, car or taxi, lorry)<br>Denominator: total resident population stratified by sex and age (some age class need to be focussed: 0-14; 14-17; 18-25; 26-50; 51-65; >65) | |
| *Units of measurement* | Number of deaths for hundred thousand population | |
| *Scale of application* | Local to international. Problems of consistency and availability may limit interpretation at broader scales | |
| *Interpretation* | This indicator is general relatively easy to interpret in that the link between the cause and health effect is explicit. Changes in the indicator should be due to reduction in total traffic volume, greater segregation of pedestrian from road traffic accident, improvement in : road design, traffic management, vehicle safety, environmental conditions. It could be better considering in the interpretation three years mortality rate, which are more stable, since this indicator could regard countries of different population density, furthermore ten years trend could be used to observe changing in mortality especially for children | |
| *Linkage with other indicators* | Event*: Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Injury rate; Potential years of life lost; Number of DALYs lost for road accident*<br>Risk Factor: *Percentage of safety vehicle ( car/motorcycle) device use; Percentage of vehicles exceeding limits; Deaths due to drunk driving* | |
| *Related data indicators* | The Euphin-East database: www.euphin.dk/Phfa.asp<br>Health for all database: www.who.dk/hfadb<br>OECD Road transport and research programme: The International Transport research database: http://www.bast.de/htdocs/fachthemen/irtad/<br>CARE: community road accident databases:<br>http://www.europa.eu.int/comm/transport/home/care/index_en.htm<br>European conference of ministry of transport:<br>http://www1.oecd.org/cem/stat/accidents/index.htm | |

The indicator is compatible with EC legislation

**This indicator is collected by all the European countries and it is available on Eurostat database**

| **Traf_E2** | **Potential Years of life lost** | DPSEEA |
|---|---|---|
| *Issue* | Transport, housing and human settlements | |
| *Definition of indicators* | Potential years of life lost (PYLL) attributable to transport accidents | |
| *Underlying definitions and concepts* | Potential Years of l life lost for premature deaths directly or indirectly attributable to involvement in a traffic accident and<br>Potential years of life lost for all causes including traffic accident | |
| *Specification of data needed* | Life expectancy at every age | |
| *Data sources, availability and quality* | Potential years of life lost should be calculated using death certificate data. It should be better avoiding the police register because of the poor validity of this kind of data. | |
| *Computation* | Numerator: total number of potential years of life lost for traffic accident<br>Denominator: total number of potential years of life lost for all causes | |
| *Units of measurement* | Number of years of life lost for traffic accident divided for the years of life lost for all causes | |
| *Scale of application* | Local to international. Problems of consistency and availability may limit interpretation at broader scales | |
| *Interpretation* | PYLL is and indicator of premature mortality. With respect to mortality rates it gives a measure not only of the mortality impact but also of the characteristics of population involved (young people for road accident). It is useful when assessing community health research priorities allowing at meantime comparison to be made over time and place | |
| *Linkage with other indicators* | Event: *Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Injury rate; Number of DALYs lost for road accident* | |
| *Related data indicators* | WHO Life table and healthy life expectancy data :<br>http://www.who.int/health_topics/global_burden_of_disease/en/ | |

The indicator is compatible with EC legislation

| Traf_E3 | Injury rate due to road traffic accidents | DPSEEA |
|---|---|---|
| ISSUE | Transport, housing and human settlements | |
| *Definition of indicators* | Injury rate due to transport accidents | |
| *Underlying definitions and concepts* | This indicator is based on the following definitions<br>Injury due to road traffic accidents: All injuries directly or indirectly attributable to involvement in a traffic accident however caused. This includes minor accident (as sprains and bruises) and serious accident. Injury could be defined as: disruption of the structure or function of the human organism resulting from exposure to excessive or deficient energy. Typically, both the exposure to energy and the onset of disruption are acute, often the energy is kinetic, but it may be another type (thermal, chemical etc.). Severity of injury can be defined in terms of threat to life, immediate effects (e.g. loss of consciousness, compound fracture, multiple injuries); time to recover, the outcome of patient (e.g. death, permanent disability or disfigurement); quality of life; resources required for treatment (e.g. surgery, invasive diagnostic tests); cost (medical or other costs)<br>Total resident population stratified by gender and age. | |
| *Specification of data needed* | Total number of injury due to road traffic accidents<br>Total resident population by gender and age | |
| *Data sources, availability and quality* | Data on injuries should be available at national level from death certificate, hospital based surveillance systems, police statistics and at local level from population based-surveys, trauma registries and registries of medical care facilities. Data on injuries should be based only on health systems databases since police records are often limited from a underreporting of total number of cases and in particular of the mild ones. However The Health Care systems of different countries deal with the injured in different ways, especially the mild ones (in emergency departments in some countries, by general practitioners in others and so on). This could affect the computation of injury indicators.<br>Data on residents should be available from national censuses and should be reliable validity of this kind of data. Injuries of tourist could be find in the numerator of the injury rate, while in the denominator only resident population is counted<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm | |
| *Computation* | Injury rate<br>Numerator: injuries stratified for: mode of road user (pedestrians, cyclists, motorcyclist, car or taxi, lorry) and severity<br>Denominator: total resident population stratified by gender and age | |
| *Units of measurement* | Number of injuries per hundred thousand population | |
| *Scale of application* | From national to very local because of the high incidence. Attention must be paid to compare different countries | |
| *Interpretation* | Injury rate: this indicator is relatively easy to interpret in that the link between the cause and health effect is explicit. Changes in the indicator should be due to reduction in total traffic volume, greater segregation of pedestrian from road traffic accident, improvement in: road design, traffic management, vehicle safety, environmental conditions. | |
| *Linkage with other indicators* | Event: *Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Number of DALYs lost for road accident*<br>Risk Factor: *Percentage of safety vehicle ( car/motorcycle) device use; Percentage of vehicles exceeding limits; Percentage of drunk drivers* | |
| *Related data indicators* | OECD Road transport and research programme: The International Transport research database:<br>http://www.bast.de/htdocs/fachthemen/irtad/<br>CARE: community road accident databases:<br>http://www.europa.eu.int/comm/transport/home/care/index_en.htm | |

The indicator is compatible with EC legislation
Member States should harmonize the definitions used

**This indicator is collected by all the European countries and it is available on Eurostat database**

| Traf_D1 | Passengers-kilometres by mode of transport (Air_D1) | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Number of passenger Km travelled per year stratified for mode of road users (car, lorries, pedestrian, motorcycle) | |
| *Underlying definitions and concepts* | Number of passenger-Kilometres: total amount of passenger-Kilometres travelled by mode of road user over a time period<br>Passenger-Kilometres: a unit of measure representing the transport of one passenger over a distance of 1 Km | |
| *Specification of data needed* | Number of registered vehicles, by type<br>Estimated Distance travelled by each type of vehicle<br>Estimated passenger number per vehicle<br>Total resident population | |
| *Data sources, availability and quality* | Data on registered vehicles should be provided by public motor vehicle registers, for this reason, data are limited to means of transport actually included in those registers (the lack of information could regard motorcycle and moped). This data could include a significant amount of non circulating vehicles<br>Estimated Distances travelled and passengers number should be provided by censuses data (question about this task are usually included there) and national surveys. Fuel consumption data is also a commonly used source of information even if this measure could be affected by several biases: number of persons transported by each vehicle, composition of vehicle fleet etc.<br>Data on residents are available from national census and should be reliable | |
| *Computation* | Computation could be given in:<br>Total amount of passenger-Km<br>Passenger-Km per inhabitant by vehicle type<br>Percentage of the total number of passenger-kilometres driven by all type of vehicle | |
| *Units of measurement* | Million of Passenger Km or Passenger Km /inhabitant | |
| *Scale of application* | Usually national: local or regional should be preferable even if a bigger effort is required. It is usually not comparable between countries with different GDP. | |
| *Interpretation* | This indicator should measure the amount of exposure to the road travelling for different categories of road users classified on the basis of means of transport used. It takes into account only powered users. Distances travelled can be very different depending on the urbanization, geographical conformation and development of road net. | |
| *Linkage with other indicators* | Event: *Road accident*<br>Exposure: *Person time spent on the road*<br>Risk Factor: *Percentage of vehicles exceeding limits* | |
| *Related data indicators* | European conference of ministry of transport, Trends in the Transport Sector West European Countries: http://www1.oecd.org/cem/stat/trends/west.htm | |

The indicator is compatible with EC legislation

**This indicator is collected by all the European countries. Different European Agencies ( Eurostat, EEA ) report the figures.**

| **Traf_S1** | **Age of vehicle fleet** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicator* | The average renewal of passenger cars | |
| *Underlying definitions and concepts* | Vehicle fleet: number of circulating vehicles as resulted from public motor vehicle registries. | |
| *Specification of data needed* | Passenger cars first registration<br>Total passenger cars | |
| *Data sources, availability and quality* | Data on registered vehicle should be provided by public motor vehicle registers. The resulting vehicle fleet could include a significant proportion of non circulating-ones.<br>Attention must be given to the problems of definitions applied differently in the countries, mainly on the distinction between a lorry and a passenger car (i.e. vans, pick ups, etc.).<br>Data on renewal rate of passenger cars are available in the European Enviromental Agency publications and are present in the EUROSTAT Database. | |
| *Computation* | Numerator: passenger cars first registration<br>Denominator: total passenger cars | |
| *Units of measurement* | Percentage of the total number of passenger cars at first registration | |
| *Interpretation* | This indicator should measure years of usage for each passenger car and quality of car fleet, in terms of reducing the severity of injuries occurring to occupants within the passenger car.<br>Changes in the indicator should be due to improvement in fleet composition, by replacing older vehicles with newer ones, vehicle safety and environmental conditions.<br>The average renewal rate could be weighted to the usage of the vehicle - i.e. the distances km travelled. | |
| *Linkage with other indicators* | Event*: Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Injury rate; Mortality rate; Years of life lost* | |
| *Related data indicators* | European Environment Agency:<br>http://themes.eea.eu.int/Sectors_and_activities/transport | |

The indicator is compatible with EC legislation

THIS INDICATOR IS COLLECTED BY ALL THE EUROPEAN COUNTRIES. DIFFERENT EUROPEAN

| Traf_S2 | Road accident rate | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Number of road accident per vehicle fleet (vehicle type) or general population | |
| *Underlying definitions and concepts* | Road accident: any collision that involves at least one vehicle in motion on a road normally open to traffic, including those where a vehicle in collision with a pedestrian is involved and results in at least one injured person.<br>Vehicle fleet: number of circulating vehicles as resulted from public motor vehicle registries.<br>Total resident population stratified by gender and age. | |
| *Specification of data needed* | - Number of road accident<br>- Number of vehicles by vehicle type (car, bus, lorries etc.)<br>- Total resident population | |
| *Data sources, availability and quality* | Data on road accident could be obtained from police statistics, insurance company records. In most countries, the police collect road crash data only if an injury occurred. These could suffer from various limitations: variance in the quality (an accident report may not be complete until several days after the event), inadequate and incomplete recording of accident, subjectivity in the ascertainment of the injury. On the other hand data coming from insurance company are limited to in which one party was insured and actually made a claim.<br>Data on registered vehicle should be provided by public motor vehicle registers; for this reason, data are limited to vehicles actually included in those registers (the lack of information could regard motorcycle and moped other than obviously bicycle). The resulting vehicle fleet could include a significant proportion of non circulating-ones.<br>Data on residents should be available from national census and should be reliable. Accidents of tourist could be found in the numerator of road accident rate, while in the denominator only resident population is counted.<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm | |
| *Computation* | Numerator: number of road accident causing with at least one injury<br>Denominator: total resident population<br>Denominator: total amount of circulating vehicles | |
| *Units of measurement* | Number of road accident for hundred thousand population<br>Number of road accident for hundred thousand vehicle | |
| *Scale of application* | Usually national. Local or regional should be preferable even if more effort is required | |
| *Interpretation* | Data on road accident are usually collected for law enforcement purposes. Crash data can be used to measure the effectiveness of law enforcement activities and determination of black-spot area providing at the mean time information about primary risk factors. Change on this indicator could be due to: the improvement on the safety of vehicles (in terms of reducing the severity of injuries occurring to occupants within the vehicle), decrease of accident number. | |
| *Linkage with other indicators* | State: *Age and quality of vehicle fleet; Extension and quality of road net*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Mortality rate; Potential years of life lost; Number of DALYs lost for road accident*<br>Risk Factor: *Percentage of vehicles exceeding limits; Percentage of drunk drivers* | |
| *Related data indicators* | European agency for environment:<br>http://themes.eea.eu.int/Sectors_and_activities/transport/indicators<br>For the methodological approach to road accident databases see also the final report of stairs project:<br>http://www.inrets.fr/ur/umrette/publications/stairs/finalreport.PDF | |

**Road accidents could be considered as a proxy of the health effect and an exposure by itself. It has been decided to extrapolate road accident from the conceptual framework and to consider it a necessary event for producing health consequences*

The indicator is compatible with EC legislation

**This indicator is collected by all the European countries**

| Traf_S3 | **Speed limits exceedances** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Percentage of vehicles exceeding speed limits | |
| *Underlying definitions and concepts* | Speed limit: top speed permitted according to the road (motorways, urban areas, other road) and vehicle type (car, motorcycle, bus, lorry)<br>Circulating vehicles: number of circulating vehicles at the site of measurement | |
| *Specification of data needed* | Number of vehicles exceeding speed limits<br>Number of circulating vehicles | |
| *Data sources, availability and quality* | Data on vehicles exceeding the speed limit are based on surveys systematically conducted. The different methodologies (several technical devices, size of data set, measuring point, measuring time) used for the estimation of this data considerably limit any comparison between different studies. Sometimes, speed limit offences as detected by the police are regarded as an alternative measurement. This, however, has clear restrictions regarding the comparability of results, because the results are strongly influenced by the enforcement strategies of the police. Self-reported speeds, from telephone surveys, is also a cheap solution already used, even if self-reported behaviours are difficult to interpret. | |
| *Computation* | Numerator: number of vehicle exceeding limit respect to the road type (motorway, urban area, other road)<br>Denominator: Number of circulating vehicles stratified by type (motorcycle, car, bus, lorries) | |
| *Units of measurement* | Percentage of vehicles exceeding limit | |
| *Scale of application* | Usually this data are collected at local level even if cases of national based study are available | |
| *Interpretation* | This indicator gives a figure of the level of transport safety and improves the understanding of road accident trends. The regular monitoring gives a good basis of information in order to develop effective measures to reduce the number of killed or injured people because of the strong relationship between speed and the number of accidents and the severity of injuries. | |
| *Linkage with other indicators* | Exposure: *Distances travelled; Person time spent on the road*<br>Event : *Road accident*<br>Effect: *Injury rate; Mortality rate; Potential years of life lost; Number of DALYs lost for road accident* | |
| *Related data indicators* | ETSC report on transport safety performance indicators<br>http://www.etsc.be/rep.htm | |

The indicator is compatible with EC legislation. The monitoring of his risk factors is strongly recommended by the EC.

| Traf_Ex1 | **Person time spent on the road** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Person hour spent on the road to get to the place of work or the school by main mode of travel [1] | |
| *Underlying definitions and concepts* | Number of hour spent on the road: total amount of time spent on the road to get to the usual place of work or the school from home | |
| *Specification of data needed* | Number of hour spent on the road to get the place of work or the school by person, by main mode of travel (car, bus, metro, motorcycle, bike, on foot)<br>Total resident population | |
| *Data sources, availability and quality* | Estimated time spent on the road should be provided by Household surveys on daily and long distance mobility, Road traffic surveys, surveys of enterprises involved in scheduled and non-scheduled bus services and census data even if this data could be scarcely accurate. National inventories are usually available from national statistics bureau. At international scale Eurostat provide data for EU countries and UNECE for all the countries in the European region. However data on non-motorised mobility (walking and cycling) are extremely scarce for the EU and need to be improved<br>Data on residents should be available from national censuses and should be reliable<br>Eurostat reports for the years 1998-2002 the results of the "time Use Surveys" in ten European Countries. http://europa.eu.int/comm/eurostat/Public/datashop/print-product/EN?catalogue=Eurostat&product=KS-58-04-998-__-N-EN&mode=download | |
| *Computation* | Computation could be given in:<br>- Number of hour spent on the road/ inhabitant, or<br>- Number of hour spent on the road by main mode of travel (car, bus, metro, motorcycle, bike, on foot) | |
| *Units of measurement* | Person hour per inhabitant or main mode of travel | |
| *Scale of application* | Usually national: local or regional should be preferable even if more effort is required | |
| *Interpretation* | This indicator should measure the exposure to the risk for different categories of road users classified on the basis of means of transport used. In relation to the distances km travelled, this indicator provides a better estimation about vulnerable users (pedestrians and cyclists) since it is difficult to calculate for these the real amount of distance travelled. On the other hand, for some modes of transport it is possible to convert the time spent to distances travelled using the average speed of vehicles. | |
| *Linkage with other indicators* | Event*: Road accident*<br>Exposure: *Distances travelled*<br>Risk Factor: *Percentage of vehicles exceeding limits* | |
| *Related data indicators* | European agency for environment:<br>http://themes.eea.eu.int/Sectors_and_activities/transport/indicators<br>European conference of ministry of transport , Trends in the Transport Sector West European Countries: http://www1.oecd.org/cem/stat/trends/west.htm<br>For update methodology see: UNECE transport division,<br>http://www.unece.org/trans/doc/2002/wp6/inf01.pdf | |

The indicator is compatible with EC legislation

[1] By "main mode of travel" is meant the one used for the longest part of the trip. Within parts of the trip of equal length, it should be used the last one as "mode of travel"

| Traf_Ex2 | Use of safety vehicle devices | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Percentage of safety vehicle device use in the circulating population | |
| *Underlying definitions and concepts* | Safety vehicle device: the term includes the main device designed to protect car (seat belt, child restrain) and motorcycle occupants (helmet)<br>Circulating population: number of car and/or motorcycle occupants as resulted from surveys | |
| *Specification of data needed* | Number of car/ motorcycle occupants properly using seat belt, child restrains, helmet<br>Number of car/motorcycle occupants | |
| *Data sources, availability and quality* | Data on use of safety devices could be obtained from specific studies and field surveys. The estimates must be based on direct observation of occupants in vehicles on roadways. Some difficulties could be due to the distinction into front/rear passenger and to the identification of children who need restrains according to the national legislation. Rates determined from secondary sources, e.g., police crash reports or self-reported use in telephone surveys, are not widely used because of poor reliability | |
| *Computation* | Seat belt use<br>Numerator: number of people using seat belt<br>Denominator: number of car occupants distinguished in driver and front/rear passenger<br><br>Child restrains use<br>Numerator: number of children as car passenger properly restrained<br>Denominator: number of children distinguished in front/rear passenger<br><br>Helmet use<br>Numerator: number of motorcycle occupants using helmet<br>Denominator: number of motorcycle occupants distinguished in driver and passenger | |
| *Units of measurement* | Percentage of passengers properly using seat belt, child restrains, helmet | |
| *Scale of application* | Usually local | |
| *Interpretation* | This indicator measures changes in people behaviours. It could also be used to monitor the efficacy of specific preventive actions | |
| *Linkage with other indicators* | Effect: *Mortality rate; Potential years of life lost; Number of DALYs Lost for road accident* | |
| *Related data indicators* | Report on availability of seat belt wearing data in OECD countries<br>http://www.bast.de/htdocs/fachthemen/irtad/utility/special_rep_seatbelt.pdf<br>Site of European commission about road safety actions programme<br>http://europa.eu.int/comm/transport/road/roadsafety/index_en.htm | |

The indicator is compatible with EC legislation. The monitoring of his risk factors is strongly recommended by the EC.

| Traf_E4 | DALY lost for road accidents | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | -Number of DALYs lost as a consequence of traffic accident for total resident population standardized per age and sex<br>-Percentage of DALYs lost as a consequence of traffic accident compared to the total number of DALYs lost for all causes | |
| *Underlying definitions and concepts* | D.A.L.Y. is an indicator of time lived with a disability and the time lost due to premature mortality.<br>The values incorporated in the DALY indicator are:<br>Duration of time lost due to a death at each age: this measure requires the definition of the potential limit of life. For a specific limit, the expectations are based on life table<br>Disability weights or degrees or suffering associated with different non-fatal conditions.<br>Age Weights which indicate the relative importance of healthy life at different ages<br>Time preferences which is the value of health gains today, compared to the value attached to health gains in the future | |
| *Specification of data needed* | Duration of time lost due to a death at each age<br>Disability weights<br>Age-weights<br>Time preferences (discounting)<br>Total resident population<br>Standard population | |
| *Data sources, availability and quality* | Data on disability could be provided by health surveys or hospital discharge data, or ad hoc registries on a local basis.<br>Data on mortality could be collected from death registries These data could suffer from limitation due to death cause definitions (reference may be made only to the nature of the injury causing death, not its source) and to a lack of a commonly agreed definition of persons killed in a traffic accident.<br>Disability weights and age weights are those used in the World bank report established with the participation of a group of independent experts.<br>Data on resident population standardized for age and sex should be available from national censuses and should be reliable. European population could be used as standard | |
| *Computation* | Numerator: Total number of DALY lost as a consequence of a traffic accident. The DALYs lost due to disability at age "x" is calculated using the following formula<br>$DALYs=(D)*(Cxe^{-Bx})(e^{-r(x-a)})$<br>Where "*D*" is the disability weight (ranging from 1 for death to 0 for perfect health)<br>$(Cxe^{-Bx})$ is the function to calculate the age weights<br>$(e^{-r(x-a)})$ is the discounting function used to convert future benefits into net present value terms<br>Denominator:<br>-total number of DALYs lost for all causes<br>-total resident population standardized for age and sex | |
| *Units of measurement* | Number of DALYs lost for traffic accident divided by number of DALYs lost for all causes and Number of DALYs lost divided by the total population standardized for age and sex | |
| *Scale of application* | Local to international because problems of consistency and availability may limit interpretation at a broader scale | |
| *Interpretation* | This indicator is a combination of years of life lost and years lived with a disability. It offers the possibility to compare the total burden of non fatal illness or injury between different countries | |
| *Linkage with other indicators* | Event*: Road accident*<br>Effect: *Mortality rate; Injury rate; Potential years of life lost*<br>Risk Factor: *Percentage of safety vehicle (car/motorcycle) device use; Percentage of vehicles exceeding limits; Percentage of drunk drivers* | |
| *Related data indicators* | WHO Life table and healthy life expectancy data :<br>http://www.who.int/health_topics/global_burden_of_disease/en/ | |

The indicator is compatible with EC legislation
Some estimates of this indicator are provided by WHO-Centre for Transport studies-Rome

| Traf_E5 | Mortality due to drinking driving | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Number of deaths due to drunk driving/population | |
| *Underlying definitions and concepts* | Alcohol use: data element which describes the suspicion or evidence of alcohol use preceding the event by persons involved in the event.<br>Road accident: any collision that involves at least one vehicle in motion on a road normally open to traffic including those in which a vehicle in collision with a pedestrian is involved and causing at least an injury<br>Total resident population stratified by gender and age. Deaths of tourists could be found in the numerator of the mortality rate, while in the denominator only resident population is counted | |
| *Specification of data needed* | Number of drivers under the effect of alcohol involved in fatal road accident<br>Total resident population | |
| *Data sources, availability and quality* | Data on deaths in accidents due to alcohol consumption: are collected by death certificate and police reports. Beside the usual problem related to this source of information, several studies, carried out in different countries, have shown that alcohol-related deaths are considerably underreported on death certificates. This underreporting seems to be due to social desirability bias that induce many physicians to avoid using codes that explicitly mention alcohol aetiology. Furthermore many police reports are based on personal opinion of policemen and not on measurements<br>Data on residents are available from national censuses and should be reliable | |
| *Computation* | Numerator: Number of deaths in road accidents due to alcohol assumption<br>Denominator: Total resident population | |
| *Units of measurement* | Number of deaths in road accidents due to alcohol assumption divided by total resident population | |
| *Scale of application* | Local to international, because problems of consistency and availability may limit interpretation at broader scales | |
| *Interpretation* | This indicator measures the risk of being involved in a fatal road accident due to alcohol. The numerator includes casualties because this data are more reliable respect to injury ones and allows a better comparison between several countries. | |
| *Linkage with other indicators* | Event: *Road accident*<br>Effect: *Injury rate; Mortality rate; Potential years of life lost; Number of DALYs lost for road accident*<br>Risk Factor*: Percentage of vehicles exceeding speed limits* | |
| *Related data indicators* | EUROCARE report on drinking and driving in Europe<br>http://www.epha.org/IMG/pdf/Drinking_and_Drg_in_Euro.pdf<br>ETSC (European transport safety council ) report on transport safety performance indicators<br>SWOV The Netherlands ( Institute for Road Safety Research)<br>http://www.swov.nl/en/kennisbank/ | |

The indicator is compatible with EC legislation. The monitoring of his risk factors is strongly recommended by the EC.

**This indicator is collected by all the European countries**

## 4. Recommendations

During the final discussion several recommendations have been expressed:

- ✓ the definition of "*accident"* presently used in most of the countries, as an accident for which the police produced a report and which had as a consequence at least one injured person, as well as the definition of *injury,* at policeman's discretion, do not guarantee an homogeneous data collection;
- ✓ data on health effects collected by the police have a poor quality and are often affected by underreporting;
- ✓ the need to take into account all the other projects with different aims and scopes but which deal with similar issues. The WG recommend to use the results of these projects to give a correct definition to some of the injury-related matters under consideration;
- ✓ the need to use the revised DPSEEA model for road accidents;

Other recommendations have been expressed also about specific indicators taken into account:

- ✓ In regard to mortality rate, it is as well important to consider the *years of life lost* that give a measure not only of the number of deaths, but also of the young age of the casualties. It is relevant to consider three years' mortality rates which are more stable, and to observe ten years trends;
- ✓ Regarding the use of Health System-based data sources to collect indicators on injury, rather than police data, which cannot provide information about severity of the injury and diagnosis. Nevertheless, different Health Care Systems in different countries treat mild injuries in different ways producing different data; the comparison among countries of Health System-based data on injury rate can be strongly biased, especially for mild injuries.

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ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 6-3
# Scientific Report of Sub-project on Road Accidents

**DEVELOPMENT
OF
ENVIRONMENT AND HEALTH INDICATORS
FOR
EUROPEAN UNION COUNTRIES**

**ECOEHIS**

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

Agenzia di
Sanità Pubblica
ASP

Regione Lazio

# RESEARCH DOCUMENT
# SUB-PROJECT ROAD ACCIDENT INDICATORS
# ECOEHIS PROJECT*

**Grant Agreement EU/03/048201**
**Between the Agency for Public Health of Lazio Region**
**and World Health Organization, Regional Office for Europe**

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## 1. Introduction

The ECOEHIS project is a part of work done by WHO to develop methods and tools for the Environmental and Health Information System (EHIS), and co-sponsored by the European Commission DG SANCO (SPC 2002300). The project objective was to establish a core set of environmental health (EH) indicators for EU countries, covering the topics of housing conditions, home and leisure activities, road accidents, and outdoor environment.

The first phase of the project defined two indicators related to the road traffic accident causal chain. The two indicators, mortality rate and injury rate were both description of the health effects of road traffic accident, while no indicator was analysing driving forces and exposure factors influencing this public health relevant problem. The necessity of a revision of the core set of Environmental and Health indicators, with a new EC DG Sanco financial support, gave the possibility to deeply analyse the road traffic accident causal chain.

### The Burden of road traffic accidents in Europe

Road traffic injuries are one of the most relevant public health problems. Traffic accidents cause about 36 000 deaths and 1.5 million injuries a year in the pilot countries. The total cost for society is enormous in terms of loss of economic and of quality of life. It has been estimated that the total cost to society is higher than €160 billion a year, more or less 2% of the EU GNP (source: WHITE PAPER. European transport policy for 2010: time to decide). Road traffic accidents are the most important cause of death among young people, especially among males and they are cause of physical disability, especially among the youngest. Vulnerable groups are: young people between 15 and 24 years of age, pedestrians, people on motorcycles and mopeds, and cyclists. Reducing the number of traffic accidents and resulting injuries and deaths is a priority throughout Europe. It is particularly urgent in the CEE countries where improvements in traffic infrastructure and driver behaviour are not balanced with the rapidly growing traffic density.

Due to the complexity of the relationships between the different factors acting in reduction or increase of road traffic accidents, results of some context modifications or new prevention programmes are not always intuitive. Therefore, the implementation of a core set of indicators able to cover all the aspect of the road accident causal chain and able to describe, at a national and international level, changes, modifications of the various factors has became a priority at EU level.

The indicators will contribute to the establishment of a “community health monitoring system” in order to:

- ✓ Measure environmental health situation, its determinants and the trends therein throughout the community
- ✓ Facilitate the planning, monitoring and evaluation of the relevant community programs and actions
- ✓ Provide member states and other international organizations with appropriate information to make comparisons and support their policies.

The objective of the project is to establish a core set of environmental health indicators for EU countries. To achieve this objective, the project will propose, validate and test feasibility for the collection of the indicators from the core set. Moreover, one of the important aims of this project is to assure that the proposed set is consistent with the existing body of regulation and legislation at EC level.

**Objectives of the project**

The objective of the project is to establish a core set of environmental health indicators for EU countries. To achieve this objective, the project will propose, validate and test feasibility for the collection of the indicators from the core set. Moreover, one of the important aims of this project is to assure that the proposed set is consistent with the existing body of regulation and legislation at EC level.

## 2. Methods

The project has been performed the following analyses:

- ❖ A review of the existing Information Systems collecting data on road accidents in the Member States has been done. The review consisted of two parts: a systematic review of the official information systems used for the official statistics on road accidents; a review non systematic of the more relevant experiences of other systems collecting relevant information for the road accidents.
- ❖ A review of the relevant EU legislation on road traffic accident was done.

It was implemented through:

- ✓ Working Group meetings with experts representing individual technical disciplines, information scientists, data providers. A review of the existing Information Systems collecting data on road accidents in the Member States has been done. The review consisted of two parts: a systematic review of the official information systems used for the official statistics on road accidents; a review non systematic of the more relevant experiences of other systems collecting relevant information for the road accidents. A review of the relevant EU legislation on road traffic accident was done. Aims of the meetings were:
    - To define the scope and the target of the indicators, according to the objectives of the project.
    - To define the evaluation criteria for the indicators
    - To adapt the DPSEEA (Driving force, Pressure, State, Exposure, Effect, Action) model to the phenomenon of road accidents
    - To establish the main topics related to the road accidents DPSEEA model
    - To evaluate the compatibility of the main topics related to the road traffic accident field with the EU legislation
    - To crosscheck the indicators proposed with the selection criteria
    - To describe the final set of indicators
- ✓ Feasibility testing implemented in the MS according to the protocol established by the WHO working Group. The national focal points and network of experts collected the information on the availability and quality of the data necessary for the indicators in their own countries in accordance with the study protocol and following a structured questionnaire. Indicators were graded as poor, fair, or good, for each of four evaluation criteria (availability, reliability,

comparability, policy relevance). The feasibility testing established the final set of indicators and a priority scheme for the implementation of indicators:

- Ready and recommended for immediate implementation* (These indicators are recommended as 'core' European Community Health Indicators):
- Ready, but not feasible for immediate implementation
- Desirable though requiring further developmental work

✓ **Testing of the sensitivity** of the selected set of indicators. The first step of the sensitivity analysis have been done, reviewing the body of evidences on the effectiveness of different interventions aimed at reducing road traffic accidents, or programmes not directly designed to prevent road accident but expected to reduce them. Moreover, in order to test the capability of such set of indicators to react to the temporal changes, implementation of new laws, new preventive programme, some specific studies have been conducted by the working group. In the results section regarding the case studies, methods and results of these studies have been described.

## 3. Results

### 3.1 Review of existing information systems and indicators

Table 3.1 illustrates the characteristics of the existing Information Systems in the 15 Member States.
During the discussion of the results presented, several problems regarding the various adopted definitions of "accident" and the different definitions of injury were focussed. In several European countries there is no systematic linkage between the death cause and the road injury databases. During the results discussion, several experts highlighted the underestimate of the official figures on road accident incidence. The underestimate of incidence was between 4 and 5 times lower than the incidence that have been estimated trough some health based statistics. Health based data came from the integrated surveillance of Lazio region, linking data from Emergency admissions, hospital admissions and mortality registry, the trauma registry of the Lyon district, collecting data on health effects from hospitals, and it collecting data about the place, dynamic and risk factors of the accidents from police records, a study conducted in the city of Gloucester concerning police and emergency linkage using non-nominative records.

### 3.2 Review of existing EU legislation

The relevant body of EU legislation (all types of regulatory texts) was identified and analyzed for the state of enforcement in the MS. The principal anomalies in the MS have been also individuated.
Some important policies implemented in the MS in the field of the road safety have been reported.
The results of this work package are summarized in the first part of the annexed document prepared by the consultant Carlo Pasquariello.

Table 3.1 Characteristics of the official road traffic accident Informative systems in the MS.

| | Agency | Name | Period | Source | Covariates | Metodological Notes | Ref |
|---|---|---|---|---|---|---|---|
| **Belgium** | INS and IBSR | Rapport annual securitè routier | Yearly | Police and gendarmerie report | Data concerning:<br>• The accident: location, time of occurrence, type of collision, weather condition, light condition, road category<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, suspected alcohol problem | Police and gendarmerie are required to complete a questionnaire on road accident of all the accident on the public road with personal lesions.<br>Severe: subject is hospitalised longer than 24 hours; Minor subject not hospitalised or shorter than 24 hours<br>An accident is classified as alcohol related when breath test is positive, or subject refused breath test, or subject clearly drunk | www.ibsr.be |
| **Luxembourg** | Ministry of Transport | Statistique sur l'accident de la circulation | Yearly ( six-month estimate) | Police reports | Data concerning:<br>• The accident: location, time of occurrence, cause of accident, weather condition, road category<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, driver nationality | Ministry of transport reports every year all the data on road accident compared to the previous. Data are updated every six months | http://www.gouvernement.lu |
| **Netherlands** | Statistic Netherlands | Non-natural deaths | Since 1996 (Yearly) | Death certificate police reports and coroner registration forms | Data concerning:<br>• The accident: cause of accident, counterpart<br>• Involved person: age, sex, road user category | Dutch citizens deceased abroad are also included in the NND statistics.<br>Included are those deceased within 30 days | www.cbs.nl |

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| **Netherlands** | Statistic Netherlands | Mortality statistics | Yearly | Death certificates | Data concerning:<br>• The accident: counterpart<br>• Involved person: age, sex, road user category, diagnosis | Dutch citizens deceased abroad are also included in the Mortality statistics. Included are those deceased within 30 days Based on ICD-10 | www.cbs.nl |
| **Netherlands** | Prismant | Dutch Information System on Hospital Care and Day Nursing (LMR) | 1984 (Yearly) | Hospital inpatient surveillance system | Data concerning:<br>• The accident: region, time of occurrence<br>• Involved person: age, sex, road user category, injury, cause of injury, injury severity | Based on Icd-9 | www.prismant.nl |
| **Sweden** | SIKA and Statistic Sweden | Road traffic injuries | Yearly | Police reports | Data concerning:<br>• The accident: location, time of occurrence, accident occasion, speed limit, light condition, road category<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, suspected alcohol problem | Police is required to complete a report on all road traffic accident with personal injury analysed by Statistic Sweden . Data are compared with those of deceased in Sweden, cause of death, data on vehicles and driving licence records, etc. To gain an estimate on the unreported events in the statistics, a comparison is made with data from medical care. | www.sika-institute.se |
| **Denmark** | Denmark Statistic | Statistic yearbook | Yearly | Police reports | Data concerning:<br>• The accident: location, time of occurrence, nature of accident, speed limit, light condition, road category, road surface<br>• Involved person: age, sex, road user category<br>• Involved vehicle: vehicle category | Traffic accident causing injury which have come to the attention of the Police and which took place on roads, streets ore square which are accessible by the public and which are being used by at least one of the traffic units involved in the accident, and at least one of the traffic units involved in the accident was driving | www.statbank.dk |

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| **Finland** | Finnish National Road Administration | Finnish road statistics (Tietilasto 2001) | yearly | Police report (including data on health effect) | Data concerning:<br>• The accident: location, time of occurrence, speed limit, light condition, road category, road surface<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, suspected alcohol problem | Length, traffic volume and injury accidents of public roads in Finland by municipality. Annual time series from 1970. | www.tiehallinto.fi/ |
| **Ireland** | National Road Authority | Road Accident Facts | yearly | An Garda Siochana | Data concerning:<br>• The accident: location, time of occurrence, light condition, weather condition, road category, road surface, road character<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, seat belt usage, crash helmet usage | This report covers all road accident reported by Garda Siochana, involving fatalities, personal injury or material damage which occurred on public roads in Ireland. Accident on private property or private lanes are excluded.<br>Injury accident are distinguished in “serious injury accident” and “ minor injury accident “.The definition of “serious injury” is an injury for which the person is detained in hospital as an ‘in-patient’, or any of the following injuries whether or not detained in hospital: fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock requiring medical treatment | www.nra.ie |

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| ***Austria*** | Statistic Austria | Straßenverkehrsunfälle (Road Traffic Accidents) | Yearly | Police and Gendarmerie reports | Data concerning …<br>• The accident: Location, date and time, light condition, weather condition, road surface, type of accident;<br>• Involved vehicles: Vehicle category resp. type of road usage, power of engine;<br>• Involved persons: Age, sex, traffic participation (pedestrian, driver, passenger), degree of injury, nationality, year of getting the license (for drivers only), seat belt or child restraint system usage, helmet usage, drunk driving, driving without license, hit-and-run. | Police and Gendarmerie are required to complete a questionnaire on road traffic accidents of all the accidents with personal injuries on the public road network. | http://www.statistik.at/ |
| **Germany** | Federal statistical office Germany | Road traffic casualties | Yearly | Police reports | Data concerning:<br>• The accident: location, time of occurrence, road category, cause of accident<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, alcohol problem, | | www.destatis.de |

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| **Italy** | Istat-ACI | Road accident statistic | Yearly | Reports of police, gendarmerie, traffic police | Data concerning:<br>• The accident: location, time of occurrence, light condition, weather condition, road category, road surface, road paving<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category | Source of information are required to fill in a format only for accidents with health consequences. The format is then transmitted to the National statistic Institute which will provide the elaboration of annual reports | www.istat.it<br><br>www.aci.it |
| **Italy** | Istat | Mortality statistic | Yearly | Death certificates | Data concerning:<br>• The accident: time of occurrence, type of accident, location<br>• Involved person: age, sex, road user category, injury description | | |
| **Greece** | Ministry of transport | National Statistical Service of Greece | Yearly | Police | Data concerning:<br>• The accident: location, time of occurrence, type of collision, weather condition, light condition, road category<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, suspected alcohol problem | Police and gendarmerie are required to complete a questionnaire on road accident of all the accident on the public road with personal lesions | www.statistic.gr |

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| **France** | *Observatoire national interministériel de la sécurité routière* | La sécurité routière en France. Bilan de l'année | Yearly | Police/gendarmerie records | Data concerning:<br>• The accident: location, time of occurrence, type of collision, weather condition, light condition, road category<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, seat belt usage, suspected alcohol problem | Police and gendarmerie are required to complete a form on road accident of all the accident on the public road with personal lesions<br>Annual report<br>Additional analysis possible by Inrets in the data base | Full report to be ordered at : La documentation française. 29-31, quai Voltaire. 75344 Paris cedex 07.<br>Synthesis on http://www.securiteroutiere.equipement.gouv.fr/observatoire/synthese |
| **France** | INSERM Institut national de la santé et de la recherche médicale | Statistiques des causes médicales de décès | Yearly | Death certificates | Data concerning:<br>• Involved person: age by 5 years and sex | Death certificate describes<br>. direct cause (eg skull fracture)<br>. initial cause (eg road accident)<br>. status that could have contributed to fatal issue (eg alcoholism) | Exists in reports until 1995<br>1979-1999: http://www.inserm.fr/servcom/servcom.nsf/<br>Special analysis to be asked at sc8@vesinet.inserm.fr |

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|---|---|---|---|---|---|---|---|
| **United Kingdom** | Department of Transport | Road Accident Statistic | Yearly (quarterly provisional estimate ) | Police reports | Data concerning:<br>• The accident: location, time of occurrence, type of collision, weather condition, light condition, road category, speed limit, junction detail, junction control, pedestrian control, carriageway hazard<br>• Involved vehicle: vehicle category, vehicle type, towing and articulation, vehicle manovre<br>• Involved person: age, sex, road user category, seat belt usage, suspected alcohol problem, severity of injury, car passenger location | The Road Accident statistics are compiled from returns made by police forces. For each injury road accident known to have occurred in their areas, the police authorities complete a statistical return which provides details of the accident circumstances, separate information for each vehicle involved in the accident, and for each person who was injured in the accident. In England, within each local area, data are collated by a central unit referred to as a Local Processing Authority (LPA) which can be managed directly either by the police or local authority, or be sub-contracted to a private consultancy. In Scotland and in Wales the Scottish Executive (SE) and the National Assembly for Wales (NAW) act as the LPA for the Department for Transport (DfT). | http://www.transtat.dft.gov.uk/roadsafe/index.htm |

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|---|---|---|---|---|---|---|---|
| **Portugal** | DGV | Relatorio annual(Road accident statistic) | Yearly | Police reports | Data concerning:<br>• The accident: location, time of occurrence, type of collision, weather condition, light condition, road category, road surface, road character, spped limit, traffic lights, accident occasion, cause of accident<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, seat belt usage, crash helmet usage, suspected alcohol problem, severity of injury, | Police is required to complete a report on all road traffic accident with personal injury which occurred on public roads | www.dgv.pt |
| **Spain** | Ministerio del Interior Direccion Gral de Trafico | Annuario Accidentes | Yearly | Police reports | Data concerning:<br>• The accident: location, time of occurrence, type of collision, weather condition, light condition, road category, road surface, road character, cause of accident<br>• Involved vehicle: vehicle category<br>• Involved person: age, sex, road user category, driving licensing age, severity of injury, | Person are recorded as killed who die within 24 hours as a result of the accident, person who die later are recorded as injured | http://www.dgt.es/iindex.html |

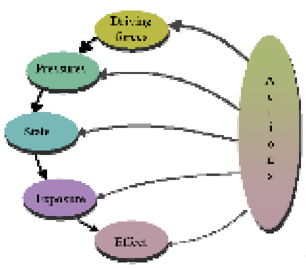
### 3.3 Preliminary discussion for the definition of indicators

The preliminary discussion for the definition of the set of indicators conducted to the following results:

- **Scope and target of indicators.** According to the objective of the project (to provide a set of indicators concerning road accidents that helps to set priorities for policy makers), the group decided that a limited number of indicators is more effective to this scope. It was decided that the proposed set of indicators should be about 10 as maximum. The specific objectives of the indicators were
  - ✓ to provide an overview of the state of the situation concerning road accidents
  - ✓ to give indications for planning preventive actions
  - ✓ to monitor the phenomenon over time
  - ✓ to compare the phenomenon among countries
- **Process and criteria for evaluating the indicators were**
  - ✓ A clear and commonly accepted definition of the indicator
  - ✓ The association with other public health indicators
  - ✓ Relevance
  - ✓ Power of discernment (ability to detect small changes in the phenomenon)
  - ✓ Sensitivity (depending on the source: % of the detected cases on the total of existing cases)
  - ✓ Comparability in time
  - ✓ Comparability among countries
  - ✓ Timeliness (time span from the event to the publication of the indicator)
  - ✓ Stability (how much is influenced by other factors, not regarding the road accident field?)
  - ✓ Continuity (how long are the historical series for the indicator available?)
  - ✓ Cost effectiveness
  - ✓ Theoretical validity (how well does the indicator represent what we are interested in, independently of the flows of the sources)
  - ✓ Reliability (depending on the source: how good and valid is the figure given by the indicator)
  - ✓ Interpretability
  - ✓ Coverage

- **Application of the DPSEEA model to the road traffic accidents field**

The Driving-forces Pressure State Exposure Effect Action (DPSEEA) model is a cause-effect conceptual framework. The figure 3.1 summarises the model.



from: www.euro.who.int/EHindicators

Until few years ago, road accidents and the related injuries were considered as consequences of the fate and the analysis of causal links between driving forces, pressure, state, exposure and effects on health, has been considered a mix of obvious and not useful.

As it can be easily understood, the DPSEEA model had been raised from the experience of classical environmental exposures and the chronic diseases as effect on health, i.e. air pollution and respiratory diseases, for which there is a rich epidemiological literature. The application of this model to acute events such as injuries related to road accidents is new and needs an effort in conceptualising accidents and injuries cause-effect chain.

- ✓ Health Effects

  The health effects which have been proposed: death, injury, disability and psychological effects (as consequences of a road accident with or without a physical injury).

- ✓ The "event" (road traffic accident)

  On the one hand, it could be considered as a proxy of the health effect, because it is an undesirable effect of travelling and it has often some physical (injury) or psychological health effects. On the other hand, the road accident could be considered an exposure by itself. It has been decided then to extrapolate the road accident from the conceptual framework and to consider it as a necessary event for the occurrence of an health consequences. It is the target of the actions, preventive measures or legislation. The use of a standardised definition of accident in term of transformation of kinetic energy has been proposed.

- ✓ Risk factors

  Risk factors are all the exposures that modify the risk of having a road accident, given that you are exposed to the road, or, that modify the risk of having an injury given that you are exposed to an accident. They include individual, mostly behavioural, risk factors, and environmental risk factors.

  It is extremely difficult to measure the exposure to these factors as person-time, in order to produce incidence rates. They can be the topic of specific studies, but also they can be measured, using sample surveys, to monitor the efficacy of specific actions.

- ✓ Exposures

  The exposures proposed can be used as denominators of all the health effects, obtaining indicators of the actual risk for any activity in the road.

  Two main axis to measure the exposure have been individuated:

  - The time of exposure to the road
  - The distance travelled

  These two quantities can be stratified for different covariates such as by mode of road user, by type and condition of the road.

  For pedestrians, other measures of the exposure can be useful: number of road crossed by type of road (main/secondary road).

The group also suggested to analyse the validity of the number of registered vehicles, a common, and easy to obtain, measure, as proxy indicator of the exposure, that can be grossly converted in distance travelled using estimates of the average distance travelled by car.

The fuel consumption is also a commonly used source of information to calculate the distance travelled.

✓ State

In the model proposed, state was represented by several topics regarding all that conditions influencing the quantity of exposure to the road and the probability of an accident:

- Degree of urbanization
- Relative location of homes, schools, shops, work places.
- Age and quality of the vehicle fleet
- Extension and quality of road net
- Climate

✓ Pressure

The pressures identified are factors deriving from the driving forces listed below, and influencing the state and the behavioural risk factors:

- Cultural and social norms creating the willingness to have a car, and to drive anyway and anywhere.

✓ Driving forces

The principal driving forces identified were the factors creating the need to travel and to move:

- Economic status of the country
- Physical geography of the country
- Distribution of the population on the land and urbanization
- Distribution of wealth

✓ Actions

Actions can be considered all the preventive measures, policies and lows aimed to reduce, directly or indirectly, the health consequences of road accidents. There are no widely-used indicators of actions.

The following figure represent the road accident DPSEEA model

The DPSEEA model for road accidents

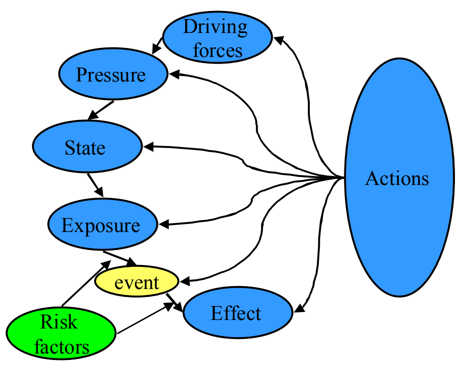


Table 3.2 The DPSEEA MODEL. Bold = topics relevant to the project aim; *italics=* other topics, not directly relevant to the project

| Driving Force | Pressure | State | Exposure | event | Effect | Action |
|---|---|---|---|---|---|---|
| *Economic status of the country* | *Cultural and social norms* | **Degree of urbanisation** | **Time of exposure to the road** | **accident** | **Mortality** | **Legislation** |
| *Distribution of wealth* | | *Relative location of homes schools, services.* | **Distance travelled** | | **Injury** | *Enforcement* |
| *Distribution of population on the land and urbanisation* | | *Climate* | | | **Disability** | *Health intervention* |
| *Physical geography of the country* | | **Age and quality of vehicle fleet** | | | **Psychological effect** | |
| | | **Extent and quality of road net** | **Risk factors** | | | |
| | | **Public transport** | **Primary** | | **Secondary** | |
| | | | **Use of mobile phones and driving** | | **Airbag and other passive car devices** | |
| | | | **Use of walkman for drivers, cyclists and pedestrians** | | **Use of seat belts** | |
| | | | **Hearing, seeing and walking impairments** | | **Use of helmets** | |
| | | | **Tiredness** | | **Child restraints** | |
| | | | **Driving at night** | | | |
| | | | **Medical conditions, mental illness** | | | |
| | | | **New licensed** | | | |
| | | | **Driving in rural/urban roads** | | | |
| | | | **Primary and secondary** | | | |
| | | | **Speed, as an individual and collective risk factor** | | | |
| | | | **Drunk driving, legal and illegal drug assumption and driving** | | | |
| | | | **Older road user** | | | |
| | | | **Not supervised children on the road** | | | |

### 3.4 Review of the indicators related to the issues relevant to the road accidents.

The indicators have been classified into the following categories according to their compatibility with EU legislation:

Not compatible (None)

Compatible (the majority)

Compulsory not harmonized (accidents, injuries)

Compulsory and harmonized (deaths)

The indicators have also been analyzed for their relevance to the privacy legislation of the member States. The annex “EU legislation” summarizes the results.

### 3.5 Review of the indicators related to the issues relevant to the road accidents.

The steps of the model examined in detail were: health effects, exposure and two topics included in state, quality and age of vehicle fleet and extension and quality of the roads. A list of the major risk factors has been filled. For some topics, indicators already exist and are well defined; in other cases, the fields identified are too far from our competences and working on them is not included in the group’s aims.

- Health effects

The health effects should be measured taking into account also economic and other aspects. For example, social costs of disability should be estimated; measures such as quality-adjusted life year (Q.A.L.Y) taking into account both quantity and the quality of life generated by healthcare interventions, or D.A.L.Y. – “Disability Adjusted Life Year” a combination of years of life lost and years lived with a disability that reflects the real burden of non-fatal illness or injury, would be very interesting. Relevant indicators were:

✓ Mortality

- Deaths of tourists could be found in the numerator of the mortality rate, while in the denominator only resident population is counted ;
- Indicators could regard countries of different population density and dimension, it is then agreeable to consider three years mortality rates, which are more stable;
- An important way to use mortality rates is to observe ten years trends. Especially for children, these trends could tell us if morality is increasing or not.
- It is important to determine the years of life lost that give a measure not only of the impact of mortality but also of the age composition. Road accidents are all over Europe affecting young people, this measure should perhaps work better than the mortality rate.

✓ Injuries

- It is strongly recommended to use Health System-based data sources to collect indicators on injury;
- Health Care Systems of different countries could affect the computation of indicators regarding injury, especially for mild injuries in some countries the emergency is the most common solution while in other countries there are general practitioners or primary care centres; hospital admission for not severe injuries can be driven also by the insurance system.

- ✓ Disability.
- ✓ Psychological effects.

- The event

The number of accidents causing at least an injury must be gathered. Several problems involving the definition of accident are at the moment affecting the indicators about the event: the first order of problem is the definition of road accident as “any collision between road users involving at least one vehicle in motion on a public roads normally open to traffic and causing the death of and/or injury to one or more of the road users” which is difficult to apply to pedestrian accidents.

- Risk factors

The following list of risk factors has been proposed as useful to quantify, what follows:

- ✓ risky behaviours
  - Speed, as an individual and collective risk factor
  - Drunk driving
  - legal and illegal drug assumption and driving
  - New licensed
  - Tiredness
  - Driving at night
  - Use of mobile phones and driving
  - Use of walkman for drivers, cyclists and pedestrians
  - Hearing, seeing and walking impairments
- ✓ Medical conditions
  - mental illness
- ✓ vulnerable subjects
  - Older road users
  - Not supervised children on the road
- ✓ Protective behaviours
  - Use of seat belts
  - Use of motorcycle helmets
  - Use of bike helmets
  - Child restraints
  - Airbag and other passive car devices
- ✓ Environment
  - driving in rural/urban roads
  - road infrastructures

These factors act as primary risks, i.e. they increase or decrease the probability of an accident happening, or as secondary risks or preventive tools, i.e. they reduce the damage after the accident. Some of them influence both links of the cause-effect chain, such as speed. Poverty and low educational level have been

individuated as important risk factors, but also as effect modifier for other risk factors and exposures. They also act as driving forces and pressures. Similarly, driver's gender acts as risk factor and effect modifier.
A reduced list of eligible risk factors has been produced. Four of these risk factors can be monitored by using data already collected for mortality statistics; in fact mortality rates can be calculated for the following subpopulations: children, older road user, and new licensed for motorbikes and cars.

- Exposures
  - ✓ Person-time spent on the road. This information is gathered by national surveys or censuses by mode of road user. Information about pedestrians and cyclists are rarely available.
  - ✓ Distance travelled Almost all countries collect "hundred million person Km travelled by car and lorry". This measure is usually calculated using the number of circulating vehicles and applying an estimate of the km travelled yearly and of the persons transported on average.

- State

An indicator of the age of vehicle fleet is the **renewal rate of vehicle fleet** and it can be calculated for all countries. Data, in some cases, can be not timely or updated, for example, the vehicle fleet resulting from the registry could include a significant proportion of vehicles not circulating anymore.
**The extent of the road net** can be obtained for all the countries, even if the definitions of the different types of roads are not homogenous.

- Actions

Actions include a very wide range of preventive interventions, policies, laws, structural changes etc. they can be aimed at reducing the health effects of accidents, or to reduce the prevalence of a risk factor in the population, to reduce the person-time of exposure or to reduce the number of accidents. For some actions there is an evidence of being effective in different contexts, for some other, there is proof of efficacy obtained in very peculiar situations, but for most of them there is no scientific evidence. The effectiveness of specific actions changes rapidly because of the technological improvement in vehicles, socio-economic and behavioural changes. The difference between theoretical efficacy and practical effectiveness, for some of the actions relevant to this field, generates the need to measure the level of implementation and enforcement of law and policies, and not only of their promulgation. Furthermore, the administrative competence for these actions varies from the EU Commission to the health district, making it impossible to produce a synthetic indicator valid for the entire State.
The WG, coherently with the objective of the EHI for EU project, agreed that the intent of this set of indicators is to monitor the effect of actions on their target, more than to measure the presence of the action itself.

### 3.6 The selection process.

In order to select the final set of indicators, all the hypothetical indicators have been screened according to the criteria defined. All experts filled independently in the cross-check table and finally a synthesis was done. The tables 3.3 and 3.4 shows the results of this screening process.

Table 3.3 Results of the compatibility of the indicators with the criteria of selection

| CRITERIA | mortality rate | years of life lost | injury rate | distance travelled | time spent on the road | accident rate | disability | age of vehicle fleet | extent of road net |
|---|---|---|---|---|---|---|---|---|---|
| Definition | Mortality rate due to road accidents, by age and mode of road use | Potential years of life lost (PYLL) attributable to road accidents | injury rate due to road accidents | Number of passenger Km travelled per year by mode of road use | Person time spent on the road by mode of road use | n° of accidents involving injured people/ pop or vehicles | DALY lost attributable to road accidents | % of vehicle fleet renewal in a year | Km of roads by type of road |
| A clear and commonly accepted definition | y | y | n | y | n | y | y/n | y | y |
| Association with other PH indicators | y | y | y | y | y | y | y | n | n |
| Relevance | y | y | y | y | y | y | y | y/n | y/n |
| Power of discernment (ability to detect small changes in the phenomenon) | y | y | y | y | y | y | y | y/n | n |
| Sensitivity (depending on the source: % of the detected cases on the total of existing cases) | y | y | n | y/n | n | y | y | y | y |
| Comparability in time | y | y | y | y | y/n | y | y/n | y | y |
| Comparability among countries | y | y | n | y/n | y | n | n | y | y |
| Timeliness (time elapsesd from the event to the publication of the indicator) | y | y | y | y | y/n | y | n | y | y |
| Availability of information | y | y | y | y | n | y | y/n | y | y |
| Stability (how much is influenced by other factors, not regarding road accident field?) | y | y | y | y | y/n | y | y | y | y |
| Continuity (how long are the historical series for the indicator available?) | y | y | y | y | n | y | n | y | y |
| Cost effectiveness | y | y | y | y | y/n | y | y/n | y | y |
| Teorethical validity (how well the indicator represent what we are interested in, independently of the flows of the sources) | y | y | y | y | y | y | y | y | y |
| Reliability (depending on the source: how good and valid is the figure given by the indicator) | y | y | n | y/n | y/n | y | y/n | y | y |
| Interpretability | y | y | y | y | y | y | y/n | y | y |
| Coverage (is the indicator available for all the country) | y | y | y | y | n | y | y/n | y | y |
| Final recommendation | *** | *** | **1/2 | *** | ** | *** | ** | **1/2 | ** |

Table 3.3 Results of the compatibility of the indicators with the criteria of selection

| CRITERIA | **Speed** | **Driving at night** | **Drunk driving** | **Driving rural urban** | **Children** | **Young drivers** | **Young drivers** | **Older road users** | **Use of seat belts** | **Use of helmets motorcycle** | **Use of helmets bike** | **Child restraints** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Definition | % of vehicles exceeding limits | n° of cases 22-05h/ estimate of traffic at night | n° of drunk drivers inv in accident/ pop | n° cases in rural urban roads | n° of cases 0-14/pop 0-14 | n° of cases 14-24 mopet/pop 14-24 | n° of cases 17-24 car/pop 18-24 | n° of cases >70/pop >70 | %of seat belt use in pop | %of helmet use in pop | %of helmet use in pop | %of restraint use in pop |
| A clear and commonly accepted definition | y | y/n | y | y | y | y | y | y | y | y | y | y |
| Association with other PH indicators | n | n | y | n | y | y/n | y/n | y | y | y | y/n | y |
| Relevance | y | y | y | y | y | y | y | y | y | y | y/n | y |
| Power of discernment (ability to detect small changes in the phenomenon) | y | y/n | y/n | y/n | y | y | y | y | y/n | y/n | y | y |
| Sensitivity (depending on the source: % of the detected cases on the total of existing cases) | y | y | y/n | y | y | y | y | y | y/n | y/n | y | y |
| Comparability in time | y/n | y/n | n | y | y | y/n | y | y | n | n | y/n | y/n |
| Comparability among countries | n | y/n | n | y/n | y | y | y | y | y/n | y/n | y/n | y/n |
| Timeliness (time elapsesd from the event to the publication of the indicator) | y/n | y | y | y | y | y | y | y | y | y | y | y |
| Availability of information | y/n | y | y | y | y | y | y | y | y/n | y/n | y/n | y/n |
| Stability (how much is influenced by other factors, not regarding road accident field?) | y | y | y | y/n | y | y | y | y | y | y | y | y |
| Continuity (how long are the historical series for the indicator available?) | y/n | y/n | y/n | y | y | y | y | y | n | n | n | n |
| Cost effectiveness | y/n | y | y/n | y | y | y | y | y | y/n | y/n | y/n | y/n |
| Teorethical validity (how well the indicator represent what we are interested in, independently of the flows of the sources) | y | y | y | y/n | y | y/n | y/n | y | y | y | y | y |
| Reliability (depending on the source: how good and valid is the figure given by the indicator) | y | y | n | y | y | y | y | y | y | y | y | y |
| Interpretability | y/n | y/n | y | y/n | y | y | y | y | y | y | y/n | y |
| Coverage (is the indicator available for all the country) | y/n | y/n | y/n | y | y | y | y | y | y/n | y/n | y/n | y/n |
| Final recommendation | ** | ** | **1/2 | *1/2 | *** | **1/2 | **1/2 | *** | ** | ** | ** | **1/2 |

### 3.7 The final set of indicators

11 indicators as being extremely useful to measure the health effects of road accidents and to monitor the cause-effect chain of the phenomenon. The indicators reported here are classified by their position in the DPSEEA modified model.

Table 3.4 The final set of indicators

| **Driving Force** | **Pressure** | **State** | **Exposure** | **event** | **Effect** | **Action** |
|---|---|---|---|---|---|---|
| | | % of vehicle fleet renewal / year | Time spent on the road by road user | Accident rate, by road user | Mortality rate, by age and road user | |
| | | | Million Km person travelled[1] | | Years of life lost[2] | |
| | | | | | Injury rate | |
| | | | | | DALY lost[3] | |
| | | | **Risk factors** | | | |
| | | | **Primary** | **Secondary** | | |
| | | | | % of use seat belts, child restrains, helmets | | |
| | | | **Primary and secondary** | | | |
| | | | % of car exceeding speed limits | | | |
| | | | Mortality due to drunk driving rate | | | |

1. This indicator is included in the air pollution set.
2. The years of life lost are directly computed from the mortality data.
3. In the absence of analytical data, the Disability Adjusted Life Years lost are computed directly from mortality and morbidity data.

Table 3.5 presents the crosscheck of compatibility of the final set of indicators with EU legislation.

| | **Topic of the indicator** | **Compatibility with EU legislation** |
|---|---|---|
| **State** | Age of vehicle fleet | compatible |
| **Exposure** | Time and km traveled | compatible |
| **Risk factors** | % of car exceeding speed limits | compatible (focus point of EU actions) |
| | Mortality due to drunk driving rate | compatible (focus point of EU actions) |
| | Use seat belts, child restrains, helmets | compatible |
| **Event** | Road accident rate | compulsory only if generate injury, not harmonised |
| **Effect** | Death | compulsory for MS |
| | Years of life lost | computed using mortality |
| | Injury | compulsory for MS, but not harmonised |
| | Disability | computed using mortality and morbidity |

The following methodology sheets have been prepared according to the WHO style, to define indicator by indicator the definition, specification of data needed, data sources, availability and quality, computation and interpretation.

| **Traf_E1** | **Mortality rate due to road traffic accidents** | DPSEEA |
|---|---|---|
| *Issue* | Transport, housing and human settlements | |
| *Definition of indicator* | Mortality rate due to transport accidents | |
| *Underlying definitions and concepts* | This indicator is based on the following definitions:<br>All deaths directly or indirectly attributable to involvement in a traffic accident however caused. It includes immediate and delayed deaths (within 30 days).<br>Total resident population stratified by gender and age. | |
| *Specification of data needed* | - Total number of deaths due to road traffic accidents<br>- Total resident population by gender and age | |
| *Data sources, availability and quality* | Data on deaths come from official statistics, death cause registries or police statistics. These data could suffer from limitation due to death cause definitions (reference may be made only to the nature of the injury causing death not its source) and to lack ness of a commonly agreed definition of person killed in a traffic accident.<br>Data on residents should be available from national censuses and should be reliable. Deaths of tourist could be find in the numerator of the mortality rate, while in the denominator only resident population is counted.<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm | |
| *Computation* | Numerator: deaths stratified by: age, gender, mode of road user (pedestrians, cyclists, motorcyclist, car or taxi, lorry)<br>Denominator: total resident population stratified by sex and age (some age class need to be focussed: 0-14; 14-17; 18-25; 26-50; 51-65; >65) | |
| *Units of measurement* | Number of deaths for hundred thousand population | |
| *Scale of application* | Local to international. Problems of consistency and availability may limit interpretation at broader scales | |
| *Interpretation* | This indicator is general relatively easy to interpret in that the link between the cause and health effect is explicit. Changes in the indicator should be due to reduction in total traffic volume, greater segregation of pedestrian from road traffic accident, improvement in : road design, traffic management, vehicle safety, environmental conditions. It could be better considering in the interpretation three years mortality rate, which are more stable, since this indicator could regard countries of different population density, furthermore ten years trend could be used to observe changing in mortality especially for children | |
| *Linkage with other indicators* | Event*: Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Injury rate; Potential years of life lost; Number of DALYs lost for road accident*<br>Risk Factor: *Percentage of safety vehicle ( car/motorcycle) device use; Percentage of vehicles exceeding limits; Deaths due to drunk driving* | |
| *Related data indicators* | The Euphin-East database: www.euphin.dk/Phfa.asp<br>Health for all database: www.who.dk/hfadb<br>OECD Road transport and research programme: The International Transport research database: http://www.bast.de/htdocs/fachthemen/irtad/<br>CARE: community road accident databases:<br>http://www.europa.eu.int/comm/transport/home/care/index_en.htm<br>European conference of ministry of transport:<br>http://www1.oecd.org/cem/stat/accidents/index.htm | |

The indicator is compatible with EC legislation.

This indicator is collected by all the European countries and it is available on Eurostat database.

| **Traf_E2** | **Potential Years of life lost** | DPSE**E**A |
|---|---|---|
| *Issue* | Transport, housing and human settlements | |
| *Definition of indicators* | Potential years of life lost (PYLL) attributable to transport accidents | |
| *Underlying definitions and concepts* | Potential Years of l life lost for premature deaths directly or indirectly attributable to involvement in a traffic accident and<br>Potential years of life lost for all causes including traffic accident | |
| *Specification of data needed* | Life expectancy at every age | |
| *Data sources, availability and quality* | Potential years of life lost should be calculated using death certificate data. It should be better avoiding the police register because of the poor validity of this kind of data. | |
| *Computation* | Numerator: total number of potential years of life lost for traffic accident<br>Denominator: total number of potential years of life lost for all causes | |
| *Units of measurement* | Number of years of life lost for traffic accident divided for the years of life lost for all causes | |
| *Scale of application* | Local to international. Problems of consistency and availability may limit interpretation at broader scales | |
| *Interpretation* | PYLL is and indicator of premature mortality. With respect to mortality rates it gives a measure not only of the mortality impact but also of the characteristics of population involved (young people for road accident). It is useful when assessing community health research priorities allowing at meantime comparison to be made over time and place | |
| *Linkage with other indicators* | Event: *Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Injury rate; Number of DALYs lost for road accident* | |
| *Related data indicators* | WHO Life table and healthy life expectancy data :<br>http://www.who.int/health_topics/global_burden_of_disease/en/ | |

The indicator is compatible with EC legislation.

| **Traf_E3** | **Injury rate due to road traffic accidents** | DPSE**E**A |
|---|---|---|
| ISSUE | Transport, housing and human settlements | |
| *Definition of indicators* | Injury rate due to transport accidents | |
| *Underlying definitions and concepts* | This indicator is based on the following definitions<br>Injury due to road traffic accidents: All injuries directly or indirectly attributable to involvement in a traffic accident however caused. This includes minor accident (as sprains and bruises) and serious accident. Injury could be defined as: disruption of the structure or function of the human organism resulting from exposure to excessive or deficient energy. Typically, both the exposure to energy and the onset of disruption are acute, often the energy is kinetic, but it may be another type (thermal, chemical etc.). Severity of injury can be defined in terms of threat to life, immediate effects (e.g. loss of consciousness, compound fracture, multiple injuries); time to recover, the outcome of patient (e.g. death, permanent disability or disfigurement); quality of life; resources required for treatment (e.g. surgery, invasive diagnostic tests); cost (medical or other costs)<br>Total resident population stratified by gender and age. | |
| *Specification of data needed* | Total number of injury due to road traffic accidents<br>Total resident population by gender and age | |
| *Data sources, availability and quality* | Data on injuries should be available at national level from death certificate, hospital based surveillance systems, police statistics and at local level from population based-surveys, trauma registries and registries of medical care facilities. Data on injuries should be based only on health systems databases since police records are often limited from a underreporting of total number of cases and in particular of the mild ones. However The Health Care systems of different countries deal with the injured in different ways, especially the mild ones (in emergency departments in some countries, by general practitioners in others and so on). This could affect the computation of injury indicators.<br>Data on residents should be available from national censuses and should be reliable validity of this kind of data. Injuries of tourist could be find in the numerator of the injury rate, while in the denominator only resident population is counted<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm | |
| *Computation* | Injury rate<br>Numerator: injuries stratified for: mode of road user (pedestrians, cyclists, motorcyclist, car or taxi, lorry) and severity<br>Denominator: total resident population stratified by gender and age | |
| *Units of measurement* | Number of injuries per hundred thousand population | |
| *Scale of application* | From national to very local because of the high incidence. Attention must be paid to compare different countries | |
| *Interpretation* | Injury rate: this indicator is relatively easy to interpret in that the link between the cause and health effect is explicit. Changes in the indicator should be due to reduction in total traffic volume, greater segregation of pedestrian from road traffic accident, improvement in: road design, traffic management, vehicle safety, environmental conditions. | |
| *Linkage with other indicators* | Event: *Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Number of DALYs lost for road accident*<br>Risk Factor: *Percentage of safety vehicle ( car/motorcycle) device use; Percentage of vehicles exceeding limits; Percentage of drunk drivers* | |
| *Related data indicators* | OECD Road transport and research programme: The International Transport research database:<br>http://www.bast.de/htdocs/fachthemen/irtad/<br>CARE: community road accident databases:<br>http://www.europa.eu.int/comm/transport/home/care/index_en.htm | |

The indicator is compatible with EC legislation.

Member States should harmonize the definitions used.

This indicator is collected by all the European countries and it is available on Eurostat database.

| Traf_D1 | **Passengers-kilometres by mode of transport (Air_D1)** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Number of passenger Km travelled per year stratified for mode of road users (car, lorries, pedestrian, motorcycle) | |
| *Underlying definitions and concepts* | Number of passenger-Kilometres: total amount of passenger-Kilometres travelled by mode of road user over a time period<br>Passenger-Kilometres: a unit of measure representing the transport of one passenger over a distance of 1 Km | |
| *Specification of data needed* | Number of registered vehicles, by type<br>Estimated Distance travelled by each type of vehicle<br>Estimated passenger number per vehicle<br>Total resident population | |
| *Data sources, availability and quality* | Data on registered vehicles should be provided by public motor vehicle registers, for this reason, data are limited to means of transport actually included in those registers (the lack of information could regard motorcycle and moped). This data could include a significant amount of non circulating vehicles<br>Estimated distances travelled and passengers number should be provided by census data (question about this task are usually included there) and national surveys. Fuel consumption data is also a commonly used source of information even if this measure could be affected by several biases: number of persons transported by each vehicle, composition of vehicle fleet etc.<br>Data on residents are available from national census and should be reliable | |
| *Computation* | Computation could be given in:<br>Total amount of passenger-Km<br>Passenger-Km per inhabitant by vehicle type<br>Percentage of the total number of passenger-kilometres driven by all type of vehicle | |
| *Units of measurement* | Million of Passenger Km or Passenger Km /inhabitant | |
| *Scale of application* | Usually national: local or regional should be preferable even if a bigger effort is required. It is usually not comparable between countries with different GDP. | |
| *Interpretation* | This indicator should measure the amount of exposure to the road travelling for different categories of road users classified on the basis of means of transport used. It takes into account only powered users. Distances travelled can be very different depending on the urbanization, geographical conformation and development of road net. | |
| *Linkage with other indicators* | Event: *Road accident*<br>Exposure: *Person time spent on the road*<br>Risk Factor: *Percentage of vehicles exceeding limits* | |
| *Related data indicators* | European conference of ministry of transport, Trends in the Transport Sector West European Countries: http://www1.oecd.org/cem/stat/trends/west.htm | |

The indicator is compatible with EC legislation.

This indicator is collected by all the European countries. Different European Agencies ( Eurostat, EEA ) report the figures.

| **Traf_S1** | **Age of vehicle fleet** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicator* | The average renewal of passenger cars | |
| *Underlying definitions and concepts* | Vehicle fleet: number of circulating vehicles as resulted from public motor vehicle registries. | |
| *Specification of data needed* | Passenger cars first registration<br>Total passenger cars | |
| *Data sources, availability and quality* | Data on registered vehicle should be provided by public motor vehicle registers. The resulting vehicle fleet could include a significant proportion of non circulating-ones.<br>Attention must be given to the problems of definitions applied differently in the countries, mainly on the distinction between a lorry and a passenger car (i.e. vans, pick ups, etc.).<br>Data on renewal rate of passenger cars are available in the European Enviromental Agency publications and are present in the EUROSTAT Database. | |
| *Computation* | Numerator: passenger cars first registration<br>Denominator: total passenger cars | |
| *Units of measurement* | Percentage of the total number of passenger cars at first registration | |
| *Interpretation* | This indicator should measure years of usage for each passenger car and quality of car fleet, in terms of reducing the severity of injuries occurring to occupants within the passenger car.<br>Changes in the indicator should be due to improvement in fleet composition, by replacing older vehicles with newer ones, vehicle safety and environmental conditions.<br>The average renewal rate could be weighted to the usage of the vehicle - i.e. the distances km travelled. | |
| *Linkage with other indicators* | Event*: Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Injury rate; Mortality rate; Years of life lost* | |
| *Related data indicators* | European Environment Agency:<br>http://themes.eea.eu.int/Sectors_and_activities/transport | |

The indicator is compatible with EC legislation.

This indicator is collected by all the European countries.

| **Traf_S2** | **Road accident rate** DPSEEA |
|---|---|
| ***Issue*** | Transport, housing and human settlements |
| *Definition of indicators* | Number of road accident per vehicle fleet (vehicle type) or general population |
| *Underlying definitions and concepts* | Road accident: any collision that involves at least one vehicle in motion on a road normally open to traffic, including those where a vehicle in collision with a pedestrian is involved and results in at least one injured person.<br>Vehicle fleet: number of circulating vehicles as resulted from public motor vehicle registries.<br>Total resident population stratified by gender and age. |
| *Specification of data needed* | - Number of road accident<br>- Number of vehicles by vehicle type (car, bus, lorries etc.)<br>- Total resident population |
| *Data sources, availability and quality* | Data on road accident could be obtained from police statistics, insurance company records. In most countries, the police collect road crash data only if an injury occurred. These could suffer from various limitations: variance in the quality (an accident report may not be complete until several days after the event), inadequate and incomplete recording of accident, subjectivity in the ascertainment of the injury. On the other hand data coming from insurance company are limited to in which one party was insured and actually made a claim.<br>Data on registered vehicle should be provided by public motor vehicle registers; for this reason, data are limited to vehicles actually included in those registers (the lack of information could regard motorcycle and moped other than obviously bicycle). The resulting vehicle fleet could include a significant proportion of non circulating-ones.<br>Data on residents should be available from national census and should be reliable. Accidents of tourist could be found in the numerator of road accident rate, while in the denominator only resident population is counted.<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm |
| *Computation* | Numerator: number of road accident causing with at least one injury<br>Denominator: total resident population<br>Denominator: total amount of circulating vehicles |
| *Units of measurement* | Number of road accident for hundred thousand population<br>Number of road accident for hundred thousand vehicle |
| *Scale of application* | Usually national. Local or regional should be preferable even if more effort is required |
| *Interpretation* | Data on road accident are usually collected for law enforcement purposes. Crash data can be used to measure the effectiveness of law enforcement activities and determination of black-spot area providing at the mean time information about primary risk factors. Change on this indicator could be due to: the improvement on the safety of vehicles (in terms of reducing the severity of injuries occurring to occupants within the vehicle), decrease of accident number. |
| *Linkage with other indicators* | State: *Age and quality of vehicle fleet; Extension and quality of road net*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: *Mortality rate; Potential years of life lost; Number of DALYs lost for road accident*<br>Risk Factor: *Percentage of vehicles exceeding limits; Percentage of drunk drivers* |
| *Related data indicators* | European agency for environment:<br>http://themes.eea.eu.int/Sectors_and_activities/transport/indicators<br>For the methodological approach to road accident databases see also the final report of stairs project:<br>http://www.inrets.fr/ur/umrette/publications/stairs/finalreport.PDF |

**Road accidents could be considered as a proxy of the health effect and an exposure by itself. It has been decided to extrapolate road accident from the conceptual framework and to consider it a necessary event for producing health consequences*

The indicator is compatible with EC legislation.

This indicator is collected by all the European countries.

| **Traf_S3** | **Speed limits exceedances** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Percentage of vehicles exceeding speed limits | |
| *Underlying definitions and concepts* | Speed limit: top speed permitted according to the road (motorways, urban areas, other road) and vehicle type (car, motorcycle, bus, lorry)<br>Circulating vehicles: number of circulating vehicles at the site of measurement | |
| *Specification of data needed* | Number of vehicles exceeding speed limits<br>Number of circulating vehicles | |
| *Data sources, availability and quality* | Data on vehicles exceeding the speed limit are based on surveys systematically conducted. The different methodologies (several technical devices, size of data set, measuring point, measuring time) used for the estimation of this data considerably limit any comparison between different studies. Sometimes, speed limit offences as detected by the police are regarded as an alternative measurement. This, however, has clear restrictions regarding the comparability of results, because the results are strongly influenced by the enforcement strategies of the police. Self-reported speeds, from telephone surveys, is also a cheap solution already used, even if self-reported behaviours are difficult to interpret. | |
| *Computation* | Numerator: number of vehicle exceeding limit respect to the road type (motorway, urban area, other road)<br>Denominator: Number of circulating vehicles stratified by type (motorcycle, car, bus, lorries) | |
| *Units of measurement* | Percentage of vehicles exceeding limit | |
| *Scale of application* | Usually this data are collected at local level even if cases of national based study are available | |
| *Interpretation* | This indicator gives a figure of the level of transport safety and improves the understanding of road accident trends. The regular monitoring gives a good basis of information in order to develop effective measures to reduce the number of killed or injured people because of the strong relationship between speed and the number of accidents and the severity of injuries. | |
| *Linkage with other indicators* | Exposure: *Distances travelled; Person time spent on the road*<br>Event : *Road accident*<br>Effect: *Injury rate; Mortality rate; Potential years of life lost; Number of DALYs lost for road accident* | |
| *Related data indicators* | ETSC report on transport safety performance indicators<br>http://www.etsc.be/rep.htm | |

The indicator is compatible with EC legislation.

The monitoring of his risk factors is strongly recommended by the EC.

| Traf_Ex1 | Person time spent on the road | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Person hour spent on the road to get to the place of work or the school by main mode of travel [1] | |
| *Underlying definitions and concepts* | Number of hour spent on the road: total amount of time spent on the road to get to the usual place of work or the school from home | |
| *Specification of data needed* | Number of hour spent on the road to get the place of work or the school by person, by main mode of travel (car, bus, metro, motorcycle, bike, on foot)<br>Total resident population | |
| *Data sources, availability and quality* | Estimated time spent on the road should be provided by Household surveys on daily and long distance mobility, Road traffic surveys, surveys of enterprises involved in scheduled and non-scheduled bus services and census data even if this data could be scarcely accurate. National inventories are usually available from national statistics bureau. At international scale Eurostat provide data for EU countries and UNECE for all the countries in the European region. However data on non-motorised mobility (walking and cycling) are extremely scarce for the EU and need to be improved<br>Data on residents should be available from national censuses and should be reliable<br>Eurostat reports for the years 1998-2002 the results of the "time Use Surveys" in ten European Countries. http://europa.eu.int/comm/eurostat/Public/datashop/print-product/EN?catalogue=Eurostat&product=KS-58-04-998-__-N-EN&mode=download | |
| *Computation* | Computation could be given in:<br>- Number of hour spent on the road/ inhabitant, or<br>- Number of hour spent on the road by main mode of travel (car, bus, metro, motorcycle, bike, on foot) | |
| *Units of measurement* | Person hour per inhabitant or main mode of travel | |
| *Scale of application* | Usually national: local or regional should be preferable even if more effort is required | |
| *Interpretation* | This indicator should measure the exposure to the risk for different categories of road users classified on the basis of means of transport used. In relation to the distances km travelled, this indicator provides a better estimation about vulnerable users (pedestrians and cyclists) since it is difficult to calculate for these the real amount of distance travelled. On the other hand, for some modes of transport it is possible to convert the time spent to distances travelled using the average speed of vehicles. | |
| *Linkage with other indicators* | Event*: Road accident*<br>Exposure: *Distances travelled*<br>Risk Factor: *Percentage of vehicles exceeding limits* | |
| *Related data indicators* | European agency for environment:<br>http://themes.eea.eu.int/Sectors_and_activities/transport/indicators<br>European conference of ministry of transport , Trends in the Transport Sector West European Countries: http://www1.oecd.org/cem/stat/trends/west.htm<br>For update methodology see: UNECE transport division,<br>http://www.unece.org/trans/doc/2002/wp6/inf01.pdf | |

The indicator is compatible with EC legislation.

1 By "main mode of travel" is meant the one used for the longest part of the trip. Within parts of the trip of equal length, it should be used the last one as "mode of travel"

| Traf_Ex2 | **Use of safety vehicle devices** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Percentage of safety vehicle device use in the circulating population | |
| *Underlying definitions and concepts* | Safety vehicle device: the term includes the main device designed to protect car (seat belt, child restrain) and motorcycle occupants (helmet)<br>Circulating population: number of car and/or motorcycle occupants as resulted from surveys | |
| *Specification of data needed* | Number of car/ motorcycle occupants properly using seat belt, child restrains, helmet<br>Number of car/motorcycle occupants | |
| *Data sources, availability and quality* | Data on use of safety devices could be obtained from specific studies and field surveys. The estimates must be based on direct observation of occupants in vehicles on roadways. Some difficulties could be due to the distinction into front/rear passenger and to the identification of children who need restrains according to the national legislation. Rates determined from secondary sources, e.g., police crash reports or self-reported use in telephone surveys, are not widely used because of poor reliability | |
| *Computation* | Seat belt use<br>Numerator: number of people using seat belt<br>Denominator: number of car occupants distinguished in driver and front/rear passenger<br><br>Child restrains use<br>Numerator: number of children as car passenger properly restrained<br>Denominator: number of children distinguished in front/rear passenger<br><br>Helmet use<br>Numerator: number of motorcycle occupants using helmet<br>Denominator: number of motorcycle occupants distinguished in driver and passenger | |
| *Units of measurement* | Percentage of passengers properly using seat belt, child restrains, helmet | |
| *Scale of application* | Usually local | |
| *Interpretation* | This indicator measures changes in people behaviours. It could also be used to monitor the efficacy of specific preventive actions | |
| *Linkage with other indicators* | Effect: *Mortality rate; Potential years of life lost; Number of DALYs Lost for road accident* | |
| *Related data indicators* | Report on availability of seat belt wearing data in OECD countries<br>http://www.bast.de/htdocs/fachthemen/irtad/utility/special_rep_seatbelt.pdf<br>Site of European commission about road safety actions programme<br>http://europa.eu.int/comm/transport/road/roadsafety/index_en.htm | |

The indicator is compatible with EC legislation.

The monitoring of his risk factors is strongly recommended by the EC.

| **Traf_E4** | **DALY lost for road traffic accidents** | DPSE**E**A |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | -Number of DALYs lost as a consequence of traffic accident for total resident population standardized per age and sex<br>-Percentage of DALYs lost as a consequence of traffic accident compared to the total number of DALYs lost for all causes | |
| *Underlying definitions and concepts* | D.A.L.Y. is an indicator of time lived with a disability and the time lost due to premature mortality.<br>The values incorporated in the DALY indicator are:<br>Duration of time lost due to a death at each age: this measure requires the definition of the potential limit of life. For a specific limit, the expectations are based on life table<br>Disability weights or degrees or suffering associated with different non-fatal conditions.<br>Age Weights which indicate the relative importance of healthy life at different ages<br>Time preferences which is the value of health gains today, compared to the value attached to health gains in the future | |
| *Specification of data needed* | Duration of time lost due to a death at each age<br>Disability weights<br>Age-weights<br>Time preferences (discounting)<br>Total resident population<br>Standard population | |
| *Data sources, availability and quality* | Data on disability could be provided by health surveys or hospital discharge data, or ad hoc registries on a local basis.<br>Data on mortality could be collected from death registries These data could suffer from limitation due to death cause definitions (reference may be made only to the nature of the injury causing death, not its source) and to a lack of a commonly agreed definition of persons killed in a traffic accident.<br>Disability weights and age weights are those used in the World bank report established with the participation of a group of independent experts.<br>Data on resident population standardized for age and sex should be available from national censuses and should be reliable. European population could be used as standard | |
| *Computation* | Numerator: Total number of DALY lost as a consequence of a traffic accident. The DALYs lost due to disability at age “x” is calculated using the following formula<br>$DALYs=(D)*(Cxe^{-Bx})(e^{-r(x-a)})$<br>Where “$D$” is the disability weight (ranging from 1 for death to 0 for perfect health)<br>$(Cxe^{-Bx})$ is the function to calculate the age weights<br>$(e^{-r(x-a)})$ is the discounting function used to convert future benefits into net present value terms<br>Denominator:<br>-total number of DALYs lost for all causes<br>-total resident population standardized for age and sex | |
| *Units of measurement* | Number of DALYs lost for traffic accident divided by number of DALYs lost for all causes and Number of DALYs lost divided by the total population standardized for age and sex | |
| *Scale of application* | Local to international because problems of consistency and availability may limit interpretation at a broader scale | |
| *Interpretation* | This indicator is a combination of years of life lost and years lived with a disability. It offers the possibility to compare the total burden of non fatal illness or injury between different countries | |
| *Linkage with other indicators* | Event*: Road accident*<br>Effect: *Mortality rate; Injury rate; Potential years of life lost*<br>Risk Factor: *Percentage of safety vehicle (car/motorcycle) device use; Percentage of vehicles exceeding limits; Percentage of drunk drivers* | |
| *Related data indicators* | WHO Life table and healthy life expectancy data :<br>http://www.who.int/health_topics/global_burden_of_disease/en/ | |

The indicator is compatible with EC legislation.

Some estimates of this indicator are provided by WHO-Centre for Transport studies-Rome .

| **Traf_E5** | **Mortality due to drinking driving** | DPSEEA |
|---|---|---|
| ***Issue*** | Transport, housing and human settlements | |
| *Definition of indicators* | Number of deaths due to drunk driving/population | |
| *Underlying definitions and concepts* | Alcohol use: data element which describes the suspicion or evidence of alcohol use preceding the event by persons involved in the event.<br>Road accident: any collision that involves at least one vehicle in motion on a road normally open to traffic including those in which a vehicle in collision with a pedestrian is involved and causing at least an injury<br>Total resident population stratified by gender and age. Deaths of tourists could be found in the numerator of the mortality rate, while in the denominator only resident population is counted | |
| *Specification of data needed* | Number of drivers under the effect of alcohol involved in fatal road accident<br>Total resident population | |
| *Data sources, availability and quality* | Data on deaths in accidents due to alcohol consumption: are collected by death certificate and police reports. Beside the usual problem related to this source of information, several studies, carried out in different countries, have shown that alcohol-related deaths are considerably underreported on death certificates. This underreporting seems to be due to social desirability bias that induce many physicians to avoid using codes that explicitly mention alcohol aetiology. Furthermore many police reports are based on personal opinion of policemen and not on measurements<br>Data on residents are available from national censuses and should be reliable | |
| *Computation* | Numerator: Number of deaths in road accidents due to alcohol assumption<br>Denominator: Total resident population | |
| *Units of measurement* | Number of deaths in road accidents due to alcohol assumption divided by total resident population | |
| *Scale of application* | Local to international, because problems of consistency and availability may limit interpretation at broader scales | |
| *Interpretation* | This indicator measures the risk of being involved in a fatal road accident due to alcohol. The numerator includes casualties because this data are more reliable respect to injury ones and allows a better comparison between several countries. | |
| *Linkage with other indicators* | Event: *Road accident*<br>Effect: *Injury rate; Mortality rate; Potential years of life lost; Number of DALYs lost for road accident*<br>Risk Factor*: Percentage of vehicles exceeding speed limits* | |
| *Related data indicators* | EUROCARE report on drinking and driving in Europe<br>http://www.epha.org/IMG/pdf/Drinking_and_Drg_in_Euro.pdf<br>ETSC (European transport safety council ) report on transport safety performance indicators<br>SWOV The Netherlands ( Institute for Road Safety Research)<br>http://www.swov.nl/en/kennisbank/ | |

The indicator is compatible with EC legislation. The monitoring of his risk factors is strongly recommended by the EC.

This indicator is collected by all the European countries.

### 3.8 The feasibility study

The feasibility study has been conducted by the WHO group of experts and the National Focal Points. Briefly, a questionnaire has been prepared and National focal Point have collected all the information. Good indicators are based on routinely collected data, available in most member states, reliable and scientifically-based, comparable over time and space, and useful for policy process. To select good indicators, the ECOEHIS project partners adopted four criteria – Availability, Quality, Comparability, and Policy-relevance. In addition, overall readiness was assessed as a summary information. Results have been presented and the final set of indicators have been classified as:

- Ready and recommended for immediate implementation* (These indicators are recommended as 'core' European Community Health Indicators)
    - Passengers-kilometres by mode of transport
    - Age of vehicle fleet
    - Road accident rate
    - Mortality due to transport accidents
    - Injury rate
- Ready, but not feasible for immediate implementation
    - Potential Years of Life Lost
- Desirable though requiring further developmental work
    - Speed limit exceedances
    - Person time spent on the road
    - Use of safety vehicle device*
    - DALY lost for road accidents
    - Mortality due to drinking driving

More in detail:

- *Passengers-kilometres by mode of transport* is ready, figures are currently present in the international databases. The only limitation is that this indicator does not collect information on distances travelled by human-powered modes of transport.
- *Age of vehicle fleet and Road accident rate* The first is reported and discussed on the EEA reports. The Traf_S2 is collected by almost all the European MS and is available in the CARE (Community Road Accident Database) . Although some problems on comparability and quality of the Traf_S2 have risen in the feasibility study, These two indicators were recommended for the ECHI set for their policy-relevance and readiness of implementation.
- *Speed limit exceedenaces* . There was no international database identified for this indicator. Therefore, it was agreed that this indicator will be monitored as a pilot indicators on a voluntary basis. In the meantime, according to the relevance of this indicator with respect to the prevention of road traffic accidents, it was recommended that this indicator be proposed to the Eurostat survey to develop more standardized assessment.
- *Person time spent on the road and Use of safety vehicle device* are both status exposure indicators for traffic accidents. Eurostat reports for the years 1998-2002 the results of the "time Use Surveys" in ten European Countries, with some estimates of time spent on the

road. The decision was to propose these two indicators for implementation to Eurostat and to collect them on a voluntary basis.

- *Mortality due to transport accidents* is the most important effect indicator. Most countries gave consistently good scores for availability, quality, and comparability. This indicator is readily available from Eurostat (CARE-Community Road Accident Database), and was agreed to recommend to the ECHI.
- *Potential years of life lost* is directly calculated from mortality figures. The life expectancy at every age is easily available by the demographic statistics. This indicator was recommended for further development in the framework of the ENHIS study.
- *Injury rate* is an important effect indicator readily available from CARE-Community Road Accident Database OECD/IRTAD. Most countries gave fairly good scores for availability, quality, and comparability. Improvements in the quality and comparability are to be recommended. This indicator was agreed to recommend to the ECHI.
- *DALY lost for road accidents* is calculated from mortality and injury. To calculate Dalys disability weights for different countries are necessary. The World Bank has proposed an algoritm to calculate DALYs. This indicator need to be better developed and the was recommended for further development in the framework of the ENHIS study.

• *Mortality due to drinking driving* is primary and secondary risk factor of traffic accident morbidity and mortality. Countries gave relatively low comparability and policy-relevance. Given the low scores and poor availability of this relevant indicator, it was recommended for further development in the framework of the ENHIS study.

### 3.9 Review of the evidence

There's a large body of evidence that driver-related behavioural factors are the major causes of road accidents, and it has been estimated that they contribute to the occurrence of 95 % of the associated injuries.

Transport interventions have the potential to benefit in several ways, such as through health promotion, engineering interventions, environment modifications, new legislations and enforcement of legislation. The relation between transport and health is very complex and not always results are ease to read. Some of the interventions that, in a first instance, could appear to be effective have resulted, analysing several trials, to be not effective or, in same cases, to conduct to opposite effect than the reduction of road traffic accidents. An example of this is the recent Cochrane review on school based education programmes, aimed at proposing driver education to high school students. The results showed that driver education leads to early licensing, and provided no evidence that it reduced road crash involvement, moreover they suggested that it may lead to a modest but potentially important increase in the proportion of teenagers involved in traffic crashes. In order to study the sensitivity of indicators to different programmes, it appeared to the Working Group necessary to provide a summary table reporting the most recent reviews on traffic accident reduction interventions, with their effectiveness. Different electronic databases have been analysed to find recent reviews: Pubmed, Cochrane library and world wide web. A synthesis of the evidences about road traffic intervention should contain the following categories of intervention:

- **Health promotion** - beneficial effects, with various quality scores of the reviews, were found for primary care based counselling to prevent childhood injury, programme to promote the use of child restrain and the use of seat belt, intervention for pedestrian and cyclist visibility for the prevention of death and injuries. As described above, some health promotion interventions have resulted in opposite or no outcome reduction such as school based driver education, or Post license driver education. Table 3.6a presents evidence on health promotion programmes.
- **Engineering interventions** – The review of traffic calming schemes had a mean effect of reducing accidents with similar effect sizes in different time periods and geographical contexts. The use of studded tyres showed controversial effects, depending on the road surface. The use of daytime running lights was associated to a reduction of accidents, but there was substantial difference in the effect depending on the latitude (greater effect in northern countries). Speed limit zones are affective in reducing accidents and material damages. Table 3.6b reports a summary of evidence on engineering interventions.
- **Environmental interventions** – Public lighting was found to reduce night time accidents, while guard rails and crash cushions were found to increase the absolute number of accidents, but the outcomes were less severe. Table 3.6c presents evidence on environmental modifications.
- **Legislative modifications** - Laws for a maximum legal blood alcohol concentration of 0.02% were found to be effective in the reduction of night time injuries and fatal crashes, and the introduction of random breath alcohol testing is associated with different beneficial effects. Laws to encourage seat belt use have been seen to increase the percentage of seat belt usage and decrease injuries. Table 3.6d reports a summary of evidence on legislation.

**Table 3.6a Main findings of systematic reviews on health promotion interventions to improve health through transport**

| Author, date and country | Modes of intervention | Main results |
|---|---|---|
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. In: J Epidemiol Community Health 2003; 57: 327-333 | Primary care based counselling to prevent childhood injury | Injury prevention counselling as part of routine health supervision increased car seat and seat belt use, decreased motor vehicle occupant injuries and decreased hospital visits for traffic injuries. |
| | | School based and public/parent education to use bicycle helmets reduced hospital inpatient rates for bicycle injuries by up to 0.2% more than control group. Reduction in hospital admission as result of general injury prevention approaches showed 20% decrease in 1 study, but NS effects in other programmes. |
| | Promotion of childhood rear car seats | The evidence is weak that either educational campaigns or legislation to encourage front and rear seat belt use and placing children in rear seats are effective in changing behaviour. At some ages, there was a decrease in placing children in rear seat s or in using rear seat belts. A number of included studies did not show statistically significant effect of intervention. |
| | Health promotion and community based approaches to reduce unintentional injury | (<15 years old): Road environment modification reduced accidents by 7-32%; package of engineering measures reduced accidental injuries by 25%; road safety education can reduce casualties from children emerging from behind a vehicle by 20%; cycle helmets associated with 48% and 70% reduction in hospital admission and death, plus 23% and 28% reduction in non-head injuries over 2 year study period; child restrain and seatbelts reduced injury severity. |

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| | | (15-25 years old): Bicycle and motorcycle helmets reduced head and other injuries and motorcycle helmet legislation was followed by a 30% reduction in fatalities, its repeal by an increase of 25-40% (the effects of reduction in cycling and motorcycling rates in the population is unclear); raising the minimum drinking age above 18 is associated with decrease in young driver and passenger fatalities.<br>No proven effect of: training in reducing motorcycle injury; enhanced driver education courses; school-based programmes, rehabilitation for drink drivers, and education of the effects of catastrophic injury.<br>Programmes that unintentionally enable adolescents to drive at a younger age than they would otherwise may have a negative effect. |
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. In: J Epidemiol Community Health 2003;57:327-333 | Driver improvement and education programmes | 24/59 included programmes resulted in statistically significant reductions in violations (4-21%) but 3/59 resulted in significant increase in violations of 9, 14 and 40%. Crash reductions of 6-32% in 10/59 included programmes but 3/59 resulted in crash increases of 20,30 and 46%. No proven effect of individual vs group intervention, direct vs indirect approaches or targeting certain types of violation. |
| | | RCTs show increase in crash involvement and violations as a result of high-school aged driver education courses. Ecological studies show both increases and decreases in crash involvement after driving education programmes and increases in licensure rates in 16-17 year olds. |
| Roberts I, Kwan I and the Cochrane Injuries Group Driver Education Reviewers. School based driver education for the prevention of traffic crashes (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | School based driver education | Two trial examined the effect of school-based driver education on licensing: 87% of students in the driver education group obtained their driving license as compared to 84.3% in the control group (RR 1.04, 95% CI 1.02 to 1.05); the time from trial enrolment to licensing was 111 days in males receiving driver education compared with 300 days in males who did not receive driver education, and 105 days in females receiving driver education compared with 415 days in females who did not receive driver education. The results show that driver education leads to early licensing. They provide no evidence that driver education reduces road crash involvement, and suggest that it may lead to a modest but potentially important increase in the proportion of teenagers involved in traffic crashes (RR 1.01 to 1.10, NS). |
| Ker K, Roberts I, Collier T, Renton F, Bunn F, Frost C. Post-license driver education for the prevention of road traffic crashes (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | Post-license driver education | Randomised controlled trials compared post-licence driver education versus no education, or one form of post-licence driver education versus another (three distinct varieties of driver education were identified: correspondence, group or individual education): 20 trials studied remedial driver education, but the methodological quality of trials was poor; 19 trials reported traffic offences: pooled relative risk (RR) = 0.96, (95% CI = 0.94, 0.98), trial heterogeneity was significant (p=<0.00001); 15 trials reported traffic crashes: pooled RR = 0.98 NS, trial heterogeneity was not significant (p=0.75); 4 trials reported injury crashes: pooled RR = 1.12 NS, trial heterogeneity was significant (p=<0.00001).<br>No one form of education (correspondence, group or individual) was found to be substantially more effective than another, nor was a significant difference found between advanced driver education and remedial driver education.<br>The methodological quality of the trials was poor: although the results are compatible with a small reduction in the occurrence of traffic offences, this may be due to selection biases or bias in the included trials. |
| Duperrex O, Bunn F, Roberts I. Safety education of pedestrian for injury prevention: a systematic review of randomised controlled trials. BMJ 2002; 324:1129 | Effect of safety education on pedestrian behaviour | The participants were children in 14 of the studies and institutionalised adults in one. 8 studies involved the direct education of study participants, and 7 involved the use of parents or teachers as educators. The relative probability of trained pedestrians behaving correctly compared with controls ranged between 0.49 (controlled group performed better than trained group) and 9.29. Safety education improved pedestrians' attitude and intentions (with standardised mean differences ranging from 0.17 to 1.28) and their knowledge about road safety when outcomes were measured before and after intervention (standardised mean differences from 0.16 to 2.39), but for dichotomous outcomes the range of effect was wide (relative probability ranging from 0.72 to 1.66). Although some existing trials showed evidence of behavioural change after safety education, these changes cannot be assumed to decrease pedestrian injury risk. |
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. In: J Epidemiol Community Health 2003;57:327-333 | Road safety campaigns | Average campaign effect for all campaigns is 7.6% improvement. Persuasive rather than educative approaches are more effective. Legislation alone is not effective but requires enforcement plus publicity. Prior qualitative research, emotional vs rational appeal, theoretical model basis vs none, and specific behaviour request, increase the effectiveness of campaigns. |
| | | All road safety campaigns show 7.0% reduction in accidents over and above the background temporal reduction in accident rates. Financial rewards are most effective, followed by enforcement + legislation combinations and in cities rather than rural settings. |

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| | Safety belt incentives | Campaigns that use tangible incentives (such as money, prizes and vouchers) lead to substantial short –term increases in safety belt use (mean effect 12.0% increase above baseline) but have more modest longer term effects (mean effect 9.6% increase above baseline).<br>Campaigns were most effective in elementary schools, where incentives were given immediately rather than delayed, and where the initial baseline use of seatbelts was low. |
| | | Educational campaigns: 1 found 5% increase in children in rear seats ($p<0.05$); 1 pilot programme found 30% increase in child restraint use in rear seats ($p<0.05$) in elementary schools, but other settings and placing children in rear seat were NS.<br>Legislation requiring restraints when children were in front car seats had effects on the use of rear seats: 1 study found 19% increase; 1 study found 9% increase in < 1 year olds, 2% in 1-4 year olds and decrease of 4% in 5-9 year olds but NS effects in 10-14 year olds; 2 study found NS effects. |
| | | Child restraint use in rear seats: 3 studies found increases of 11-16% ($p<0.05$); 1 study found decrease in restraint use of 10% in 1-4 year olds and 3% in 5-9 year olds but increase in <1 year olds (all $p<0.05$).<br>Community and clinical programmes to increase <5 year olds' car seat and seatbelt use have moderate but only short term effects. 3 RCTs showed 36% increase in car seat or seatbelt use |
| | Remediation of drinking and driving offenders | Programmes to treat drink drivers show non-alcohol related crashes were worse as a result of the intervention (mean 11% increase) but a small decrease in alcohol related crashes occurred (mean 7% reduction). More severe licence sanctions increased crash rates by 7%. |
| Dinh-Zarr T, Goss C, Heitman E, Roberts I, DiGuiseppi C. Intervention for preventing injuries in problem drinkers (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | The effect of interventions for problem drinking on subsequent injury risk | Several intervention among convicted drunk drivers reduced motor vehicle crashes and injuries. Monthly probation alone, structured rehabilitation alone, and these two intervention combined were each associated with a reduced risk of motor vehicle crashes (RR 0.76, 0.85 and 0.90, respectively); monthly probation and structured rehabilitation had stronger effect on motor vehicle crashes injuries (RR 0.47 and 0.58) while the combination of probation and rehabilitation appeared to have no effect on crash-related injuries (RR 1.06 NS). |
| Kwan I, Mapstone J. Intervention for pedestrian and cyclist visibility for the prevention of death and injuries (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | Intervention for pedestrian and cyclist visibility for the prevention of death and injuries | Visibility aids have the potential to increase visibility and enable drivers to detect pedestrians and cyclists earlier, they influence drivers' reaction, detection and recognition. For daytime visibility, fluorescent materials in yellow, red and orange colours improved detection and recognition. Yellow was the most effective non-fluorescent colour. For night-time visibility, lamps, flashing lights and retroreflective materials in red and yellow colours enhanced drivers' detection and recognition. Retroreflective materials arranged in a 'biomotion' configuration also improved recognition. |
| Towner E, Dowswell T, Mackereth C Jarvis S. What works in preventing unintentional injuries in children and young adolescents? An updated systematic review. London, Health Development Agency, 2001. | Area-wide urban safety measure | 1 study described an evaluation of the effectiveness of school-crossing patrols (ie paid adult supervisors) in the prevention of pedestrian injuries in children on their journeys to and from school. The results suggest that the presence of school crossing patrols may reduce the number of accidents involving child pedestrians. |
| | | Six studies evaluated the impact of traffic calming or area-wide engineering measures on injuries in the traffic environment. The study which compared three different levels of treatment of engineering measures produced counter-intuitive results: the second package reduced injury by up to 25%. Another study found that overall road traffic accidents were reduced by 13% but there were great variations between schemes. Slight accidents declined proportionately more than fatal and serious ones. Measures that protected two-wheel vehicles such as right turn prevention and right turn bays, were particularly successful. The evaluation of 20mph zones proved to be effective both in reducing traffic speed and in reducing accidents. In particular child pedestrian injuries were reduced by 70% and child cyclist injuries by 48%. No migration of accidents was found to other areas as a result of the introduction of the zones. |
| | Pedestrian injuries | Ten studies examined the effects of pedestrian skills training and were directed at children in the primary school age range, 4-10 years. Experimental programmes which have been targeted on relevant and clearly defined road crossing skills have shown positive results. Both roadside training and classroom training using a table-top model resulted in considerable improvements in road crossing skills and the skills were maintained over time. Operational programmes combining a number of road crossing skills have also shown positive results. |

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| | | Five studies examined the effects of children's traffic clubs (children were enrolled into the traffic club on their third birthday and traffic education materials were distributed to parents at six-monthly intervals until the age of five). The evaluation of the school-based traffic club found that there was no evidence it had contributed to children's knowledge of road safety. Others children's traffic clubs showed improvements in knowledge and evidence of casualty reduction, with a 20% reduction in casualties involving children emerging from behind a vehicle. |
| | | Seven studies evaluated the effectiveness of a range of other traffic education programmes with some school based elements. The result of one of these studies was that the intervention was ineffective and possibly harmful. The young people aged 11-18 targeted in the intervention reported more unsafe behaviours after the intervention. The study on bus-boarding behaviour, including the use of designated safe areas painted on pavements, had positive behavioural outcomes. |
| | Bicycle injuries | Three studies examined the effectiveness of bicycle skills training and were directed at children in the age range 8-10 years. The studies produced widely differing results. There is now some evidence that bicycle training schemes can improve safe riding behaviour. |
| | | Eighteen studies examined the effectiveness of bicycle helmet programmes. 8 of these studies were based within schools and one of them in a pre-school enrichment programme. A range of educational and promotional methods has been shown to increase cycle helmet use in children. An important element is the use of discount purchase schemes to reduce the cost of the helmet. A number of studies report more success with primary schoolchildren compared with secondary schoolchildren and more success with girls rather than boys. Studies comparing the effect of programmes in more deprived and affluent schools reported low use of helmets in more deprived schools. |
| | | Studies in Australia and the US have evaluated the effectiveness of legislation requiring the use of cycle helmets. The Australian studies suggest that the introduction of legislation has been associated with injury reduction. It was noted that while cycling exposure among adults had not decreased, 10% fewer child cyclists and 46% fewer teenage cyclists were observed following the introduction of legislation. The remaining studies suggest that legislation increased the numbers of children observed wearing helmets. It has been also demonstrated that a combination of approaches (ie legislation and education) achieves greater numbers of children wearing helmets. |
| | Car passengers | Nine of the studies included examined the effectiveness of child restraint loan schemes. All of the schemes were aimed at infants and young children under one year. The results of these studies suggest that the loan or free provision of car seats for newborn babies and young children is an effective means of achieving an increase in the use of seats, at least in the short term. |
| | | Sixteen studies were included, examining the effects of educational campaigns to increase the use of safety seats or seat belts to restrain child car passengers. In five of the studies, the campaigns targeted newborn babies and children under one year. These interventions sought to increase the correct use of safety seats. Older children were the focus of the remaining campaigns. Some campaigns targeted all car passengers, including adults. The results of most of these studies suggest that educational approaches achieve some positive effect in terms of increasing observed restraint use. The limited effect of interventions in the medium and longer term was also recorded in other studies. Those programmes including rewards produced similar results. While seat belt use increased considerably during the reward phase of studies, it declined once rewards were withdrawn. Nevertheless, longer term follow-up revealed that rates of belt use remained above baseline.. Those studies examining the differential effect of programmes on different population sub-groups revealed that programmes may be less effective with some groups: it was noted the positive effect of pre-natal education at a hospital serving a low income population and that restraint use differed, depending on the age of the children, with restraint being higher in the younger age groups. |
| | | All of the nine studies examining the effect of laws requiring the restraint of children in cars suggest that legislation requiring the restraint of children in cars both increases the number of children observed using restraints and changes in the law have been associated with a reduction in injuries and risk of death. Despite these positive effects, these studies reveal that even after the introduction of legislation, there remained large numbers of child car passengers who were not restrained. |

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| | | Five studies examined the issue of the enforcement of car passenger restraint laws. The intervention included police enforcement of car occupant restraint laws, along with some general publicity advertising the campaigns. The results of these evaluations suggest that law enforcement has some positive effect on the observed use of restraints by child car passengers. However, campaigns were not always effective with all groups and the size of the effect was sometimes limited. For example, for children 4-15 years, it was reported increases in seat belt use from approximately 41% before to 50% after the campaign in the intervention area. |
| Centers for Disease Control and Prevention (CDC). Motor-vehicle occupant injury: Strategies for increasing use of child safety seats, increasing use of safety belts, and reducing alcohol-impaired driving. A report on recommendations of the Task Force on Community Preventive Services. MMWR Recommendations and Reports 2001:50(RR-7);1–13. | Intervention for increasing the use of children restrains | Effect of legislation about childhood restrains(n=9):<br>Increase in Use: +13% (from +5% to +35%), 3 studies<br>Fatal crashes: -35% (from –57.3% to –25%), 3 studies<br>Total crashes: -17.3% (from –35.9% to –10.5%), 5 studies |
| | | Community based campaigns (n=4):<br>Use: +12.3% (from +3.8% to +20.8%), 5 studies |
| | | Distribution and education programmes (n=4):<br>Use: +22.6% (from +4% to +62.3%), 11 studies |
| | | Improvement and education programmes (n=4):<br>Use: +9.9% (from +4.8% to +36%), 6 studies |
| | | Education programmes alone(n=6):<br>Insufficient data in order to estimate the effectiveness of these programs in modifying or correcting the use or for other outcomes<br>Three studies on programs of education for parents on the correct use of the emergency seats<br>A study on an pre-school education program on the correct use of the seats of emergency for children<br>Two studies on course of professional formation: one for nurses on the performance of the programs of education for patients and one for the staff assigned to the application of a provision on the found fines |
| | Intervention for intensifying the use of the seat belts | Legislation on safety belt use (n=34):<br>Modification on safety belt use: +32% (from 19.6% to 36.3%), 9 studies<br>Safety belt use, customers declarations: +15.8% (from 13% to 18.7%), 4 studies<br>Safety belt use, police declarations: +20.4% and +26%, 2 studies<br>Fatal injuries: -3.5% (from –14.5% to +10.6%), 6 studies<br>Non fatal injuries: -8.4% (from –9% to –5%), 7 studies<br>Total injuries: -8.3% (from –19.7% to –2.6%), 9 studies |
| | | " Primary enforcement" legislation (n=13):<br>Modification safety belt use: +14.1% (from 12% to 22.6%), 5 studies<br>Safety belt use, customers declarations: +22% and +1%, 2 studies<br>Fatal injuries: -7.7% (from –13.9% to –3.1%), 3 studies |
| | | "*Strengthened* enforcement" legislation (n=16):<br>Modification on safety belt use: +17% (from 8.3% to 24.0%), 16 studies<br>Total injuries: -6.7% and –15.3%, 2 studies |
| | Intervention for reducing problem drinking | Laws about the minimal age for the alcoholic drink assumption (n=33):<br>Increase of minimal age:<br>Fatal crashes: -17% (from –30% to –7%), 9 studies<br>Injury crashes: -15% (from –33% to –6%), 4 studies<br>Overall crashes: -21% and –18%, 2 studies<br>Decrease of minimal age:<br>Fatal crashes: +8% (from +2% to +38%), 3 studies<br>Injury crashes: +5% (from -2% to +22%), 4 studies<br>Overall crashes: +22% and +186%, 2 studies<br>Insufficient evidence was found to estimate the effect of minimal age's reduction on alcohol-involvement crashes of teenage drivers not directly interested to the change of legislation. |
| | | Laws requiring a reduction of BAC for teenage and novice drivers (n=6):<br>Fatal alcohol-involvement crashes: -17% (from –24% to –9%), 3 studies<br>Injury crashes: -17% and –4%, 2 studies<br>Overall crashes: -11%, 1 study |
| | | Sobriety checkpoints (n=23):<br>Random breath testing*:*<br>Fatal crashes: -22% (from –36% to –13%), 6 studies<br>Injury crashes: -18% (from –36% to –13%), 6 studies<br>Overall crashes: -26% and –15%, 2 studies<br>Selective BAC test:<br>Fatal crashes: -26% e –20%, 2 studies<br>Injury crashes: -21% (from –24% to –5%), 6 studies<br>Overall crashes: -24% (form –35% to –13%), 5 studies |

Table 3.6b Main findings of systematic reviews on engineering interventions to improve health through transport

| Author, date and country | Modes of intervention | Main results |
|---|---|---|
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. In:J Epidemiol Community Health 2003;57:327-333 | Ignition interlock devices | Ignition interlock devices were used for convinced drink-driving offenders. Re-arrest and re-conviction were reduced in intervention versus control groups (RR 0.36-0.85) in a variety of study designs, including an RCT. |
| | Studded tyres | Studded tyres may increase or decrease accident rates, depending on road conditions. 8 included studies found changes in accident rates significant at 95% level: on snow (18-72% reduction), on bare roads (increase of 151% to decrease of 68%), and an all road surfaces (16-57% reduction). Studies with higher quality (large size, surface condition of road specified, type of tyre specified, confounding variables accounted for) showed small, NS effect sizes (2-5% accident reductions). 5 studies on the effects of laws prohibiting the use of studded tyres found increases in accident rates of 3-10% (p<0.05). |
| Elvik R. Area-wide urban traffic calming schemes: a meta-analysis of safety effects. Accident Analysis and Prevention 2002;33(3):327-336. | Effect of traffic calming on reported injury accidents | Area-wide urban traffic calming schemes are typically implemented in residential areas in towns in order to reduce the environmental and safety problems caused by road traffic. A hierarchical road system is established and through traffic is removed from residential streets by means of, for example, street closures or one-way systems. Main roads are improved in order to carry a larger traffic volume without additional delays or more accidents. A meta-analysis of 33 studies shows that area-wide urban traffic calming schemes on the average reduce the number of injury accidents by about 15%. The largest reduction in the number of accidents is found for residential streets (about 25%), a somewhat smaller reduction is found for main roads (about 10%). |
| Bunn F, Collier T, Frost C, Ker K, Roberts I, Wentz R. Area-wide traffic calming for preventing traffic related injuries (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | Area- wide traffic calming for preventing traffic related injuries | 16 controlled before-after trials were considered to evaluate the effectiveness of area-wide traffic calming in preventing traffic related crashes, injuries and deaths.<br>8 trials reported the number of road traffic crashes resulting in deaths: the pooled rate ratio was 0.63 (0.14-2.59 95%CI)<br>16 studies reported the number of road traffic crashes resulting in injuries (fatal and non fatal): the pooled rate ratio was 0.89 (0.80-1.00 95%CI)<br>9 studies reported the total number of road traffic crashes: the pooled rate ratio was 0.95 (0.81-1.11 95%CI)<br>13 trials reported the number of pedestrian-motor vehicle collision: the pooled rate ratio was 1.00 (0.84-1.18 95%CI)<br>There was significant heterogeneity for the total number of crashes and deaths and injuries. |
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. In: J Epidemiol Community Health 2003;57:327-333 | Daytime running lights | Daytime running lights are associated with a reduction in multi-party accident rates of 14-18% (p<0.05 in prospective controlled studies and in uncontrolled prospective designs, NS in RCTs). All types of accident (front/side impact, rearend collision, pedestrian, not specified) reduced by 14% (12-16%). There is no clear dose-response relation between proportion of cars using DRLs and accident rates. The effects of DRLs are greater with increasing latitude (for example, 9% reduction in accidents in Israel v 60% reduction in Finland). |
| | Speed limit reductions | Speed limit reductions may be effective on their own in reducing accidents but additional measures may be needed. Speed limit zones in built up areas reduce personal injuries but have no clear effect on material damage. Controlled studies show smaller reductions in personal injuries (18%, 8-26%) than uncontrolled studies (43%, 42-45%). Speed limit zones in quieter peripheral roads are effective in reducing both personal injuries (21%, 9-31%) and material damage (18%, 9-26%). A change to differential speed limits (slower in more built up areas, faster in peripheral roads) is associated with an increase in accidents in the peripheral areas (17%, 0-37%). For 30km/h zones, accidents are reduced by 3.5% per km/h speed is reduced, independent of study design.<br>Speed reduction by road humps shows non-significant reductions in personal injuries in controlled studies (37% reduction, 95% CI 67% reduction to 19% increase). Controlled studies show non significant increases in accident in areas surrounding road humps. Accidents are reduced by 4.5% per km/h speed is reduced, independent of study design.<br>Raised crossroads are associated with non-significant increases in personal and material accidents. Rumble strips approaching crossroads are associated with significant decreases in personal (33%, 25-40%) and material (25%, 5-45%) accidents. |
| Retting R A, Ferguson S A, McCartt A T. A review of Evidence-Based Traffic Engineering Measures to Reduce Pedestrian –Motor Vehicle Crashes. In: American | | Principal engineering measures designed to reduce vehicle speeds: installation of modern roundabouts in place of conventional intersections can reduce the rate of pedestrian crashes by about 75%; installation of multiway stop signs in place of traffic signals at low-traffic-volume urban intersection showed that pedestrian collisions decreased by 25%; the effects of traffic calming measures on pedestrian-vehicle crashes are less certain, indicating no effect |

| | | |
|---|---|---|
| Journal of Public Health. September 2003, Vol 93, No.9:1456-1463. | | on pedestrian-vehicle crashes or a reduction of 25% after treatment.<br>Engineering measures intended to separate pedestrians and vehicles by time: installation of traffic signals substantially reduced conflicts occurring at high-speed intersections where previously no signals were present; traffic signs and pavement marking that encourage pedestrian to look for potential conflicts have been shown to be effective at intersection with traffic signals; vehicle speeds and conflicts at uncontrolled crossing were reduced by in-pavement flashing lights that were automatically activated by the presence of pedestrians.<br>Engineering measures intended to separate pedestrians and vehicles by space: conflicts and pedestrian crashes can substantially be reduced by overpasses, underpasses and sidewalks in residential areas; refuge islands decrease conflicts, and there are significantly lower pedestrian crash rates on multilane roads with raised medians than on those without such medians.<br>Engineering measures designed to increase the visibility and conspicuity of pedestrians: increased intensity of roadway lighting and of roadway lighting at pedestrian crossing has been associated with significant reductions in nighttime pedestrian crashes; diagonal parking as a replacement for parallel parking has been shown to reduce the number of pedestrians entering the roadway in front of a parked vehicle; bus stop relocation significantly decreases the percentage of pedestrians who enter the roadway in front of a stopped bus at signal-controlled intersections; crosswalk pavement markings are widely used with the intent of reducing pedestrian crashes, but research indicates that they are largely ineffective and, in some settings, may be harmful. |

Table 3.6c Main findings of systematic reviews on environmental interventions to improve health through transport

| Author, date and country | Modes of intervention | Main results |
|---|---|---|
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. In:J Epidemiol Community Health 2003;57:327-333 | Public lighting | Night time accidents were reduced by 15-35% as a result of public lighting interventions. The effect size was greater where more accidents occurred at night as compared with during the day. Fatal accidents reduced by 65% (range 52-75%) and property damage reduced by 17% (range 13-21%). The effects were also dependent upon the decade of study (greatest in the 1980s), the country of study (largest effect in Israel, smallest effect in Denmark), rural areas benefited more than urban environments, and pedestrian benefited more than other street users. |
| | Guardrails and crash cushions | Installing median barriers increases the total number of accidents by about 30% (p<0.05). Severity of accidents is reduced. New median barriers reduce the probability of fatal accidents by 32% (range 14-46%), given the total number of accidents, but apparently have no effect on the probability of injury accidents (-2%, -7-4% change).<br>Guardrails reduce both the number of accidents (by 27%, range 18-35%) and their severity. Crash cushions reduce both number (84%, range 74-90%) and severity of accidents although studies are few and of doubtful validity. |
| | Modifiable risk factors for child pedestrian injuries | Child risk factors, in order of effect size, are large, behaviour, race, and sex. Social and cultural risk factors increasing likelihood of child pedestrian injuries are income (RR 5.7), crowding (RR 1.3 to 3.4), mother's working status and history of hospitalisation (RR 2-2.5), illness in the order, volume of traffic, speed limit, predominant type of dwelling, absence of play area, location on road, protection of play area, proportion of curb side parking, street mean vehicle speed, shared driveway, type of road, time of day, weather, and lighting. |
| Egan M, Petticrew M, Ogilvie D, Hamilton V. New roads and human health: a systematic review. In: American Journal of Public Health. September 2003, Vol 93, No.9:1463-1471. | Effects of new roads on injuries prevalence rates | Major urban roads: 2 studies revealed negligible decreases in the incidence of accidents involving injuries (4% and 1%); 2 others revealed statistically significant decreases (19% and 26%). Bypasses: the 5 bypasses studies showed a general decline in the incidence of injury accidents after the opening of new bypasses; this decline was statistically significant in 2 studies. In a meta-analysis of 20 bypasses, injury accidents decreased of 19%. Major connecting roads: there is a reduction in rates of injury accidents, that has been revealed statistically significant in 2 of the 3 studies in this category. Construction of 2 highways reduced injury accidents by a mean of 25%, new highways and new dual carriageways reduced injury accidents by 19% and 32%, respectively. |

Table 3.6d Main findings of systematic reviews on legislative interventions to improve health through transport

| Author, date and country | Modes of intervention | Main results |
|---|---|---|
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. In: J Epidemiol Community Health 2003;57:327-333 | Drinking and driving legislation, including administrative per se, random screening and lowering the legal blood alcohol limit | A systematic review on drink driving control showed that licence suspension, illegal and administrative per se laws, selective and regular enforcement patrols and sobriety checkpoints were most effective, with typical effect sizes of around 10% reduction in a variety of outcomes. Several studies on mandatory jail sentences showed increases in crashes following implementation. |
| | | Laws requiring a reduction to maximum 0.02% blood alcohol concentration associated with reduction in night time injuries of 17% (NS); 12% reduction in injuries in men, 24% in women; 17% reduction in fatal crashes among younger drivers (p<0.001), 1% in older drivers; 22% net reduction fatal crashes.<br>Pre-post with interrupted time series (1 study): 4% reduction in serious injuries using time series, 6% reduction using pre-post – both NS.<br>Interrupted time series (1 study): 11% or 33% reduction in "had been drinking" crashes depending on model chosen. |
| | | Evaluation of licence suspension or revocation through administrative determination showed no clear effect in 1/3; in 1/3, recidivism in intervention v controls OR 0.60 (0.54 to 0.68) up to but not after 36 months; in 1/3, intervention v controls in first year – drunk driving offences OR 0.78 (0.76 to 0.79), traffic crashes OR 0.65 (0.63 to 0.67) and alcohol related crashes OR 0.73 (0.70 to 0.77). |
| | | Random breath testing reduced hospital admissions by 20%, reduced deaths and injuries by 17-35%, reduced night-time crashes by 18-19% and reduced charges for drink driving. Checkpoints reduced night-time crash rates by 10-38% and reduced fatal crashes by 17-25%. |
| | Graduated driver licensing among young drivers | Graduated driver licensing was associated with a reduction in hospital admission of up to 23% and a reduction in deaths of 5.5% in 15-19 year olds; however, there was a simultaneous reduction in 15-19 year olds who drove and a 5% decrease in the teenage population in New Zealand.<br>A provisional licensing programme for 16-17 year olds showed a 5% decrease in daytime crashes; no effect of night time driving restriction; and a 10% decrease in traffic violation convictions.<br>Curfew laws in under – 18s: (1/4) found no apparent effects; (3/4) found decrease in fatality by 23-28%. |
| Hartling L, Wiebe N, Russell K, Petruk J, Spinola C, Klassen TP. Graduated driver licensing for reducing motor vehicle crashes among young drivers (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | Graduated driver licensing | Graduated driver licensing (GDL) has been proposed as a means of reducing crash rates among novice drivers by gradually introducing them to higher risk driving situations. Percentage change was calculated using one year prior to the intervention as the baseline rate. Results were calculated for the different crash types: overall, injury, fatal, night-time, alcohol, and those resulting in hospitalisation.<br>Reductions in crash rates were seen for all crash types. *Overall crashes:* For 16 year-olds, the reduction in per population crash rates for the first year post-GDL ranged from 26 to 41%. Crash rates per licensed driver were similar (19-31%). *Injury crashes:* Per population reduction for 16 year-olds ranged from 4 to 43%, for all teenagers from 8 to 25%. *Hospitalisation:* Among 16 year-olds, initial reductions were 41% per population and 27% per licensed driver. The reduction was smaller for all teenagers (26 and 18%, respectively). *Fatal crashes:* The changes in per population fatal crash rates for the first year post-GDL ranged from an increase of 56% to a decrease of 60% among 16 year-olds. Rates per licensed driver showed a wide range as well (43 and 73%). *Night:* For 16 year-olds in the first year post-GDL, the reduction in per population night-time crash rates ranged from 25 to 47%. Comparing crash rates between 15-29 year-old drivers, it was found a 32% decrease in crash rates during curfew hours (22:00-5:00) for drivers with restricted licenses. *Alcohol:* in jurisdiction with zero tolerance for BAC, studies provided per population reductions of 16% and 38%, for 16 year-olds, and a rate reduction per licensed driver of 19%, for all teenage novice drivers; in jurisdiction with BAC restrictions of 0.02 and 0.03 mg/dl, was found a per licensed driver rate reduction of 39% for 16 year-olds, among all teenage drivers crashes where alcohol-involvement was suspected ranged from a reduction of 23% to an increase of 15%. |
| Morrison D S, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from | Car safety belt laws (only for adults) | Prevalence of seat belt use increased by 1.08-1.3 times after laws introduced. Primary enforcement compared with no laws found 1.5-4.1 times more prevalent seat belt use (17 studies); one outlier of 15.4 times more use of seatbelts; RR fatal injury 0.69 to 0.97 (20 studies) but 1.12 (NS) in 1 study; serious non fatal injury RR 0.20 to 0.89 (11 studies).<br>Secondary enforcement compared to no laws found a prevalence of seatbelt |

| | | |
|---|---|---|
| systematic reviews. In:J Epidemiol Community Health 2003;57:327-333 | | use 2.1-2.6 times higher in the former group (6 studies); RR fatal injury 0.62 to 1.03 (7 studies), but no significant value over 1.00; serious non-fatal injury RR 0.75 to 0.85 (4 studies).<br>Any law compared with no law: 4 studies found that relative risk of fatal injury was 0.91 to 0.95 in the former. |
| Liu B, Ivers R, Norton R, Blows S, Lo SK. Helmets for preventing injury in motorcycle riders (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | Helmets for preventing injury in motorcycle riders | Motorcycle helmets appear to reduce the risk of mortality by 28%-39% in studies controlling for confounders. 1 study estimated the odds of death for helmeted riders travelling 30-50km/h, adjusted OR 0.03 (95%CI 0.002-0.42), and for those travelling over 50km/h, adjusted OR 0.47 (95%CI 0.086-2.32*).* There was some evidence that the effect of helmets on mortality is modified by speed. Studies (18) not controlling for confounders found helmets compared with no helmet protective against death: risk reduction by 29%-84%. Motorcycle helmets were found to reduce the risk of head injury and from five well-conducted studies the risk reduction is estimated to be 72% (OR 0.28, 95%CI 0.23, 0.35). Insufficient evidence was found to estimate the effect of motorcycle helmets compared with no helmet on facial or neck injuries. However, studies of poorer quality suggest that helmets have no effect on the risk of neck injuries and are protective for facial injury. There was insufficient evidence to demonstrate whether differences in helmet type confer more or less advantage in injury reduction. |
| Thompson DC, Rivara FP, Thompson R. Helmets for preventing head and facial injuries in bicyclist (Cochrane Review). In: The Cochrane Library, Issue 2, 2004. Chichester, UK: John Wiley & Sons, Ltd. | Helmets for preventing head and facial injuries in bicyclist | Five well conducted case-control studies showed that helmets provide a 63%-88% reduction in the risk of head, brain and severe brain injury for all ages of bicyclists.<br>Protective effect among helmet users versus nonusers for cyclists involved in crashes with motor vehicles was: adjusted OR=0.31 (95%CI 0.20-0.48), and for cyclist who crashed for all other reasons, adjusted (for potential confounding) OR=0.32 (95%CI 0.20-0.39). Similar protection was found for brain and severe brain injuries and for cyclists of all ages. Helmets decrease the risk of head and brain injury by 65%-88% and facial injury to the upper and mid face by 65%. Helmets are effective for cyclists of all ages and provide protection for all types of crashes whether or not a motor vehicle involved. |

## 3.10 Case studies

The set of road traffic accident indicators proposed by working group for the feasibility study to the National Focal Points gave good results in term of quality, availability, comparability and policy relevance. Out of 11 indicators proposed five were judged ready for implementation, and the other were considered relevant for further developments. It is, therefore, interesting to analyse the sensitivity of these indicators to actions and interventions that have been shown to be effective in reducing the health consequences of road traffic accidents. In fact, indicators should serve as monitoring tools, in order to observe structural, behavioural and environmental changes, in order to make comparison among several countries and give a synthetic picture of the situation in a specified geographical context.

In order to achieve this goal, the working group has performed some specific studies, using different data sources and focussing on the capability of the indicators to react to changes.

1. The first case study here presented is part of the WHO process towards the implementation of an Environmental and Health Information System (EHIS). It is an ecological analysis of the driving forces of road traffic accident health consequences, and an attempt to perform international comparisons on the effect of different strategies in term of prevention of road traffic accidents. This ecological study gave good results on the sensitivity of indicators, but highlighted the necessity to harmonise definitions and data sources among different countries.
2. The second pilot study is a before and after study, performed using health based indicators and comparing them with official statistics, aimed at observing the changes occurred after the compulsory helmet law for people over 18 years of age. Interesting results have been obtained, on the use of health-based information systems, and in particular, on the sensitivity of specific diagnoses.
3. The third case study has been considering the policy modifications and health effects in France during the 2002-03 period of time. It is interesting to observe different results on the indicators when considering some stratifications of them. Indicators seems to react to some actions in different ways, if considering different ages, or road users or type of road.
4. The forth example of indicator based studies is an analysis of several action aimed at reducing road traffic accident in the Netherlands and the sensitivity of the indicators. This analysis is based on very local experiences, and it's interesting observe that reducing the area of observation doesn't modify the role of the indicators.

### 3.10.1 The Environmental Health Indicators for Europe. Road Traffic Accident Indicators.

This pilot study has been presented during the Budapest Conference on Environment and Health in June 2004. It is an example on how indicators are useful for the regular monitoring on Environmental risk factors and for the implementation of policies aimed at reducing the burden of disease attributable to Environmental factors such as air pollution, traffic, noise, housing conditions.

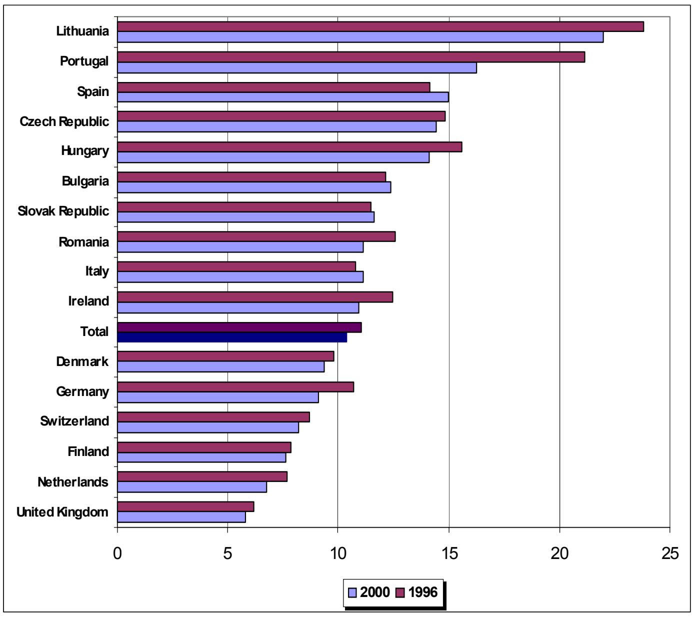
This study is part of all the activities of WHO on the implementation of an Environment and Health Information System (EHIS).

The data have been collected by several National Institutions (Environmental or Health Agencies) in almost all the European countries. Age standardized mortality rate has been taken by the Health For All database. Indicators considered in this analysis are: Gross Domestic Product (GDP), Number of cars, Standardized

Road accident mortality rate, and injury rate. Indicators have been analysed in relation to the others and in relation to policies.

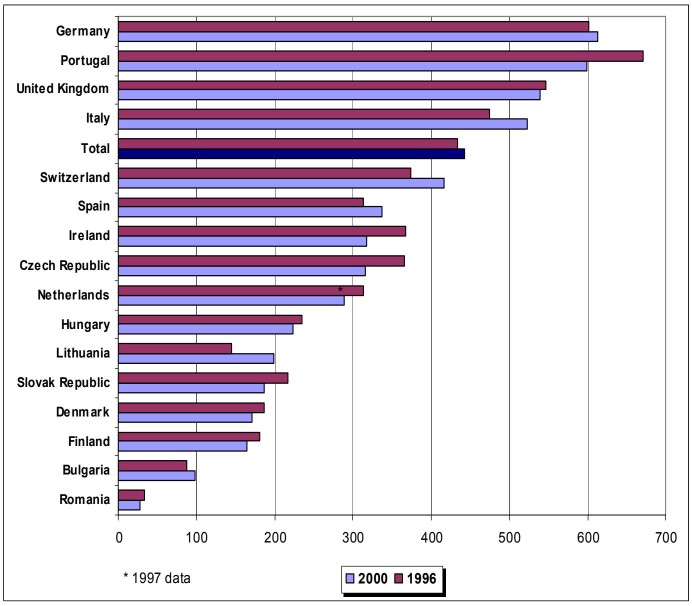
Figure 3.1 and 3.2 show the age standardised road accident mortality rate and the injury rate in several European countries for two years: 1996 and 2000.

Fig. 3.1 Road accident mortality per 100000 in some European Countries,1996 and 2000




Source: Health for all database, WHO Regional Office for Europe

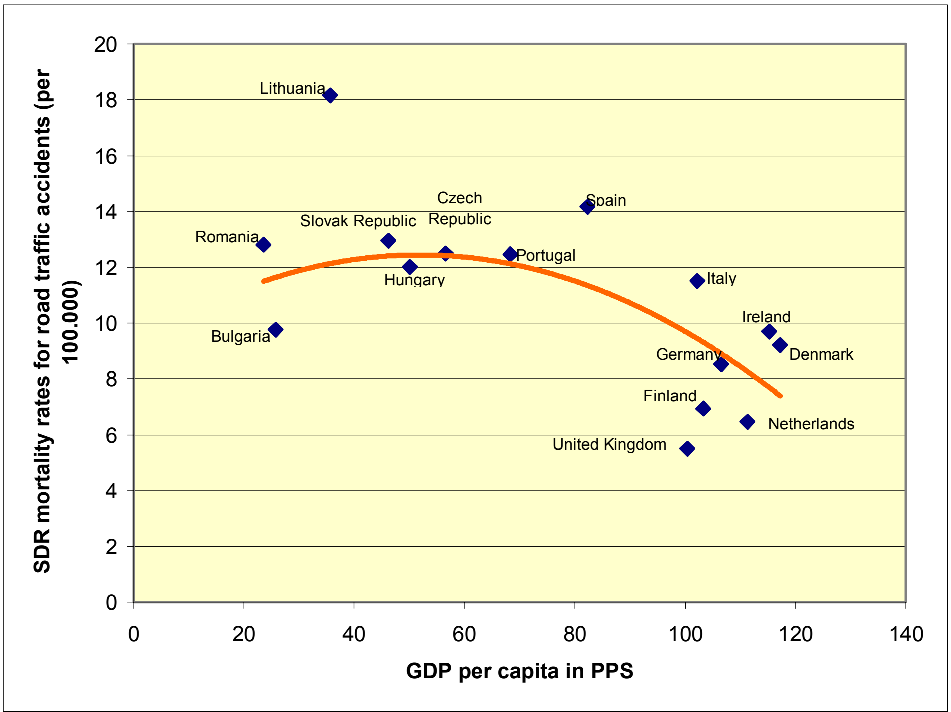
Fig. 3.2 Road accident injuries per 100000 in some European Countries,1996 and 2000




Source: EuroIndy and national statistics for Denmark, Ireland, Italy, Portugal and the United Kingdom

The CEE countries, with the exception of Armenia and Bulgaria, have a higher than the average standardized mortality rate, whereas the Western European countries, with the exception of Italy, Portugal and Spain, are below the average. A large reduction (41%) in road accident mortality was observed in Portugal between 1996 and 2000. Country Ranking on injuries differs from that on mortality. It is quite difficult to compare injury rates among countries because sources of data, definition of injury and quality of the information vary. Moreover, the practice in some countries of collecting health-based statistics makes international comparisons even more complicated. The difference in country ranking between mortality and injury rate could be due partly by an effective reduction of mortality, and consequent increase of injuries, and partly by higher quality of information. A strong relation between the socio-economic background of different countries and mortality rates has been observed. Figure 3.3 shows the relation between GDP per capita and road traffic mortality rates.

Fig. 3.3 Road accident mortality rates and GDP per capita in some European Countries, 2000

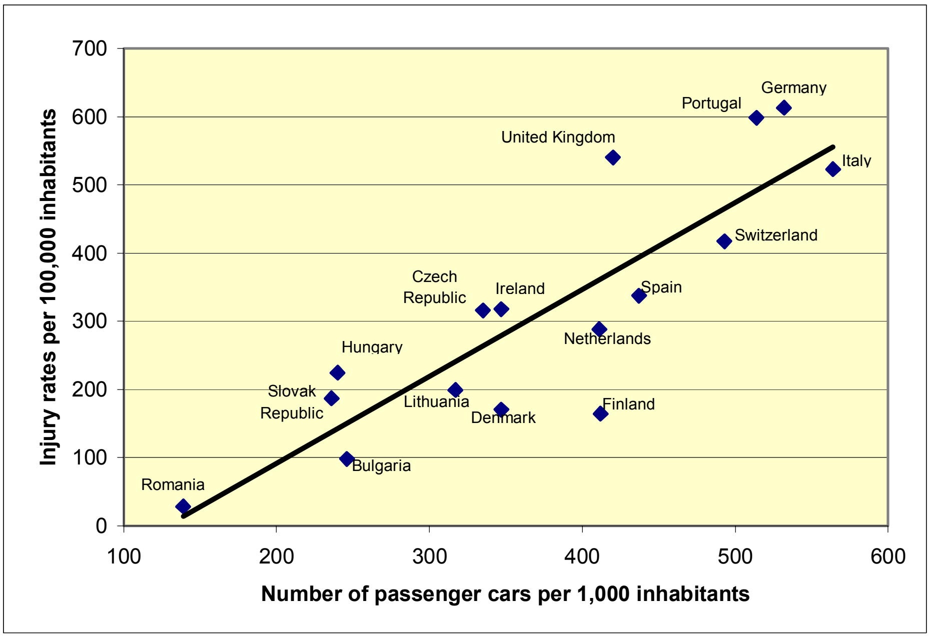



Source: Health for all database, WHO Regional Office for Europe and the Statistical Office of the European Communities (Eurostat)

The relationship between traffic accident mortality and economic growth is not linear: economic development first leads to a growing number of traffic-related deaths, but later becomes protective. It seems that increasing wealth is associated with a rapidly growing number of motor vehicles, and an increased mobility, inducing higher mortality rates, then, at a certain level of prosperity, there's a suggestion that actions aimed to improve traffic infrastructure and medical care for injured are set up.

This causal chain seems to be partly confirmed by the relationship between the number of cars per 1000 inhabitants and the injury rates.

Fig. 3.4 Number of cars per 1000 inhabitants and injury rates in some European Countries, 2000



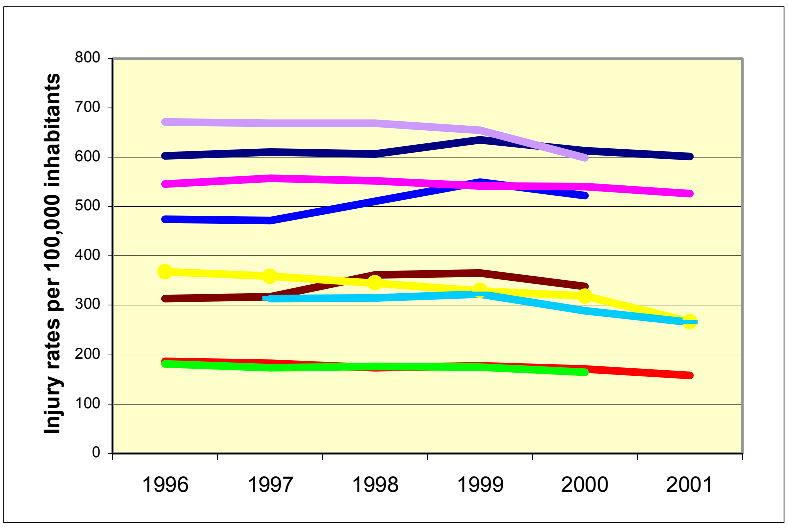

Source: EuroIndy and International Road Traffic and Accident Database (IRTAD)

The linear relationship between the number of cars in circulation and the injury rate is true also when only those countries are compared for which data quality, underreporting and definitions are comparable.

Indicators have been used to show some suggestive analyses on the ecological association between policies and health effects.

The time trends of injury rates in some western European countries show that higher injury rates correspond to higher speed limits.

Fig. 3.5 Injury rates per 100000 in some European Countries, 1996-20001

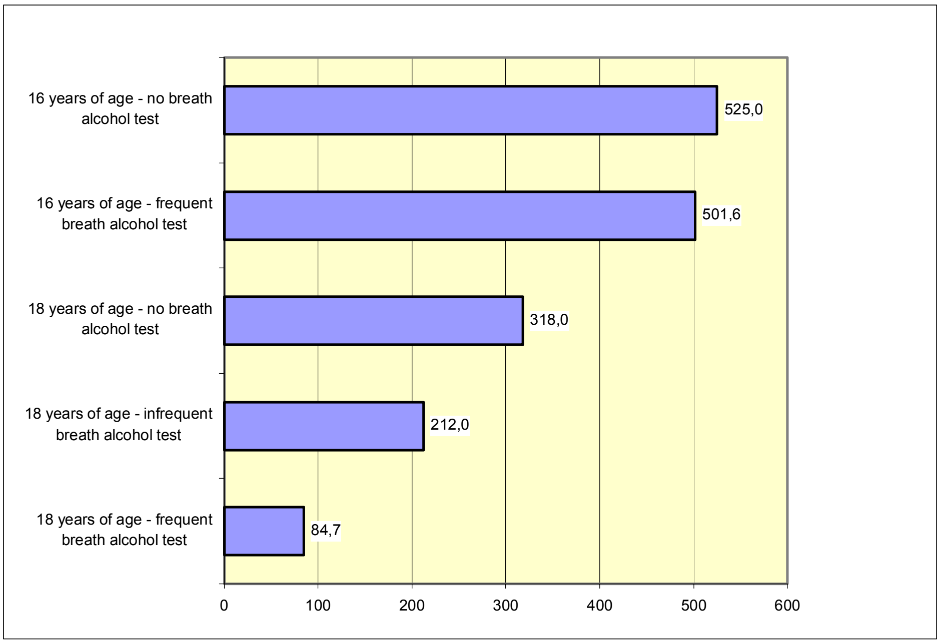



| | Speed Limits (Km/h) | |
|---|---|---|
| | **National** | **Highways** |
| **Denmark** | **80** | **110** |
| **Finland** | **80** | **120** |
| **Netherlands** | **80** | **120** |
| **Spain** | **90** | **120** |
| **Italy** | **90** | **130** |
| **United Kingdom** | **96** | **112** |
| **Ireland** | **96** | **112** |
| **Portugal** | **100** | **120** |
| **Germany** | **100** | **no limit** |

Source: EuroIndy

Another example of the relation between policies and health outcomes regards the alcohol legislation in different countries. Countries have been classified according to the frequency of alcohol breath testing and the legal minimum age for buying alcohol. The chart shows that lower injury rates correspond to the countries in which the minimum legal age for buying alcohol is 18 and random breath test are performed frequently. The highest injury rates correspond to countries in which the minimum legal age is 16, regardless of how alcohol breath testing is carried out.

**Fig. 3.6 Injury rates according to breath testing policy and minimum legal age for buying alcohol, 2000**




Source: EuroIndy and the Alcohol Control Database of the WHO Regional Office for Europe

### 3.10.2 The helmet law in Lazio Region: analysis of sources of information and indicators validity.

In 31/3/2000 in Italy the extension of the mandatory helmet law was introduced: the helmet was mandatory also for adults (>18 years old) on scooter (<=50 cc).

Several analytic studies demonstrated the efficacy of the law in prevent TBI and death in Italy. The aim of the study is to evaluate the ability of different road accident indicators and sources of information to detect changes after the law passage.

**Methods**

Data sources:

- ✓ Death Registry
- ✓ Emergency information system (EIS) collects all the admissions to emergency wards in Lazio.
- ✓ Hospital Information System collects all the hospital discharges occurred in the Lazio region.
- ✓ National Statistics on road accidents

Setting:

- Rome, population 2000: *2,800,000*

Definitions:

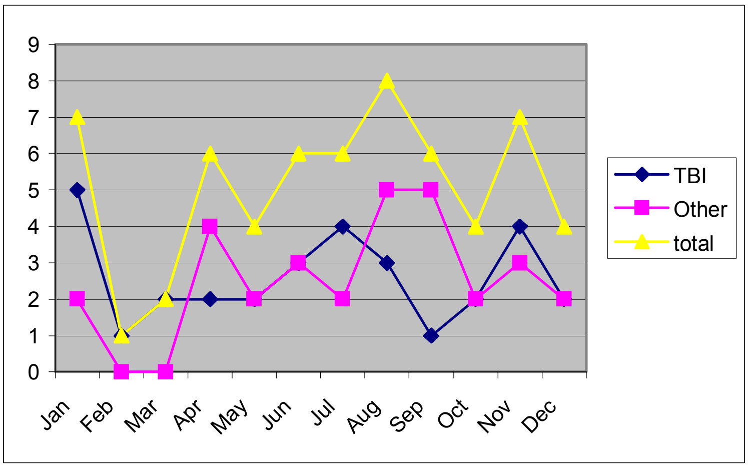
- ✓ Mortality on motorcycle from Death Registry: all deaths with external cause ICD-9 E810-E819 and fourth digit .2 and .3. Data can be disaggregated by dygnosis.
- ✓ Road accident hospitalisations: emergency admissions for road accident with an injury-compatible diagnosis followed by an hospitalisation, the data can be disaggregated by diagnosis.
- ✓ Injured people from EIS: emergency admissions for road accident with an injury-compatible diagnosis
- ✓ Mortality on scooter from national statistics.
- ✓ Injured people on scooter from national statistics.

We analysed the trend during the year 2000 for the five indicators.

**Results**

Comparing the number of deaths in the months April to December, no significant difference can be seen.

Fig. 3.7 Deaths on motorcycle from Death Registry, Lazio 2000



The number of deaths for all causes in the year 2000 is significantly lower than in the year 1997, but it does not differ from the 1998 and the 1999 figures.

Table 3.7 Deaths on motorcycle from Death Registry period April-December, Rome 1997-2000

| | other | TBI | total |
|---|---|---|---|
| 1997 | 16 | 25 | 41 |
| 1998 | 17 | 10 | 27 |
| 1999 | 20 | 11 | 31 |
| 2000 | 17 | 12 | 29 |
| total | 70 | 58 | 128 |

Fig. 3.8 Road accident-related hospitalisations >=18, Lazio 2000

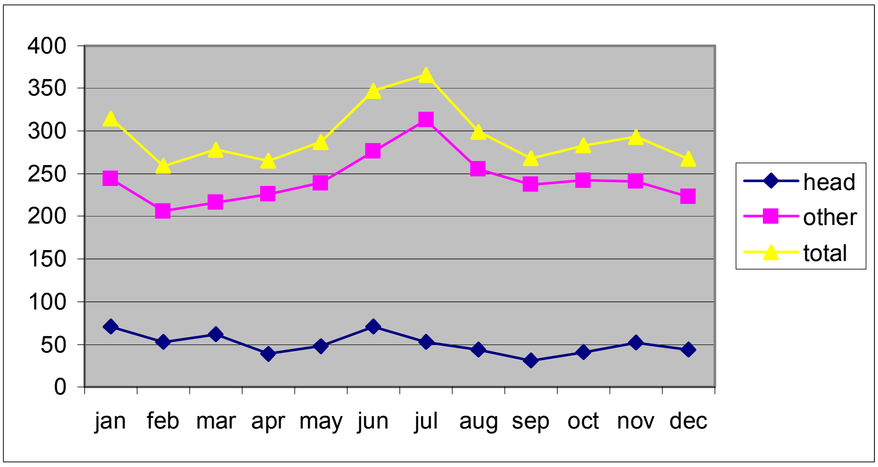
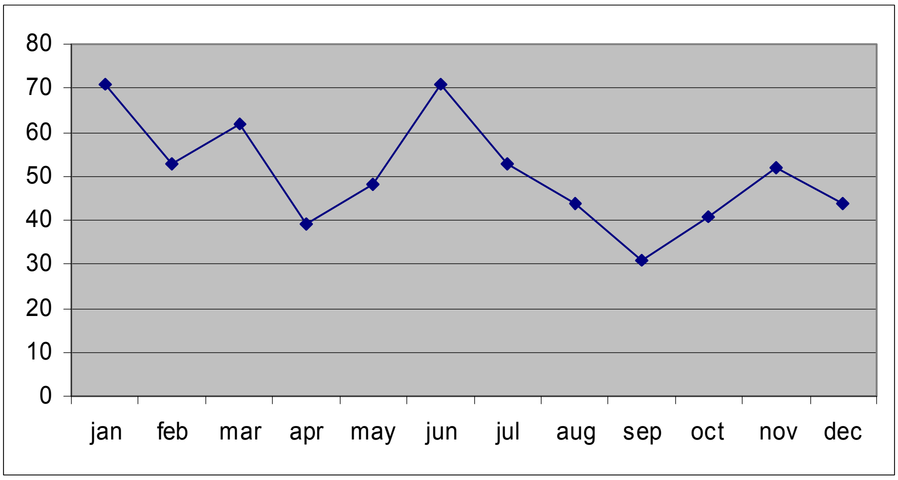



Fig. 3.9 Road accident-related hospitalisations >=18, head injuries, Lazio 2000




No evident difference in the number of hospitalisation by body district emerges, although there is a less pronounced peak in summery months, with very little reduction over the year period

Fig. 3.10 Road accident-related injuries from EIS >=18, Lazio 2000

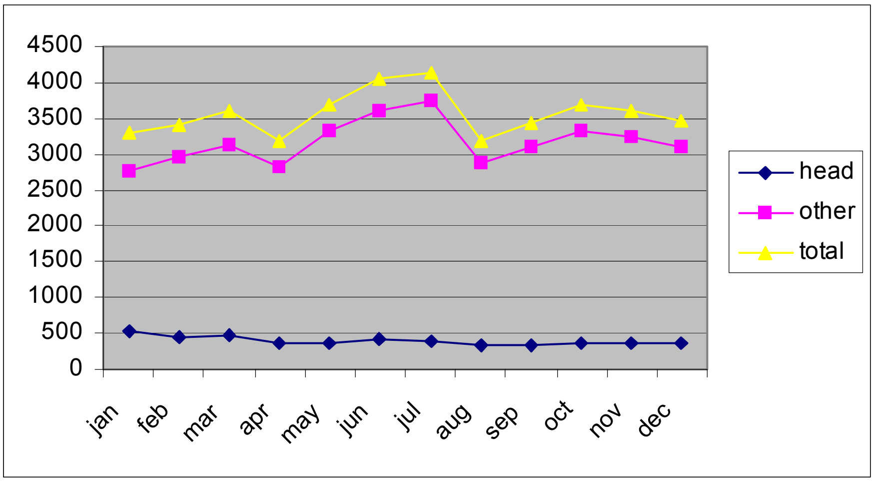
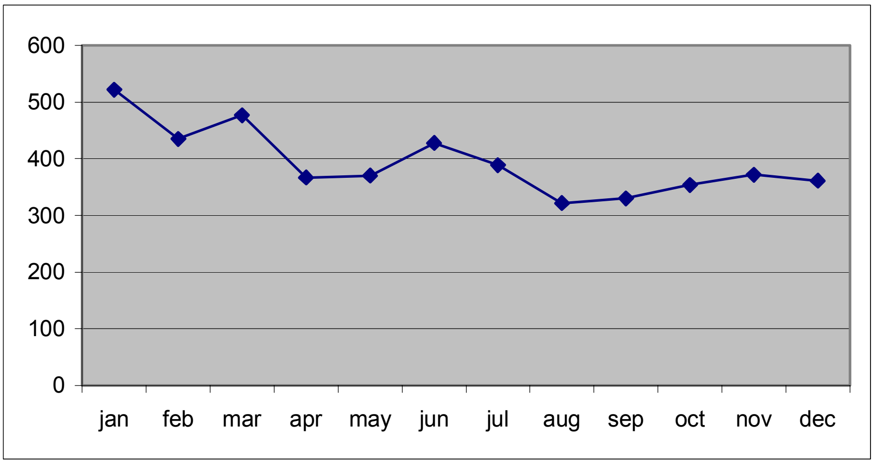



Fig. 3.11 Road accident-related injuries from EIS >=18, head injuries, Lazio 2000




Emergency admissions for road accident with an head injury show a flattening trend, that suggests a reduction of slight injuries.

Fig. 3.12 Falls from motorbike, injured people from national statistics, Italy 2000

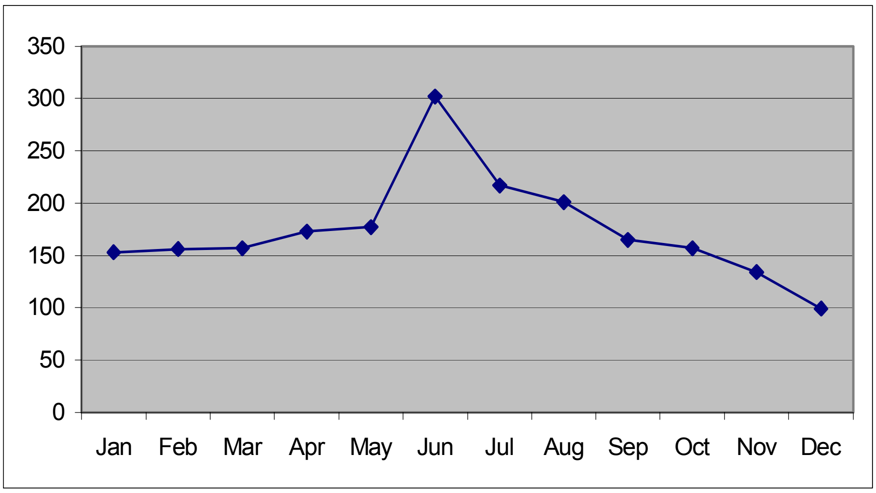
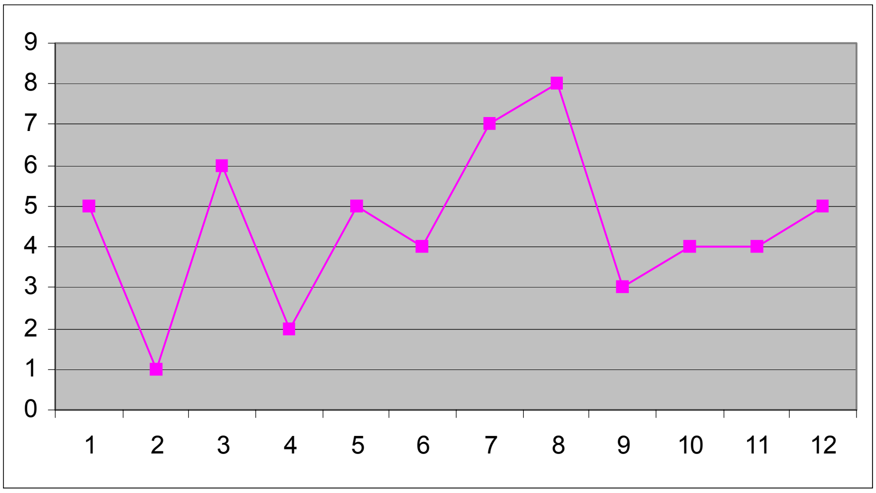


Fig. 3.13 Falls from motorbike, deaths from national statistics, Italy 2000




Fatality numbers from national statistics show similar non significant differences after the application of the law to that from Death Registry.

## Conclusions

The only indicator able to monitor changes in the road traffic health consequences after the extension of the helmet low in Italy was the one based on the emergency admissions and using an information on the diagnosis: the incidence of emergency admissions due to road accidents involving a head injury.

### 3.10.3 Road accident indicators in France. A comparative analysis of the 2002-03 years.

*Legislative modifications:*

- **Law of 3 February 2003:** severer penalties concerning the guide under the influence of drugs, aggravated when driver is also under the effect of alcohol.
- **Decree of 31 March 2003:** affecting the application of the previous law (18 December 2002). increases the sanctions concerning use of seat belts and helmets. Moreover, introduces specific infraction for the driver use of mobile phones, endorsed with the withdrawal of two license points.
- **Law of 12 June 2003:** increased sanctions regarding involvement in fatal or injury accident,
- **Decree of 11 July 2003:** increased from 4 to 6 the number of lost license points for driving with blood concentration (BAC) between 0.5 and 0.8g/l.

*Communication campaigns*

Since not observance of speed limits is a determining and/or aggravating factor for fatal accidents, a national communication campaign concerning speed and speed control was designed. A combination of mass-media campaigns was diffused on April and May 2003: one television spot, two radio spot and two poster. In order to inform those who leave for the summer holidays, one new speed campaign was diffused on the radio during the weekends strongly traffic. In the second half of 2003, special attention was given to drinking and driving, the second cause of fatal accidents. The new alcohol campaign, launched from 15 to 22 October, consisted of one television spot, one campaign of postings and of three radio spots.

Results of the increase of police control (in term of quantity and severity) are shown in table 3.8.

**Table 3.8 Description of police control in 2003 vs 2002**

| | 2002 | 2003 | 2003/2002 |
|---|---|---|---|
| Driving offences (without parking offences) | 10528570 | 11793037 | +12% |
| Speed limit offences | 1354957 | 1611240 | +19% |
| Seat belt wearing offences | 707553 | 810936 | +15% |
| Lost license points | 3100966 | 4458497 | +44% |
| Cancelled driving licenses | 13601 | 20967 | +54% |
| Alcohol control | 6685072 | 7703816 | +15% |

Significant changes in the health effects indicators have been observed in 2003 compared to 2002, as shown in table 3.9.

Table 3.9 Injuries and fatalities by road user, type of road, age group, 2003 vs 2002

| | Fatalities[1] | Slight injuries[2] | Serious injury[3] | Injuries |
|---|---|---|---|---|
| **Road users:** | | | | |
| Pedestrians | -27.7 | -14.8 | -10.9 | -11.6 |
| Cyclists | -10.0 | -0.2 | 7.6 | 6.1 |
| Moped users | 1.6 | -14.0 | -0.6 | -3.1 |
| Motorcyclists | -16.4 | -16.2 | -8.1 | -9.9 |
| Car users | -23.8 | -26.6 | -21.5 | -22.3 |
| Heavy lorries users | -14.4 | -14.3 | -15.6 | -15.4 |
| Commercial vehicles | 1.4 | 6.6 | -15.3 | -12.7 |
| **Road location:** | | | | |
| Total motorways | -15.8 | -23.6 | -18.6 | -19.3 |
| interurban motorways | -16.2 | -23.0 | -19.7 | -20.6 |
| urban motorways | -15.2 | -25.4 | -18.1 | -18.5 |
| National roads | -27.0 | -23.5 | -19.7 | -20.5 |
| Countryside roads | -20.0 | -20.9 | -17.1 | -18.1 |
| Communal roadway systems and other ways | -16.5 | -16.3 | -11.8 | -12.2 |
| **Age group:** | | | | |
| 0-14 | -14.6 | -17.4 | -15.2 | -15.5 |
| 15-24 | -20.4 | -20.7 | -14.2 | -15.3 |
| 25-44 | -23.7 | -23.2 | -16.5 | -17.5 |
| 45-64 | -21.5 | -19.5 | -12.8 | -14.1 |
| 65 or more | -17.8 | -14.4 | -16.4 | -15.9 |
| **Total** | **-20.9** | **-20.3** | **-15.0** | **-15.9** |

1 Within 6 days.

2 Slight injuries= hospitalized from 0 to 6 days, or need of medical care.

3 Serious injuries = hospitalized more than 6 days.

Indicators seem to be differently sensitive to actions according to the sub-group analysis: for example the reduction in health indicators between 2003 and 2002 for car users is stronger than for the other categories of road users, while no reduction could be seen for cyclists.

### 3.10.4 Road accident indicators in the Netherlands.

Although the burden of road traffic accidents in the Netherlands is one of the lowest among the countries of the European Union, the accident toll is still unacceptably high. New ways for further improvement have to be implemented to reduce casualties in these countries. Important measures concerned speed limits for the different parts of the road network, the physical protection of car-occupants and moped drivers, drinking and driving legislation, and the use of traffic calming measures in built-up areas.

- In 1983, a National Road Safety Plan was issued.
- The first “Long-term Road Safety Plan” (MPV-I) was issued in 1987.
- MPV-III, issued in 1991/92, adopted a two-sided policy of renewing and intensifying the spearhead approach on the one hand, and the implementation of this “sustainable safety” vision on the other.

Between 1993 and 1997, the Traffic Department of the Amsterdam police has conducted an enforcement project on: (a) speeding on 61 roads; and (b) on red-light trespassing and speeding at four intersections. The SWOV Institute for Road Safety Research conducted an evaluation study on speed and accidents articulated in three phases: phase 0 in summer 1993, phase 1 about six months there after, and phase 2 three months after phase 1. The effect on speed was strongest in phase 1: the average speed on 50 and 70 km/h roads was reduced by about 2.5 km/h. The percentage of speeders though was still high: 48% on 50 km/h and 40% for the 70 km/h roads. The accident evaluation compared the number of injury accidents and victims in the months September-December in 1991 and 1992 (before period) and 1993 (campaign period) on the roads that were enforced. A significant reduction of 25 to 36% was found. Speed and red-light measurements were conducted in phase 0 in 1994 and phase 1 in 1997. The percentage of cars driving through red-light went down on the four intersections/directions. Speed was reduced on three intersections. (C 9510 ).

The proposed indicator “speed limit exceeding” was necessary to monitor the effect of this preventive action.

In 1996 from an evaluation of 143 black spots that had been treated, SWOV Institute for Road Safety Research estimated that the total number of accidents afterwards was reduced by an average of 32%, and the number of injury accidents by approximately 45%. If 40 black spots are treated each year, this would mean a reduction of about 120 accident each year. There are also a number of locations (5%) where, after carrying out engineering changes, the number of accidents increased. This has improved the insight into the correct way to approach treatment of such locations. The future application of this knowledge could lead to a reduction in number of injury accidents by more than 45%. On the other hand, the most serious black spots have, in the meantime, been improved, whereby the number of accidents of the locations still to be improved could be less spectacular. Together, these factors appear to maintain a percentage reduction of about 45%. (SUN flower)

Between 1985 and 1997, it would appear that 10-15% of the urban residential roads were converted to 30km/h zones. The average saving of accidents in these zones is quoted as about 40%. Overall therefore this should have reduced accidents on these roads by about 4 - 6% i.e. about 0.3 - 0.5% per year. Between 1997 and 2002 (5 years), the proportion of roads treated has increased to 50%. If a lower percentage change in accidents (e.g. 33%) is assumed, because the treatments have not been so comprehensive, this suggests a further 13% of accidents on these roads should have been saved. (SUN flower)

At the end of 1999 moped drivers were not allowed anymore to use bicycle paths in built-up areas. However, road authorities had to decide for each path separately if this general rule could be applied safely. Many local authorities decided to make exceptions to the general rule, mostly because of expected difficulties when mixing mopeds with high motor vehicle volumes at junctions, or with speeding cars at road sections. A first evaluation in 2001 showed a 15% reduction of injury accidents. (SUN flower)

The proposed effect indicators were necessary and able to monitor the effect of these preventive action.

## 4. Discussion

This project defined 11 indicators which have resulted to be the best candidate for a valid monitoring of the road traffic accident cause-effect chain. These indicators cover different steps in the causal chain. The renewal rate was related to the quantity of exposure to the road and the probability of an accident (State). Two indicators were directly related to the exposure to the road risk factors. One, the time spent on the road by road user, was chosen in order to take into account the exposure of vulnerable categories such as pedestrians and cyclists (and to consider children and older people); the second was the distance travelled. The accident rate and the indicators on health effects of road traffic accident, the injury rate and the mortality rate, are indicators present in almost all the MS, and therefore have been chosen to be part of the core set. Other health effect indicators, important to take into account the enormous toll paid by the youngest, were the years of life lost and the DALY attributable to road traffic accidents. Other important indicators were related to behavioural aspects strongly important in the determination of road accidents or in worsening the prognosis of them. The use of safety devices (seat belt, child restrain and helmets) are strong determinant of the outcome of an accident, percentage of cars exceeding the speed limits, and mortality due to drunk driving are instead primary and secondary risk factors, acting in increasing the probability of the occurrence of an accident and worsening the prognosis of an accident.

All the selected indicators were considered in the selection criteria to have the best performance and were all compatible to the EU legislation.

The feasibility study, conducted by WHO and the National Focal Points, gave good results for almost all these 11 indicators, but five of these will be part of the core set of indicators to be proposed to the ECHI list, while the others will be used for WHO purposes.

The sensitivity study showed a good potentiality of the indicators in describing all the components of road traffic accident and in monitoring actions.

Some critical points emerged:

- Differences in the availability and quality of the information have been found during the review of the principal data sources. One criticism is related to the collection of accident records: these are collected, in several countries, by the police, reporting an information given by person which is not an health expert. This problem affects, and underestimates, mostly the injury records, while mortality records seem not to be underestimated. The comparative analysis on health based and official records describing the differences in sensitivity to the helmet law in Italy, revealed that only an emergency based surveillance, and only admissions for traumatic brain injury, were sensitive to the introduction of the law.

- Availability of the two exposure indicators was different: the distance travelled indicator was easily available, while the time spent on the road was less present in the national figures. It should be noticed, however, that the latter one is the only real indicator on exposure and it gives information also on vulnerable road users, such as pedestrian. It is able to describe exposure to the road of children, older people, fragile population.
- The feasibility study gave poor results in term of policy relevance to some fundamental indicators, such as the use of safety devices, the speed limit exceedance, drunk driving mortality and time spent on the road. This result was due to the poor presence of the road traffic accidents within the Environmental Action Plans, which priorities are related to more “classical” environmental health problems, such as exposure to air pollution.

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**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 7
# Summary of the Luxembourg Meeting
# January 2004

**DEVELOPMENT**
**OF**
**ENVIRONMENT AND HEALTH INDICATORS**
**FOR**
**EUROPEAN UNION COUNTRIES**

**ECOEHIS**

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**Bonn Office**

# Development of EH Indicators for EU countries: design of pilot study

**Co-sponsored by EC DG SANCO (SPC 2002300)**

**9 March, 2004**

**29-30 January 2004, Luxembourg**

## WHO Notes from the meeting

The Meeting in Luxembourg, 29-30 January 2004 was convened to assess the progress in the methodology development, to evaluate the feedback from the national reviews of the system, and to plan the pilot testing of the proposed environmental health indicator system in the Member States. The meeting gathered the ECOEHIS project network members as well as invited experts developing indicators in selected areas.

Maria Jose Carroquino, David Kay, and Jouko Tuomisto were elected and served as the chairpersons of the meeting. After the prepared agenda was adopted, Antonio Doronzo presented from the EC DG SANCO perspectives on the ECOEHIS project. The ECHI (European Community Health Indicators) is under development, and some of EH indicators might fit into the ECHI scheme. During the discussion, it was also pointed out that the future project would depend on the outcome of Budapest conference.

Dafina Dalbokova presented the background, objective, scope, and the progress of the ECOEHIS project (slides available on request). In the next seven months, the main task is to carry out the pilot study and recommend the ‘core’ indicators. A meeting to report and discuss about the pilot study findings will be convened on early July. During the discussion, it was confirmed that the indicators on food safety, waste management, and workplace health would not be covered in the ECOEHIS according to the ECOEHIS plan. EH indicators would be proposed for consideration in the ECHI meeting in 19-20 February.

Indicators on air pollution, noise, housing, water and sanitation, road traffic accidents, chemicals, and radiation were reviewed and updated one by one on the first and second day of the meeting.

The revised set of indicators is attached at the end of this note.

On the second day, Michal Krzyzanowski reported about recent progress in preparing Budapest Ministerial Conference (slides available on request). In Copenhagen meeting on 29 January, it was decided that a ‘step-by-step’ implementation of the EH information system would be proposed for endorsement at the Budapest conference. During the discussion, the importance of clarifying organizational and financial issues (who will be the manager/ owner of the system and who will fund it) was raised. Formation of steering committee among the international organizations to oversee an open system was suggested. The need for clarifying in the declaration the obligations of different organizations such as WHO, EU and EEA was recommended.

The SCALE project was presented by Brigit Staatsen and discussed. (Slides available on request)

Rokho Kim presented the protocol of pilot study (slides available on request).

In the discussion, the following points were made.

- The need for forming a steering body to coordinate the different institutes in the country was emphasized as much as for the role of focal points.
- The present pilot study integrates two steps, the feasibility study and pilot study.
- The cost-effectiveness evaluation needs to be included in the pilot testing, if possible.
- EuroIndy is not ideal for the pilot study because it needs to be amended to fit into the pilot study.
- Time frame is too tight to cover all indicators, to collect the actual data. However, extending the overall time frame was not an option, because the final report of the ECOEHIS should go to the Commission by September. Relying on the experts opinion about overall feasibility, and selecting only ‘priority’ indicators and reducing the information to collect in the pilot study might be needed to fit into the timeframe.
- It was argued that the number of indicators does not make much difference than the availability of the data in real workload of NFPs in the pilot study, because many indicators are already reported to the international agency.
- If the data are already available in the international agencies, WHO/Euro will collect the actual data from these agencies.
- To streamline the data collection process, the core set of indicators could be revised.
- Collecting the actual data is necessary to evaluate the feasibility of data collection.
- Flexibility was emphasized. Countries should be allowed to select indicators to collect the actual data.
- The NFP and national committee have to decide about which indicators to collect real data in each country.
- Simplified framework for assessing the feasibility based on two levels of availability (high/low) and quality (high/low) was proposed.
- The definition of ‘comparability’ should be further refined.
- Credibility of action indicators was questioned.

- For the indicators having more than one data elements, the feasibility of data elements will be averaged. If the unit of measure is hard to make as a scale for feasibility, a synthetic judgement by experts on whether to use or not to use the data will be necessary.
- Translation of tools was considered not necessary.
- It was agreed that:
  - The plan for the pilot study described in the draft proposal protocol is accepted.
    - The attendants will start to organize their own national network (Step 1) soon after the meeting.
    - Revised proposal will be submitted by WHO in three weeks.

After discussing about the protocol of the pilot study, all indicators were reviewed one by one for finally approval. Agreements were made on the set of indicators to be pilot tested.

- Transport, Noise: only the fact-sheets to be collated, final refinement
- Existing: air, water, radiation, chemicals – also final refinement
- Housing: one more round circulation among the authors and expert group

Key decisions at the meeting are as below:

- <u>On the indicators</u>
  - For housing indicators, there will be another feed back from the experts group before finalization.
  - Final revised methodology sheet will be sent to WHO in three weeks.

- <u>On the pilot study:</u>
  - Each country NFP will start organizing national committee for the pilot study.
  - A revised protocol will be prepared by WHO in three weeks.
  - Tools (questionnaire/ form) for the pilot study will be prepared and sent in four weeks. Not translation is needed for tools.
  - A maximum of 3,000 EUR is available for temporary hiring of personnel for the pilot study. County NFPs should send a proposal to WHO to used the fund.
  - The next meeting to report on the pilot study will be 6-7 July in Bonn (Alternative dates were proposed and the dates are not yet finalized as of 11 March).

- **List of attendants at the meeting**

| | |
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WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 8
# Protocol of Pilot Study and Questionnaire

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

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**REGIONAL OFFICE FOR EUROPE**

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**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**Bonn Office**

**Development of EH Indicators for EU countries: ECOEHIS**
**Co-sponsored by EC DG SANCO (SPC 2002300)**

**March 5, 2004**

# Pilot Study on the Environmental Health Indicators: Protocol

This protocol outlines the objectives, scope, methods, timetable to carry out the pilot study of environmental health (EH) indicators as discussed and agreed at the ECOEHIS meeting in Luxembourg on 29-30 January 2004. It also contains the provisional criteria and related questions to be used as tools in the pilot study. A final version of tools will be provided to the NFPs by the 24th of March. The study findings will be evaluated at the ECOEHIS meeting (Bonn, 6-7 July) and decisions will be made concerning potential revisions of the indicators. These along with the proposal for a core set of EH indicators for EU countries will be a part of the final report to be submitted to DG SANCO by September 2004.

## 1. Objectives

The purpose of the pilot study is to determine the implementability of the proposed EH indicators. The study aims at assessing the feasibility of the data collection and applicability of the information carried by the indicator in the participating MS.[1] It will classify the proposed indicators into three groups: (i) ready for immediate implementation; (ii) not ready for immediate implementation; (iii) requiring further developmental work as of 2004. Therefore, the practical goal of the study will be to identify the indicators that are ready for immediate implementation in most of participating countries.

## 2. Scope

All indicators proposed at the ECOEHIS meeting in Luxembourg on 29-30 January 2004 will be studied. When possible, actual data on selected

[1] Austria, Belgium, Denmark, France, Finland, Germany, Italy, The Netherlands, Portugal, Spain, Sweden

indicators will be collected for realistic assessment of feasibility of data collection process. In most cases, each indicator is computed from a few necessary data elements. Aspects of both ‘the data elements’ and ‘the indicator’ will be taken into account to determine the implementability of the indicator. The aspects of the availability and the quality of the data elements will be considered to assess the feasibility of data collection. The aspects of the policy-relevance and the comparability of indicators will be considered to assess the applicability of the information carried by the indicators. The findings from the previous feasibility study will be taken account in drawing conclusions.[2]

**3. Methods**

The pilot study will adopt a five-step approach as illustrated in Figure 1.

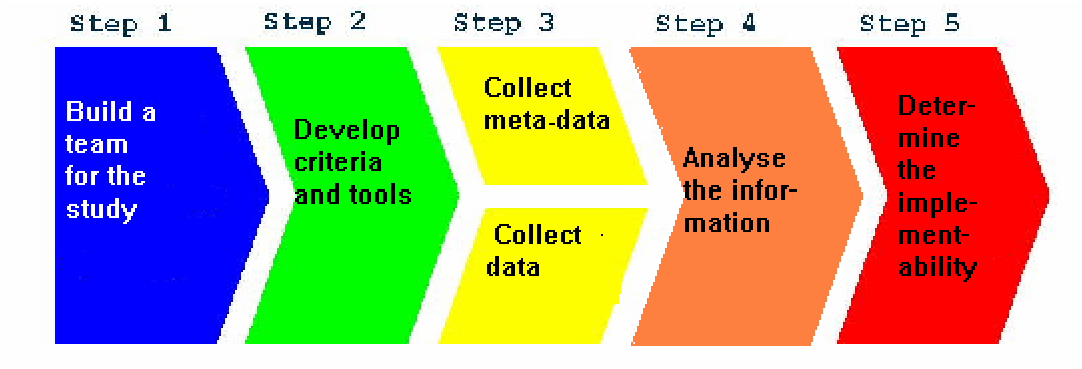


***Figure 1. Approach to performing Pilot Study***

**Step 1: Build a team for the study**

This step is comprised of nominating the Steering Committee to oversee the study, appointing National Focal Points (NFP’s), and setting up a Working Group of experts to cover all proposed indicators. NFP’s will collaborate with the experts for the pilot study. The national and international network currently involved in ECOEHIS project will be utilized in this step. This step should be completed by the end of March.

**Step 2: Develop criteria and tools**

This step includes developing the criteria and tools for testing the feasibility and applicability of proposed indicators. This step lays the foundation for how the analysis and assessment are performed in Step 4 and 5. Table 1 summarizes the conceptual frame for the criteria to be used in determining the implementability in this pilot study. The ***feasibility of collecting the data elements*** and the ***applicability of the information carried by the indicator*** are considered the two most important factors to determine the ***implementability of indicators***. The feasibility of data collection may depend on the **availability** (e.g., existence, accessibility, timeliness), and **quality** (e.g., reliability, standardization, completeness) of the data elements among

---

[2] For the past feasibility study and update of methodology, see
http://www.who.dk/document/ehi/bonnerepjuly2001.pdf,
http://www.euro.who.int/document/E75517.pdf,
http://www.euro.who.int/document/E76979.pdf

many factors. The applicability of the indicator may depend on the **policy-relevance** (e.g., usefulness, validity and interpretability in terms of policy-making and health-environment assessments) and temporal and spatial **comparability** (e.g., suitability for monitoring over time and across the countries) of the information carried by the indicator. The provisional criteria and related questions are presented in Annex 1. The tools for collecting data and meta-data in spreadsheet formats will be finalized and provided to the NFPs by the 24th of March.

Table 1. Conceptual framework for the criteria to determine implementability

| Main outcome | Components | Criteria | Data elements | Indicator |
|---|---|---|---|---|
| Implementability | Feasibility | Availability | * | |
| | | Quality | * | |
| | Applicability | Policy-relevance | | * |
| | | Comparability | | * |

**Step 3: Collect meta-data and data**

In this step, the data holders and providers will be identified and contacted by NFPs. If the data is known to be available, the actual data contents will also be collected. For the data that are already available from the international agency, NFPs will only provide the information about the quality and applicability of the data elements. For such data elements, WHO/Euro will collect the actual data from the agency in collaboration with the NFPs. The questionnaires about the data elements and the indicators will be filled in by the NFPs with the assistance of the national experts on the topic. The standard tools developed in Step 2 will be used to collect meta-data and data. WHO/Euro and the NFPs will communicate about the progress of data collection every two weeks. The collection of meta-data and data would take eight weeks, and should be completed by the end of May.

**Step 4: Analyse the information**

Analyses of data and meta-data are performed to evaluate the data elements and the indicators over the criteria set forth in the previous steps (in Table 1). WHO/Euro will work with the support of experts of the participating MS in this step. The feasibility and applicability will be scored according to the following methods.

Based on the information collected by the questionnaires, the availability and the quality of the data elements are scored as high=2, medium=1, or low=0, respectively. Then, the feasibility of each indicator is determined by the sum of these scores as shown in Table 2.

Table 2. Scoring of the feasibility of data collection

| | High availability 2 | Medium availability 1 | Low availability 0 |
|---|---|---|---|
| High quality 2 | 4 | 3 | 2 |
| Medium quality 1 | 3 | 2 | 1 |
| Low quality 0 | 2 | 1 | 0 |

In a similar way, the policy-relevance and the comparability of the indicator are scored as high=2, medium=1, or low=0, respectively. Then, the applicability of the indicator is determined by the sum of these scores as shown in Table 3.

Table 3. Scoring of the applicability of the indicator

| | High relevance 2 | Medium relevance 1 | Low relevance 0 |
|---|---|---|---|
| High comparability 2 | 4 | 3 | 2 |
| Medium comparability 1 | 3 | 2 | 1 |
| Low comparability 0 | 2 | 1 | 0 |

**Step 5: Determine the implementability**

Based on the analysis results and the feed back from the MS, the indicators are classified into three groups: (i) ready for immediate implementation; (ii) not ready for immediate implementation; (iii) requiring further developmental work. The conceptual classification method using the scores of feasibility and applicability to determine the immediate implementability is shown in Table 4. For the indicators that are not ready for immediate implementation, an assessment about the factors interfering immediate implementation will be made, and the methods to expedite the implementation will be recommended.

Table 4. Classification of the indicators by the implementability

| | High applicability | Low applicability |
|---|---|---|
| High Feasibility | Ready for immediate implementation | Not ready for immediate implementation |
| Low feasibility | Not ready for immediate implementation | Requiring further developmental work |

## 4. Timetable

### Table 5: Timetable of implementing the pilot study: March – July 2004

| STEP | ACTIVITY | BY | DURATION (Weeks) | ENDS |
|---|---|---|---|---|
| **Step 1** | **Build a team for the study** | | | |
| 1.1 | Nomination of the Steering Committee to oversee the study including, if appropriate, representatives of; the Ministry of Health, the Ministry of Environment, National Public/ Environmental Health institutes, institution responsible for NEHAP evaluation etc. | WHO<br>MS | 3 | End Mar |
| 1.2 | Setting up a Working Group of experts the national focal points (NFP) in the MS to cover proposed indicators and appointment of | MS<br>WHO | 3 | End Mar |
| **Step 2** | **Develop criteria and tools** | | | |
| 2.1 | Determine the criteria to determine implementability | WHO | 3 | End Mar |
| 2.2 | Specification of measurable elements of each criteria | WHO | 3 | End Mar |
| 2.3 | Develop tools to measure specified elements<br>♦ Test meta-data and data form by NFP's<br>♦ Design forms of data and meta-data entry in Excel and EuroIndy | WHO<br>NFP | 3 | End Mar |
| **Step 3** | **Collect data and meta-data** | | | |
| 3.1 | Collect data for 1997-2001 of MS<br>♦ Identify data elements for all indicators<br>♦ Identify dataset holders for each data element<br>♦ Contact heads of dataset holder institutions and<br>  ♦ Nominate the contact person<br>♦ Obtain data (in electronic form if possible)<br>♦ WHO collects the data held by the international agency | NFP<br>WHO | 8 | End May |
| 3.2 | Collect data about data (meta-data) for 1997-2001 of MS<br>♦ Collect information regarding the criteria for evaluation<br>♦ Complete the meta-data entry form for each dataset | NFP | 8 | End May |
| 3.3 | Report collected data and meta-data to WHO/Euro every two weeks<br>♦ Submit country progress to WHO project manager | NFP | 4 | End May |
| **Step 4** | **Analyse the information** | | | |
| 4.1 | Country- and topic-specific analyses of collected data and meta-data by experts of MS or thematic area | WHO | 2 | Early Jun |
| 4.2 | International comparison analysis by experts of thematic area | WHO | 2 | Mid Jun |
| 4.3 | Communicate with NFP's for verification of the analysis results<br>♦ Feedback from MS collected<br>♦ Verify the validity of scores to the experts | WHO<br>NFP | 2 | Mid Jun |
| **Step 5** | **Determine the implementability** | | | |
| 5.1 | Classify indicators by the readiness for immediate for implementation<br>1. Ready for immediate implementation<br>2. Not ready for immediate implementation<br>3. Requiring further developmental work | WHO | 1 | End Jun |
| 5.2 | Preparation of report of the pilot study<br>♦ Revise definitions of indicators if necessary<br>♦ Recommendations to enhance implementability of EHIS | WHO | 4 | Mid Jun |
| 5.3 | ECOEHIS meeting<br>♦ Review of report of the pilot study<br>♦ Ascertainment of definitions of indicators<br>♦ Evaluation of the pilot study | WHO<br>NFP | 2 days | 6-7 Jul |

NOTE: MS: Member States, NFP: National Focal Point

**Annex 1. Criteria and related questions**[3]

## CRITERION 1: THE AVAILABILITY OF THE DATA ELEMENT

The questions about ‘data availability’ cover the existence, the accessibility, and the timeliness of acquiring the data.

## Questions

- **Existence of indicator information**
    - Does the data exist in the country?  Yes, No
        - If yes,
            - Who is the data holder?
                - Institute, office, person and title
                - Telephone, email, website
            - Does it exist in electronic form?
- What is the method for data collection?
        - Registry
        - Surveys
        - Monitoring/ measurements
        - Ad hoc studies
        - Expert estimates
        - Other *(describe: blank box)*
- **Accessibility to the indicator information**
    - Can the focal point obtain the data? Yes, No
        - If yes,
            - What is the cost involved?
            - Is there legal support for the access?
        - If no,
            - Is there legal restriction against the access?
            - What is needed for NFP to access the data?
- **Timeliness in acquiring the data**
    - Who is focal point?
        - Institute, office, person and title
    - Timeliness of the data collection from the data holder by NFP
        - Estimated time lag from data request to obtaining
        - Actual time lag from data request to obtaining
    - Timeliness of data reporting to WHO by NFP
        - Estimated time lag from data obtaining to reporting
        - Actual time lag from data obtaining to reporting

- How would you summarize the availability of this data element?
    0. Poor
    1. Fair
    2. Good

[3] Final version of questionnaires will be provided in spreadsheet files by the 24th of March.

## CRITERION 2: THE QUALITY OF THE DATA ELEMENT

The questions about 'data quality' cover the reliability, standardization, completeness, and quality control of the data.

### Questions

- How is the reliability of the data considered by the experts in your country? (Reliability--the extent to which the data is consistent and reproducible)
  Good, Fair, Poor

- How is the method for data collection standardized?
  Good, Fair, Poor

- How is the completeness of the data collected?
  Good, Fair, Poor

- How is the quality control / assurance procedure for this data?
  Good, Fair, Poor

- How would you summarize the quality of this data element?
  0. Poor
  1. Fair
  2. Good

## CRITERION 3: THE POLICY-RELEVANCE OF THE INDICATOR

The questions about 'the policy-relevance' of the indicator cover the usefulness/ interpretability in the policy-making and monitoring process.

### Questions

- Is the collection of this indicator a statutory requirement? Yes, No
  If yes, which level of statutory requirement?
  - International level (EC directives, treaties, agreements, etc.)
  - National level (Environmental and health laws, orders, etc.)
  - Local government level (Municipal housing regulations, etc.)

- Has the indicator been used to formulate a new policy in the past two years? Yes, No

- Has the indicator been used to monitor and evaluate a policy in the past two years? Yes, No

- Has the indicator been used to prioritise a policy issue in the past two years? Yes, No

- Is the indicator used in the NEHAP, LEHAP, or in the future in the context of the EU EH action plan (within the SCALE process)?[4] Yes, No

- What is the geographical coverage of the information carried by the indicator?
  National
  Regional
  Municipalities

- What is the population coverage of the information carried by the indicator?
  < 50%
  50 – 90 %
  > 90%
  Unknown

- How would you summarize the policy-relevance of the indicator?
  0. Poor
  1. Fair
  2. Good

[4] NEHAP:National Environmental Health Action Plan
LEHAP:Local Environmental Health Action Plan
SCALE: Science, Children, Awareness, Legal instruments, Evaluation

## CRITERION 4: THE COMPARABILITY OF THE INDICATOR

The questions about 'the comparability' of the indicator cover the temporal and spatial consistency which are important in monitoring trends in a country and/or in comparing the status across the countries.

### Questions

- Have there been changes in the data collection/reporting in the past five years affecting the comparability of the data over time? Yes, No
  - If yes,
    - When?
    - How was it changed?
    - How significantly did it affect the data comparability over time?
      - Little or no
      - Moderately
      - Very significantly

- Does the method of data collection follow the methods described in the EC or international agreement? Yes, No

- Is the method of data collection different by the regions in your countries? Yes, No
  - If yes,
    - How is it different by region?

- How would you summarize the comparability of the indicator?
  0. Poor
  1. Fair
  2. Good

# WHO-ECEH Bonn Office

## Development of EH Indicators for EU Countries (ECOEHIS)

## Questionnaire for Pilot Study (updated 30/04/2004) of Selected EH Indicators

### General guideline

**Each worksheet contains questions for a set of data elements for an indicator, except for the first and the last worksheets.**

**The first worksheet labelled as 'POPULATION' is for common data elements such as total population.**

**The last worksheet labelled as 'COMMENTS' is for any comments to supplement answers in any worksheets.**

**Most questions are to be answered by the number code for the sake of quick data analysis. When indicated, enter a brief narrative answer in the cell. If necessary, use the comments worksheet which is the last worksheet.**

**There are 49 worksheets (1 introduction + 1 POPULATION + 46 indicators + 1 Comments). Note that AIR_D1 and TRAF_D1 is exactly the same.**

| |
|---|
| **Light blue cell contains the question for each data element or indicator** |
| **Light green cell contains the name of the data element or indicator.** |
| **Light purple cell contains the coding direction for data entry.** |
| **Light yellow cell is where the answerer has to fill in with a number or narrative text.** |

**The National Focal Point of the Country**

***Country name: (answer here)*__________________________________________**

***Name of the National Focal Point: (answer here)*__________________________**

***Email: (answer here)*________________________________________________**

***Telephone number: (answer here)*______________________________________**

## Part 0. INFORMATION ABOUT THE INFORMATION COLLECTOR

| | | |
|---|---|---|
| 0_1 | Name of person who collected information and answer on this data element | Enter your first and last name |
| 0_2 | Time needed for answer (from initiation to completion of information collection) | Enter the number of days |
| 0_3 | Email of the information collector | Enter email address |
| 0_4 | Telephone number of the information collector | Enter telephone number |

## Part 1. QUESTIONS ON THE AVAILABILITY OF THE DATA ELEMENT

| | | |
|---|---|---|
| 1_1 | Does the data exist in the country? If yes, go to the next questions. If no, go to 1_S | 1. Yes<br>2. No |
| 1_2 | Is the collection of this data element mandated by an international law or treaty (e.g., EC directive)? If yes, specify in the comments sheet. | 1. Yes<br>2. No |
| 1_3 | Is reporting of this data element mandated by a national law (e.g., environment and health standards)? If yes, specify in the comments sheet. | 1. Yes<br>2. No |

| | | |
|---|---|---|
| 1_4 | What is the geographical coverage of the information carried by the data element? | 1. National<br>2. Regional<br>3. Local (Cities or townships)<br>4. Unknown |
| 1_5 | If local coverage, how many communities are covered? | Enter the number of local government units covered |
| 1_6 | What is the population coverage of the information carried by the data element? If regional or local data element, estimate the population of all studied communities as a percent of the national population. | 1. < 50%<br>2. 50-90 %<br>3. >90%<br>4. Unknown |
| 1_7 | Name and address of organization(s) responsible for data collection | List all if more than one. |
| 1_8 | Name and address of organization(s) responsible for database management | List all if more than one. |
| 1_9 | What is the method for data element collection? | 1. Registry<br>2. Periodic survey (eg. census)<br>3. Specially designed survey<br>4. From a research data<br>5. Other (explain) |
| 1_10 | If answer to 1_9 is 3 (Specially designed survey), is it likely that survey will be performed regularly (at least once every few years) in the future? | 1. Yes2. No |
| 1_11 | Does it exist in electronic form (computer file)? If yes, go to the next question. If no, go to 1_13. | 1. Yes<br>2. No |
| 1_12 | Is the data element freely accessible on the website? | 1. Yes<br>2. No |
| 1_13 | Is the data element being reported to an international organization? | 1. Yes<br>2. No |

| | | |
|---|---|---|
| 1_14 | Indicate the time period for which the data are available. | 1. Last 20 years or more<br>2. Last 10 years<br>3. Last 5 years<br>4. Other (specify):_____ |
| 1_15 | Can the information collector obtain the data? If yes provide obtained data in the next question. If no, go to 1_18 | 1. Yes<br>2. No |
| 1_16 | Enter the obtained data elements for the years 1997-2001. | Enter the actual data below |
| 1_16_1 | | Enter the data of 1997, if any |
| 1_16_2 | | Enter the data of 1998, if any |
| 1_16_3 | | Enter the data of 1999, if any |
| 1_16_4 | | Enter the data of 2000, if any |
| 1_16_5 | | Enter the data of 2001, if any |
| 1_17 | What is the cost involved in EURO? | |
| 1_18 | Is there legal support for the access? | 1. Yes<br>2. No |
| 1_19 | Is there legal restriction against the access? | 1. Yes<br>2. No |
| 1_20 | What is needed for the information collector to access the data? | Enter the text. For example, a specific official request, or central collection of scattered data? |
| **1_S** | **How would you summarize the availability of this data element?** | **0. Poor**<br>**1. Fair**<br>**2. Good** |

**Part 2 QUESTIONS ON THE QUALITY OF THE DATA ELEMENT**

| | | |
|---|---|---|
| 2_1 | How good is the reliability of the data? | 0. Poor<br>1. Fair<br>2. Good |
| 2_2 | How good is the standardization of the method for data collection? | 0. Poor<br>1. Fair<br>2. Good |
| 2_3 | How is the overall quality control / assurance procedure for this data? | 0. Poor<br>1. Fair<br>2. Good |
| **2_S** | **How would you summarize the overall quality of this data element?** | **0. Poor**<br>**1. Fair**<br>**2. Good** |
| | | |
| **Part 3** | **QUESTIONS ON THE COMPARABILITY OF DATA ELEMENTS** | |
| 3_1 | Have there been changes in the methods of data collection for this the data element in the past five years? If yes, go to the next question. If no, skip to 3_S. | 1. Yes<br>2. No |
| 3_2 | How significantly did it affect the comparability of this data element over time? (Specify in the comments sheet) | 0. Negligible<br>1. Minor<br>2. Major |
| 3_3 | Does the method of data collection follow the methods required by the EC or international agreement? | 1. Yes<br>2. No |
| 3_4 | Is the method of data collection different by the regions in your countries? If yes, go to the next question. If no, skip to 3_S. | 1. Yes<br>2. No |

| | | |
|---|---|---|
| 3_5 | How significantly does it affect the data comparability between the regions? (Specify in the comments sheet) | 0. Negligible<br>1. Minor<br>2. Major |
| **3_S** | **How would you summarize the comparability of this data element?** | **0. Poor**<br>**1. Fair**<br>**2. Good** |

**Part 4. QUESTIONS ON INDICATOR - THE POLICY-RELEVANCE AND COST**

| | | |
|---|---|---|
| 4_1 | In the past five years, has the information carried by this indicator been used in formulating a new policy concerning environmental health in the country? | 1. Yes<br>2. No |
| 4_2 | In the past five years, has the information carried by this indicator been used in monitoring and evaluating a policy concerning environmental health in the country? | 1. Yes<br>2. No |
| 4_3 | In the past five years, has the information carried by this indicator been used in prioritising policies and interventions concerning environmental health in the country? | 1. Yes<br>2. No |
| 4_4 | Has the information carried by this indicator ever been used in the NEHAP or LEHAP? | 1. Yes<br>2. No |
| 4_5 | How much additional human cost (person-hours) was spent to obtain the information for this indicator for this pilot project? | Enter the total person-hrs |
| 4_6 | How much total cost (including human cost) was spent to obtain and report the information for this indicator for this pilot project? | Enter the total cost in EURO |
| **4_S_1** | **How would you summarize the policy-relevance of the information carried by this indicator?** | **0. Poor**<br>**1. Fair**<br>**2. Good** |

| | | |
|---|---|---|
| 4_S_2 | When will this indicator be ready for the implementation in your country? Enter your best estimate based on experts' opinion in your country. | 1. Immediately<br>2. By the end of 2004<br>3. By the end of 2005<br>4. After 2006 |
| **Part 5** | **QUESTION ON THE QUALITY OF THE DATA ELEMENT** | |
| 5_1 | Overall, how reliable are the answers to the questions (1_1 through 3_S) for this data element? | 0. Poor<br>1. Fair<br>2. Good |

***THE END. As soon as the worksheet for this indicator is completely answered, please send it to WHO ECEH Bonn Office (rki@ecehbonn.euro.who.int) by email. THANK YOU VERY MUCH!***

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 9
# Report on the Bonn Meeting
# July 2004

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

WORLD HEALTH ORGANIZATION
EUROPE

# Development of Environment and Health Indicators for European Union Countries: Results of a Pilot Study

**Report on a WHO Working Group Meeting**
**Bonn, Germany, 7–9 July 2004**

Cosponsored by the European Commission
DG SANCO Grant Agreement SPC 2002300

# ABSTRACT

From October 2002 to September 2004, the WHO European Centre for Environment and Health implemented the project "Development of Environment and Health Indicators for the European Union countries (ECOEHIS)". The meeting in Bonn, 7–9 July 2004 was convened to review the results of the pilot study, testing the feasibility and applicability of proposed indicators in countries participating in the project. Based on national reports as well as the review of international databases and reporting systems, the meeting recommended a list of "core" indicators ready for inclusion in the European Commission Health Indicators core set. The meeting also identified issues that require further developmental work in order to allow for a more comprehensive monitoring and assessment of environmental health policies.

**Keywords**

ENVIRONMENTAL HEALTH
ENVIRONMENTAL MONITORING – METHODS
HEALTH STATUS INDICATORS
PILOT PROJECTS
EUROPEAN UNION

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# Introduction

In the Declaration of the Fourth Ministerial Conference on Environment and Health in Budapest 23–25 June 2004, the proposed Environment and Health Information System was reaffirmed as an essential tool for policy-making, allowing priorities to be set on the basis of evidence, enhancing access to information, and facilitating communication with the public. Consequently, developing a well-designed pan-European EHIS based on a core set of environmental health indicators has become even a higher priority for the WHO, European Commission (EC) and the European Environment Agency (EEA), as well as for the Member States themselves. As a part of the concerted efforts towards the establishment of EHIS in Europe, the WHO European Centre for Environment and Health, Bonn Office, implemented a project "Development of Environment and Health Indicators for the EU countries" (ECOEHIS). The project was cosponsored by the EC DG SANCO under the Grant Agreement SPC 2002300 (1 October 2002–30 September 2004). The results of the project provide the input to the comprehensive list of European Community Health indicators (ECHI). Eleven countries – Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Portugal, Spain and Sweden – participated as partners of ECOEHIS project.

The previous meeting for the project in Luxembourg, from 29–30 January 2004, reviewed progress in the development of indicators methodology, agreed on the list of the indicators to be tested, and designed the pilot study. Since then, the study protocol has been set and the pilot study has been carried out in the participating countries. This involved five steps: building a team for the study in the country, developing criteria and tools, collecting meta-data and data, analysing the information, and determining the readiness for implementation of the indicators. Most of the partner countries had completed questionnaires to evaluate the necessary data elements of indicators tested in the pilot study and submitted national reports summarizing their experience and the major findings in their countries before the meeting in Bonn.

This meeting in Bonn on 7–9 July 2004 was convened to review the results of the pilot study. Based on national experiences of implementing the pilot study, and the results of a WHO review of the relevant international databases and reporting systems, the meeting recommended a list of "core" indicators ready for immediate inclusion to the Community Health Monitoring System and the ECHI list. The meeting also identified issues and indicators that require further developmental work in order to allow for a more comprehensive monitoring and assessment of environmental health policies. The meeting also discussed necessary follow-up actions for harmonization to be taken in the Member States in collaboration with WHO, EC, and other international organizations in order to allow implementation of indicators.

The meeting was attended by project partners, invited experts providing scientific advices on technical issues, observers from interested countries actively collaborating with WHO Environment and Health information projects, and representatives of the EC and EEA. This final report includes comments received in the review process. The methodology sheets for the accepted indicators included in this report reflect the changes recommended by the meeting.

## Objectives of the meeting

In the framework of the ECOEHIS project, this meeting was considered to be the final step in agreeing the core set of environmental health indicators to be integrated into the comprehensive list of European Community Health Indicators (ECHI). The objectives of the meeting were:

- to assess the feasibility and applicability of the proposed indicators by reviewing results of the pilot study from national and international perspectives;
- to make a final agreement on the core set environmental health (EH) indicators for EU countries;
- to identify follow-up actions needed to enhance the use for the indicators.

# Summary of the meeting discussion

The meeting agenda was accepted unanimously with an amendment proposed by Manfred Schmitz (Germany) on the sequence of discussions. As an introduction to the discussion of study results, overall progress of the project was reviewed. The international developments relevant to the ECOEHIS project at the European level were first discussed together with the overall ECOEHIS process, thus setting the scene for the technical discussion on the activities and achievements in the pilot study.

Discussion centred on the following issues:

- ECOEHIS in light of the recent international developments towards a European EHIS
- experiences in partner countries in testing feasibility of the proposed methodology
- criteria for evaluation of the EH indicators and selection of a core set
- agreement on core set EH indicators for EU countries and recommendations.

## ECOEHIS in light of the recent international developments towards a European EHIS

### *The Fourth Ministerial Conference on Environment and Health in Budapest*

Michal Krzyzanowski (WHO) presented the future of EHIS in light of the Budapest Conference. The Fourth Ministerial Conference on Environment and Health, held in Budapest on 23–25 June 2004, set out a road map for actions concerning environment and health in Europe. In the Declaration of the Conference, the policy-makers of European countries agreed to implement the Children's Environment and Health Action Plan for Europe (CEHAPE) and to develop a pan-European Environment and Health Information System (EHIS) as a tool for strengthening policy-making in Europe. By signing the Declaration, the Member States committed themselves to report on the progress of national actions at the mid-term review in 2007. In collaboration with Member States and other international agencies, WHO was expected to set international mechanisms for selection and approval of elements of EHIS supported by the Member States, develop guidelines for a core set of indicators, and build a network active in the Region.

Lis Keiding (Denmark) and Manfred Schmitz (Germany) were invited to give accounts of the Budapest Conference from the perspective of country delegates to the Conference.

Lis Keiding had a very positive outlook on the Budapest Conference. At side events the discussion was constructive, and the fora had an open atmosphere due to young participants from delegations and non-governmental organizations. The pre-planned national interventions were necessary at such a huge arrangement, but it meant that plenary discussions were not so lively. In addition to the first results of the environmental burden of disease study, EHIS was considered very necessary and important for international cooperation. Some Member States underlined the reporting fatigue and the need to limit it. Housing environment was viewed as a very important upcoming theme despite the fact that it was not widely accepted as a ‘traditional’ environmental issue and other ministries were in charge of it.

Manfred Schmitz (Germany) made a comment that EHIS was recognized as a very important area in Budapest, as was mentioned in the opening speech of the Deputy Federal Minister of Health and Social Security of Germany, Ms Caspers-Merk, at the session ‘The state of health and the environment in Europe – an assessment’. Three main pillars for WHO/EC collaboration were identified: Children’s health, Indicators, and Housing and health. The role of the WHO European Centre for Environment and Health in the preparation of the Budapest Conference was acknowledged in moving the agenda along at the Conference. There was a need for further strengthening the collaboration between WHO and the international organizations on the EHIS.

## *The initiatives of the EC*

Antonio Doronzo (EC) briefed participants on the most recent developments of EHIS in the European Commission (EC), i.e. the Public Health Action Programme, and the Environment and Health Action Plan. It was at the core of the Public Health Action Programme 2003–2008 to develop and operate an information and knowledge system on health to inform policy-makers and the citizens. The DG SANCO had created mechanisms to ensure continuity between past and future projects as well as progress towards implementation. Seven working parties (WP) had been created (one of them was on environment and health information) to coordinate the projects and advise on technical issues. In addition, a network of the WP leaders had been created as an intermediary body to keep all interested parties up to date on the information and knowledge system. The National Competent Authorities (NCA) was an advising body designated by the health ministries. It met twice a year to advise on the work plan and its progress. All these were new mechanisms and were still in the process of finding their responsibilities and roles.

The NCA meeting was held in Luxembourg from 5–6 July 2004 to discuss the Work Plan for 2005. At the meeting the WP leaders reported on the progress of the working parties. Concerning the core/short list of 80 indicators coming from the ECHI project, discussions with Eurostat show that 45 of them are practically available for the 25 EU Member States, and that 35 are not available on a regular basis, therefore requiring considerable work over the next years. Three of the proposed indicators should be better defined. A limited number of ‘preliminary’ ECOEHIS proposed indicators were submitted to this NCA meeting. It was therefore the responsibility of the present meeting to recommend a definite set of indicators and approaches to data gathering.

The European Environment & Health Action Plan 2004–2010 set the framework for the relevant EC actions. It consisted of 13 actions; four of them focus on information and monitoring, five on research, and four on training and knowledge. DG SANCO has a good cooperation with Eurostat; strengthening the collaboration with EEA will benefit the Action Plan. Eurostat had recently launched a new policy of free dissemination on the Internet of the so-called ‘1000 Tables’. As of 1 October the Eurostat NewCronos Database should be fully open to free access.

One should keep in mind the two different types of existing data systems: the one imposed by laws and the other reported voluntarily. All health statistics were an example of the latter.

These EC activities gave a strong impetus to the entire European Region. Synergies between them and the actions arising from the Budapest Conference should be fully exploited, and the work should be carried out under close collaboration between the EC and WHO together with the EU Member States. WHO should make an effort to mobilize the eastern part of the Region and actively involve the EECCA (Eastern Europe, Caucasus and Central Asia) countries in the process.

## Progress in ECOEHIS

The ECOEHIS project that WHO European Centre for Environment and Health, Bonn office, implemented with the support from EC DG SANCO was an important part of the process towards a European Community health information and knowledge system.

Rokho Kim (WHO) reported progress in the project activities since the meeting in Luxembourg. In that meeting, the set of indicators were selected to be pilot tested, the pilot study protocol was designed, and the criteria for evaluation were agreed. The objective of the pilot study was to test feasibility and applicability of the indicators selected at the meeting. The pilot study aimed at classifying the indicators into three groups according to the study results: indicators ready and recommended for implementation, those ready but not feasible for immediate implementation, and those desirable though requiring further developmental work.

According to the study protocol, methodology sheets and questionnaires were distributed among the partner countries in February and March 2004. The questionnaire focused on four criteria of evaluating indicators and data elements: availability, quality, comparability, and policy-relevance. In partner countries, data and meta-data were collected using the questionnaire from April to June. Since June, the national reports were prepared based on the data analysis, and the results would be discussed. WHO checked the availability of the indicators' data from the international data sources.

The ECOEHIS process had provided very good information on current status, the main drivers and how far the existing national information systems met these criteria. The work fed into the EU activities, but the decisions about the indicators were taken at the EC level. It was therefore necessary to assess the added value of every newly proposed indicator, and to consider the structure in charge of providing the data.

### *Experience in Partner Countries*

Participating Member States presented main results and experiences in the pilot study. Using the protocol as a guideline, they undertook creative approaches in setting out the mechanisms for the pilot study. Despite the considerable time pressure and other limitations, most countries completed the pilot testing as planned.

Only Austria and Belgium were unable to complete the pilot study for different reasons. **Austria** withdrew from the study because of limited resources to perform the study. In particular, the cost of obtaining the data and collecting meta-data was prohibiting, since many of the environment and health data were held and managed by private institutes in Austria. Despite this situation, Austria confirmed that they welcomed the development of indicators for monitoring the relation between health and environment, and in this respect fully supported the aims of the project ECOEHIS. **Belgium** organized a steering committee of the Communities and Regions for this project. However, it had to withdraw from the study because the national focal point was not replaceable when he was unable for health reasons to perform the pilot study.

**Denmark** evaluated the proposed EH indicators from the National Environmental Health Action Plans (NEHAP) perspective. In the Danish NEHAP, areas such as environmental tobacco smoking and accidents were not included. Thus the policy relevance of indicators on these items were judged limited in relation to the NEHAP, although they were regarded as very important from a broader public health point of view. The pilot study report was disseminated to the inter-ministerial group established to steer the NEHAP implementation but there was no time for discussion with the stakeholders. Most data were already reported to international organizations.

**Finland** checked thoroughly the data availability and accessibility as well as the methodology of the proposed indicators. Primary data were scattered among different organizations and collecting these seemed to work, although compiling data from various sources might require additional effort. There was a problem when data was collected on a local scale, e.g. restrictions related to environmental tobacco smoke, management of bathing waters, etc. In Finland, partly because of the climatic conditions, good housing systems were in place. Therefore, some housing indicators were not so relevant. Some water and sanitation indicators (e.g. population connected to wastewater treatment) were also considered not very useful because of the high standards already achieved in a number of EU countries. Gaps of information were reported in noise, housing and chemicals. What is the reason for these gaps? Was there simply no problem on this issue in Finland, or was there no institute that collects the data? Finland stated that the clarity of definitions should be improved in some of the methodology sheets when they are to be used as guidelines for implementation.

**France** undertook a multi-stakeholder process, creating a steering team from the main organizations concerned with data centralization and monitoring of the environmental or health area, and by collaboration with European organizations. The pilot study got a very positive resonance. It was a good opportunity to identify organizations in charge of the production of the data. It appeared that most data existed in the country albeit dispersed among many organizations. Most of them answered quickly, correctly and willingly despite the very short schedule. The willingness of tightening links between actors of monitoring in environment and health was also obvious. ECOEHIS facilitated the production of a programme of action for the French NEHAP concerning monitoring of indicators. A number of positive developments since the beginning of the ECOEHIS implementation made this possible. These included the establishment of the National Sanitary Security Agencies (AFSSA, AFSSE, AFSSAPS, InVS, etc.), the recently adopted NEHAP and the national public health law which set the regulatory framework for public health monitoring. Housing and indoor air qualities were priority topics in the French NEHAP and a national observatory on indoor air quality had been created. The pilot study had identified an obvious lack of data in the field of noise monitoring. It had also stressed the necessity of common work between experts from European countries to arrive at precise definitions and to standardize data collection for the development of housing indicators. Direct contact with relevant experts of databases owned by the Ministry of Interior was not possible. The result was that information on data availability and quality was difficult to obtain for traffic indicators and incomplete for crime and perception of crime. The steering committee agreed to continue to meet after ECOEHIS in order to optimize the participation of French organizations in European working groups in the area of environment and health monitoring.

**Germany:** The first step of the German participation to the ECOEHIS project was an analysis of existing EU-reporting obligations and current EU-indicators in the fields of interest for ECOEHIS. One of the main findings was that a number of very similar indicators was already provided by international data holders (e.g. structural indicators by Eurostat, TERM indicators by EEA). Therefore, German project participants did not undertake separate collection of data and meta-data on a national level. The basic understanding of German project participants of indicators suitable for implementation at EU-level was that there must be existing data flows from Member States to the European Union. This was a prerequisite in order to avoid duplication of work and unnecessary reporting obligations. Where there were no such data-flows yet, but nevertheless the ECOEHIS project identifies a priority area of environmental health, a cost benefit analysis needed to be provided for the European Commission. On the basis of this analysis, the European Commission would be able to decide on the initiation of an official decision making process. This approach was also favoured following previous experiences in the former project on Environmental Health Indicators coordinated by WHO-ECEH (EHI for the European Region). According to German participants, the results from the previous project indicated that the proposed indicators were only partly relevant for reporting on environmental health issues in the national context. It was emphasized that the exposure related indicators were the most useful indicators and could be combined with reasonable health impact assessments if appropriate risk estimates and data on the related health outcomes existed. One of the objectives of the ECOEHIS project was to propose E&H indicators for the ECHI-short list. These proposals would be discussed by the working party on health and environment that has been set up under the ECHI process. Germany considered that many indicators proposed in the Luxembourg meeting should be discussed by the appropriate working party of the ECHI-process. For example, the working party on accidents and injuries were appropriate for indicators on traffic accidents and the housing indicator of injuries at home.

Taking full advantage of participating in the pilot study, **Italy** set up an extensive network of stakeholders and major players in the environment and health in the country. The environment and health project of the Italian Agency for the Protection of the Environment (APAT) through which the pilot study was conducted had created a very strong participatory process. It allowed for the involvement of all the stakeholders at national and regional levels, creating an appropriate forum for a constructive discussion, sharing of information, and common approach in evaluating the proposed environment and health indicators. Such a process would make possible a cost-effective plan to further strengthen the integrated reporting between environment and public health institutions, promote the achievements, and evaluate the actual and potential capacity of building a shared information system. Creating a network which was operational at national and international levels ensured the successful implementation of harmonized European activities, bringing European strategies and policy targets while taking into consideration national and local priorities. The pilot study demonstrated that the current national data-flow system was not efficient and that more information was needed for an in-depth cost-benefit analysis. In follow-up, there would be good visibility of the pilot study and the overall ECOEHIS project: officially launching the pilot report, publishing selected ECOEHIS indicators in Italian Environmental Protection Agency (APAT) yearbook, both in paper and on the web and further harmonizing and strengthening the activities towards integrated environment and health reporting. There was a strong will to further expand the WG participatory process in a planned activity and building and maintaining a national network with the Agency in its ‘core’.

The National Institute for Public Health and the Environment (RIVM) of **the Netherlands** was developing a national EH information and monitoring system as part of the Dutch NEHAP. For the pilot study, a steering committee was created as a temporary advisory body. In the future, the steering committee would be linked with the recently set up National Advisory Board on EH Monitoring. The board includes representatives of the ministries of environment, health, transport, as well as local health authorities, environment agencies and nongovernmental organizations. Furthermore, there was a plan for a permanent expert working group. Making the steering committee into a permanent body would ensure progress towards the establishment of the national EHIS. The Dutch NEHAP did not have clear targets, and therefore it was difficult to decide on the policy relevance of the ECOEHIS indicators. For that reason, evaluation of policy-relevance was mostly based on current policy and the usefulness for health impact assessment. It was stated that the evaluation of policy-relevance was very subjective. Overall readiness of some indicators was difficult to assess because these indicators consisted of many data-elements. The pilot study revealed extensive data collection activities in the field of environmental and public health but no integrated reporting, except as an *ad hoc* activity or as a part of existing environment or public health reporting systems (internet, reports). Some of the indicators were not considered very useful for the Netherlands, because the standards for these indicators were already very high. These indicators were probably more important to other countries. The Steering Committee also proposed a set of additional indicators that they thought missing in the proposed set (for example exposure indicators for radiation). The process of implementing EH indicators should start with the policy priorities, using the existing (international) reporting obligations, identifying the relevant national and international studies, and most importantly keeping the system regularly updated.

**Portugal** had limited the scope of the pilot study to noise, water and sanitation and housing, and they were shared between two agencies. One partner led by João de Quinhones Levy of Instituto Superior Técnico collected meta-data on the indicators for noise, and water and sanitation. Because the data was collected by a university which did not belong to any of the official organizations which held the information, the collection process was more time consuming as it was necessary to make enquiries at diverse institutions to ascertain where the information was being kept. On the other hand, once the data holders were known, the collection process was easier because it was not necessary to follow all the institutional steps normally necessary in the government. The other partner led by Jorge Mota Prego of the Directorate General of Health collected meta-data on housing-health indicators only.

**Spain** reported difficulty in assessing the policy relevance and the comparability. Because of the change of the government during the pilot study period, the networking was delayed and difficult. Information on indicators on housing and noise was particularly difficult to collect. It was often unclear whether Spanish data were available in the international databases. Some of the indicators were only partially available for certain regions.

In **Sweden**, the Board of Health and Social Welfare identified relevant indicators for monitoring the national environmental quality objectives. The approach in evaluating the indicators feasibility and relevance was to contact experts and data providers officially. The indicators on chronic exposure to PM10 and PM2.5, the associated years of life expectancy lost, indoor air quality in terms of ETS exposure, radon, and mould, disturbance from traffic noise, kin cancer divided into epithelial cancer and malignant melanoma were very useful in the Swedish context. The indicator on health effects from extreme temperatures was felt not relevant in Sweden. In the opinion of Sweden, housing was not a part of environmental health, except for dampness/mould and radon. Furthermore, the proposed chemical indicators were not found relevant in Sweden. It would be more interesting to have indicators linked to chemical exposure.

Presentations from **several countries** indicated that, although most of the data for indicators were electronically available, the current methodology sheets did not provide sufficiently detailed guidelines for users to find the information from the international databases quickly. Participants emphasized the need to supplement the methodology sheet with additional ‘how-to’ guides to access the international databases. Therefore, an example of a ‘how-to’ guide prepared by the WHO secretariat was presented and is attached as Annex 3. The meeting pointed out that international databases for some countries are sometimes incomplete. Furthermore, the question was raised whether data that is being reported to EC could legally be used in other systems. In other words: could WHO use the data at the same time? A problem could be that some statistical institutions sell their data and therefore they might not give permission to give the data to everyone. This issue remained unresolved.

## Criteria for evaluation of the indicators

Considering the different needs and situations of environmental health policies in the Member States, the pilot study showed various approaches to the evaluation of **the policy relevance** of the proposed EH indicators by the partner countries. Denmark focused on the priority areas of the NEHAP. Sweden and Netherlands looked at the important public concerns. In France, experts focused essentially on their assessment of the importance of public health concerns, and the existence of a regulatory context or national action plans (NEHAP, laws etc.). Italy considered as most important the regulatory context and the existing reporting obligations for better data quality and availability. The decisions on many indicators in Finland were driven by ‘bringing the public health argument’ to multi-sectoral policies. In some cases, e.g. water and sanitation, the evaluation was based on assessment of the situation when high standards have already been achieved. German participants considered that the assessment of policy-relevance did not necessarily reflect the “real” relevance of a certain indicator but reflected the opinion of the expert answering the WHO questionnaire, and that experts’ assessments on the relevance of a certain issue were biased by the belief in the relevance of their own field of work. They expressed their concerns that these expert assessments may not necessarily be in accordance with the burden of disease caused by the environmental factor under consideration, nor with the assessment of the national policy-makers. To avoid such problems in developing indicators, the Netherlands also let policy-makers and not only experts look at the indicators, and took into account the burden of disease estimates for the Netherlands. All the criteria applied by participating countries to consider the policy-relevance (e.g. important public health problem, useful for existing policies and/or NEHAPS, useful for future assessment, useful for assessment of burden of disease, useful for tracking of emerging issues) had been taken into account by the working group decisions at the meeting.

Checking **data availability** was easier and all participating countries had been checking the national (and for some indicators also sub-national) data holder agencies: environmental and/or health statistics. The practical approach used for multinational evaluation was to check data availability in the European databases e.g. Eurostat, WHO/Europe, EEA etc. Evaluating **the data quality** was not always straightforward because the determinants of data quality such as validity and reliability of the data elements were often hard to measure and not well documented. It was particularly challenging to assess the data quality when the indicator and data elements were not clearly defined. At the meeting **comparability** had been assessed from a multinational perspective and differences in the methods used for the data systems from the proposed methodology were taken into account. The primary focus of discussion at the meeting was on exposure, effects and action indicators as available information about the upstream determinants and state of the environment was usually of reasonable quality and comparability.

The ECOEHIS project was part of a process that aimed to improve existing environmental monitoring systems and reporting for health assessments. The addressee of the project report was therefore very important. The results of the pilot study should be presented and discussed with the partner countries to check whether the proposed indicators were feasible and relevant in a national context and what should be done to make this data available. One way to do this might be to discuss the results in **the EU Working Party on Environment & Health** as had been planned.

There were a few remarks on the future use of the indicators, responsibility of analysis and policy-oriented reporting on public health and the environment, and existence of legal constraints for using and re-using data already submitted to the EC for other purposes than compliance.

From the EC point of view it should be clear that the indicators proposed for the core set should be **readily available in the international databases** such as Eurostat (the EU main source for routine data collection) and other services of the commission to which data were reported in accordance with the legislation. The ECOEHIS project should take into consideration that the definitions and all the data specification of the indicator methodology should be practically identical to the existing ones in Eurostat and the Commission. The methodology sheets would be updated in order to achieve this. It would be equally important to make a distinction between two levels of readiness of availability: when the indicator could be used exactly as was, and when it needs to be ‘filtered’ (i.e. only a few data elements were needed from an extensive database). The latter might require a little bit more effort than the former. If the indicator required some testing it should be done on a project basis. In this respect, activities of the WHO/Europe technical programmes and the implementation of ENHIS project provided a good opportunity to further advance the indicator developments.

To achieve the goals of protecting and promoting the population’s health, the health information system primarily focused on the indicators regarding **Exposure (Ex), Health effects (E) and Action (A)** in the causal chain framework of DPSEEA. The indicators readily available and proposed by the projects would be directly used by the EC, WHO and other national and international organizations. The action indicators considering existing national regulations and policies should be compiled and reported by the EU Member States. The ECOEHIS indicator proposal considered these issues mentioned above.

# Agreement on a core set of EH indicators for EU countries and recommendations

The participants reviewed and discussed the results of pilot study of each indicator extensively at this three-day meeting. As a main outcome of the meeting, the indicators were classified into the following categories.

1. *Readily and recommended for implementation:*
   These indicators were recommended for ECHI. Most of indicators in this category were directly available from international databases. For some indicators, the definition and methodology should be adjusted to make them easily available.

2. *Ready, but not feasible for immediate implementation:*
These indicators were recommended for WHO use (i.e. ENHIS project). These were relevant indicators but require more effort in data collection, computation, and interpretation.

3. *Desirable though requiring further developmental work:*
These indicators were recommended for further elaboration, and not ready yet for implementation.

The discussion and conclusion on the final classification of the indicators would be presented in the following by indicators and topic areas. The final classification of the indicators is presented in Annex 2.

## Air

Seven indicators on the topics of air pollution were tested in the pilot study. The results of international testing and the understanding of the process from an international perspective were presented by Michal Krzyzanowski (WHO), followed by discussions and agreements among the participants. An overview of the indicators and recommendations is given in table 1.

*Passenger transport demand by mode of transport* (AIR_D1), *Freight transport demand by mode of transport* (AIR_D2), *Road transport fuel consumption* (AIR_D3), and *Emissions of air pollutants* (AIR_P1) were readily available and accessible in international databases such as Eurostat and UNECE/EMEP. Most countries reported good availability, quality, comparability, and policy relevance. Overall rating of readiness for implementation was also very good. A few countries experienced difficulty in accessing the data in Eurostat, suggesting the need for a 'how-to' guideline to access the international database for this indicator. These four indicators were recommended for ECHI.

Table 1. Air indicators classified at the meeting

| **Indicator Code** | **Title** | **Final decision: *Recommended for*** |
|---|---|---|
| Air_D1 | Passengers transport demand by mode of transport | *ECHI* |
| Air_D2 | Freight transport demand by mode of transport | *ECHI* |
| Air_D3 | Road transport fuel consumption | *ECHI* |
| Air_P1 | Emissions of air pollutants | *ECHI* |
| Air_Ex1 | Exposure to air pollutants (Population-weighted annual average concentration of $PM_{10}$, $PM_{2.5}$, $O_3$; Exceedance of AQ limit values for $NO_2$, $SO_2$) | *ECHI* |
| Air_E1 | Years of Life Expectancy Lost due to PM exposure | *ENHIS* |
| Air_A1 | Policies to reduce environmental tobacco smoke exposure | *ECHI* |

*Exposure to air pollutants* (AIR_EX1) has two components: *Population-weighted annual average concentration of $PM_{10}$, $PM_{2.5}$, $O_3$;* and *Exceedance of air quality limit values for $NO_2$, $SO_2$*. This indicator measured the outdoor levels of air pollution in urban areas representing a significant source of exposure and health risk. Most countries reported good availability, quality, comparability, and policy relevance of pollutants concentration data (though the availability of $PM_{2.5}$ was still limited). Most countries agreed that this indicator was immediately ready for implementation. The information on the level of annual concentration of air pollutants was available in EEA/ETC-AQ AirBase, and the population data on 352 major cities were available in 20 countries in the Urban Audit as well as in the Eurostat–GISCO database. Because the population statistics were basic information in most urban areas, population-weighting did not add much complexity, although it required an expert input on a local level. A problem could be linking the population data with the air data, because information on population covered by the monitoring was not always reported, even though it was requested by the AirBase. However, the value added by this indicator was compared to the routinely reported frequency of exceeding the EC Directive Target Limit Value of the pollutant, i.e. compliance indicator. It was agreed that use of compliance data did not reflect the health impact of the pollutants for which health effects were observed at concentrations below TLV (e.g. PM and ozone). It was also pointed out that this indicator did not involve an additional burden of reporting to the member countries, since it relied on the same set of air quality data as used to generate compliance indicators. To limit the need for additional calculations and considering the highest health relevance of PM and ozone exposures, it was agreed that population-weighted mean concentration of $PM_{10}$, $PM_{2.5}$ and ozone would be recommended for the ECHI, while for $SO_2$ and $NO_2$ compliance indicators collected by EEA would be recommended for ECHI. It was also recommended to separately list pollutant-specific indicators:

- AIR_EX1_$PM_{10}$: population-weighted annual mean $PM_{10}$ concentration
- AIR_EX1_$PM_{2.5}$: population-weighted annual mean $PM_{2.5}$ concentration
- AIR_EX1_$O_3$: population-weighted annual mean ozone concentration
- AIR_EX1_$NO_2$: population distribution of number of hours exceeding AQ limit values for $NO_2$ in urban areas (EEA AP13)
- AIR_EX1_$SO_2$: population distribution of number of days exceeding AQ limit values for $SO_2$ in urban areas (EEA AP11)

This set of indicators should adequately address health considerations and was easily available from currently collected data. Therefore, it was recommended for ECHI.

*Years of Life Expectancy Lost due to PM exposure* (AIR_E1) are calculated from the information from AIR_EX1 specific to particulate matter. Except for Germany, most countries gave fairly good scores to this indicator for all criteria. It was agreed that this indicator would not be included in the ECHI set, but would be recommended for further harmonization in the ENHIS set.

Many countries did not provide a complete answer to the questions on *Policies to reduce environmental tobacco smoke exposure* (AIR_A1). Countries usually had information on this indicator individually and currently there was no international reporting system on this topic. It was emphasized that this indicator should be coupled in the future with an indicator on children's exposure to ETS to provide information on policy effectiveness. There might be a comparability issue because of the different survey methods to get this information, which could be improved by international collaboration. The meeting considered that the indicator is easy to calculate, and has very high public health significance. Therefore, it was concluded that this action indicator be recommended for ECHI.

## Noise

Six noise indicators were proposed for the pilot study. The results of the international testing and the understanding of the process from an international perspective were presented by Célia Rodrigues (WHO), followed by discussions and agreements among the participants. Overview of the indicators and recommendations is given in table 2.

Table 2. Noise indicators classified at the meeting

| **Indicator Code** | **Title** | **Final decision: *Recommended for*** |
|---|---|---|
| Noise_Ex1 | Population exposed to various noise level ranges per source | *ECHI* |
| Noise_E1 | Cardiovascular morbidity and mortality attributable to noise | *ENHIS* |
| Noise_E2 | Annoyance and sleep disturbance due to noise | *Further elaboration* |
| Noise_A1 | Policies to reduce exposure to leisure sounds | *ECHI* |
| Noise_A2 | Existence and effectiveness of urban or national action plans to solve noise problems | *Dropped* |
| Noise_A3 | Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures | *Dropped* |

*Population exposed to various noise level ranges per source* (Noise_EX1) provided the percentage of population exposed to different noise levels resulting from the monitoring process integrated in the European directive 2002/49/EC for environmental noise. For the development of strategic noise mapping, the directive proposed two indexes L*den* (day-evening-night level) and L*night* (night level). The maps would be the common assessment method and should present an estimation of the number of people located in areas exposed to noise. The first maps had to be produced by June 30, 2007. Though countries reported that at present they did not collect this data (with the exception of Netherlands), almost all of them had estimates of people exposed in major cities, but not according to the directive methodology. Where it existed, this data had been rated as being of low quality and not internationally comparable. Nevertheless countries had classified the indicator as having “good policy-relevance” (with the exception of Italy and Sweden). In summary, this was considered an extremely important indicator, even if for the time being only few countries had reliable data available. It was well understood that this indicator was well related to a risk for a range of health effects. It was also well recognized that, in accordance with EC directive, the collection of data for this indicator was mandatory by 2007, and that some Member States had already started collecting the data as of 2004. The indicator was considered for “immediate implementation”, even if some Member States would not have data representing the national level until 2007. Therefore, this indicator was recommended for ECHI at least for gradual adoption until 2007.

*Cardiovascular morbidity and/or mortality attributable to noise exposure* (Noise_E1) consisted of the number of cases of cardiovascular diseases and number of deaths attributable to noise exposure. This indicator was proposed by a group of experts at the first meeting of the noise and health indicators and had been very carefully discussed until its adoption in Bonn at a second meeting. The discussion around this indicator had a meta-analysis produced by RIVM as starting point. All the countries had demonstrated interest in and acknowledged the importance of, such an indicator. Some countries reported problems raised by their national officers regarding uncertainty due to the existence of a small number of studies (Denmark, Italy) and reinforced what was stated before about exposure data. This indicator had been the subject of in-depth discussions among noise experts and epidemiologists, and it had been agreed that enough solid evidence existed although there was still discussion about the magnitude of the risk and the relative risks to be used for its calculation. Despite the fact that a certain level of uncertainty still remained, this indicator was considered very important and pertinent to public health. Therefore, this indicator was recommended for the ENHIS indicators set. WHO would develop the model for its calculation in the framework of ENHIS. When ready and agreed upon it would be proposed for immediate calculation to the Commission.

*Annoyance and sleep disturbance due to noise* (Noise_E2) was another "effect" indicator and translated the percentage of people reporting noise annoyance and sleep disturbance. This indicator had, like the exposure one, the 2002/49/EC Directive as its background. The directive states that dose-effect relationships could be used to assess the effect of noise on populations. Dose-effect relationships for L*den* and annoyance and L*night* and sleep disturbance existed (known as "Miedema-curves"). This indicator had initially been designed following the methodology of the directive (using dose-effects relationships). The noise expert group agreed at its second technical meeting to change its calculation method and to calculate it on the basis of results achieved through representative surveys. This indicator was rated with very "good policy-relevance", but not all the countries had carried out surveys. It was agreed that this indicator should be a potential candidate for the core set. In the meantime, this indicator would be recommended for further elaboration. It would also be proposed to the Commission that these surveys be included in the Health Interview Survey. The group requested fine-tuning of the use of existing and international agreed surveys (for example ISO annoyance survey). On the other hand, the Netherlands had shown interest in adding another indicator, using the European SILC questionnaire, for neighbourhood noise annoyance.

*Policies to reduce exposure to leisure sounds* (Noise_A1) were an indicator proposed by the noise expert group. The added value of this indicator was that it could allow country comparison and, when analysing differences and success stories, encourage policy action. It reflected the actions of a given country to avoid health problems resulting from high leisure sounds (tinnitus and premature hearing impairment were increasing strongly among young people). Countries reported that data was available with medium quality but international comparability was difficult. Problems encountered were due to the existence of different data holders, strongly depending on a country's legal organization. Some countries considered this indicator (France, Denmark and Sweden) as "very policy-relevant" because it reflected the concern of a given country regarding the risk of hearing impairment by high sound levels. It was agreed that this indicator would be recommended for ECHI.

The second "action" indicator *Existence and effectiveness of national, regional or local action plans for noise reduction* (Noise_A2) was a composite indicator that reflected the existence of noise in national, regional or local plans as a health determinant and the existence of noise reduction and prevention plans in major urban areas as well as around major transport infrastructures. This indicator was rated quite highly in all the categories that were proposed for the pilot study and it would be available for implementation quite soon (end of 2004). Countries still reported that data was dispersed in the country, being very difficult for one stakeholder to have full access to it, although it could be useful to identify trends. Therefore, this indicator was dropped from the list of indicators to be considered for recommendation.

*Willingness to enforce and implement the Environmental noise European Directive and to enforce noise abatement measures* (Noise_ A3) was also proposed by the noise expert group. This indicator was composed of two figures, the first showing how much the countries were following the directive and the second showing the percentage of population covered by a noise map. This indicator was rated rather low; the countries did not see the need for an indicator of this nature, seeing that the directive would become mandatory very soon. For the similar problems as Noise_A2, this indicator was not recommended at the meeting.

## Housing

Matthias Braubach (WHO) summarized the international situation of the housing indicators, including the comments made by the countries involved, the realized challenges in data identification, and the potential ways forward to an updated indicator set. This was followed by discussions and agreements among the participants. Overview of the indicators and recommendations is given in table 3.

In summary, the participating countries reported a number of problems regarding the availability of data. Main challenges of the housing and health indicator piloting were:

- the limited use of data available from the European Commission in the framework of other projects and obligations (taking into consideration the new transparency policy allowing an extended access to Eurostat data)
- the complexity of some indicator computations, requiring a variety of data items to be related to each other and analysis steps to be undertaken on the level of individual households/persons
- the necessity of data collected at sub-national level which was not easily available
- the integration of data out of the traditional environment and health domain (e.g. climate data, socio-economic data)
- the holistic approach to environmental health indicators and the health relevance of housing, conflicting with national priorities of environment and health programmes in few countries
- the variety of aspects with large variation between European countries, making some indicators more or less policy-relevant based on the national context.

Meeting these challenges, WHO had supported the countries in the data identification process using the international network on housing and health, and summarized the comments in order to develop a second draft version of the indicators that would fulfil the priority needs:

- using European data whenever possible
- reducing the complexity of the indicators

In addition, the issues of data quality and policy-relevance variations were discussed at the meeting and considered in the selection process for the list of core indicators, aiming for identification of policy-relevance on the international scale and compromising with the varying individual priorities on the national scale. However, a general trend was recognized of allocating higher policy relevance to those indicators representing current issues (most often lacking adequate data), while traditional indicators with high data availability were estimated to be less relevant.

For the case of data quality, there were only minor problems expected when the data was available, and a better use of Eurostat data should improve data quality and comparability.

Table 3. Housing indicators classified at the meeting

| **Indicator Code** | **Title** | **Final decision:** ***Recommended for*** |
|---|---|---|
| HOUS_P1 | Affordability | *ECHI* |
| HOUS_EX1 | Crowding | *ECHI* |
| HOUS_EX2 | Accessibility | *Further elaboration* |
| HOUS_EX3 | Dampness/Mould Growth | *ECHI* |
| HOUS_EX4 | Household hygiene | *ECHI* |
| HOUS_EX5 | Indoor radon in dwellings | *ENHIS* |
| HOUS_EX6 | Crime/Perception of crime | *ECHI* |
| HOUS_E1 | Mortality associated with extreme temperature | *ECHI* |
| HOUS_E2 | Housing safety and accidents | *ENHIS* |

*Affordability* (Housing_P1) looked at the financial resources that were required for purchasing a square meter of construction, and combined this with the percentage of population living in absolute or relative poverty. Generally, the availability of data was good except for the construction cost. Policy-relevance was assessed as average. Several countries recommended the use of the Eurostat data on housing expenses. WHO suggested that this indicator should be updated, taking into account the existing Eurostat indicators coming closest to the concept of the original indicator. It was agreed that this indicator be recommended for ECHI after an adjustment is made on the methodology sheet.

*Crowding* (Hous_Ex1) combined data on households and residents with the statistical information on room number and floor area, identifying the number of households with less than one room per person and the number of households with less than 14 square meters per person. It was a traditional housing indicator with high data availability, although the policy relevance was deemed to be rather low. Also for this indicator, recommendations were made to use Eurostat data. WHO acknowledged the usefulness of using the Eurostat definition, which was most helpful in providing comparable data for all EU countries, based on widely accepted definitions, and offered to change the computation of this indicator. It was agreed that this indicator be recommended for ECHI after an adjustment was made on the methodology sheet.

*Accessibility* (Hous_Ex2) focused on the accessibility of the housing stock and compared the amount of physical environmental barriers with the number of persons with functional limitations, or elderly people. It also included policy guidelines on housing adaptation. Although it was common opinion that accessibility was a key issue for housing, a large number of countries faced considerable challenges in identifying the necessary data. Most difficult were the environmental barriers in the housing stock, which either did not exist at all (except local surveys etc.) or were only available in very different data formats that could not be easily merged. Another problem area was the identification of adapted dwellings in case policies existed. WHO research brought similar results, showing that many data items were available that showed the prevalence of handicaps and chronic limitations, but could not be related to housing conditions due to a lack of relevant housing stock data. It was agreed that this indicator needed further elaboration.

*Dampness/Mould Growth* (Hous_Ex3, *former Hous_Ex4)*) used data on dampness and mould growth and tried to assess the amount of persons/dwellings being exposed. It received a very high assessment of policy-relevance, but was rarely available as it was currently not included in the national health or housing surveys, and data was often available only from local studies. It was considered one of the major indicators to be part of the housing and health indicator core set if adequate data availability was guaranteed. WHO identified, following the request of the countries to work with European data when possible, the European Community Household Panel (ECHP), continued by the SILC survey (Statistics on Income and Living Conditions), as relevant sources of information. It was agreed that the indicator on dampness/mould should be added to the core indicator list if an adaptation of the computation towards the data collection mechanism of the SILC were possible. The SILC would contain a variable on problems with dampness and mould within the house. It was confirmed that the indicator Hous_Ex3 on dampness and mould growth would be covered by the SILC which was a mandatory data collection mechanism for all EU countries, starting in 2004 with most EU-15 countries and being complete with contributions from all EU countries by 2005/2006. The relevant data item (HH040) was covering data on dampness problems in the house as a potential cause of mould growth in the format of a composite indicator: leaking roof, damp walls/floors/foundations, and rot in the window frames or the floor. With the national data availability being rather low, and the strong policy relevance attached to the issue of damp and mould, the indicator had been adapted towards the SILC data and then added to the core list of housing and health indicators to be proposed to the European Commission for the ECHI list.

*Household hygiene* (Hous_Ex4, *former Hous_Ex5, Housing hygiene*) aggregated data on the presence – and quality – of selected hygiene amenities such as water supply, shower/bath, or toilet. It included data on dwellings, households, or persons not being equipped with these amenities, and – if available – data on dwellings, households, or persons being equipped with substandard amenities that do not provide efficient service. Although most countries did have some data on sanitation equipment etc., the main challenge for this indicator was (a) the amount of data items needed; (b) the complex computation (relating all individual items to produce a composite hygiene score); and (c) the qualitative dimension of assessing the existing amenities as adequate or inadequate (for which no data was available). In addition, countries having high sanitation standards assessed the policy relevance as low. WHO identified two international sources (ECHP/SILC) and the WHO Health for All database with some relevant data items, although not covering the full range of data needs. It was therefore agreed to follow the data format provided by SILC for all EU countries, and leave options for national reporting of hygiene data that were not included in the minimum set of SILC. After the adaptation to the SILC data format as the minimum data set for this indicator, the household hygiene indicator would go to the ECHI list.

*Indoor Radon in dwellings* (Hous_Ex5, *former Hous_Ex6*) aggregated data from *in situ* Radon measurement and from mitigation work. It combined this quantification of exposure conditions with the existence of national policies on Radon in housing. The indicator received the highest policy relevance rating, but many countries encountered problems in identifying the data in the relevant format. In various countries, data on national scale was scarce. Due to the high policy relevance, it was decided to amend the indicator, splitting it into two areas (exposure surveillance and policy action) and taking into consideration comments from the countries. A new version would then be sent out for review and approval, and may be taken into the core set. It was agreed that this indicator be recommended for ENHIS.

*Crime/Perception of crime* (Hous_Ex6, *former Hous_Ex7*) considered the occurrence of physical and mental health effects related to the occurrence of crime, and more generally fear of crime. It aggregated available data on crime rates within residential areas and distinguished between crime against persons and objects. Although the policy relevance of this indicator in the filed of environment and health was questioned by some countries, the meeting agreed that the indicator would be proposed for integration to the general European Community Health Indicators. Data availability may be a challenge in few countries, although most data items were available. WHO/Euro Housing and Health Programme presented the data kept by the International Crime Victim Survey (ICVS), which was held every four years and theoretically covered all the required data items for the indicator (to be used to substitute lacking national data). The next survey would be realized in 2004/2005 in all EU-15 countries. Still, the indicator depended on national crime and police records to (a) update the crime prevalence on an annual basis and (b) be more detailed/more valid in case the national data sources offer better data quality. It was agreed that this indicator be adjusted to fit with the new wave of ICVS, and then, be recommended for ECHI.

*Mortality associated with extreme temperature* (Hous_E1, *former Hous_Ex3, Extreme indoor temperatures*) combined data on extreme climate conditions with health data (mortality and hospitalization cases), assuming that housing quality would be an essential element in maintaining acceptable indoor temperature levels. For this indicator, the main issues were the identification of the climate data due to “unusual” collaboration with meteorological institutes (although it was agreed that such data does exist in every country), the exact definition of the morbidity and mortality cases looked at, and the availability of mortality by month. The assessment of policy-relevance varied strongly, showing national priorities and previous experiences with heat and cold wave effects. WHO acknowledged the complexity of the suggested indicator draft, and it was agreed to limit this indicator to mortality data only, as this was much easier to define, access and compute. Still, it was clear that for this indicator international data sources cannot be sufficient as (a) at international level, the relevant mortality data were only partially available and the required climate data very rarely existed, and (b) climate events and their effects may be regional. The definition would be revised to limit to mortality. It was agreed that this indicator be recommended for ECHI after an adjustment is made on the methodology sheet.

*Housing safety and accidents* (Hous_E2, *former Hous_E1*) dealt with the number of health effects and deaths as a result of accidents and injuries in and around the private home. This included (a) the occurrence of burns, injuries and poisonings, and (b) the occurrence of deaths by home accidents, poisonings and fires. Although many countries did have some information on accidents and their health effects, it seemed difficult to identify the required data due to the specific format and the detailed ICD groups that were requested. Also, many countries had different data formats based on varying survey schemes, and comparability was not always easy. In addition, it was suggested that next to simplifying the indicator it was useful to add age-specific data into the indicator as accidents were often linked to specific risk groups (children, elderly). WHO offered to work with the EC Working Party on Accidents and Injuries to get access to the EC database on home and leisure accidents, and draft a new indicator sheet based on the available data. However, it was clear that to some extent national data (especially on mortality and morbidity) would be required as international data sources could only partially cover the data. It was agreed that this indicator be recommended for ENHIS.

## Traffic accidents

Table 4. Traffic accidents indicators classified at the meeting

| **Indicator Code** | **Title** | **Final decision:** ***Recommended for*** |
|---|---|---|
| Traf_D1 | Passenger transport demand by mode of transport | *ECHI* |
| Traf_S1 | Age of vehicle fleet | *ECHI* |
| Traf_S2 | Road accident rate | *ECHI* |
| Traf_S3 | Speed limit exceedances | *Further elaboration* |
| Traf_Ex1 | Person time spent on the road | *Further elaboration* |
| Traf_Ex2 | Use of vehicle safety device | *Further elaboration* |
| Traf_E1 | Mortality rate due to road traffic accidents | *ECHI* |
| Traf_E2 | Potential Years of Life Lost due to road traffic accidents | *ENHIS* |
| Traf_E3 | Injury rate due to road traffic accidents | *ECHI* |
| Traf_E4 | DALY lost due to road traffic accidents | *Further elaboration* |
| Traf_E5 | Mortality due to drinking driving | *Further elaboration* |

Eleven traffic accidents indicators had been subject to the piloting phase in spring 2004. The international summary of the piloting phase was presented by Sara Farchi (Italy), followed by discussions and agreements among the participants.

*Passenger transport demand by mode of transport* (Traf_D1) could be considered as an exposure indicator from a traffic accident point of view. Therefore, it was also called Traf_Ex1. It was in fact the same as Air_D1. See the discussions and decisions on Air_D1. The feasibility study confirmed that the figures for this indicator were currently present in the international databases. The only limitation was that this indicator did not collect information on distances travelled by human-powered modes of transport.

*Age of vehicle fleet* (Traf_S1) and *Road accident rate* (Traf_S2) were both status indicators for traffic accidents, available in Eurostat. The first was reported and discussed on the EEA reports. The Traf_S2 was collected by almost all the European MS and was available in the CARE (Community Road Accident Database). Although some problems on comparability and quality of the Traf_S2 had arisen in the feasibility study, these two indicators were recommended for the ECHI set for their policy-relevance and readiness of implementation.

*Exceeding of speed limit* (Traf_S3) was an important primary and secondary risk factor for traffic accidents. Most countries considered this indicator relatively less comparable and less relevant for policy making. The low score for policy relevance was principally due to the problem that the National Action Plans had no aims regarding the prevention of road traffic accidents. There was no international database identified for this indicator. Therefore, it was agreed that this indicator would be monitored as a pilot indicators on a voluntary basis. In the meantime, according to the relevance of this indicator with respect to the prevention of road traffic accidents, it was recommended that this indicator be proposed to the Eurostat survey to develop more standardized assessment.

*Person time spent on the road* (Traf_Ex1) and *Use of vehicle safety device* (Traf_Ex2) were both exposure indicators for traffic accidents. Some of the countries participating to the feasibility studies reported good scores for these indicators, but this result was not uniform in all the countries. The Traf_Ex1 was an important indicator because it was the only one that could give a measure of exposure of pedestrians and cyclists. For example, it was relevant in monitoring children's exposure. Eurostat reported the results of the "Time Use Surveys" in ten European Countries for the years 1998–2002. The Traf_Ex2 is fundamental in the monitoring process of the road traffic accident reduction. The lack of usage of safety devices, together with speed limit exceedances and drunk driving, was responsible for most of the road traffic accident death. The decision was to propose these two indicators for implementation to Eurostat and to collect them on a voluntary basis. These indicators were recommended for further elaboration.

*Mortality due to road traffic accidents* (Traf_E1) was the most important effect indicator. Most countries gave consistently good scores for availability, quality, and comparability. This indicator was readily available from Eurostat (CARE-Community Road Accident Database), and was agreed for recommendation to the ECHI.

*Potential Years of Life Lost due to road traffic accidents* (Traf_E2) was directly calculated from Traf_E1.. The life expectancy at every age was easily available from the demographic statistics. This indicator was recommended for further development in the framework of the ENHIS study.

*Injury rate due to road traffic accidents* (Traf_E3) was an important effect indicator readily available from CARE-Community Road Accident Database. Most countries gave fairly good scores for availability, quality, and comparability. Improvements in the quality and comparability were recommended. This indicator was agreed for recommendation to the ECHI.

*DALY lost due to road traffic accidents* (Traf_E4) was calculated from Traf_E1 and Traf_E3. To calculate DALY, disability weights for different countries were necessary. The World Bank had proposed an algorithm to calculate DALY. This indicator was recommended for further development.

*Mortality due to drinking driving* (Traf_E5) is a primary and secondary risk factor of traffic accident morbidity and mortality. Countries indicated relatively low comparability and policy-relevance. The low score for policy-relevance of this indicator was principally due to the fact that the National Action Plans/legislation were not involved in the prevention of road traffic accidents. Given the low scores and poor availability of this relevant indicator, it was recommended for further development.

## Water, sanitation and health

Seven indicators were proposed for pilot study. The results of the international testing and the understanding of the process from an international perspective were presented by Dafina Dalbokova (WHO), followed by discussions and agreements among the participants.

The three upstream determinants indicators: *Wastewater treatment* (WatSan_P1), *Recreational water quality* (WatSan_S1) and *Drinking-water quality* (WatSan_S2) had a clear regulatory context and reporting obligations. WatSan_P1 and WatSan_S1 were publicly available from Eurostat and DG Environment. WatSan_S2would be reported to the EC in 2005. It was also pointed out that the EEA WaterBase was under construction. Therefore, all three of these indicators were recommended for ECHI.

Table 5. Water and sanitation indicators classified at the meeting

| **Indicator Code** | **Title** | **Final decision:** ***Recommended for*** |
|---|---|---|
| WatSan_P1 | Wastewater treatment | *ECHI* |
| WatSan_S1 | Recreational water quality | *ECHI* |
| WatSan_S2 | Drinking-water quality | *ECHI* |
| WatSan_Ex1 | Safe drinking-waters | *ECHI* |
| WatSan_E1 | Outbreak of waterborne diseases | *Further elaboration* |
| WatSan_A1 | Management of bathing waters | *ENHIS* |
| WatSan_A2 | Water safety plans | *Further elaboration* |

*Safe drinking-waters* (WatSan_Ex1) was meant to provide information about the monitoring/control coverage of the Drinking-water Directive and also about the populations which use small/individual water-well supplies and hence could be potentially exposed to water-related health risks (both microbiological and chemical). The policy relevance was rated ‘poor’ by Denmark, Italy (for national reporting means), and the Netherlands, ‘fair’ by France and Sweden, and ‘good’ by Portugal. Sweden reported about 1.6 million out of 9 million of their population without access to municipal water supply. The variability of evaluations was mostly related to the lack of ‘direct’ regulatory context (no reporting obligation about the monitoring coverage) and also because high standards had already been achieved in many countries especially for piped drinking water supply at home. Availability of data was evaluated ‘good’ as these are routinely collected statistics, however the quality and comparability of the indicator became questionable given the considerable differences in national definitions and estimation methods.. Within the structural indicators of economy and ecology/water, Eurostat produced a similar indicator using the definition of ‘population connected to public water supply’. Given the ready availability, the indicator could be recommended for the ECHI list taking the Eurostat definition and refining the methodology. There might still be some problems with comparability because of differences in definitions and data collection methods used across Europe. Nevertheless, the indicator was proposed as the best available and relevant information and using it should drive the acquisition of better quality data.

The most intrinsic EH indicator of water and sanitation, *the outbreaks of waterborne diseases* (WatSan_E1), was rated as ‘fair’ to ‘good’ for the policy relevance by several participating countries (Denmark, Finland, France, Portugal). The data was considered available in Finland, Italy, Netherlands and Spain and partly available in Sweden but their quality – ‘poor’ (Denmark, Italy, Netherlands, Portugal, Sweden). Germany reported that the identification of waterborne diseases out of all reportable infectious diseases was at present not possible. The poor data quality is mostly due to the considerable underreporting, lack of sensitivity – characteristic for the notification systems, slow ways of discovering an outbreak and differences in diagnostic and surveillance practices. A good example was Finland, where 32 outbreaks of (mostly recreational) waterborne diseases with a total number of 16 000 cases were detected during 1997–2002 after introducing a new surveillance system. The indicator was in need of considerable development, improvement, and harmonization of the diagnostics and reporting systems. As this work was beyond the scope of the project and the overall health information system activities and required involvement of other agencies e.g. the European Centre for Disease Prevention and Control (ECDC), this indicator was left for the time being for further elaboration.

The two action indicators, WatSan_A1 and WatSan_A2 provide information about implementation of a proactive approach to bathing and drinking-waters quality management.

*Management of bathing waters* (WatSan_A1) was considered to be policy relevant, readily available in Denmark, Portugal, Spain, and Sweden with a fair comparability. Italy reported non-availability and the Netherlands – partial. The bathing water directive had been recently revised to incorporate the WHO Guidelines for Safe Recreational Water Environments together with the beach management principles of the Annapolis protocol. The Council had adopted the amended proposal for a Directive of the European Parliament and of the Council concerning the management of bathing water quality on 23 June 2004. This indicator could be proposed to the ECHI list only after the methodology was refined to reflect the very recent finalization of the revised Directive and associated reporting obligations. In the meantime, this indicator was recommended for WHO use in the framework of ENHIS study.

*Water safety plans* (WatSan_A2) was considered potentially very useful for the future. The concept of water safety plans that encompassed all steps in water protection from catchment to the consumer was the most effective and protective means of consistently assuring drinking-water quality and the protection of pubic health. It had been introduced in the third revision of the WHO Drinking-water quality guidelines. Since this was not yet finalized it was difficult to provide clear guidelines on how to produce the indicator. In the meantime, this indicator was recommended for further development.

Out of the seven originally proposed indicators, three: *Wastewater treatment coverage* (WatSan_P1), *Recreational water quality* (WatSan_S1), and *Drinking-water quality* (WatSan_S2) were decided ready for immediate implementation. *Safe drinking-waters* (WatSan_Ex1) was also decided for the core set based on the indicator ‘Population connected to public water supply’ routinely collected by Eurostat. *Bathing water management* (WatSan_A1) was a potential candidate for the core set with slight refinement following the official publication of the revised and adopted by the Parliament Bathing Water Directive. *Water safety plans* (WatSan_A2) and *the outbreaks of waterborne diseases* (WatSan_E1) would require longer-term methodological development.

## Chemical emergencies

Table 6. Chemical emergencies indicators studied and reviewed at the meeting

| **Indicator Code** | **Title** | **Final decision:** ***Recommended for*** |
|---|---|---|
| Chem_P1 | Industrial facilities under Seveso II directive | ECHI |
| Chem_A1 | Regulatory requirements for land-use planning | ECHI |
| Chem_A2 | Chemical incidents register | ECHI |
| Chem_A3 | Government preparedness | ECHI |

The international summary of the pilot study of the four indicators for chemical emergencies was presented by Rokho Kim (WHO), followed by discussions and agreements among the participants.

All four indicators on chemical emergencies were recommended as part of a 'regulatory approach' to the topic by an earlier working group meeting in Berlin, in May 2003. All indicators for the topic of chemical emergencies were based on EU Seveso II Directive. Most countries scored the availability, quality, comparability, and policy-relevance as 'fair' to 'good.' It was agreed that all indicators be recommended to the ECHI. It was also noted that this was a minimum set and needed further development more focused on health aspects.

## Radiation

Two indicators on radiation had been pilot tested according to the decision of the last meeting. The international summary of the piloting phase was presented by Rokho Kim (WHO), followed by discussions and agreements among the participants.

Table 7. Radiation indicators studied and reviewed at the meeting

| **Indicator Code** | **Title** | **Final decision:** ***Recommended for*** |
|---|---|---|
| Rad_E1 | Incidence of malignant melanoma | ECHI |
| Rad_A1 | Effective environmental monitoring of radioactivity | ECHI |

*Incidence of malignant melanoma* (Rad_E1) was an effect indicator of ionising radiation. Malignant melanoma incidence was easily available with good quality and comparability through WHO/IARC. However, the incidence of other skin cancers was not reported regularly in many cancer registries. Therefore, it was recommended that the definition of Rad_E1 be changed to exclude 'other skin cancers.' With this modification, Rad_E1 was recommended to the ECHI.

*Effective environmental monitoring of radioactivity* (Rad_A1) is based on Euratom Treaty. Most countries reported a good score for this indicator on all criteria. Without modification, Rad_E1 was recommended to the ECHI.

## Follow-up Actions

The meeting agreed on the follow-up actions to allow the completion of the ECOEHIS project by 30 September 2004. Participants also discussed the use of its results in the future programmes of WHO and EC.

Methodology sheets would be updated according to the meeting decisions and will be enclosed in the final project report. The 'how-to' guides to access international databases necessary for application of the indicators on international level would be developed in future projects.

The indicators recommended by the ECOEHIS project for inclusion to the ECHI short list are expected to be considered by the EC DG SANCO Health & Environment Working Party and the meeting of the Network of Competent Authorities before their inclusion to the ECHI Core List. However, independently of the final decisions in the EC process, the recommended indicators would be used by the follow up WHO projects, such as ENHIS, that would be implemented to establish the indicators and reporting system. These actions were considered to be a follow-up of the decisions of the Fourth Ministerial Conference on Environment and Health held in Budapest, June 2004, which requested WHO, EEA, and EC to further develop and manage the environment and health indicators, related data sets and the shared information infrastructure, and to report a progress in this process at an intergovernmental meeting by the end of 2007.

*Annex 1*

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*Annex 2*

# FINAL CLASSIFICATION OF RECOMMENDED INDICATORS

Table 1. Indicators recommended for ECHI

| Indicator Code | Title | Data availability | Comments |
|---|---|---|---|
| Air_D1 (=Traf_D1) | Passenger transport demand by mode of transport | Readily available in Eurostat | Adjusted to Eurostat |
| Air_D2 | Freight transport demand by mode of transport | Readily available in Eurostat | Adjusted to Eurostat |
| Air_D3 | Road transport fuel consumption | Readily available in Eurostat | Adjusted to Eurostat |
| Air_P1 | Emissions of air pollutants | UNECE/EMEP data | Sectoral breakdown according to SNAP |
| Air_Ex1 | Exposure to air pollutants<br>• Population-weighted annual average concentration of $PM_{10}$, $PM_{2.5}$, $O_3$<br>• Exceedance of air quality limit values for $NO_2$, $SO_2$ | Concentration data in Airbase, population data in Urban Audit or GISCO database, and exceedance data as provided by ETC/AC | Five sub-indicators:<br>–Air_Ex1_$PM_{10}$,<br>–Air_Ex1_$PM_{2.5}$,<br>–Air_Ex1_$O_3$,<br>–Air_Ex1_$NO_2$,<br>–Air_Ex1_$SO_2$. |
| Air_A1 | Policies to reduce environmental tobacco smoke exposure | Each country to assess the composite score and voluntary report on the components | Needs to improve comparability through standardized surveys |
| Noise_Ex1 | Population exposed to various noise level ranges per source | Mandatory reporting by 2007 according to EU Directive | Gradual reporting until EU Directive is fully implemented in 2007 |
| Noise_A1 | Policies to reduce exposure to leisure sounds | Countries will provide the data voluntarily. | Available when EU Directive is fully implemented |
| Hous_P1 | Affordability | National statistics, EU ECHP/SILC | WHO adjustment to Eurostat data |
| Hous_Ex1 | Crowding | National statistics EU ECHP/SILC | Using the Eurostat indicator |
| Hous_Ex3 | Dampness/Mould growth | National statistics EU ECHP/SILC | WHO confirmed availability in SILC |

| Indicator Code | Title | Data availability | Comments |
|---|---|---|---|
| Hous_Ex4 | Household hygiene | National statistics EU ECHP/SILC | WHO adjusted to Eurostat data as the minimum set |
| Hous_Ex6 | Crime/Perception of crime | National crime records ICVS | WHO updated definition to reflect the new wave of the ICVS |
| Hous_E1 | Mortality associated with extreme temperature | National mortality statistics<br>Climate data archives | WHO Revised definitions and limitation to mortality data |
| Traf_D1 (=Air_D1) | Passenger transport demand by mode of transport | Available in Eurostat | Could be considered an exposure indicator in the traffic accident context |
| Traf_S1 | Age of vehicle fleet | Available in Eurostat | |
| Traf_S2 | Road accident rate | Available in Eurostat | The CARE (Community Road Accident database) reports detailed data at European and National levels |
| Traf_E1 | Mortality due to road traffic accidents | Available in Eurostat | The CARE reports detailed data at European and National levels |
| Traf_E3 | Injury rate due to road traffic accidents | Available in Eurostat | The CARE reports detailed data at European and National levels |
| WatSan_P1 | Wastewater treatment | Available in Eurostat | Methodology sheet to be updated to the existing Eurostat indicator on urban population connected to wastewater treatment |
| WatSan_S1 | Recreational water quality | Available in DG Env, EEA waterbase | Refinement of methodology: indicator 'as is' in DG Env reporting |
| WatSan_S2 | Drinking-water quality | Available in EU Drinking-Water Directive from 2005 | |

| Indicator Code | Title | Data availability | Comments |
|---|---|---|---|
| WatSan_Ex1 | Safe drinking-waters | Available in Eurostat | Methodology in accordance with the existing Eurostat indicator 'Population connected to public water supply' |
| Chem_P1 | Industrial facilities under Seveso II Directive | Available in Seveso Plant information retrieval system (SPIRS) | Based on Seveso II Directive |
| Chem_A1 | Regulatory requirements for land-use planning | Countries score using methodology sheet | Based on Seveso II Directive |
| Chem_A2 | Chemical incidents register | Available in Major Accident Reporting System (MARS) | Based on Seveso II Directive |
| Chem_A3 | Government preparedness | Countries score using methodology sheet | Based on Seveso II Directive |
| Rad_E1 | Incidence of malignant melanoma | WHO/IARC | Adjustment: limit to ICD 10 code C43 |
| Rad_A1 | Effective environmental monitoring of radioactivity | Countries score using methodology sheet | Euratom treaty |

Table 2. Indicators recommended for WHO use (i.e. ENHIS)

| Indicator Code | Title | Comments |
|---|---|---|
| Air_E1 | Years of Expected Life Lost due to PM exposure | Calculated from Air_Ex1. |
| Noise_E1 | Cardiovascular morbidity and mortality attributable to noise | Calculated from Noise_Ex1. Methodology to be developed for countries |
| Hous_Ex5 | Indoor radon in dwellings | National surveys<br>To be revised and split into two sections (exposure and action) to choose one |
| Hous_E2 | Housing safety and accidents | EU Injury Database<br>National survey data<br>To be revised and amended by age-specific data computations |
| Traf_E2 | Potential Years of Life Lost due to road traffic accidents | Calculated from Traf_E1 |
| WatSan_A1 | Management of bathing waters | Methodology adapted to the reporting obligations under the recently accepted revision of the EU Bathing water Directive |

Table 3. Indicators recommended for further elaboration

| Indicator Code | Title | Comments |
|---|---|---|
| Noise_E2 | Annoyance and sleep disturbance due to noise | To be proposed to Eurostat Health Interview Survey |
| Hous_Ex2 | Accessibility | National survey data/health |
| Traf_S3 | Speed limit exceedances | Pilot voluntary reporting<br>Propose to Eurostat survey |
| Traf_Ex1 | Person time spent on the road | Pilot voluntary reporting<br>Eurostat reports this indicator collected within the Time Use Surveys |
| Traf_Ex2 | Use of vehicle safety device | Pilot voluntary reporting<br>Propose to Eurostat survey |
| Traf_E4 | DALY lost due to road traffic accidents | Calculated from E3. Further development of the method before putting on ENHIS |
| Traf_E5 | Mortality due to drinking driving | Check EUROCARE, if not available, propose to Eurostat survey |
| WatSan_E1 | Outbreak of waterborne diseases | Future, desirable but not available. Needs considerable development beyond the project scope |
| WatSan_A2 | Water safety plans | Important and useful in the future: methodology to be proposed upon finalization of the WHO DWQ Guidelines third revision http://www.who.int/water_sanitation_health/dwq/guidelines3/en/ |

*Annex 3*

# AN EXEMPLARY 'HOW–TO' GUIDE TO ACCESS DATA ON THE INTERNET

**Example indicator: Hous_Ex6 (Crime and perception of crime)**

According to the methodology sheet, this indicator of crime and perception of crime (Hous_Ex6) is defined as the incidence and perception of theft, robbery and vandalism in dwellings and public spaces. To compute this indicator, the following data elements are required.

| |
|---|
| Crime<br>A – 1000 X number of thefts in dwellings/total number of dwellings<br>B – 1000 X number of crimes against people in public space/total number of residents<br>C – 1000 X number of crimes against private property in public space/total number of residents<br><br>Fear of crime<br>D – 100 X citizens reporting fear of crime in the immediate environment/total number of residents<br><br>Prevention action<br>E – 100 X number of dwellings with burglar alarms/total number of dwellings<br>F– 100 X number of dwellings with special door locks/total number of dwellings |

The current methodology sheet indicates International Crime Victim Survey (ICVS) as an international data source. The following example of 'how-to' guide will provide a step-by-step process of getting the data elements for the indicator. The how-to guide will be developed for all recommended indicators in the follow-up activities of ECOEHIS such as ENHIS project.

1. Visit http://www.unicri.it/icvs/index.htm.
2. Click on 'Publications' in the menu of left-hand side of the screen.
3. Click on Full text in PDF of in the yellow box at the centre of screen under the title of '2000 surveys'.

   | |
   |---|
   | Van Kesteren, J.N., Mayhew, P. & Nieuwbeerta, P. (2000) 'Criminal Victimisation in Seventeen Industrialized Countries: Key-findings from the 2000 International Crime Victims Survey'. The Hague, Ministry of Justice, WODC. full text in PDF |

4. Click 'Additional tables' under the heading of 'Appendices' near the bottom of the light blue window. This will lead to a pdf file on the right lower corner of the screen. The path and name of the pdf file is 'http://www.minjust.nl:8080/b_organ/wodc/publications/17-icvs-app4.pdf'.
5. Save the pdf file into your local drive by clicking on the diskette shaped icon of Adobe program.
6. Open the pdf file from your local drive.
7. Go to Table 2 and find the data on 'Crime' for the computation of the indicator elements A, B and C.

A) "number of thefts in dwelling" includes:

- burglary
- attempted burglary

B) "Number of crimes against people in public space" includes:

- robbery
- personal theft
- sexual incident
- assault & threats

C) "Number of crimes against private property in public space" includes:

- car theft
- theft from car
- car vandalism (taken out in 2004 survey)
- motorcycle theft
- bicycle theft

8. Go to Table 24 and find the data on "Feeling of safety when walking alone after dark in the area" for the indicator element D. Add the figures for "bit unsafe" and "very unsafe".
9. Go to Table 26 and find the data on 'Burglar alarms' and 'Special door locks' for the indicator elements E and F.

WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 10
# Methodology Sheets for Recommended Indicators

## DEVELOPMENT OF ENVIRONMENT AND HEALTH INDICATORS FOR EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

# METHODOLOGY SHEETS FOR RECOMMENDED INDICATORS

# I. Indicators recommended for ECHI

| Air_D1 Passenger transport demand by mode of transport | **D**PSEEA |
|---|---|
| *Issue* | Air Quality, Transport and Noise |
| *Definition of indicator* | Number of passenger-kilometres travelled per year by the following modes of transport per capita: personal cars, trucks, public transport (electric), public transport (fossil fuel), human powered (walking, bicycling) |
| *Underlying definitions and concepts* | The indicator is based on the assumption that the amount of transport vehicles and the amount of kilometres driven by them represent a significant source for air pollution and noise. |
| *Specification of data needed* | Total number of vehicles per transport type per year<br>Amount of passenger-kilometres per transport type vehicle per year<br>Total resident population |
| *Data sources, availability and quality* | The indicators are published for the European Union as a whole, as well as for each Member State separately. The indicators for the Acceding Countries and Bulgaria, Romania and Turkey are also provided where data are available. The data are electronically available at Eurostat website. Data on the total resident population should be available from national censuses. |
| *Computation* | **Number of passenger-kilometres by vehicle [type]** = total number of vehicles [type] × amount of passenger-kilometres driven per vehicle [type]<br>**Passenger-kilometres**: a unit of measure representing the transport of one passenger over a distance of 1 km<br>**Summaries can be given**: in passenger-km [type] per inhabitant, or as percentage of the total number of passenger-kilometres driven by all types of vehicles |
| *Units of measurement* | Passenger-km [type]/inhabitant; or as percentage |
| *Scale of application* | Usually national. Local (urban) to regional (sub-national) is also relevant, however more effort may be required to obtain data. |
| *Interpretation* | The success of policies targeted at reducing the traffic as significant source of air pollution and noise can be assessed. Trends in passenger-kilometres can be coupled to economy (e.g. relation between the economic development as expressed by the GDP and transport needs) as well as to atmospheric emissions. A shift towards more environmentally friendly transport modes will result in a more sustainable situation. |
| *Linkage with the other indicators* | This is indicator is also a driving force indicator regarding Traffic Accidents (TRAF_D1).<br>Driving force: ***Passenger transport demand by mode of transport,*** *Freight transport demand by mode of transport*; *Road transport fuel consumption*<br>Pressure: *Emissions of air pollutants*<br>Exposure: *Exposure to air pollutants*<br>Effect: *Years of Life Expectancy Lost due to PM exposure, Annoyance and sleep disturbance by noise*<br>Action: *Application of regulations, restrictions and noise abatement measures* |
| *Related data, indicators* | UN Indicators of sustainable development: http://www.un.org/esa/sustdev/isd.htm<br>For updated Guidelines and Methodologies (2001) see: http://www.un.org/esa/sustdev/indisd/indisd-mg2001.pdf<br>Related documents: Declaration of the Third Ministerial. Conference on Environment and Health, London, 1999 http://www.euro.who.int/Document/E69046.pdf<br>Glossary of transport statistics http://www.unece.org/trans/main/wp6/pdfdocs/glossen2.pdf<br>EEA (2000) Are we moving in the right direction. Indicators on transport and environment integration in the EU (TERM 2000) http://reports.eea.eu.int/TEC18 |

| Air_D2 Freight transport demand by mode of transport | **D**PSEEA |
|---|---|
| *Issue* | Air Quality, Transport and Noise |
| *Definition of indicator* | Number of tonne-kilometres transported per year by the following modes of transport per capita: road, rail, and inland waterways. |
| *Underlying definitions and concepts* | The indicator is based on the assumption that the freight intensity of a society represents a significant source for air pollution and noise. Rail and inland waterways transport are based on movements on national territory, regardless of the nationality of the vehicle or vessel. Road transport is based on all movements of vehicles registered in the reporting country. |
| *Specification of data needed* | Total number of vehicles per transport type per year<br>Amount of tonne-kilometres per transport type vehicle per year<br>Total resident population |
| *Data sources, availability and quality* | The indicators are published for the European Union as a whole, as well as for each Member State separately. The indicators for the Acceding Countries and Bulgaria, Romania and Turkey are also provided where data are available. The data are electronically available at Eurostat website. Data on the total resident population should be available from national censuses. |
| *Computation* | **Tonne-kilometres by transport mode [type]** = total number of vehicles [type] × amount of tones × kilometres moved per vehicle [type]<br>**Tonne-kilometres**: a unit of measure representing the movement over a distance of 1 km of one tonne of vehicle and contents excluding the weight of tractive vehicle. *The weight of railcars is included.*<br>**Summaries can be given**: in tones-km [type] per inhabitant, or per GDP |
| *Units of measurement* | Tonnes-km [type]/inhabitant; or as percentage |
| *Scale of application* | Usually national. Local (urban) to regional (sub-national) is also relevant, however more effort may be required to obtain data. |
| *Interpretation* | Tonne-kilometres per capita represent the freight-intensity of a society; reflecting on the one hand, the dependence of an economy on trade in raw materials and heavy goods production, and on the other, the development of other less transport-intensive industries such as trade in lighter consumer products and services. The success of policies targeted at reducing the traffic as significant source of air pollution and noise can be assessed. Trends in tone-kilometres can be coupled to population size (per capita), economy (e.g. relation between the economic development as expressed by the GDP and transport needs) as well as to atmospheric emissions. |
| *Linkage with the other indicators* | Driving force: *Passenger transport demand by mode of transport,* ***Freight transport demand by mode of transport****; Road transport fuel consumption*<br>Pressure: *Emissions of air pollutants*<br>Exposure: *Exposure to air pollutants*<br>Effect: *Years of Life Expectancy Lost due to PM exposure, Annoyance and sleep disturbance by noise* |
| *Related data, indicators* | UN Indicators of sustainable development: http://www.un.org/esa/sustdev/isd.htm<br>For updated Guidelines and Methodologies (2001) see: http://www.un.org/esa/sustdev/indisd/indisd-mg2001.pdf<br>Related documents: Declaration of the 3rd Min. Conference on Environment and Health, London, 1999 http://www.euro.who.int/Document/E69046.pdf<br>Glossary of transport statistics http://www.unece.org/trans/main/wp6/pdfdocs/glossen2.pdf<br>EEA (2000) Are we moving in the right direction. Indicators on transport and environment integration in the EU (TERM 2000) http://reports.eea.eu.int/TEC18 |

| Air_D3  Road transport fuel consumption | | **D**PSEEA |
|---|---|---|
| *Issue* | Air Quality | |
| *Definition of indicator* | Average consumption of fuel by type from road transport per year | |
| *Underlying definitions and concepts* | The indicator is based on the assumption that the use of fossil fuel in road traffic represents a significant source of exposure to ambient air pollutants and health risk. Underlying definitions are:<br>**Fossil fuel consumption**: total annual sales of each type of fossil fuel (e.g. gasoline, diesel, LPG) by volume multiplied by the average energy content for the respective fuel<br>**Total population**: total resident population | |
| *Specification of data needed* | Amount of sales of fossil fuel consumption by type in a country/region and total<br>Total population | |
| *Data sources, availability and quality* | Data on the amounts of energy used by fuel type are usually available from national statistics, and are typically derived either from the trade data, taxation registries, or the sales data of the energy companies. These data are reasonably reliable at the national level; at the regional/local level, however, they may be difficult to acquire (for the reasons of commercial confidentiality) and may be less accurate. At international level IEA http://www.iea.org<br>produces data for fuel consumption by the transport sector<br>Data on the total resident population should be available from national censuses | |
| *Computation* | The indicator can be computed by:<br>$(E_{mj} \times U)/P$,<br>where U is the total volume of the respective type of fuel sold and $E_{mj}$ is the average energy content (MJ/l or MJ/kg) of that fuel and P is the total population in the area under consideration.<br>Summaries can be given: in MJ [type of fuel]/inhabitant, or as percentage of the total consumption by all types | |
| *Units of measurement* | MJ [type of fuel]/inhabitant; or as percentage | |
| *Scale of application* | Regional to international | |
| *Interpretation* | The indicator can be interpreted in terms of a measure of potential emission of air pollutants. Depending on the state of technology used (e.g. three-way catalyst) emission of various pollutants can be expected.<br>An interpretation of the state of energy efficiency and pollution control can be made based on a comparison with emission indicator. Therefore changes in fuels consumption (with the likely exception of the $CO_2$) should not necessarily be seen as direct evidence of a change in emissions. | |
| *Linkage with the other indicators* | Driving force: *Passenger transport demand by mode of transport; Freight transport demand by mode of transport*<br>Pressure: *Emissions of air pollutants*<br>Exposure: *Exposure to ambient air pollutants (urban)*<br>Effect: *Years of Life Expectancy Lost due to PM exposure; Annoyance by noise due to traffic; Sleep disturbance by noise due to traffic*<br>Action: | |
| *Related data, indicators* | Related documents: Declaration of the 3rd Min. Conference on Environment and Health, London, 1999 http://www.euro.who.int/Document/E69046.pdf<br>Towards a transport and environment reporting mechanism for the EU: technical report N. 18 (EEA and Eurostat) http://reports.eea.eu.int/TEC18<br>See also Core Set of Environmental Indicators http://ceroi.net/ind/matrix.asp | |

| Air_P1 Emissions of air pollutants | DPSEEA |
|---|---|
| *Issue* | Air Quality |
| *Definition of indicator* | Total annual emissions of $SO_2$, $PM_{10}$, $PM_{2.5}$, NOx, CO, NMVOC by the following economic sectors: industry-process and energy, energy industry, domestic and services, transport, agriculture. |
| *Underlying definitions and concepts* | The indicator describes emissions of a selection of pollutants or precursors of pollutants, which form a potential risk to health. Part of the pollution is directly emitted into the atmosphere (such as $SO_2$), other pollutants are formed by chemical reactions in the atmosphere (such as secondary PM and ozone). (In some cases, precursor emissions might be aggregated using appropriate weight factors.)<br>Sectors are according to the NFR reporting system and includes the main sectors such as<br>– Industry-process and energy: combustion in manufacturing industry, production processes, extraction and distribution of fossil fuels, solvent and other product use, waste treatment and disposal<br>– Energy industry: combustion in energy and transformation industry<br>– Domestic and services<br>– Transport: road transport, other mobile sources and machinery<br>– Agriculture |
| *Specification of data needed* | National total and sectoral emissions for $SO_2$, primary $PM_{10}$ and $PM_{2.5}$, $NO_X$, CO and NMVOC.<br>(National total and sectoral emissions for $CH_4$ are relevant for ozone formation, while $NH_3$ contributes to the formation of secondary PM). |
| *Data sources, availability and quality* | Data on national emissions including a sectoral breakdown of $SO_2$, $NO_x$, VOC, CO, $NH_3$, primary PM and $CH_4$ can be obtained from EEA/ETC-AE (CORINAIR project), from UNECE/CLRTAP/EMEP http://www.emep.int/index.html for total. For sectoral (SNAP): http://www.emep.int/areas/index.html<br>Data for classical gaseous pollutants are usually available at reasonable quality. Larger uncertainties can be expected for ammonia, NMVOC and primary PM. |
| *Computation* | The pressure indicator of $SO_2$, primary $PM_{10}$ and $PM_{2.5}$, $NO_x$ CO and NMVOC is directly obtained from the reported national total and/or sectoral emissions. |
| *Units of measurement* | Gg or ktons/yr |
| *Scale of application* | Usually national. Local (urban) to regional (sub-national) is also relevant. However, more effort may be required to obtain robust data. |
| *Interpretation* | This indicator can be used to interpret temporal trends in air pollution emissions. In general terms, a change in emissions will lead to a change in ambient air concentrations. However, ambient air concentrations are also determined by meteorological conditions. Changes in air concentrations may lead to a change in exposures and health risk of the (urban) population. Some of the pollutants described in this indicator have long atmospheric lifetimes and may therefore be transported over long distances. There might well be a discrepancy between the temporal trends in national emissions and countrywide averaged concentrations, since transboundary fluxes can contribute significantly to air concentrations. Long-range transport over the European continent is superimposed on the impact of a national emission trend. |
| *Linkage with the other indicators* | Driving force: *Passengers transport demand by mode of transport; Freight transport by mode of transport; Road transport fuel consumption*<br>Pressure: ***Emissions of air pollutants***<br>Exposure: *Exposure to air pollutants*<br>Effect: *Years of life lost due to PM exposure* |
| *Related data, indicators* | Towards Environmental Pressure Indicators for the EU http://esl.jrc.it/envind/hm_me_en.htm<br>Environmental signals 2001: Environmental assessment report no 8 (a series of regular indicator-based reports) http://reports.eea.eu.int/signals-2001<br>EMEP/CORINAIR Atmospheric Emission Inventory Guidebook (Second edition) http://themes.eea.eu.int/toc.php/state/air?doc=39186&l=en<br>See also Core Set of Environmental Indicators http://ceroi.net/ind/matrix.asp<br>See Clear The Air web: http://www.cta.policy.net/ |

| | |
|---|---|
| *Related web sites Related web sites* | Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants – http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32001L0081&model=guichett<br>Protocol to the 1979 Convention on Long-range Transboundary Air Pollution http://www.unece.org/env/lrtap<br>EMEP home page – see http://www.emep.int/index_data.html<br>UNECE/EMEP emission database – see http://webdab.emep.int/ |
| *Policy/ regulatory context* | The European Community and all its Member States are party to the UN ECE Convention on Long-range Transboundary Air Pollution. There is an obligation for all parties to report emission data annually to the UN ECE secretariat, using the format agreed upon by the Executive Body of the Convention. Emissions of $NO_x$, $SO_2$, NMVOC and $NH_3$ have to be reported annually to the European Commission under the EU Directive on National Emission Ceilings (NECD; 2001/81/EC), using the same reporting format as the UN ECE Air Convention. |
| *Reporting obligations* | ***Practical compliance*** All MS are requested to provide the relevant emission data annually to the European Commission (SO2, NOx, NH3 and NMVOC) and to the CLRTAP.<br>***Descriptions of policy measures*** The NEC directive sets national emission ceilings for $SO_2$, $NO_x$, VOC and $NH_3$ to be attained by 2010. Member States have to draw up, implement and revise programmes to achieve the emission ceilings set in the NECD. These programmes have to be reported to the Commission at fixed dates.<br>***Policy effects and effectiveness*** The Commission publishes reports in 2004 and 2008 to the European Parliament and the Council on progress on the implementation and on how far the emission reductions will be met. |

| Air_Ex1 Exposure to air pollutants | DPSEEA |
|---|---|
| *Issue* | Air Quality |
| *Definition of indicator* | Pollutants and averaging period:<br>**AIR_EX1_PM10**: population-weighted annual mean PM10 concentration<br>**AIR_EX1_PM2.5**: population-weighted annual mean PM2.5 concentration<br>**AIR_EX1_O3**: population-weighted annual mean (of max. daily 8h means) ozone concentration<br>**AIR_EX1_NO2**: Population distribution of exceedance hours of AQ limit values for NO2 in urban areas (EEA AP13)<br>**AIR_EX1_SO2**: Population distribution of exceedance days of AQ limit values for SO2 in urban areas (EEA AP11) |
| *Underlying definitions and concepts* | The ambient concentrations of four selected pollutants ($NO_2$, $SO_2$, $O_3$ and PM) should provide a good picture of air quality and related risk to health. Each sub-indicator is based on the assumption that an increase of the incidence of health outcomes in a given population is proportional to the exposure to the pollutant. To limit the need for additional calculations and considering the highest health relevance of PM and ozone exposures, population-weighted mean concentration is calculated for PM10, PM2.5 and ozone. For SO2 and NO2, the compliance indicators collected by EEA are adopted.<br><br>Underlying definitions are:<br>**Mean annual concentration**: mean concentration of the pollutant of concern, averaged over all measurements conducted in the year. Data coverage should be at least 75% distributed throughout all seasons.<br>**Population weighting**: based on measurements at city **background** monitoring sites or other assessment techniques the pollution concentration is estimated for a certain area A. The number of people living in this area is the required and is, ideally, based on the actual number of people living there. If this number is not available (e.g. due to insufficient spatial resolution in the population data), the fraction of the urban built-up area in the area A is taken as the estimate of the fraction of the population in a city living in area A. The exposure of rural population may also be estimated using rural monitoring sites or modeling.<br>**Urban (cities) area:** The built-up area of a municipality. There is no international agreement on the minimum size required. In international studies urban areas with a population above 100.000 inhabitants are usually included, sometimes extended with a representative sample of urban areas with 20.000 to 100.000 inhabitants.<br>The same approach can be used to estimate the ambient air pollutant exposure of rural population using rural monitoring sites or modeling |
| *Specification of data needed* | Annual mean concentration for $PM_{10}$ and PM2.5, $NO_2$ and $SO_2$ as well as mean of max. daily 8h O3 concentrations measured in a background location and reflecting exposure of the considered population over the calendar year.<br>Number of residents of an urban and rural area for which the aforementioned estimate of air pollution concentration is relevant<br>Total population in urban/rural area/city. |
| *Data sources, availability and quality* | Data on ambient air pollution concentrations can be obtained from national or local monitoring networks, using preferably data from fixed-site monitoring station.<br>The number of people living in a certain urban area/city/agglomeration is usually available at a local/regional/national level. |

| | |
|---|---|
| *Computation* | For a given population, the exposure to an ambient air pollutant ***y*** (PM or ozone) is calculated as the annual mean concentration measured in the area relevant for that population.<br>For larger population at regional or national scales, the indicator can be presented as population distribution over a few categories of annual average pollutant levels.<br>For the purposes of health-relevant assessment at larger (big cities, regional, and national scales) the indicator is calculated using the population-weighting as:<br>$Exp_y = SUM \{( P_i/P ) * C_{yi}\}$, where:<br>$C_{yi}$ = annual concentration of pollutant ***y*** in sub-population ***i,***<br>$P = SUM ( P_i )$ – total population in urban/rural area/region/country<br><br>For NO2: proportion of population with 0, 1–18, 19–36, >36 hours with hourly mean over 200 ug/m3: AQ limit values in urban areas (same as EEA AP13).<br>For SO2, proportion of population with 0, 1–3, 4–9, >9 days with daily mean over 125 ug/m3: AQ limit values in urban areas (same as EEA AP11). |
| *Units of measurement* | For PM and O3: ug/m3. For NO2 and SO2: proportion (0–1) |
| *Scale of application* | Local/regional/national |
| *Interpretation* | There are a number of other indicators, which could be used to assess exposure; the selection was driven by the later usefulness for any assessment of health impacts. For NO2 and SO2, indicators are based on exceedance statistics of current air quality limit values in EU. For particulate matters and ozone, which do not have a no-effect threshold, population-weighted annual average concentrations provide comprehensive information needed for health impact assessments.<br>Assessments using the data on ambient air pollution concentrations from fixed-site monitoring stations provide conservative estimates of population exposure and related health impacts. |
| *Linkage with the other indicators* | Driving force: *Passengers transport demand per mode of transport; Freight transport demand by mode of transport; Road transport fuel consumption*<br>Pressure: *Emissions of air pollutants*<br>Exposure: ***Exposure to air pollutants***<br>Effect: *Years of Life Lost due to PM exposure* |
| *Related data, indicators* | n.a. |
| *Related web sites* | http://eea.eu.int; EIONET; AirBase http://etc-acc.eionet.eu.int/databases/airbase.html; AIRVIEW |
| *Policy/regulatory context* | The Air Quality Framework Directive (AQ FWD; 96/62/EC) requests EC Member States to assess air quality throughout their territory. All the pollutant for which indicators have been proposed are covered by daughter legislation to the AQ FWD.<br>The first Daughter Directive for sulphur dioxide, oxides of nitrogen, particulate matter and lead in ambient air (Council Directive 1999/30/EC) sets limit values for the protection of human health for the following pollutants: $NO_2$, $SO_2$, $PM_{10}$ and lead. In addition, there is the obligation to monitor $PM_{2.5}$<br>The Ozone Daughter Directive 2002/3/EC sets the target value, long-term objectives, an information and an alert threshold.<br>EC regulations regarding TSP and Black smoke is being phased out. |

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| *Reporting obligations* | EC air quality legislation contains comprehensive requirements. This includes information on the measured air quality data (raw data), results of air quality assessment (focusing on air quality in zones in relation to the limit values specified by the Council directives) and programmes and plans to reduce air pollution.<br>Practical compliance: number of days of exceedance of target values<br>Data on the state-of-the-environment: The Council Decision of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States (Exchange of Information, EoI, 1997/101/EC) requests Member States to report ambient air quality raw data and meta data annually to the European Commission. |

References

Council Directive 96/62/EC on Air Quality Assessment and Management.

Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air – see http://europa.eu.int/eur-lex/pri/en/oj/dat/1999/l_163/l_16319990629en00410060.pdf.

Directive 2002/3/EC of the European Parliament and of the Council of 12 February 2002 relating to ozone in ambient air – see http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_067/l_06720020309en00140030.pdf.

The Council Decision of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States is found at http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31997D0101&model=guichett.

EEA fact sheets on exposure of population to exceedances of EU air quality standards are available at http://themes.eea.eu.int/Sectors_and_activities/transport/indicators/consequences/air_quality/tab_factsheets_ILR.

| Air_A1 Policies to reduce environmental tobacco smoke exposure | DPSEE**A** |
|---|---|
| *Issue* | Indoor air, built-in environment |
| *Definition of indicator* | Composite index of capability for implementing policies to reduce environmental tobacco smoke exposure and promoting smoke free areas |
| *Underlying definitions and concepts* | The existence, implementation and enforcement of instruments and measures to prohibit smoking in indoor environment (facility, room, etc.)<br>The existence of instruments to restrict smoking in designated areas with separate exhaust ventilation |
| *Specification of data needed* | Evidence of existence and enforcement of regulations to reduce ETS exposure |
| *Data sources, availability and quality* | Information on the existence and scope of the legislation and abided by population |
| *Computation* | The index is computed as a sum of 10 subset variables<br>*SUM* (Ci)<br>where Ci is the score for component i.<br><br>For each component the following scoring is accepted:<br>0 – Not existing, not clearly stated<br>1 – Clearly stated, partly (not) implemented or enforced<br>2 – Clearly stated and obeyed, implemented and enforced<br><br>The full list of components (Ci) is as follows:<br><br>1. Smoking prohibited/restricted in schools<br>2. Smoking prohibited/restricted in day-care centres<br>3. Smoking prohibited/restricted in governmental offices and other public buildings<br>4. Smoking prohibited/restricted in public traffic vehicles in urban areas<br>5. Smoking prohibited/restricted in public traffic vehicles – long distance<br>6. Smoking prohibited/restricted in hospitals<br>7. Smoking prohibited/restricted in work places<br>8. Smoking prohibited/restricted in cinemas, theatres, museums etc<br>9. Smoking prohibited/restricted in bars, restaurants<br>10. Advertisement of cigarettes prohibited |
| *Units of measurement* | Ordinal score (0–20) |
| *Scale of application* | Regional, national to international |
| *Interpretation* | This indicator provides a general measure of the capability to implement policies for reducing environmental tobacco smoke exposure and promoting smoke free areas: an increase in the score should be taken as a broad indication of increased capability, a reduction the reverse. Like all compound indicators, however, this one needs to be interpreted with care for the final score is the sum of many different components: areas with the same indicator score, therefore, do not necessarily have the same capability profile. It is equally important to examine the indicator components before drawing conclusions. |
| *Linkage with the other indicators* | Action: ***Policies to reduce environmental tobacco smoke exposure*** |

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| *Related data, indicator, web sites* | International data available in WHO Tobacco control database http://cisid.who.dk/tobacco/<br>US EPA Indoor Environments Division. Introduction to IAQ: http://www.epa.gov/iaq/ia-intro.html.<br>US EPA Second Hand Smoke (SHS) also known as: Environmental Tobacco Smoke (ETS) http://www.epa.gov/iaq/ets/index.html<br>See WHO Publication E70610 Policies to reduce exposure to environmental tobacco smoke: report on a WHO working group meeting, Lisbon, Portugal 29–30 May 2000 http://www.who.dk/document/e70610.pdf |
| *Policy/ regulatory context* | Council Recommendation (2003/54/EC) of 2 December 2002 on the prevention of smoking and on initiatives to improve tobacco control recommends Member States to implement legislation and/or other effective measures to limit exposure to environmental tobacco smoke at http://europa.eu.int/eur-lex/en/dat/2003/l_022/l_02220030125en00310034.pdf. |
| *Reporting obligations* | The Recommendation contains no obligations for Member States reporting. However, it invites the Commission to monitor and assess the developments and measures undertaken in the Member States and at Community level. |

| Noise_Ex1 Population exposed to various noise level ranges per source | DPSEEA |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | This indicator is in line with the requirements of the European directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002.<br>Estimated population living in dwellings that are exposed to the noise ranges of values from different sources of environmental noise in urban areas and along major transport infrastructures<br>Taking into consideration the existing situation on European countries regarding data collection and the diversity of methodologies and models, the data needed for computing this indicator can be derived from any of the models existing in countries. In addition if a country has only the exposure for cut-off points (e.g. high noise levels) they should report these data and explain this in a special note. When models are used to provide the data, the model assumptions and calculation method should described in detail. After the full implementation of the directive (2008) the data will have to follow the EC assessment methods. |
| *Underlying definitions and concepts* | This indicator is a basic one for noise and health, it allows assessing exposure and has a direct connection with the other indicators.<br>The ranges of values are the ones from the European Directive (2002/49/EC of 29 June 2002) as well as the noise sources (road traffic, Air traffic, Railway traffic and Industry). |
| *Specification of data needed* | Estimation on the number of people exposed to the following ranges of values of $L_{den}$ in dB 4 m above the ground on the most exposed façade:<br>**$L_{den}$**<br>55–59, of $L_{den}$ in dB; 60–64, of $L_{den}$ in dB;65–69, of $L_{den}$ in dB<br>70–74, of $L_{den}$ in dB; > 75 of $L_{den}$ in dB<br>Separately for road, rail and air traffic, and industrial sources.<br>**$L_{night}$**<br>50–54, 55–59, 60–64, 65–69, > 70,<br>Separately for road, rail and air traffic, and for industrial sources. |
| *Data sources, availability and quality* | Noise mapping; acoustical surveys; estimation models<br>Sound characterization near airports.<br>Characterization and monitoring of the noise emission along roadways and railways. |
| *Computation* | When possible the methodology of the Directive 2002/49/Ec should be followed, if not the country could use their models to estimate exposure and report on the methodology. After 2008 all countries should use the methodology of the Directive. |
| *Units of measurement* | Number of people exposed, and percentage of a given population exposed |
| *Scale of application* | National as well as local – residential settings |
| *Interpretation* | This indicator is the basis for the calculation of the total health effects as it provides data on exposure. It is the rough "portrait" of the noise situation on a country. |
| *Related web sites* | Noise DG environment policy: http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit: www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |
| *Policy/regulatory context* | European directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 |
| *Reporting obligations* | Practical compliance: MS report on the implementation of limit values of Lden and Lnight for some sources of noise.<br>MS inform regularly the EC of major roads, railways, airports and agglomerations with more than 250,000 inhabitants<br>Environmental data: noise maps to assess the number of people annoyed and sleep disturbed throughout Europe. MS apply Lden and Lnight. |

| Noise_A1 Policies to reduce exposure to leisure sounds | DPSEE**A** |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Composite index of ability to implement regulations, restrictions and noise abatement measures in leisure activities that involve high music levels for indoor and outdoor leisure events. |
| *Underlying definitions and concepts* | The existence, implementation and enforcement of regulatory instruments to control the exposure in leisure activities. Tinnitus and premature hearing impairment are increasing strongly among young people; this indicator reflects the concern of a given country to protect its population from high leisure sounds. |
| *Specification of data needed* | Evidence of existence and enforcement of regulations to regulate the music levels and insulation.<br>Evidence of the appliance (control) of this regulations |
| *Data sources, availability and quality* | Information on the existence and scope of the legislation and efficiency.<br>This indicator should report on the existence of national laws and regulations (e.g laws that oblige municipalities to control the sound levels of leisure events). In the case of countries with complex political organization the type of regulation should be specified (regional, municipal) and the organizational differences discriminated (e.g. only 30% of the country is covered, etc) |
| *Computation* | The index is computed as a sum of the following 6 variables (for indoor and for outdoor separated)<br>*SUM* (Ci)<br>Where:<br>i is the legislation<br>and Ci is the score for component i<br>For each component Ci the following scoring is accepted:<br>0 – Not existing, not clearly stated<br>1 – Clearly stated, partly (not) implemented or enforced;<br>2 – Clearly stated and obeyed, implemented and enforced<br><br>The full list of components (Ci) for indoors is as follows:<br>1. Legislation for maximum sound levels in discothèques, bars and other similar settlements<br>2. Building regulations for acoustical insulation of discothèques, bars and other similar settlements<br>3.Regulations for music appliances (walkmans, Discmans,. .) and computer games<br><br>and for outdoor:<br>4. Legislation for open-air events, fairs markets and similar<br>5.Regulations for music concerts<br>6. Local authorities required to deal with noise complaints |
| *Units of measurement* | Ordinal score (0 – 6) for outdoor and ordinal score (0 – 6) for indoor |
| *Scale of application* | National to international |
| *Interpretation* | This indicator provides a general measure of the ability to implement policies for reducing the exposure to leisure noise: an increase in the score should be taken as a broad indication of increased ability, a reduction the reverse. Like all compound indicators, however, this one needs to be interpreted with care for the final score is the sum of many different components: areas with the same indicator score, therefore, do not necessarily have the same capability profile. It is equally important to examine the components of the indicator and handle appropriately the lack of data before drawing conclusions. |
| *Related web sites* | Noise DG environment policy: http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit: www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |

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| *Policy/regulatory context* | This indicator is strongly linked with a country's legal organization. Its calculation should however translate the country efforts to deal with the problem deriving from exposure to high sound levels. If necessary, and considered meaningful, a local expert knowledge and opinion of the country's legislation and compliance can be used; All the different criteria and suppositions should be mentioned in the comments of the calculation sheet. |
| *Reporting obligations* | None |

| Hous_P1 Affordability | DP**S**EEA |
|---|---|
| *Issue* | Housing and Settlements – Use and Economy |
| *Definition of indicator* | Affordability – Percentage of population facing financial problems with the housing expenditures as % of disposable income spent on housing costs, broken down into population groups and focusing on the group that is defined as in risk of poverty. |
| *Underlying definitions and concepts* | The indicator deals with the general affordability of housing and heating. It is based on the Eurostat definition of the standard risk-of-poverty threshold (60% of the national median income) and identifies the degree of financial problems such households face for their housing supply.<br>This indicator does not look into the variation between owned and rented housing, which may differ extremely within countries, regions and cities. Countries are encouraged to look into national and regional distributions in detail.<br>The indicator requires the ability to document percentiles of the population living below the defined risk-of-poverty level. |
| *Potential health effect* | Households living below the risk-of-poverty level will normally have to accept dwellings in the poorest parts of the housing stock. Within this stock will normally be found a combination of all the potential exposures and effects of inadequate housing conditions. There will also be a detrimental effect on the mental well-being of such households, both because of being unable to afford decent housing and their lack of control over their housing conditions. |
| *Vulnerable groups* | The most vulnerable groups covered by this indicator are young children, women and the elderly. |
| *Specification of data needed* | National risk-of-poverty level based on disposable income data (RP)<br>Household disposable income (DI)<br>Total housing costs (HC) |
| *Data sources and availability* | Required data should be available within all countries in the framework of the national data collection for the SILC (EU Community Statistics on Income and Living Conditions)<br>- DI: SILC variable HY020<br>- RP: derived from SILC variable HY020 based on the 60% of the median income – threshold<br>- HC: SILC variable HH070 |
| *Computation* | The indicator is computed as follows:<br>Step 1: select households with an income lower than the defined risk-of-poverty threshold<br>Step 2: relate the total housing costs (HC) to the disposable household income (DI) to get the percentage paid for housing (if not already computed)<br><br>Results are to be provided on three levels to identify the distribution of financial burden of housing cost for the less affluent population groups:<br><br>1) Affordability A = Ratio of persons below risk-of-poverty income level paying more than 35% of their disposable household income on the total housing costs<br>2) Affordability B = Ratio of persons below risk-of-poverty income level paying more than 50% of their disposable household income on the total housing costs<br>3) Affordability C = Ratio of persons below risk-of-poverty income level paying more than 65% of their disposable household income on the total housing costs |
| *Units of measurement* | 1) Ratio in percent<br>2) Ratio in percent<br>3) Ratio in percent |
| *Relationship to other Indicators* | The affordability indicator provides a pressure indicator partially explaining the exposure to harmful housing exposures and conditions. It identifies the socio-economic causality to be exposed to the conditions of other housing indicators. |
| *Scale for application* | Local, Regional, National |

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| *Interpretation* | Affordability conditions show the percentage of persons or households that cannot easily cover the cost of housing based on their income. It is expected that especially for the less affluent population group, housing costs may require substantial parts of the household budget.<br>As the percentages are based on the households at risk of poverty, a comparison with the percentage for all households will show the degree of disadvantage for the poor population groups.<br><br>This indicator is not global, but must be considered nationally specific. As it reflects socio-economic conditions in each country at a given point in time, it should be generally applicable. |
| *Linkage with other indicators in the set* | Crowding<br>Dampness and Mould<br>Housing hygiene<br>Home accidents |
| *Related indicator sets* | Water and sanitation<br>Air quality |
| *Policy/regulatory context* | Improving the affordability of housing in general to reduce selection mechanisms<br>Introducing targeted programs to supply social housing to low-income households.<br>Introduce targeted economic support and financial subsidies to improve the competitiveness of low-income households in the housing market. |
| *Reporting obligations* | All necessary data elements for this indicator have to be reported to the European Commission<br>(Commission Regulation No 1983/2003) |

| Hous_Ex1 Crowding | DPSEEA |
|---|---|
| *Issue* | Housing and Settlements – Use and Economy |
| *Definition of indicator* | Crowding – Proportion of households living in crowded housing conditions |
| *Underlying definitions and concepts* | Crowding has two dimensions:<br>objective measurement (floor area or number of inhabitable rooms available per person);<br>subjective perception and awareness of sufficient or insufficient space for daily living.<br>The objective assessment of density does not necessarily reflect the subjective perception of crowding, which is influenced by variety of factors including culture.<br>It is furthermore necessary to distinguish between voluntary and forced coexistence.<br>This indicator uses the Eurostat definition of overcrowding as more than one person per room, and the definition of risk of poverty (less than 60% of the national median income) to identify the crowding prevalence for the less affluent population groups. |
| *Potential health effect* | Dwellings should have sufficient space for the number of occupants. That space should be divided into rooms to give adequate space for sleeping, space for living and dining (opportunities for family life) and space for privacy.<br>Crowded housing conditions pose a threat to the mental well-being of an individual, and reduce opportunities of his/her healthy development (social decline of families, alcoholism, drug addictions, growth of criminality)<br>Crowding creates conditions for the emergence of population groups at risk, resulting in adverse social, health and economic consequences.<br>Perception of crowding will result in stress and dissatisfaction.<br>Crowding in living areas allows the rapid spread of infectious diseases, and increases the likelihood of accidental injuries within dwellings. |
| *Vulnerable groups* | Households in disadvantaged social groups, and those on low income (including the unemployed).<br>Multi-generation and multi-member families including children and elderly. |
| *Specification of data needed* | Data needed:<br>1) Crowding<br>Household size (number of household members)<br>to be linked with the number of rooms in the dwelling<br>alternatively: Eurostat data on crowding<br>2) Households in total<br>3) Households at risk of poverty (based on the disposable household income and the identification of households with less than 60% of the median income) |
| *Data sources, availability and quality* | Country statistical information<br>Census and national surveys<br>Eurostat data (European Community Household Panel – ECHP and Community Statistics on Income and Living Conditions – SILC) |

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| *Computation* | The indicator can be computed as:<br>1) GC (General crowding) = Share of persons living in crowded conditions within the country<br>(H1/H2) * 100<br>H1 = number of persons that live in crowded conditions (more than one person per room)<br>H2 = total number of residents<br>Alternatively, the information on general crowding can be drawn from Eurostat (SILC data).<br><br>2) PC (Poverty-related crowding) = Share of persons below the risk-of-poverty threshold of 60% national median income living in crowded conditions (more than one person per room)<br>(H3/H4) * 100<br>H3 = number of persons at risk of poverty that live in crowded conditions<br>H4 = total number of residents at risk of poverty<br>Alternatively, the information on poverty-related crowding can be drawn from Eurostat (SILC data).<br><br>NB – the national definitions of "room" that have been considered should be quoted with the indicator results in case the data is not taken from Eurostat sources.<br>It is important that the indicator is computed on individual household- and dwelling-basis, and then aggregated to national level. Using national average values of rooms per dwelling and average household size will not make it possible to identify the problem of housing shortage and crowding for the disadvantaged part of the population. |
| *Units, measurement* | Percentages |
| *Scale for application* | National and local |
| *Interpretation* | General crowding:<br>This variable indicates if the housing stock of a country provides enough rooms for all households/citizens in relation to the size of the household. Increased percentages of crowding indicate that the housing stock is either not matching the needs of the population, or that the distribution of small and large dwellings is not related to household size.<br>Poverty-related crowding:<br>This variable indicates the degree to which the less affluent part of the population is affected by crowding. It indicates the potential influence of socio-economic mechanisms. A comparison of the general and the poverty-related crowding shows the degree of disadvantage faced by the less affluent population groups. |
| *Linkage with other indicators in the set* | Household hygiene<br>Housing safety and accidents<br>Affordability |
| *Related indicator sets* | UN Economic and Social Council – Economic Commission for Europe<br>Committee on Human Settlements (Building regulations in ECE countries)<br>UN Urban Observatory |
| *Policy/regulatory context* | It is important to identify why crowding has occurred:<br>Lack of appropriate (size, quality, price) dwellings (question of planning and urban planning regulations for construction and renovation of housing fund on the municipal level)<br>Lack of financial resources to procure the housing of adequate quality by households and individuals (question of social exclusion and regulations for social assistance and housing allowances)<br>Long-term planning of appropriate solutions to prevent health complications through housing and to improve social cohesion and regional development (considering national conditions and policies) can include; definition for the lowest living area standard for social housing in European countries, and development of an effective support system through housing allowances for larger households |
| *Reporting obligations* | All necessary data elements for this indicator have to be reported to the European Commission (Commission Regulation No 1983/2003) |

| Hous_Ex3 Dampness and mould growth | DPSEEA |
|---|---|
| *Issue* | Housing and Settlements – Indoor comfort |
| *Definition of indicator* | Dampness and mould growth – Percentage of the population living in housing suffering from dampness. Exposure to high levels of relative humidity and mould spores are known threats to health and reduce the quality and adequacy of the dwelling.<br>The indicator uses the Eurostat SILC data (variable HH040) on dampness-related problems such as (a) leaking roof, (b) damp walls/floors/foundations and (c) rot in window frames or floor; all of which could lead to or represent mould growth. |
| *Underlying definitions and concepts* | Some dampness will not necessarily be a threat to health. It may be small scale, intermittent in nature, or located in a part of the dwelling that will not unduly affect the occupants (ie not a living room or occupied bedroom).<br><br>The cause of the dampness within the housing context could be:<br>Moisture penetration due to inadequate design, construction and or maintenance of the housing, or<br>Moisture rising through floors and/or walls because of a lack of or defects to damp proof courses or membranes, or<br>Condensation due to poor housing design, construction, insulation or ventilation, or.<br>Condensation due to overcrowding or heavy household use of the dwelling – such as washing/airing clothes without opening windows. |
| *Health effects* | The health effects of serious dampness include:<br>• Increased humidity, which encourages the growth of mould and the production of fungal spores, and household dust mites – both known respiratory allergens.<br>• An inability to keep clothing and soft furnishings dry, which can lead to discomfort, skin conditions, and hypothermia in extreme cases.<br>• Dampness and mould growth affect the social and mental well-being. Occupants suffer stress and depression and become ashamed and reluctant to allow visitors into their home.<br>Dampness has also been linked with nausea and vomiting and general ill-health, as well as respiratory conditions. |
| *Vulnerable groups* | Respiratory conditions occur especially in children and elderly residents.<br>Specific risk may exist for allergic people being more vulnerable for specific allergens and fungal spores |
| *Specification of data needed* | Total number of dwellings or persons in housing stock<br>Number of dwellings suffering from dampness problems, or persons living in dwellings affected by dampness problems<br>If available from national sources:<br>Number of occupied dwellings suffering from mould growth, or persons living in dwellings affected by mould growth |
| *Data sources, availability and quality* | Housing surveys will be the most reliable source of data on the number of affected<br>Household interview surveys (particularly those that include photographs of damp/mould affected areas), can be used to produce estimates of the number of dwellings/people affected by mouldy dwellings.<br>Censuses will provide information on total population and total housing stock.<br>Specifically, the data on dampness problems can be taken from the Eurostat SILC data, variable HH040 |

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| *Computation* | The indicator can be computed on dwelling or person level:<br><br>1) Persons affected<br>100 * (R/P)<br>where R is the number of residents living in dwellings with dampness problems and P is the total residential population.<br><br>2) Dwellings affected<br>100 * (D/H)<br>where D is the number of damp dwellings and H is the total number of dwellings in the housing stock.<br><br>NB: the computation can be done with “mouldy housing” instead of “damp housing” in case valid national data is available for the occurrence of mould growth as a consequence of dampness.<br>In such cases, the national definition of “mouldy housing” should be quoted with the Indicator. |
| *Units of measurement* | Percentage |
| *Scale of application* | Ideally, the information should come from sample national surveys. However, it is equally applicable at local level, and rough estimates at national level might be produced by extrapolating trends from available local or regional data. |
| *Interpretation* | Increasing percentage values indicate an increasing problem of dampness and an increasing vulnerability of housing for degradation trends. Based on scientific evidence it must be followed that the increased exposure also leads to increased health effects.<br>The assumption of health effects is even stronger in case the indicator is calculated based on mould data instead of dampness problem data.<br><br>A dwelling that is damp is not only proven to have an effect on the health of the occupants, it is an indication of the quality and condition of the housing. Work to rectify problems in dampness will have the benefit of improving the health of the household and reducing the deterioration to the housing stock. Thus work should be undertaken urgently to rectify problems identified. |
| *Linkage with other indicators in the set* | Extremes of Indoor Air Temperature – A cold dwelling which is also damp, will increase the likelihood of discomfort, skin conditions, and hypothermia in extreme cases. A hot dwelling which is also damp, will increase the level of humidity, condensation and mould/mite reproduction.<br>Household Hygiene – A damp dwelling will be hard to keep hygienic.<br>Housing Safety and Accidents – Damp floors can lead to accidents, while dampness may increase electrical shorting with resulting fire safety hazards.<br>Crowding – Overcrowding leads to moisture production, condensation and resulting mould growth. Also, there will be no opportunity for household members to avoid damp rooms. |
| *Related indicator sets* | UN Human Settlements Programme: list of key urban indicators and database.<br>UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America 1998. |
| *Policy/ regulatory context* | Rehabilitation – improvement works.<br>Intervention – action to require remedial works.<br>Subsidy – grants/loans to fund remedial action> financial subsidies to occupiers towards cost of heating.<br>Regulation to control standards for new housing construction.<br>Future surveys will identify whether there has been an improvement in the percentage/number of dwellings affected by dampness. From this it should be able to estimate the health gains and the reduction in deterioration to the housing fabric. |
| *Reporting obligations* | All necessary data elements on dampness problems have to be reported to the European Commission<br>(Commission Regulation No 1983/2003) |

| Hous_Ex4 Household hygiene | DPSEEA |
|---|---|
| *Issue* | Housing and Settlements – Indoor comfort |
| *Definition of indicator* | Household hygiene – Percentage of the population living in housing with missing hygienic amenities. The indicator is broken down into population groups in relation to the household income and the risk of poverty threshold. |
| *Underlying definitions and concepts* | The indicator requires the identification of the number of households/persons living in housing which lacks one or more of the hygienic amenities.<br>The hygiene amenities include, within the dwelling and for the exclusive use of the household –<br>(a) a supply of water to the household<br>(b) a toilet<br>(c) a shower or bath<br>The applied risk of poverty-threshold is based on the data provided by Eurostat (defined as up to 60% of the national median income) |
| *Specification of data needed* | Number of dwellings/persons with lacking hygiene amenities:<br>- supply of water to the household<br>- toilet<br>- shower or bath<br>National risk of poverty-threshold<br>Total number of dwellings<br>Total residential population |
| *Data sources, availability and quality* | Data on the number of dwellings not connected to public water supply systems should be available in each country from national census and water & sanitation databases.<br>Data on the total residential population and the number of dwellings should be available from national censuses and should be reliable.<br>This indicator is based on the Eurostat SILC data and integrates the two variables HH080 (bath or shower in dwelling) and HH090 (indoor flush toilet for sole use of household). The population group affected by the national risk of poverty threshold is defined by the variable HY020. |

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| *Computation* | The indicator looks at the general provision of hygiene amenities, identifying dwellings not being equipped adequately.<br><br>General lack of household hygiene equipment<br>LS (Lack of sanitation):<br>Percentage of dwellings/persons without supply of water to the household<br>LT (Lack of toilet):<br>Percentage of dwellings/persons without indoor flush toilet for sole use of the household<br>LSB (Lack of shower/bath):<br>Percentage of dwellings/persons without a shower or bath in dwelling<br><br>Poverty-related lack of household hygiene equipment<br>For this computation, only households/persons with an income lower than the national risk of poverty-threshold are to be used.<br><br>PLS (Poverty-related lack of sanitation):<br>Percentage of households/persons below the threshold without supply of water to the household<br>PLT (Poverty-related lack of toilet):<br>Percentage of households/persons below the threshold without indoor flush toilet for sole use of the household<br>PLSB (Poverty-related lack of shower/bath):<br>Percentage of households/persons below the threshold without a shower or bath in dwelling<br>NB – If national data exists, the indicator can be extended with similar computations for the following amenities:<br>- cooking facilities<br>- food storage/fridge |
| *Units of measurement* | Percentage |
| *Scale of application* | Local to national and with care international |
| *Interpretation* | Increasing percentages show an increasing exposure of the population to inadequate or substandard hygiene conditions. The comparison between the general lack of hygiene equipment and the poverty-related lack of hygiene equipment gives information on the magnitude of the impact of poverty on housing and sanitation quality, and identifies the risk of inadequate sanitation for the less affluent part of the population.<br><br>It is likely that in most countries, the existing data will only cover the existence/non-existence of the listed hygiene amenities. The results will therefore be an under-estimation of the problem, as not all existing hygiene amenities will provide adequate service.<br>In case both types of data (quantitative and qualitative) are available, it is recommended for national application of the indicator that the two indicator levels are distinguished. The aggregation of both dimensions will then allow a better understanding of the respective problems and whether action is needed for installing new amenities, or renovating existing systems.<br><br>Like all general-purpose indicators, this one needs to be interpreted carefully. The driving forces, which render a housing substandard, may clearly vary as they are strongly interlinked with socio-economic factors. The definition therefore should enable flexibility for highly developed countries in setting their "reference levels" and at the same time ensuring between-country comparability |
| *Linkage with the other indicators* | Crowding<br>Affordability<br>Diarrhoeal disease in children (WatSan indicator set) |
| *Related web sites* | UN Human Settlements Programme: list of key urban indicators and database<br>http://www.unhabitat.org/guo/index1.asp<br>UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America, 1998<br>http://www.unece.org/env/hs/bulletin/cnt2_e98.htm |

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| *Policy/regulatory context* | This is a housing indicator which has wide-ranging significance for policy. In providing a measure of the condition of the housing stock, it also acts as an indicator of health risks associated with basic sanitation, poor sanitation, and access to safe water inside the dwelling.<br>Opportunities for action include:<br>Rehabilitation campaigns<br>Supporting policies with provision of subsidies or grants/loans to fund remedial action<br>Regulation to control standards for new housing construction<br>Information campaigns targeting risk groups for inadequate and substandard hygiene conditions, aiming at behaviour changes and risk awareness |

| Hous_Ex6 Crime and perception of crime | DPSEEA |
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| *Issue* | Housing and Settlements – Safety |
| *Definition of indicator* | Crime and the perception of crime – Incidences and perception of theft, robbery and vandalism in dwellings and public spaces. |
| *Underlying definitions and concepts* | This indicator is based on:<br>actual and reported crime by type;<br>crime perception and fear of crime;<br>how people react to crime and its perception.<br>Measurements incorporate both the dwelling and its residential environment.<br>All necessary data elements are contained in the ICVS (International Crime Victim Survey) but should be extended/substituted by national data when available. |
| *Potential health impact* | Potential health impacts include general dissatisfaction, stress, mental effects and behaviour changes, sleep deprivation, shock, and physical injury. There can also be increased feelings of social isolation, such as a decline in social networks and contacts and the 'shell' effect (where more time is spent inside the home and less outside it), depression and phobias. |
| *Vulnerable groups* | Risks of crime and fear of crime vary between groups and are dependent on many factors, including age and socio-economic circumstances. For example, those in poor health are most vulnerable to heightened levels of anxiety about entry by intruders. Other vulnerable groups include children, the elderly, handicapped, and people living alone (mainly in urban areas with weak neighbourhood networks and isolated rural areas). Identifying those at high risk is important as it allows for those at risk to be defined and targeted with prevention techniques. |
| *Specification of data needed* | Number of thefts in dwellings;<br>Number of crimes against people in public space (includes: theft by pull, pickpocket, robbery in the public space);<br>Number of crimes against private property in public space (includes: theft by pull, pickpocket, robbery in the public space, theft in motorized vehicle, theft of motorized vehicle or bicycle, damage against cultural patrimony, other damage, set fire to building or motorized vehicle);<br>Number of citizens reporting "fear of crime" in their neighbourhood<br>Number of dwellings with burglar alarms; number of dwellings with special door locks;<br>Total number of dwellings<br>Total number of persons |
| *Data sources, availability and quality* | National crime records/police statistics (related to events in and around the dwelling/living area)<br>National census (housing and demographic data)<br>Housing and social surveys including data on perception and fear of crime<br>Victimization inquiries<br>International Crime Victim Survey (ICVS) |
| *Computation* | Crime<br>A – 1000 * number of thefts in dwellings/total number of dwellings<br>B – 1000 * number of crimes against people in public space/total number of residents<br>C – 1000 * number of crimes against private property in public space /<br>total number of residents<br><br>Fear of crime<br>D – 100 * citizens reporting fear of crime in the immediate environment/total number of residents<br><br>Prevention action<br>E – 100 * number of dwellings with burglar alarms/total number of F– 100 * number of dwellings with special door locks/total number of dwellings |
| *Units of measurement* | Per-one thousand<br>Percentage |
| *Scale of application* | Local, national or international |

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| *Interpretation* | The number of crimes in dwellings and in public space allows the interpretation of general prevalence of crime.<br>The number of citizens reporting fear of crime in their neighbourhood allows the interpretation of people's perception of crime.<br>The number of dwellings with burglar alarms and with special door locks allows the interpretation of how people react to crime and its perception.<br>The indicator can be useful for various investigations, for example of correlations between unemployment rates and crime incidence. |
| *Related indicators sets* | Data source: International Crime Victim Survey (ICVS)<br>(http://www.unicri.it/icvs/)<br>Further information and method approaches are available at:<br>European Forum for Urban Safety (http://www.urbansecurity.org/)<br>NSCR – Netherlands Institute for the study of crime and law enforcement<br>(http://www.nscr.nl/overnscr/overviewE.htm)<br>United Nations Crime And Justice Information Network (http://www.uncjin.org/) |
| *Policy/regulatory context* | The indicator can base interventions to prevent and reduce crime and fear of crime in three main areas:<br>physical environment – orientation for urban planning and architectonic design, identification of areas that need rehabilitation (e.g., public space activities, lighting); grants/loans to fund security action;<br>social intervention – identification of areas for special social intervention regarding security or safety problem;<br>security forces – better management of police resources.<br>An improvement in these areas will have direct or indirect impact on residents' health and well-being. |
| *Reporting obligations* | None<br>Voluntary participation of all EU-15 member states for the 2004/2005 wave of the International Crime Victim Survey (ICVS) |

| Hous_E1 Mortality associated with extreme temperature | DPSEEA |
|---|---|
| *Issue* | Housing and Settlements – Indoor comfort |
| *Definition of indicator* | Temperature-associated mortality: the sum of excess deaths during periods of exposure to (a) extreme high or (b) low temperatures compared to normal (non-extreme) periods.<br>Outdoor air temperatures are used as a proxy for indoor air temperature measurements, which generally are not accessible/available. |
| *Underlying definitions and concepts* | The indicator relies on measurements of extreme high or low temperatures occurring for prolonged periods of the winter (low temperature), or the summer (high temperature) seasons. For the calculation of the winter excess deaths, the internationally used definition by the World Health Organization (WHO EH series No.16, 1985) has been applied. For the summer excess deaths, an approach was chosen reflecting the calculation method of the French Ministry of Health for identifying the health effects of the summer 2003 heat wave.<br>The indicator assumes a direct causal link between the physical standard and condition of the housing stock, and the inhabitants´ exposure to extreme indoor temperatures caused by extreme climatic conditions.<br>It further assumes a direct causal link between housing conditions and excess deaths during periods of excess climatic conditions.<br><br>The possibility of extreme indoor temperatures during periods of extreme climatic conditions may be caused by one or more of the following:<br>➢ Unsatisfactory housing conditions, e.g. low thermal insulation characteristics, lack or inadequate provision of ventilation possibilities or air conditioning, and/or lack or inadequate means for heating.<br>➢ Lack of household economic resources to compensate for extreme climatic conditions (high and low).<br>➢ Lack or breakdown of external provision of fuel or power to the dwelling, e.g. external failure in supply of central heating, or external failure in supply of electricity.<br>➢ Individual failure to utilize available means to compensate for extreme indoor temperatures, e.g. lack of knowledge, realization, or willingness.<br>Generally, short-term exposure to high/low indoor temperatures will not be prejudicial to health, even for vulnerable groups. Therefore only exposure events as long as, or longer than set by the indicator should be recorded. |

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| *Health effects* | The health effects of excess indoor temperatures are among others:<br>(a) for high temperature:<br>➢ Cardiovascular strain with increase risk of strokes and death is caused by prolonged exposure when temperatures remain above 24°C during the whole night<br>➢ Ozone concentrations tend to rise during periods of high temperature, with a consequential increase in respiratory conditions and diseases<br>➢ link with excess mortality due to mental disorders.<br>➢ Dehydration<br>➢ Vulnerable groups in the population are the elderly, people with cardiovascular problems, and the very young.<br>NB – There appears to be a delay between the onset of a heat wave and the related increases in mortality. The delay can range from 1 to 3 days depending on health effect and vulnerability.<br>(b) for low temperature:<br>➢ Temperatures between 19°C and 16°C for substantial periods of time cause only a small risk of adverse health effects.<br>➢ Below 16°C there is a serious risk to health, including increased risk of respiratory and cardiovascular conditions.<br>➢ Below 10°C there is a risk of hypothermia, especially for the elderly (65 years or older).<br>➢ Cold air streams can affect the respiratory tract and the immune system and can reduce the resistance to infections.<br>➢ Vulnerable groups in the population are the elderly, people with cardiovascular problems, and the very young.<br>NB – There appears to be a delay between the onset of a cold spell and the related increases in mortality and morbidity. For deaths from heart attacks the delay is about 2 days, about 5 days for deaths from stroke, and about 12 days for respiratory deaths. |
| *Specification of data needed* | Climate data<br>For heat: Identification of periods of two or more consecutive days when the minimum outdoor air temperature remains above 25 degrees C throughout the 24-hour period<br>For cold: no climate data required<br>Health data<br>Mortality – total death cases (if possible, separating out the periods two days from the start of a hot or cold period)<br>Mortality data is needed on monthly basis (winter excess deaths) and on daily basis (summer excess deaths) |
| *Data sources, availability and quality* | Data for relevant extreme outdoor temperatures will normally be available from national/local meteorological statistics.<br>Data on mortality should be available through national health services and the system of death certificates/coroners records. Some of the mortality data is provided to the WHO Health for All database (from the years 1998–2003) but is only available on annual basis. |

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| *Computation* | The indicator is calculated differently for (a) heat and (b) cold:<br>Heat – considering all causes of mortality:<br><br>Step 1: identification of heat waves by climate data<br>If one or more heat waves occurred:<br>Step 2: excess summer death calculation (individually for each heat wave)<br>1) Heat – absolute excess mortality<br>Absolute excess mortality (H-AEM) = Ma – Mb<br>2) Heat – relative mortality increase<br>Relative mortality increase (H-RMI) = ((Ma – Mb)/Mb) * 100<br>Where Ma is the cumulated daily mortality following the onset of the period of extreme heat with a three-day delay (i.e., if the heat wave goes from 15th to 23rd of July, mortality data from July 18th to 26th is to be used), and Mb is the average of the cumulated daily mortality calculated from the previous three years for the same time period (i.e. the average mortality from the periods July 18th to 26th from the preceding three years)<br>3) Addition of excess mortality cases for all heat waves of the calendar year<br>-----------------------------------------<br>Cold – considering all causes of mortality<br>Step 1: excess winter death calculation<br>1) Cold – absolute excess mortality<br>Absolute excess mortality (C-AEM) = Mc – Md<br>2) Cold – relative mortality increase<br>Relative mortality increase (C-RMI) = ((Mc – Md)/Md) * 100<br>Where Mc is the monthly mortality for the cold months of the year (i.e. death cases from December to March), and Md is the monthly mortality for the other months of the year (i.e. the total sum of death cases from April – July of the same year and August – November of the previous year; and divided by 2)<br>Step 2: identification of the total amount of cold waves and/or the total amount of cold wave days on the basis of the climate data |
| *Units of measurement* | AEM: Case numbers<br>RMI: Percentages |
| *Interpretation* | The absolute excess mortality cases show the absolute number of cases that can be defined as excess events due to the extreme temperature conditions, and demonstrate the absolute increase of mortality based on extreme climate conditions and consequent thermal stress inside of dwellings. It can be used for assessing the additional demand for health services within affected countries or regions. Summer excess deaths are only calculated in case heat waves can be identified, while winter excess deaths are computed in general.<br>The relative increase shows the degree of variability that can be attributed to extreme climatic conditions. With a value of 20% it can be estimated that roughly 20% more death cases have occurred within the period of extreme temperature exposure.<br>It is important for an effective interpretation to look at the climate data that has been used. As the effect of cold and heat exposure may be delayed by few days from the onset of the extreme temperature phase, it is necessary to identify whether the health effects can be linked with the extreme temperatures.<br>The relative increase and the absolute number of excess deaths should be – for national implementation of follow-up action – related to the amount of extreme climate days and the number and length of the individual cold and heat waves, which can give further information about the relationship of temperature and mortality patterns. |
| *Scale of application* | Depending on the geographical occurrence of extreme climate events, the indicator can be applied on nation, regional and local level. |
| *Linkage with other indicators in the set* | Dampness and Mould Growth – A cold dwelling may be more prone to condensation and decreased thermal insulation quality.<br>Housing Safety and Accidents – Cold can impair mobility, particularly of the elderly, and may increase the severity of the outcome of any accident.<br>Affordability – households facing severe problems to pay the housing cost are prone to reduce their expenses on heating, cooling, and general housing quality aspects, making them more vulnerable to climate events |

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| *Policy/regulatory context* | Improving insulation/technical qualities of the housing stock<br>Installing/improving facilities for indoor temperature regulation<br>Improving regularity of external supply of heating<br>Introduction of targeted economic support to enable households to consume more energy.<br>Installing national "warning systems" and action plans on informing the public about the most suitable behaviour (for cold: e.g. maximum time outdoors, clothing; for heat: e.g. physical exercise restrictions, water consumption etc. |
| *Reporting obligations* | None<br>Mortality data is collected in every country and grouped into categories according to the international classification of diseases and related health problems (ICD) |

| Traf_D1 Passenger transport demand by mode of transport | **D**PSEEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Number of passenger Km travelled per year stratified for mode of road users (car, lorries, pedestrian, motorcycle) |
| *Underlying definitions and concepts* | Number of passenger-Kilometres: total amount of passenger-Kilometres travelled by mode of road user over a time period<br>Passenger-Kilometres: a unit of measure representing the transport of one passenger over a distance of 1 Km |
| *Specification of data needed* | Number of registered vehicles, by type<br>Estimated Distance travelled by each type of vehicle<br>Estimated passenger number per vehicle<br>Total resident population |
| *Data sources, availability and quality* | Data on registered vehicles should be provided by public motor vehicle registers, for this reason, data are limited to means of transport actually included in those registers (the lack of information could regard motorcycle and moped). This data could include a significant amount of non circulating vehicles.<br>Estimated Distances travelled and passengers number should be provided by censuses data (question about this task are usually included there) and national surveys. Fuel consumption data are also a commonly used source of information even if this measure could be affected by several biases: number of persons transported by each vehicle, composition of vehicle fleet etc.<br>Data on residents are available from national census and should be reliable.<br>This indicator is collected by all the European countries. Different European Agencies (Eurostat, EEA ) report the figures. |
| *Computation* | Computation could be given in:<br>Total amount of passenger-Km<br>Passenger-Km per inhabitant by vehicle type<br>Percentage of the total number of passenger-kilometres driven by all type of vehicle |
| *Units of measurement* | Million of Passenger Km or Passenger Km /inhabitant |
| *Scale of application* | Usually national: local or regional should be preferable even if a bigger effort is required. It is usually not comparable between countries with different GDP. |
| *Interpretation* | This indicator should measure the amount of exposure to the road travelling for different categories of road users classified on the basis of means of transport used. It takes into account only powered users. Distances travelled can be very different depending on the urbanization, geographical conformation and development of road net. |
| *Linkage with other indicators* | This indicator is one of the driving force indicators regarding Air Quality (AIR_D1).<br>Driving force: ***Passenger transport demand by mode of transport***<br>Event: *Road accident rate*<br>Exposure: *Person time spent on the road*<br>Risk Factor: *Speed limit exceedances* |
| *Related data indicators* | European conference of ministry of transport, Trends in the Transport Sector West European Countries: http://www1.oecd.org/cem/stat/trends/west.htm |

| Traf_S1 Age of vehicle fleet | DP**S**EEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicator* | The average renewal of passenger cars |
| *Underlying definitions and concepts* | Vehicle fleet: number of circulating vehicles as resulted from public motor vehicle registries. |
| *Specification of data needed* | Passenger cars first registration<br>Total passenger cars |
| *Data sources, availability and quality* | Data on registered vehicle should be provided by public motor vehicle registers. The resulting vehicle fleet could include a significant proportion of non circulating-ones. Attention must be given to the problems of definitions applied differently in the countries, mainly on the distinction between a lorry and a passenger car (i.e. vans, pick ups, etc.).<br>Data on renewal rate of passenger cars are available in the European Enviromental Agency publications and are present in the EUROSTAT Database. |
| *Computation* | Numerator: passenger cars first registration<br>Denominator: total passenger cars |
| *Units of measurement* | Percentage of the total number of passenger cars at first registration |
| *Interpretation* | This indicator should measure years of usage for each passenger car and quality of car fleet, in terms of reducing the severity of injuries occurring to occupants within the passenger car. Changes in the indicator should be due to improvement in fleet composition, by replacing older vehicles with newer ones, vehicle safety and environmental conditions.<br>The average renewal rate could be weighted to the usage of the vehicle – i.e. the distances km travelled. |
| *Linkage with other indicators* | Status: ***Age of vehicle fleet***<br>Event*: Road accident*<br>Exposure: *Person time spent on the road*<br>Effect: *Injury rate due to road traffic accidents; Mortality rate due to road traffic accidents; Potential Years of Life Lost due to road traffic accidents* |
| *Related data indicators* | European Environment Agency:<br>http://themes.eea.eu.int/Sectors_and_activities/transport |

| Traf_S2 Road accident rate | DP**S**EEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Number of road accident per vehicle fleet (vehicle type) or general population |
| *Underlying definitions and concepts* | Road accident: any collision that involves at least one vehicle in motion on a road normally open to traffic, including those where a vehicle in collision with a pedestrian is involved and results in at least one injured person.<br>Vehicle fleet: number of circulating vehicles as resulted from public motor vehicle registries.<br>Total resident population stratified by gender and age. |
| *Specification of data needed* | – Number of road accident<br>– Number of vehicles by vehicle type (car, bus, lorries etc.)<br>– Total resident population |
| *Data sources, availability and quality* | Data on road accident could be obtained from police statistics, insurance company records. In most countries, the police collect road crash data only if an injury occurred. These could suffer from various limitations: variance in the quality (an accident report may not be complete until several days after the event), inadequate and incomplete recording of accident, subjectivity in the ascertainment of the injury. On the other hand data coming from insurance company are limited to accidents in which one party was insured and actually made a claim.<br>Data on registered vehicles should be provided by public motor vehicle registers; for this reason, data are limited to vehicles actually included in those registers. The resulting vehicle fleet could include a significant proportion of non circulating-ones.<br>Data on residents should be available from national census and should be reliable. Accidents of tourists could be found in the numerator of road accident rate, while in the denominator only resident population is counted.<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm |
| *Computation* | Numerator: number of road accident causing with at least one injury<br>Denominator: total resident population<br>Denominator: total amount of circulating vehicles |
| *Units of measurement* | Number of road accident for hundred thousand population<br>Number of road accident for hundred thousand vehicle |
| *Scale of application* | Usually national. Local or regional should be preferable even if more effort is required |
| *Interpretation* | Road accidents could be considered as a proxy of the health effect and an exposure by itself. It has been decided to extrapolate road accidents from the conceptual framework and to consider it a necessary event for producing health consequences<br>Data on road accidents are usually collected for law enforcement purposes. Crash data can be used to measure the effectiveness of law enforcement activities and determination of black-spot area providing at the mean time information about primary risk factors. Change on this indicator could be due to: the improvement on the safety of vehicles (in terms of reducing the severity of injuries occurring to occupants within the vehicle), decrease of accident numbers. |
| *Linkage with other indicators* | State: *Age of vehicle fleet;* ***Road accident rate****; Speed limit exceedances;*<br>Exposure: *Person time spent on the road*<br>Effect: *Injury rate due to road traffic accidents; Mortality rate due to road traffic accidents; Potential years of life lost due to road traffic accidents; DALY lost due to road traffic accident* |
| *Related data indicators* | European agency for environment:<br>http://themes.eea.eu.int/Sectors_and_activities/transport/indicators<br>For the methodological approach to road accident databases see also the final report of stairs project:<br>http://www.inrets.fr/ur/umrette/publications/stairs/finalreport.PDF |

| Traf_E1 Mortality rate due to road traffic accidents | DPSE**E**A |
|---|---|
| Issue | Transport, housing and human settlements |
| *Definition of indicator* | Mortality rate due to transport accidents |
| *Underlying definitions and concepts* | This indicator is based on the following definitions:<br>All deaths directly or indirectly attributable to involvement in a traffic accident however caused. It includes immediate and delayed deaths (within 30 days).<br>Total resident population stratified by gender and age. |
| *Specification of data needed* | – Total number of deaths due to road traffic accidents<br>– Total resident population by gender and age |
| *Data sources, availability and quality* | Data on deaths come from official statistics, death cause registries or police statistics. These data could suffer from limitation due to death cause definitions (reference may be made only to the nature of the injury causing death not its source) and to lack ness of a commonly agreed definition of person killed in a traffic accident.<br>Data on residents should be available from national censuses and should be reliable. Deaths of tourist could be find in the numerator of the mortality rate, while in the denominator only resident population is counted.<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm |
| *Computation* | Numerator: deaths stratified by: age, gender, mode of road user (pedestrians, cyclists, motorcyclist, car or taxi, lorry)<br>Denominator: total resident population stratified by sex and age (some age class need to be focussed: 0–14; 14–17; 18–25; 26–50; 51–65; >65) |
| *Units of measurement* | Number of deaths for hundred thousand population |
| *Scale of application* | Local to international. Problems of consistency and availability may limit interpretation at broader scales |
| Interpretation | This indicator is general relatively easy to interpret in that the link between the cause and health effect is explicit. Changes in the indicator should be due to reduction in total traffic volume, greater segregation of pedestrian from road traffic accident, improvement in: road design, traffic management, vehicle safety, environmental conditions. It could be better considering in the interpretation three years mortality rate, which are more stable, since this indicator could regard countries of different population density, furthermore ten years trend could be used to observe changing in mortality especially for children |
| *Linkage with other indicators* | State*: Road accident*<br>Exposure: *Person time spent on the road; Distances travelled*<br>Effect: ***Mortality rate due to road traffic accidents;*** *Injury rate; Potential years of life lost; Number of DALY lost due to road accident*<br>Risk Factor: *Percentage of safety vehicle ( car/motorcycle) device use; Percentage of vehicles exceeding limits; Deaths due to drunk driving* |
| *Related data indicators* | The Euphin-East database: www.euphin.dk/Phfa.asp<br>Health for all database: www.who.dk/hfadb<br>OECD Road transport and research programme: The International Transport research database: http://www.bast.de/htdocs/fachthemen/irtad/<br>CARE: community road accident databases:<br>http://www.europa.eu.int/comm/transport/home/care/index_en.htm<br>European conference of ministry of transport:<br>http://www1.oecd.org/cem/stat/accidents/index.htm |

| Traf_E3 Injury rate due to road traffic accidents | DPSEEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Injury rate due to transport accidents |
| *Underlying definitions and concepts* | This indicator is based on the following definitions<br>Injury due to road traffic accidents: All injuries directly or indirectly attributable to involvement in a traffic accident however caused. This includes minor accident (as sprains and bruises) and serious accident. Injury could be defined as: disruption of the structure or function of the human organism resulting from exposure to excessive or deficient energy. Typically, both the exposure to energy and the onset of disruption are acute, often the energy is kinetic, but it may be another type (thermal, chemical etc.). Severity of injury can be defined in terms of threat to life, immediate effects (e.g. loss of consciousness, compound fracture, multiple injuries); time to recover, the outcome of patient (e.g. death, permanent disability or disfigurement); quality of life; resources required for treatment (e.g. surgery, invasive diagnostic tests); cost (medical or other costs)<br>Total resident population stratified by gender and age. |
| *Specification of data needed* | Total number of injury due to road traffic accidents<br>Total resident population by gender and age |
| *Data sources, availability and quality* | Data on injuries should be available at national level from death certificate, hospital based surveillance systems, police statistics and at local level from population based-surveys, trauma registries and registries of medical care facilities. Data on injuries should be based only on health systems databases since police records are often limited from a underreporting of total number of cases and in particular of the mild ones. However, the health care systems of different countries deal with the injured in different ways, especially the mild ones (in emergency departments in some countries, by general practitioners in others and so on). This could affect the computation of injury indicators.<br>Data on residents should be available from national censuses and should be reliable validity of this kind of data. Injuries of tourist could be find in the numerator of the injury rate, while in the denominator only resident population is counted<br>This indicator is computed by almost all the member states and an European overview is available in the CARE (Community Road Accident Database):<br>http://europa.eu.int/comm/transport/care/index_en.htm |
| *Computation* | Injury rate<br>Numerator: injuries stratified for: mode of road user (pedestrians, cyclists, motorcyclist, car or taxi, lorry) and severity<br>Denominator: total resident population stratified by gender and age |
| *Units of measurement* | Number of injuries per hundred thousand population |
| *Scale of application* | From national to very local because of the high incidence. Attention must be paid to compare different countries |
| *Interpretation* | Injury rate: this indicator is relatively easy to interpret in that the link between the cause and health effect is explicit. Changes in the indicator should be due to reduction in total traffic volume, greater segregation of pedestrian from road traffic accident, improvement in: road design, traffic management, vehicle safety, environmental conditions. |
| *Linkage with other indicators* | Driving forces: *Passenger transport demand by mode of transport*<br>State: *Road accident rate; Speed limit exceedances*<br>Exposure: *Person time spent on the road; Use of vehicle safety device*<br>Effect: ***Injury rate due to road traffic accidents****; DALY lost due to road traffic accidents*; *Mortality due to road traffic accidents; Mortality due to drinking driving* |
| *Related data indicators* | OECD Road transport and research programme: The International Transport research database:<br>http://www.bast.de/htdocs/fachthemen/irtad/<br>CARE: community road accident databases:<br>http://www.europa.eu.int/comm/transport/home/care/index_en.htm |

| WatSan_P1 Wastewater treatment | DPSEEA |
|---|---|
| *Issue* | Water and Sanitation |
| *Definition of indicator* | Percentage of the population served by sewerage connected to a modern wastewater treatment facility producing a regulated effluent discharge monitored by the competent authorities. |
| *Underlying definitions and concepts* | **Wastewater:** fluid waste originating from household activities associated with daily human life, e.g. use of toilets, bathing, washing, cleaning, nutrition, food preparation, laundering, personal hygiene.<br>**Wastewater treatment:** any process that produces an effluent quality in compliance with the conditions set by the competent authorities responsible to implement EU and/or associated national legislation. The EU urban wastewater treatment Directive distinguishes: primary, secondary and tertiary treatment.<br>Primary treatment is a treatment by physical and/or chemical processes (such as sedimentation, flotation, etc.), in which the BOD5 and the total suspended solids load of the incoming wastewater are reduced by at least 20 % and 50 %, respectively;<br>Secondary treatment: by a process generally involving biological treatment with a secondary settlement or other process, resulting in a BOD removal of at least 70 % and a COD removal of at least 75 %;<br>Tertiary treatment comes on top of secondary treatment and is targeted to remove nitrogen and/or phosphorous and/or to tackle any other pollutant affecting the quality or a specific use of water, like microbiological pollution, colour etc.. The following minimum treatment efficiencies define a tertiary treatment:<br>– organic pollution removal of at least 95 % for BOD and at least 85 % for COD, and at least one of the following:<br>– nitrogen removal of at least 70 %<br>– phosphorus removal of at least 80 %<br>– microbiological removal achieving a faecal coliform density less than 1 000 in 100 mL. |
| *Specification of data needed* | The number of population served by sewerage connected to a wastewater treatment facility defined above.<br>The total number of so connected persons ($P_w$) and the total of population (P) in a community or other appropriate spatial unit considered |
| *Data sources, availability and quality* | Data may be available from relevant administrative authorities, both national and local. In a case where only household data are available, it can be converted to population based data using the average number of people living in a household in the relevant region.<br>At the international level, data are available from Eurostat (for the 25 EU and accession countries as well as the three EFTA ones) ) and are accessible from Eurostat free data service under long-term indicators, section 'Ecology and economy'=>'The Environment' => Water |
| *Computation* | The indicator W can be computed as: $W = 100 * P_w /P$ where:<br>P = the total number of population in the community or area under consideration<br>$P_w$ = the number of population served by sewerage connected to a modern wastewater treatment facility or a safe local wastewater disposal system; e.g. the secondary and tertiary treatment together |
| *Units of measurement* | Percentage |
| *Scale of application* | Local (urban) to national, international |
| *Interpretation* | A high percentage indicates a high percentage of the population for which the potential 'chain of infection' by the faecal oral route is interrupted by the sewage disposal system. |
| *Linkage with the other indicators* | Pressure: ***Wastewater treatment***<br>State: *Inappropriate effluent disposal can cause exceedance of recreational water criteria for the microbiological parameters; exceedance of EU guidelines for microbiological parameters in water intended for human consumption and water intended for abstraction before treatment* |

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| *Related web sites* | Water Supply and Sanitation Sector Questionnaire WHO/UNICEF Global Assessment 2000: http://www.who.int/water_sanitation_health/Globassessment/GlobalTOC.htm<br>UN Centre for Human Settlements The Global Urban Observatory Database: http://www.unhabitat.org/guo/index1.asp<br>See also Core Set of Environmental Indicators http://ceroi.net/ind/matrix.asp<br>The EEA indicators: http://themes.eea.eu.int/Specific_media/water/indicators<br>WHO-UNECE Protocol on Water and Health, Article 6: http://www.internationalwaterlaw.org/RegionalDocs/UN_ECE_Protocol.htm<br>(or http://www.euro.who.int/Document/Peh-ehp/ProtocolWater.pdf)<br>The Council Directive of 21 May 1991 concerning urban wastewater treatment (91/271/EEC) is available at http://europa.eu.int/comm/environment/water/water-urbanwaste/directiv.html<br>The Commission website on urban wastewater treatment is available at http://europa.eu.int/comm/environment/water/water-urbanwaste/index_en.html.<br>The Council Directive of 8 December 1975 concerning the Quality of Bathing Water (76/160/EEC) http://europa.eu.int/water/water-bathing/directiv.html<br>OECD Environmental indicators http://www.oecd.org/pdf/M00019000/M00019613.pdf |
| *Policy/ regulatory context* | The Council Directive of 21 May 1991 concerning urban wastewater treatment (91/271/EEC) regulates the collection, treatment and discharge of urban wastewater and the treatment and discharge of wastewater from certain industrial sectors. It sets standards for the final effluent quality of regulated wastewater treatment facilities. The 91/271/EEC Directive is designed to protect the ecological status of receiving waters: it does not require microbiological analysis of effluents discharged from wastewater treatment facilities.<br>The Council Directive of 21 December 1975 (76/160/EEC), the Bathing Water Directive, sets microbiological standards in the receiving waters where bathing is traditionally practiced by large numbers of bathers. Thus, the Directive 76/160/EEC provides the principal health protection instrument in Europe for identified bathing waters and sets out to protect public health as its principal objective. |
| *Reporting obligations* | **Practical compliance:** Member States shall ensure that all agglomerations are provided with collecting systems for urban wastewater: by the end of 2000 for those with a population equivalent (p.e.) of more than 15,000, and by 31 December 2005 for those with a p.e. of between 2,000 and 15,000.<br><br>Member States shall ensure that urban wastewater entering collecting systems shall, before discharge, be subject to secondary treatment or an equivalent treatment: by 31 December 2000 for all discharges from agglomerations of more than 15 000 p.e.; by 31 December 2005 for all discharges from agglomerations of between 10 000 and 15 000 p.e, and by 31 December 2005 for discharges to fresh-water and estuaries from agglomerations of between 2 000 and 10 000 p.e.<br><br>**Environmental data**: None<br><br>**Description of policy measures:** Member States should by 30 June 1994 provide the Commission with information on the programme for the implementation of this Directive. Member States shall, if necessary, provide the Commission by 30 June every two years with an update of this information.<br><br>**Policy effects and effectiveness:** The Commission shall every two years review and assess the information received and publish a report thereon. The latest report was published in 1998. |

| WatSan_S1 Recreational water quality | DPSEEA |
|---|---|
| *Issue* | Safe recreation water environment: does NOT include enclosed water i.e. swimming pools |
| *Definition of indicator* | Proportion of identified bathing waters in compliance during the specified bathing season with the EC mandatory standards for the coliform parameters |
| *Underlying definitions and concepts* | **The proportion of the bathing water sites exceeding the current imperative values** for the coliform parameters specified by the European Commission under the Bathing Water Directive (76/160/EEC) over the bathing season.<br>**Total coliforms**:<br>Imperative 95%<10,000 per 100 ml<br>**Faecal coliforms or *E. coli***<br>Imperative 95%<2000 per 100 ml<br>**Note**: these standards are in transition and are likely to change before 2010 |
| *Specification of data needed* | Total number of bathing waters identified for compliance monitoring to the European Commission.<br>Number of bathing waters in compliance with the mandatory *(Imperative)* coliform standards of Directive 76/160/EEC of as defined above |
| *Data sources, availability and quality* | Accurate information on the number of bathing waters and compliant bathing waters. |
| *Computation* | The indicator RWC can be computed as: RWC = 100 * ( C/T ) where:<br>C is the number of bathing waters in compliance with the imperative coliform standards, and T is the total number of bathing waters identified for compliance monitoring |
| *Units of measurement* | Percentage |
| *Scale of application* | National |
| *Interpretation* | Different sampling frequency between EU member states may make direct statistical inference on the significance of differences in percentage compliance between member countries problematical. |
| *Linkage with the other indicators* | Pressure: *Wastewater treatment coverage and effluent and disposal policy*<br>State: ***Recreational water quality***<br>Effect: *Sporadic cases of self limiting gastroenteritis and potentially outbreaks of waterborne diseases, Diarrhoeal diseases in children and adults*<br>Action*: Appropriate sewage effluent treatment and disposal, appropriate diffuse source pollution control to limit, principally, zoonotic pathogen exposures from agriculture and finally, management and monitoring of recreational water as recommended in Directive 76/160/EEC ad into the future by WHO (2003) and CEC (2002); Management of bathing waters* |
| *Related web sites* | Bathing water quality in the EU Directive 76/160/EEC at:<br>http://www.europa.eu.int/water/water-bathing/directiv.html<br>The EU bathing water quality report (annually) at http://www.europa.eu.int/water/water-bathing/report.html<br>Data on compliance for the EU can be downloaded (different measures) from http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=683<br>Proposal for a revised Directive of the European Parliament and of the Council concerning the Quality of Bathing Water COM(2002)581 http://europa.eu.int/eur-lex/en/com/pdf/2002/com2002_0581en01.pdf<br>WHO 2003 Guidelines for safe recreational water environment (GSRWEs): Vol. Coastal and Fresh-waters. Geneva, WHO at:<br>http://www.who.int/water_sanitation_health/bathing/srwe1/en/<br>The Annapolis Protocol: http://www.who.int/water_sanitation_health/bathing/Annapolis.pdf |

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| *Policy/ regulatory context* | The quality of recreational waters is regulated by the Council Directive of 8 December 1975 concerning the Quality of Bathing Water (76/160/EEC). The Bathing Water Directive, sets microbiological standards in the receiving waters where bathing is traditionally practiced by large numbers of bathers. Thus, Directive 76/160/EEC provides the principal health protection instrument in Europe for identified bathing waters and sets out to protect public health as its principal objective.<br>The Bathing Water Directive is now under revision (CEC, 2002) and it is intended to incorporate the microbiological criteria contained in the new WHO Guidelines for Safe Recreational Water Environments (GSRWEs, 2003) together with the beach management principles in the Annapolis protocol (WHO, 1999) which accommodate real time prediction of microbiological hazard for public health protection. On 24 October 2002, the Commission has adopted the proposal for a revised Directive of the European Parliament and of the Council concerning the Quality of Bathing Water COM(2002)581. |
| *Reporting obligations* | **Practical compliance:** Member States submit a comprehensive report to the Commission on their bathing water on an annual basis.<br><br>**Environmental data:** The following microbiological parameters are noted in Directive 76/160/EEC:<br>• Total coliforms/100 ml (*Universally monitored parameter)*<br>• Faecal coliforms/100 ml (*Universally monitored parameter)*<br>• Faecal streptococci/100 ml<br>• Salmonella/litre<br>• Enteroviruses PFU/10 litres<br><br>**Description of policy measures:** Member States shall take all necessary measures to ensure that, within 10 years following the notification of the Directive, the quality of bathing water conforms to the limit values.<br><br>**Policy effects and effectiveness:** None |

| WatSan_S2 Drinking-water quality | DPSEEA |
|---|---|
| *Issue* | Water and Sanitation |
| *Definition of indicator* | The indicator **refers to regulated public water supplies**<br>Proportion of the drinking-water samples analysed which fail to comply with the EU Directive on the quality of water intended for human consumption. |
| *Underlying definitions and concepts* | **Number of regulatory drinking-water analyses** not in compliance with the suite of parameters specified in the EU Directive on the quality of water intended for human consumption.<br>**Total number of regulatory analyses** made by an official monitoring agency or undertaker within the defined spatial unit over a given time period (one year).<br>**This applies to regulated piped water supplies, provided by a licensed water undertaker.** |
| *Specification of data needed* | Number of non-compliant samples (E)<br>Total number of samples taken from a defined spatial unit (a water supply zone or other regional entity defined for regulatory purposes in the member country) over the previous year (T) |
| *Data sources, availability and quality* | Accurate information on the number of valid drinking-water measurements taken from the defined spatial area and the results should be available from the relevant monitoring agency or the licensed water undertaker. |
| *Computation* | The 'percentage compliance' indicator can be computed as:<br>( (T-E)/T ) * 100 |
| *Units of measurement* | Percentage |
| *Scale of application* | Local to international |
| *Interpretation* | It is a potential measure of the state of the drinking-water contamination by chemical and microbiological contaminants and can serve as warning signal requiring further in-depth investigations and countermeasures |
| *Linkage with the other indicators* | State: ***Drinking-water quality***<br>Effect: *Chronic and potentially acute illness episodes due to toxicant release or infectious agents in the consumer population*<br>Action: *Water safety plans to protect source and supply system integrity together with appropriate monitoring systems (EU, 1998; WHO, 2002)* |
| *Related web sites* | Council Directive 98/83/EC on the quality of water intended for human consumption<br>http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/l_330/l_33019981205en00320054.pdf<br>Current revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines2/en/<br>Rolling revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines3/en/<br>Water safety plans:<br>http://www.who.int/docstore/water_sanitation_health/GDWQ/Updating/draftguidel/2003gdwq4.pdf<br>The UNECE/WHO Protocol on Water and Health:<br>http://www.euro.who.int/watsan/MainActs/20030219_1 |
| *Policy/ regulatory context* | The quality of drinking-water is regulated by the Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/l_330/l_33019981205en00320054.pdf.<br>The EC has not ratified the joint WHO and UN ECE Protocol on Water and Health. |

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| *Reporting obligations* | **Practical compliance:** Each Member State shall publish a report every three years on the quality of water intended for human consumption with the objective of informing consumers. Compliance database is being created with DG Environment.<br><br>The first report shall cover the years 2002, 2003 and 2004. Each report must include all individual supplies of water exceeding 1,000 $m^3$ a day as an average or serving more than 5,000 persons and shall cover three calendar years and be published within one calendar year of the end of the reporting period.<br><br>Member States have 5 years i.e. until 25 December 2003 to ensure that the Drinking-water complies with the standards set, except for Bromate (10 years), Lead (15 years) and Trihalomethanes (10 years)<br><br>**Environmental data:** Details not specified. EEA ETC on water is working on establishment of WATERBASE on the status and quality of European waters.<br><br>**Description of policy measures:** Member States shall take the measures necessary to ensure that the quality of water intended for human consumption complies with this Directive within 2004<br><br>**Policy effects and effectiveness:** Member States shall send their reports to the Commission within two months of their publication.<br><br>Together with the first report, Member States shall also produce a report to be forwarded to the Commission on the measures they have taken or plan to take to fulfil their obligations regarding the implementation of the Directive.<br><br>The Commission shall examine the Member States' reports and, every three years, publish a synthesis report on the quality of water intended for human consumption in the Community. That report shall be published within nine months of the receipt of the Member States' reports. |

| WatSan_Ex1 Safe drinking-waters | DPSE**EA** |
|---|---|
| *Issue* | Water and Sanitation |
| *Definition of indicator* | Proportion of the population with continuous access to adequate amount of safe drinking-water in the home.<br>**Eurostat** produces similar indicator using the definition of '**population connected to public water supply'.** The Eurostat indicator is proposed as the best available and relevant information and using it should be driving better quality data acquisition. |
| *Underlying definitions and concepts* | **Safe drinking-water**: is a piped water supply, providing a sufficiency of water available 24 hours per day piped into the cartilage of the property provided by a licensed and regulated water undertaker.<br>**Public water supply** is defined as water supplied by economic units engaged in collection, purification and distribution of water (including desalting of sea water to produce water as the principal product of interest, and excluding system operation for agricultural purposes and treatment of wastewater solely in order to prevent pollution). It corresponds to division 41 (NACE/ISIC). Deliveries of water from one public supply undertaking to another are excluded. (Joint Eurostat/OECD Questionnaire on Inland Waters) |
| *Specification of data needed* | Number of people **with access to safe drinking-water or connected to public water supply** (N)<br>Total population (P) |
| *Data sources, availability and quality* | Data on number of people living in households receiving a safe drinking-water should be available from the water undertaker or the regulator<br>At the international level, the indicator is available from Eurostat (for the 25 EU and accession countries as well as the three EFTA ones) ) and is accessible from Eurostat free data service under long-term indicators, section 'Ecology and economy'=>'The Environment' => Water<br>There might be problems with comparability because of differences in definitions and data collection methods used across Europe. |
| *Computation* | The indicator can be computed as:<br>( N/P)*100<br>The alternative indicator "population with potentially unsafe drinking-water" can be calculated as:<br>100 – ( N/P)*100 |
| *Units of measurement* | Percentage |
| *Scale of application* | Regions to international |
| *Linkage with the other indicators* | Pressure: *Wastewater treatment coverage*<br>Exposure: ***Safe drinking-waters***<br>Effect: *Chronic illness and potentially acute illness episodes due to toxicant releases to the consumer population* |
| *Interpretation* | The indicator gives a crude estimate of the monitoring/control coverage of the Drinking-water Directive and also of the populations, which use small/individual water-well supplies, and could therefore potentially exposed to water-related health risks. A low percentage suggests actions should be taken to increase population access to safe drinking-water and hence, reduce exposure and health risk. |
| *Related web sites* | Current revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines2/en/<br>Rolling revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines3/en/<br>The UNECE/WHO Protocol on Water and Health:<br>http://www.euro.who.int/watsan/MainActs/20030219_1<br>The right to water<br>http://www.who.int/water_sanitation_health/rightowater/en/<br>The Global Burden of Disease study and its application in water, sanitation and hygiene<br>http://www.who.int/water_sanitation_health/dwq/en/iwachap3.pdf |
| *Policy/ regulatory context* | Currently, there is no EC legislation regarding the access to drinking-water.<br>The EC has not ratified the joint WHO and UN ECE Protocol on Water and Health.<br>This statistics is not being collected within the framework of the EC legislation. |

| Chem_P1 Industrial facilities under SEVESO II directive | DP**S**EEA |
|---|---|
| *Issue* | Chemical Emergencies |
| *Definition of indicator* | Number of sites containing large quantities of chemicals according to the criteria of the EU 'Seveso II' directive |
| *Underlying definitions and concepts* | The indicator is based on the ability to identify fixed facilities qualifying as upper and lower tier establishments according to the EU Council directive 96/82/EC(09 Dec 1996), i.e. the 'Seveso II' directive. Underlying definitions are:<br>**Establishment:** the whole area under the control of the operator where dangerous substances are present in one or more installations, including common or related infrastructures or activities.<br>**Dangerous substance**: a substance, mixture or preparation listed in the Seveso II directive's annex I, part 1, or fulfilling the criteria in annex 1, part 2. |
| *Specification of data needed* | Inventory of all establishments that could potentially come under the Seveso II directive.<br>Quantity of dangerous substances present in the fixed facilities identified above as a raw material, product, by-product, residue or intermediate, including those substances for which it is reasonable to suppose that may be generated in the event of accident. |
| *Data sources, availability and quality* | All EU member states should have an inventory of establishments coming under the scope of the directive since February 1999. Other states can apply the methodology detailed in annex I of the directive to determine if establishments qualify as an upper or lower tier establishment, although this may require a fair amount of work. |
| *Computation* | Count the numbers of upper tier and lower tier (only those *not* qualifying as upper tier) establishments separately, as outlined in annex I of the directive. |
| *Units of measurement* | Numbers |
| *Scale of application* | National and international |
| *Interpretation* | The indicator has a reasonable degree of resonance with the concept of potential damage to the public health. The few surveillance data available indicate that 80% of chemical incidents occur in fixed facilities; the proportion of those occurring in the larger facilities that (would) come under the scope of the Seveso II directive is unknown.<br>All operators of establishments in EU member states coming under the scope of the Seveso II directive need to send a notification to the competent authority and to establish a Major-Accident Prevention Policy. In addition, operators of upper tier establishments need to establish a Safety Report, a Safety Management System and an Emergency Plan.<br>Therefore, a facility coming under the scope of the Seveso II directive may be considered a serious potential hazard for its surroundings, the magnitude of the actual risk depending a/o. on the safety management, land-use planning and emergency planning. |
| *Linkage with the other indicators* | Pressure: ***Industrial facilities under the Seveso II Directive***<br>Action: *Regulatory requirements for land-use planning; Chemical incidents register; Government preparedness* |
| *Related web sites* | EU Council directive 96/82/EC(09 Dec 1996) the 'Seveso II' directive<br>http://www.europa.eu.int/comm/environment/seveso/index.htm<br>See also Seveso Substance Database at<br>http://mahbsrv.jrc.it/turku/seviisubs/seviisubs1.html<br>See also Guidance Documents for Implementing Seveso II at:<br>http://mahbsrv.jrc.it/NewProducts.html |

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| *Policy/ regulatory context* | EU Council directive 96/82/EC(09 Dec 1996) the 'Seveso II' directive<br>http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31996L0082&model=guichett<br>The aim of the Seveso II Directive is two-fold: (i) prevention of major-accident hazards involving dangerous substances; (ii) as accidents do continue to occur, limitation of the consequences of such accidents not only for man (safety and health aspects) but also for the environmental aspects. Both aims should be followed with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.<br>Directive 2003/105 extends the scope of the 1996 "Seveso II" major accident hazards directive to include certain storage and processing activities in mining, pyrotechnic and explosive manufacturing sites and sites for the storage of ammonium nitrate and similar fertilisers.<br>A modified version of the rules was finally approved by a joint committee of EU governments and the European parliament in September (ED 11/09/03 http://www.environmentdaily.com/articles/index.cfm?action=article&ref=15071 and also http://europa.eu.int/eur-lex/en/com/pdf/2002/com2002_0540en01.pdf |
| *Reporting obligations* | **Legal transposition**: MS bring into force the regulations and administrative provisions not later than 1998. The recent revision – by 1 July 2005.<br><br>**Practical compliance:** Member States shall require operators to send the competent authority a notification within the following time-limits: (i) for new establishments, a reasonable period of time prior to the start of construction or operation, (ii) for existing establishments, before 1999.<br><br>**Environmental data:** The notification shall contain the following details:(a) the name or trade name of the operator and the full address of the establishment concerned; (b) the registered place of business of the operator, with the full address; (c) the name or position of the person in charge of the establishment, if different from (a); (d) information sufficient to identify the dangerous substances or category of substances involved; (e) the quantity and physical form of the dangerous substance or substances involved; (f) the activity or proposed activity of the installation or storage facility; (g) the immediate environment of the establishment (elements liable to cause a major accident or to aggravate the consequences thereof).<br><br>**Description of olicy measures:** MS to establish a Competent Authority for the Directive follow-up<br><br>**Policy effects and effectiveness:** The Commission is reporting on the implementation of the Seveso II Directive. The modification invites the European Commission to review by 30 December 2006 existing guidance on preparation of safety reports. The EU executive is also invited to draw up by 31 December 2006 guidelines for a database to assess whether so-called "Seveso" installations are compatible with their surrounding areas. |

| Chem_A1  Regulatory requirements for land-use planning | DPSEE**A** |
|---|---|
| *Issue* | Chemical Emergencies |
| *Definition of indicator* | Regulatory requirement for land-use planning around sites containing large quantities of chemicals according to the criteria for upper tier of the EU ‘Seveso II’ directive |
| *Underlying definitions and concepts* | Underlying definitions are:<br>**Establishment:** the whole area under the control of the operator where dangerous substances are present in one or more installations, including common or related infrastructures or activities.<br>**Dangerous substance**: a substance, mixture or preparation listed in the Seveso II directive’s annex I, part 1, or fulfilling the criteria in annex 1, part 2.<br>**Regulatory requirement on the land-use planning**: clearly outlined restrictions on land use in the safety zone(s). The safety zones around an establishment are determined based on the identification and definition of accident scenarios involving the dangerous substances and determination of the likelihood of (health) consequences of these scenarios. |
| *Specification of data needed* | - Inventory of all establishments that could potentially come under the Seveso II directive.<br>- On the basis of an assessment of establishments so identified, an inventory of establishments that (would) qualify as an upper tier Seveso II establishment (for all EU member states should have been completed by February 1999). Other states can apply the methodology detailed in annex I of the directive.<br>- Existence and enforcement of regulatory requirement for land-use planning around all those fixed facilities that meet the upper tier criteria. The regulatory requirement should at least include:<br>  - Identification and definition of accident scenarios involving dangerous substances.<br>  - Rules for determining the likelihood of and the (health) consequences of these accident scenarios.<br>  - On the basis of the possible health outcomes, determine risk zones around an establishment.<br>  - Clearly outlined restrictions on land use in the safety zone(s).<br>  - Sanctions for non-compliance with the land use planning regulations. |
| *Data sources, availability and quality* | Information on the existence of these instruments and measures<br>Information should be available at ministries responsible for environment, safety and/or emergency response. |
| *Computation* | 0. A score 0 is assigned if any of the following apply:<br>  • There is no inventory of establishments that could potentially come under the Seveso II directive, ***or***<br>  • Less than 80% of the inventory of potential sites has actually been assessed for compliance with the Seveso II directive, ***or***<br>  • There is no regulatory requirement that meets at least 4 of the above 5 criteria, or the land-use requirements are not enforced, ***or***<br>  • Less than 20% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.<br>1. A score 1 is assigned if:<br>  • All of the criteria under 1) do not apply, ***and***<br>  • A proportion of 20% – 80% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.<br>2. A score 2 is assigned if:<br>  • All of the criteria under 1) do not apply, ***and***<br>  • More than 80% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above. |
| *Units of measurement* | Ordinal score (0 – 2) |
| *Scale of application* | National and international |

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| *Interpretation* | This indicator has a reasonable degree of resonance with the concept of potential damage to the public health. The underlying construct is that competent authorities should have a regulatory tool to enforce a 'safety distance' between hazardous installations and vulnerable objects, such as residential areas, schools, recreational areas etc. |
| *Linkage with the other indicators* | Pressure: *Industrial facilities under the Seveso II Directive*<br>Action: ***Regulatory requirements for land-use planning;*** *Chemical incidents register; Government preparedness* |
| *Related web sites* | EU Council directive 96/82/EC (09 Dec 1996) the 'Seveso II' directive<br>http://www.europa.eu.int/comm/environment/seveso/index.htm<br>See also "Land-use planning in the context of Major Accident Hazards" at<br>http://mahbsrv.jrc.it/turku/lup/sld001.htm |
| *Policy/ regulatory context* | EU Council directive 96/82/EC(09 Dec 1996) the 'Seveso II' directive<br>http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31996L0082&model=guichett<br>The aim of the Seveso II Directive is two-fold: (i) prevention of major-accident hazards involving dangerous substances; (ii) as accidents do continue to occur, limitation of the consequences of such accidents not only for man (safety and health aspects) but also for the environmental aspects. Both aims should be followed with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.<br>Directive 2003/105 extends the scope of the 1996 "Seveso II" major accident hazards directive to include certain storage and processing activities in mining, pyrotechnic and explosive manufacturing sites and sites for the storage of ammonium nitrate and similar fertilisers.<br>A modified version of the rules was finally approved by a joint committee of EU governments and the European parliament in September (ED 11/09/03<br>http://www.environmentdaily.com/articles/index.cfm?action=article&ref=15071 and also<br>http://europa.eu.int/eur-lex/en/com/pdf/2002/com2002_0540en01.pdf |
| *Reporting obligations* | **Legal transposition**: MS bring into force the regulations and administrative provisions not later than 1998. The recent revision – by 1 July 2005.<br>**Practical compliance:** Member States shall ensure that the objectives of preventing major accidents and limiting the consequences of such accidents are taken into account in their land-use policies through controls. Control should be pursued on: (i) the siting of new establishments, (ii) modifications to existing establishments, (iii) new developments such as transport links, locations frequented by the public and residential areas in the vicinity of existing establishments, where the siting or developments are such as to increase the risk or consequences of a major accident.<br>**Environmental data:** n.a.<br>**Description of policy measures:** M S ensure that their land-use and/or other relevant policies and the procedures for implementing those policies take account of the need, in the long term, to maintain appropriate distances between establishments covered by the Seveso II Directive and residential areas, areas of public use and areas of particular natural sensitivity or interest, and, in the case of existing establishments, of the need for additional technical measures as not to increase the risks to people. MS ensure that all competent authorities and planning authorities responsible for decisions in this area set up appropriate consultation procedures to facilitate implementation of the policies. The procedures shall be designed to ensure that technical advice on the risks arising from the establishment is available, either on a case-by-case or on a generic basis, when decisions are taken.<br>**Policy effects and effectiveness:** MS require the competent authority to make recommendations on future preventive measures following a major accident. They shall communicate to the Commission the main provisions of domestic law, which they adopt in the field governed by the Seveso II Directive. |

| Chem_A2  Chemical incidents register | DPSEE**A** |
|---|---|
| *Issue* | Chemical Emergencies |
| *Definition of indicator* | Presence of an active, cumulative register of chemical incidents with national coverage |
| *Underlying definitions and concepts* | Underlying definitions are:<br>**Register** – active database, with the population and geographical areas defined. The register should define the incident at least in terms of:<br>• Identification of the source: chemical(s) released (name and CAS number), estimated quantities and the medium to which the chemical(s) have been released.<br>• Information about the location of the incident: unique identifier of geographical location (grid coo rdinates, latitude and longitude, or similar), fixed site or transportation.<br>• Outcome: estimate of the number of people actually exposed (population, workers and responders).<br>• A contact source of further information on the incident<br>**Incident** – an agreed exposure-category of incident. Typically this can be taken as the IPCS Level 3 – where there is suspected or actual ill-health; and IPCS Level 4 – where a major emergency plan is activated. |
| *Specification of data needed* | Evidence of existence of register with the above characteristics. |
| *Data sources, availability and quality* | Information on the existence of the register. |
| *Computation* | A score 0 is assigned if there is no such instrument.<br>A score 1 is assigned if the conditions are met partly, ***and*** less than 80% of the country is covered,<br>A score 2 is assigned if:<br>- the conditions are met completely, i.e. the register is in operation with its full specifications, but less than 80% of the country is covered, or<br>- the conditions are met partly, ***and*** 80% or more of the country is covered.<br>A score 3 is assigned if the conditions are met completely, i.e. the register is in operation with its full specifications, ***and*** 80% or more of the country is covered. |
| *Units of measurement* | Ordinal score (0 – 3) |
| *Scale of application* | National and international |
| *Interpretation* | The indicator is a measure of the degree of sophistication in a country's approach to chemical incidents. However, increases in the rate of incidents may be due to a real increase in the rate of incidents, or may be due to better incident ascertainment. |
| *Linkage with the other indicators* | Pressure: *Industrial facilities under the Seveso II Directive*<br>Action: *Regulatory requirements for land-use planning;* ***Chemical incidents register****;* *Government preparedness* |
| *Related web sites* | The WHO Collaborating Centre for a Clearing House for Chemical Incidents: http://www.healthchem.uwic.ac.uk<br>IPCS Chemical Incidents and Emergencies: http://www.who.int/pcs/chem_incid_main.html<br>The Major Accidents Hazards Bureau and its database http://mahbsrv.jrc.it/ |

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| *Policy/ regulatory context* | EU Council directive 96/82/EC(09 Dec 1996) the 'Seveso II' directive<br>http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31996L0082&model=guichett<br>The aim of the Seveso II Directive is two-fold: (i) prevention of major-accident hazards involving dangerous substances; (ii) as accidents do continue to occur, limitation of the consequences of such accidents not only for man (safety and health aspects) but also for the environmental aspects. Both aims should be followed with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.<br>Directive 2003/105 extends the scope of the 1996 "Seveso II" major accident hazards directive to include certain storage and processing activities in mining, pyrotechnic and explosive manufacturing sites and sites for the storage of ammonium nitrate and similar fertilisers.<br>A modified version of the rules was finally approved by a joint committee of EU governments and the European parliament in September (ED 11/09/03 http://www.environmentdaily.com/articles/index.cfm?action=article&ref=15071 and also http://europa.eu.int/eur-lex/en/com/pdf/2002/com2002_0540en01.pdf |
| *Reporting obligations* | **Legal transposition**: MS bring into force the regulations and administrative provisions not later than 1998. The recent revision – by 1 July 2005.<br><br>**Practical compliance:** Following a major accident, the operator of a plant shall supply information to the Member State. Member States have the obligation to report major accidents to the Commission.<br><br>**Environmental data**: The following information is submitted to the Member State:<br>(i) the circumstances of the accident; (ii) the dangerous substances involved; (iii) the data available for assessing the effects of the accident on man and the environment, and (iv) the emergency measures taken.<br><br>**Description of policy measures:** Member States shall inform the Commission as soon as practicable of major accidents. Mortality rate is one of the data, which should be submitted.<br><br>**Policy effects and effectiveness:** Member States shall require the competent authority to make recommendations on future preventive measures following a major accident.<br>In order to fulfil its information obligations towards the Member States, the Commission has established a so-called Major-Accident Reporting System (MARS) and the Community Documentation Centre on Industrial Risks (CDCIR) at the Major-Accident Hazards Bureau http://mahbsrv.jrc.it/. |

| Chem_A3 Government preparedness | DPSEE**A** |
|---|---|
| *Issue* | Chemical Emergencies |
| *Definition of indicator* | Government preparedness for chemical incidents |
| *Underlying definitions and concepts* | This indicator relates to the central government's ability to respond adequately to a chemical incident. The following are crucial elements that a government should have in place to enable its (coordinating role in the) response function:<br>• **National Advisory Body**: an institution/body (ideally centrally funded) staffed by professionals with a background in legislation, chemical incident management and data collation; and with access to specialist professionals. Its function is to advise Government on preparedness, and during significant chemical incidents; it can also coordinate all the regional and local functions.<br>• **Environmental/Public Health Plans** for dealing with chemical incidents: an active, written, document detailing the actions required of public health and environmental health professionals before, during and after a chemical incident.<br>• **Emergency Response Guidelines**: A widely accepted set of emergency response guidelines is an essential element of a country's ability to perform a rapid health risk assessment for a chemical incident.<br>*Emergency response guideline*: a concentration of a substance in air or drinking-water indicating a threshold for a well-defined level of toxic health effect in the general population from an emergency exposure with a specified exposure period.<br>• **Public alerting system**: The presence of a system with very wide coverage to alert the public that an incident has occurred. |
| *Specification of data needed* | Evidence of existence of such instruments at regional or national level<br>Population/geographical areas covered. |
| *Data sources, availability and quality* | Information on the existence of a national advisory body, environmental/public health plans, emergency response guidelines and a public alerting system can be available through the national ministries of health or government agencies responsible for emergency planning and response. |

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| *Computation* | The value of this indicator ($N_{GP}$) is calculated as the sum of the values of the 4 components for each of the above aspects, which are calculated according to the following steps:<br>1. **National Advisory Body**: *To determine $N_{NAB}$, score 0 if no national advisory body is established, 1 if the body was established but is not yet fully operational, and 2 if the body is established and fully operational.*<br>2. **Environmental/Public Health Plans**: *To determine $N_{EPH}$, score 0 if these plans are not available, 1 if the plans are available but not fully operational/implemented, and 2 the plans are available and operational.*<br>3. **Emergency Response Guidelines** For this component:<br>• Determine the number of chemicals with nationally accepted and applied emergency response guidelines ($N_a$ for airborne guideline levels, $N_d$ for drinking-water guideline levels).<br>• If no nationally accepted and applied list of emergency response guidelines is available, $N_C$ and/or $N_d = 0$.<br>• Score = $N_C + N_d$.<br>*The value is assigned, based on the score:*<br>*Score ≤ 100* *Value $N_{ERG} = 0$.*<br>*Score > 100 and ≤ 250* *Value $N_{ERG} = 1$.*<br>*Score > 250* *Value $N_{ERG} = 2$*<br>4. **Public Alerting System**: The component $N_{PAS}$ is calculated on the basis of:<br>• A general auditory public alerting system that covers at least 90% of all households.<br>• Public alerting system covers at least 90% of recreational areas with high numbers of visitors (theme parks, beaches, etc.).<br>• Public alerting system covers at least 90% of non-residential working areas (ports, industrial zones, etc.).<br>• Special arrangements in place for people with auditory handicap.<br>• Clear arrangements about roles and responsibilities for activating the system.<br>• Testing of the public alerting system at least once a year, with notification to the public.<br>• The score = the number of the above criteria that are met (minimum:0, maximum: 6).<br>*The value is assigned based on the score:*<br>*If score ≤ 1* *sub-indicator value = 0*<br>*If score 2, 3 or 4* *sub-indicator value = 1*<br>*If score 5 or 6* *sub-indicator value = 2*<br>5. The final score for Government preparedness $N_{GP}$ is calculated as the sum of the component values:<br>$N_{GP} = N_{NAB} + N_{EPH} + N_{ERG} + N_{PAS}$ |
| *Units of measurement* | Ordinal score (0 – 8) |
| *Scale of application* | Regional or national |
| *Interpretation* | This indicator is a measure indicating a degree of sophistication in a country's approach to chemical incidents. Governments may be able to institute these functions after an incident has occurred (e.g. obtain advice from individuals, or from (interested) parties and bodies), but the effectiveness would be much reduced as compared with a well-prepared organization. |
| *Linkage with the other indicators* | Pressure: *Industrial facilities under the Seveso II Directive*<br>Action: *Regulatory requirements for land-use planning; Chemical incidents register;* ***Government preparedness*** |
| *Related web sites* | Web page with example of National Advisory Body: http://www.natfocus.uwic.ac.uk<br>OECD chemical accidents programme: http://www.oecd.org/ehs/accident.htm<br>ATSDR Chemical Accidents: http://www.atsdr.cdc.gov/mmg.html<br>Emergency Response Planning Guidelines: http://www.bnl.gov/scapa/<br>EPA Chemical Emergency Preparedness and Prevention Office: http://www.epa.gov/swercepp/ |
| *Policy/ regulatory context* | EU Council directive 96/82/EC(09 Dec 1996) the 'Seveso II' directive http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31996L0082&model=guichett though the implementation should be taken in a broader policy context |

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| *Reporting obligations* | **Legal transposition:** n.a.<br><br>**Practical compliance:** Member States ensure that the operator is obliged to take all measures necessary to prevent major accidents and to limit their consequences for man and the environment. They also ensure that the operator is required to prove to the competent authority, at any time, in particular for the purposes of the inspections and controls, that he has taken all the measures necessary.<br>Internal Emergency Plans for response measures to be taken inside establishments have to be drawn up by the operator and to be supplied to the local authorities to enable them to draw up External Emergency Plans.<br><br>**Description of policy measures:** Emergency Plans have to be reviewed, revised and updated, where necessary.<br><br>**Policy effects and effectiveness:** The Seveso II Directive contains an obligation to regularly test in practice the Internal and External Emergency Plans. |

| Rad_E1 Incidence of malignant melanoma | DPSEEA |
|---|---|
| *Issue* | Radiation |
| *Definition of indicator* | Annual incidence rate of malignant melanoma |
| *Underlying definitions and concepts* | The indicator is based on the following definitions:<br>**Malignant melanoma:** skin cancer as defined by ICD-10 code C43<br>**Total population:** total resident population |
| *Specification of data needed* | Annual number of malignant melanoma cases ICD-10 code C43<br>Total population |
| *Data sources, availability and quality* | Data on malignant melanoma cases should be available from the national cancer registries or WHO-IARC.<br>Reliable data on total population are usually available from national censuses. |
| *Computation* | $100000 * ( I_{sc}/P_t )$<br>where $I_{sc}$ is the annual number of malignant melanoma cases and $P_t$ is the total population |
| *Units of measurement* | Number of cases per hundred thousand of population |
| *Scale of application* | Regional, national, international |
| *Interpretation* | This indicator should be interpreted very cautiously as indirect health effect associated with population exposure to UV radiation. The effect of UV radiation on melanoma incidence is modified by lifestyle and behavioural factors, such as time spent outdoor, choice of clothing and use of UV protection. Genetic factors such as skin colour and nevus are also important. International figures on rates on non-melanoma skin cancer are not generally available as many registries do not register these cancers. Unlike malignant melanoma, non-melanoma skin cancer is often curable, and rarely fatal. Considering the data availability and policy-relevance, the numerator counts only malignant melanoma cases. |
| *Linkage with the other indicators* | No indicators in the proposed E&H indicator set. Within the European Community Health Information framework there is a project EUROCHIP which identified a set of European Cancer Health Indicators ( http://europa.eu.int/comm/health/previous_whatsnew_en.htm ) |
| *Related data, indicators* | International data available at WHO-IARC Cancer Mortality database for ICD 10 code C43 only: http://www-depdb.iarc.fr/who/menu.htm<br>GLOBAL SOLAR UV INDEX http://www.who.int/inf-pr-1998/en/pr98-53.html<br>http://www.who.int/inf-fs/en/fact133.html<br>INTERSUN The Global UV Project http://www.who.int/peh-uv/<br>See also Health for All (HFA) Indicators for monitoring and evaluation of Health 21<br>http://www.who.dk/hfadb<br>The European Cancer Health Indicator Project<br>http://www.istitutotumori.mi.it/project/eurochip/homepage.htm |

| Rad_A1 Effective environmental monitoring of radioactivity | DPSEE**A** |
|---|---|
| *Issue* | Radiation |
| *Definition of indicator* | Existence of effective environmental monitoring of radioactivity in compliance with national and international quality assurance programs |
| *Underlying definitions and concepts* | QA programmes on environmental monitoring will among others set criteria with respect to set-up of the system, monitoring frequency, density and sensitivity. As an example – or, if desired, as a reference system – the criteria of the EC draft recommendation on monitoring of the levels of radioactivity in the environment are given.<br>**Density:** The EC recommends a sparse and a dense network with different sampling frequency for each media, among others 'representative for various geographical regions and taking population distribution into account'<br>**Frequency:** dense network: ≤quarterly; sparse: ≤monthly; ambient dose: continuously.<br>**Sensitivity:** detection limit < reporting level |
| *Specification of data needed* | Accurate information on the density of monitoring networks and their operation (monitoring frequency and sensitivity in relation to reporting levels, etc)<br>One may score for each of the following media (N=5):<br>– airborne particles<br>– ambient dose rate<br>– mixed diet and milk (i.e. a representative food package)<br>– surface water<br>– drinking-water<br>And on various aspects (N=5):<br>– density of the network: 1 – national; 0 – regional<br>– frequency of measurements: 1 – continuously or less than one month; 0 – monthly or more<br>– sensitivity in comparison with reporting levels: 1 – detection limit < reporting level; 0 – otherwise<br>– monitoring on a routine basis and not only in case of an accident: 1 – yes; 0 – no<br>– successful participation in international inter-comparisons: 1 – yes; 0 – not<br>One may score each of these aspects for the sparse and the dense network (N=2) |
| *Data sources, availability and quality* | The organizations (national or otherwise) responsible for environmental surveillance. Doing the survey may be hampered when different organizations are responsible for each of the sampling media. |
| *Computation* | Sum of scores |
| *Units of measurement* | Ordinal score (0 – 25; and 0 – 50 when two networks with different density are distinguished) |
| *Scale of application* | Mainly national |
| *Interpretation* | This indicator provides a useful measure of the attention given to monitoring of radiation levels, and as such shows how seriously this issue is being taken. The presence of enhancements is not a condition for the existence of a monitoring programme given the fact it has to be considered an early warning and follow-up system in case of accidents (which may have a trans-boundary effect).<br>The indicator does not describe the actual radiation risk but the level of compliance with standards. |
| *Linkage with the other indicators* | |
| *Related web sites* | The Euratom Treaty at http://www.europa.eu.int/abc/obj/treaties/en/entoc38.htm<br>Commission Recommendation on the application of Article 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole:<br>http://europa.eu.int/comm/environment/radprot/legislation/00473.pdf |
| *Policy/ regulatory context* | See above |

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| *Reporting obligations* | **Legal transposition:** The Euratom Treaty article 35 demands Each Member State to establish the facilities necessary to carry out continuous monitoring of the level of radioactivity in the air, water and soil and to ensure compliance with the basic standards.<br><br>**Practical compliance:** The Member States annually forward to the Commission, the monitoring results; all data for a calendar year being submitted no later than 30 June of the following year. |

# II. Indicators recommended for WHO use (e.g., ENHIS)

| Air_E1 Years of Life Expectancy Lost due to PM exposure | DPSEEA |
|---|---|
| *Issue* | Air quality |
| *Definition of indicator* | Years of Life Expectancy Lost (YLL) attributed to the long-term exposure to fine particulate matter due to PM exposure |
| *Underlying definitions and concepts* | The indicator is based on the following definitions:<br>Life expectancy at age x: average number of years of life remaining to persons who survive to age x<br>YLL: A measure of the relative impact of a risk on society or groups of society which provides information on the difference between the life expectancy of two scenarios with different mortality risk.<br>Long-term exposure: The calculation is based on the health risk linked to long-term exposure to air pollution.<br>Fine particulate matter: PM2.5 |
| *Specification of data needed* | Annual concentrations of PM2.5 or PM10 (if no PM2.5 data are available, this value may be estimated using PM10 data; ideally, factors to estimate PM2.5 should be derived from parallel measurements of this two metrics. If such measurements are not available, a factor of 0.6 could be used).<br>Population distribution by age<br>Age specific mortality rates (all causes of death) |
| *Data sources, availability and quality* | National statistics on the population, mortality and age distribution<br>PM2.5 (or PM10): see the Air_Ex1 indicator |
| *Computation* | Calculation can be conducted with WHO software AirQ2 – Life Tables module. Reference PM2.5 concentration =7.5 µg/m3. Use "WHO default" RR estimates<br>**YLL due to deaths in one year per 100,000 entry population**<br>$Y = \Sigma_i (\Delta d_i * ELR_i)/(S/100{,}000)$, i=0,1,2,….100 – age and the sum is for all ages<br>Where<br>$\Delta d_i = d_{empirical}$ (i) – $d_{modified}$ (i) is estimated number of attributable deaths in first year of follow-up (simulation) in age i<br>$d_{empirical}$ (i) is observed number of deaths in age i in the first year of simulation<br>$d_{modified}$ (i) is estimated number of deaths with hazard rate for age i modified by RR<br>$ELR_i$ is Expected Life Remaining calculated for the baseline population & exposure<br>$S=\Sigma_i s_i$ total entry population |
| *Units of measurement* | Years of expected life lost/100,000 population |
| *Scale of application* | Local/regional/national |
| *Interpretation* | WHO systematic review on health aspects of air pollution reconfirmed that there is an associations between exposure to fine particulate matter and mortality.<br>The most complete estimates of both attributable numbers of death and average reduction of lifespan associated with exposure to air pollution are those based on cohort studies. The indicator is based on the difference in life expectancy of a given population under current pollution levels and a (hypothetical) low-pollution scenario, which is set at 7.5 µg/m3 PM2.5 as annual mean. This represents the lower range of concentrations, which were observed in the American Cancer Society study (Pope et al., 2002). |
| *Linkage with the other indicators* | Driving force: *Road transport fuel consumption; Passenger transport demand; Freight transport demand*<br>Pressure: *Emissions of air pollutants;*<br>Exposure: *Exposure to air pollutants*<br>Effects: ***Years of Life Expectancy Lost due to PM exposure*** |

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| *Related data, indicators, information* | EUR/01/5026342, Annex 2: "Life-table methods for predicting and quantifying long-term impacts on mortality".<br>"Quantification of Health Effects of Exposure to Air Pollution" (can be found under http://www.euro.who.int/document/e74256.pdf).<br>Air Quality Health Impact Assessment Tool (AirQ version 2.2.2) at http://www.euro.who.int/air<br>Download the European Health for All (HFA) Database http://www.euro.who.int/hfadb and related products HFA – Mortality Database by leading causes of death, age and sex (HFA-MDB), or access it online at http://hfadb.who.dk/hfa/<br>Check also the information at http://www.euphin.dk/hfa/Phfa.asp |

| Noise_E1 Cardiovascular morbidity and mortality attributable to noise | DPSE**E**A |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Number of cases of cardiovascular problems attributable to noise exposure<br>Number of deaths attributable to noise exposure. |
| *Underlying definitions and concepts* | Concepts:<br>1) The biological plausibility of an increase in cardiovascular risk due to noise exposure has been shown in numerous noise-stress experiments.<br>2) There is qualitative evidence from many epidemiological noise studies that persistent noise exposure increases the risk for cardiovascular diseases.<br>3) Quantitative estimates of the relative risk for highly exposed subjects can be taken from a few reasonably good studies (current status).<br>4) The development of a continuous risk function is a dynamic process that incorporates new results of present and future studies (future status).<br>5) Calculation of the attributable fraction (AR%) and the population attributable risk percentage (PAR%). |
| *Specification of data needed* | For relative numbers:<br>Estimation of the number of people exposed to $L_{den}$ > 65 dB(A).<br>For absolute numbers:<br>Estimation of the number of people exposed to $L_{den}$ > 65 dB(A).<br>Prevalence/incidence of cardiovascular diseases (international classification of diseases, ICD codes) |
| *Data sources, availability and quality* | Noise mapping; acoustical surveys; estimation models<br>National statistical agencies. |
| *Computation* | Relative risk of RR = 1.2 for ischaemic heart diseases when the sound level exceeds 65 dB(A) (value extrapolated from Empirical data)<br>**AR% = (RR-1)/RR * 100**<br>**PAR% = $P_e$/100 * (RR-1)/( $P_e$/100 * (RR-1) + 1) * 100**<br>(AR%) – the attributable fraction<br>PAR% – population attributable risk in percentage<br>$P_e$ – Population exposed<br>PAR – Absolute cases per year due to road traffic noise: **PAR = PAR% * $P_d$**<br>Disease occurrence ($P_d$):<br>Lethal cases from ischaemic heart diseases (ICD 9, 410–414)<br>Lethal cases from acute myocardial infarction (ICD 9, 410) |
| *Units of measurement* | Number of cases |
| *Scale of application* | National as well as local |
| *Interpretation* | The indicator provides a measure of the population percentage with increased cardiovascular risk due to traffic noise exposure. |
| *Related web sites* | Noise DG environment policy: http://europa.eu.int/comm/environment/noise/<br>WHO noise and health Unit: www.euro.who.int/noise<br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf |
| *Policy/ regulatory context* | – |
| *Reporting obligations* | None |

| Hous_Ex5 Indoor radon in dwellings | DPSEEA |
|---|---|
| *Issue* | Housing and Settlements – Indoor comfort |
| *Definition of indicator* | Indoor radon in dwellings –<br>Potential exposure to radon levels in indoor dwellings implies the following:<br>1) existence of a monitoring program<br>2) a defined action radon level<br>3) information at a given area unit (e.g. national or regional) on:<br>- distribution of the dwellings according to radon levels<br>- proportion of effectively detected dwellings with radon levels above action level<br>- proportion of effectively remedied dwellings among the effectively detected |
| *Underlying definitions and concepts* | The indicator is based on the following definitions:<br>Radon level: the annual average of radon activity concentration in a dwelling (in an inhabited room of a house)<br>National or regional radon level: mean of measured radon level in a representative sample (arithmetic, geometric mean, median)<br>Dwelling: the inhabited part of the house<br>Remedy: action done to reduce radon levels<br>National action level: regulation or guideline level of radon joint with a reduction programme<br>Monitoring program: officially carried program of measurement to assess indoor radon levels |
| *Specification of data needed* | Radon activity concentrations should be measured according to national or international guidelines specifying measurement methodology and strategy of sampling.<br>Distribution of radon levels should be estimated on the basis of a representative sample of dwellings of a region. Therefore information should be given on the characteristics of that sample (number of dwellings measured, number of dwellings in the region, methodology of selection of the sample, stratification criteria, dates and duration of the measure, types of detectors).<br>Geometric mean, standard deviation of geometric mean, arithmetic mean, median, proportion of houses above 200 Bq.m-3, 400 Bq.m-3, action level.<br>Information on the number of detected houses, of remedied houses, of the total dwellings in the area. |
| *Data sources, availability and quality* | Such data usually partially exists in European countries. Data should be based on a representative sample for dwellings with sufficient number of measurements.<br>Data on the number of dwellings is usually available at a regional and national level<br>Reporting needs:<br>- a centralised database containing measurement results, and data on dwellings detected and remediated<br>- harmonised guidelines on the measurement and monitoring of indoor radon levels |
| *Computation* | Estimated arithmetic mean, geometric mean, standard geometric deviation, median<br>The distribution of dwelling radon for the following (annual) radon level categories: above 200, 400 Bq.m-3, above national action level<br>Number of houses with radon in each radon level category * 100/total number of houses of the area<br>Number of houses detected * 100/number of houses estimated with radon level above the national action level.<br>Number of houses remediated * 100/number of houses detected with radon level above the national radon level. |
| *Units of measurement* | Bq.m-3 and % |
| *Scale of application* | Local to international |

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| *Interpretation* | Distribution of radon levels is an important indicator of state of exposure at the beginning and the end of the strategic process. It gives indication on potential exposure of the population to high radon levels in dwellings in a given region/country<br>Proportion of houses detected with high levels of radon, proportion of houses remediated among the ones with radon above action levels are indicators of progression of a policy. |
| *Related indicator sets* | http://www.univie.ac.at/kernphysik/oenrap/onrap_e.htm<br>http://www.epa.gov/iaq/radon/images/radonresults85–99.pdf<br>www.euro.who.int/document/aiq/8_3radon.pdf<br>http://www.nrpb.org/radon/index.htm<br>http://www.asn.gouv.fr/publications/radioprotection/radon_mesures.asp |
| *Policy/regulatory context* | Various levels joint with action and regulatory policies or initiatives exist in countries. They rely on:<br>- existence of monitoring program, radon prone areas, existence of education/information campaigns,<br>- definition of radon guidelines levels and incentives for measurement or remediation<br>- or regulations for measurement, radon level limits, actions of remediation, building materials or designs on new houses.<br>But there is no regulation, no directives at the European level.<br>It is therefore necessary:<br>To propose radon levels guidelines for Europe based on a state-of-the art review of the existing evidence for health impacts and effective interventions<br>To propose a set of actions which could be coupled with national housing stock objectives and/or specific public health goals (the latter needs burden of disease assessments). They can inter alia include:<br>(–) guidelines on technical recommendations which could be endorsed by Ministries of (Environment or Health)<br>(–) financial measures and incentives for effective reducing of health risks from exposure to indoor radon |
| *Reporting obligations* | none |

| Hous_E2  Housing safety and accidents | DPSEEA |
|---|---|
| *Issue* | Housing and Settlements – Safety |
| *Definition of indicator* | Housing Safety and Accidents –<br>Accidental (unintentional) injuries and fatalities from external causes (including poisonings) in and around the dwelling, measured by the number of fatalities and injuries requiring medical attention related to dwellings; and if possible, related to dwelling characteristics. |
| *Underlying definitions and concepts* | Includes –<br>Fatalities and physical injuries resulting from falls, being struck by objects, cuts and lacerations from the structure or equipment.<br>Fatalities and burn injuries caused by unintentional dwelling fires.<br>Poisonings includes those resulting from unintentional or mistaken (or inquisitive in the case of small children) ingestion of medicines, cleaning products, pesticides etc.<br>Toxic effects of gases, whether poisoning or asphyxiation (eg, from carbon monoxide).<br>The dwelling should include the private internal and external space and any commonly shared internal and external space, associated with the dwelling.<br>Data on dwelling characteristics (eg, age, type) may provide a proxy for features likely to increase or reduce the risk of accidents.<br>Accident and poisoning data should be comparable to the following ICD-10[1] codes (or equivalent ICD-9) –<br>Physical Injuries and poisonings: ICD-10 codes S00 to T32; T36 to T60; T64 to T65; T71; and T75.1<br>Burn Injuries: ICD-10 codes T20 – T31 (excluding corrosion injuries)<br>Fatalities: death as a direct result of an accidental injury or poisoning<br>External Causes: ICD-10 codes W00 to X19; and X40 to X49<br>Dwelling: (ICD-10 fourth code. 0) |
| *Specification of data needed* | Number of burns, physical injuries and poisonings requiring medical attention and which resulted from external causes in and around the dwelling per annum.<br>Number of fatalities resulting from house fires or external causes in and around the dwelling per annum.<br>Number of reported dwelling fires per annum.<br>Number of occupied dwellings.<br>Population living in dwellings.<br>Condition and/or characteristics of dwellings. |
| *Data sources, availability and quality* | Hospital and health records should provide data on medical attention given for injuries etc. National data could be extrapolated from samples. (Similar data collected and provided for Injury Surveillance System[2].)<br>Mortality data from death certificates and coroners' records. Should be available locally and nationally.<br>Data on house fires (and possibly deaths and injuries) from fire brigade records.<br>Dwelling and population numbers from census and housing records. Should be available locally and nationally.<br>Dwelling condition and/or characteristics could be obtained through censuses and surveys. |

1 International Statistical Classification of Diseases and Related Health Problems, 10th Revision. (1992) WHO.
2 Previously European Home and Leisure Accident Surveillance System (EHLASS). Now part of the Injury Prevention Programme of the Public Health Programme.

| | |
|---|---|
| *Computation* | 1) Health effects and injuries<br>I per 10,000 N<br>where I is the total number of burns, injuries and poisonings from external causes, and N is dwellings (or population).<br>2) Mortality<br>F per 10,000 N<br>where F is the number of fatalities from accidents, poisonings or fires, and N is dwellings (or population).<br>As a secondary indicator – related to housing type, material and electrical safety – the number of deaths due to home fires is computed separately.<br>3) Fire deaths<br>Total: FF per 10,000 N<br>Relative: FF/FR * 100<br>where FF is the total number of fatalities from fires, N is dwellings (or population), and FR is the number of reported home fires. |
| *Units of measurement* | Number per 10,000 dwellings.<br>Or, number per 10,000 population. |
| *Scale of application* | Locally, regionally, nationally, and internationally.<br>Locally, it could be further refined as the Number of injuries, poisonings and deaths per dwelling type. |
| *Interpretation* | The computations for mortality and injuries aggregate all health effects of various home accidents, poisonings and fires. For each value, it is necessary to take a detailed look into the distribution of accident types leading to the health effects or death cases. For death cases, the secondary indicator on home fire deaths gives already a first insight into the relevance of home fires for home accident fatalities. The percentage of home fire events leading to death shows the potential vulnerability of the housing stock.<br>Home accidents and fires can be a result (i) solely of the design, construction and maintenance of the dwelling; (ii) solely of the behaviour of the person (negligence, risk-taking, impaired mobility, impaired vision, lack of experience and knowledge); or (iii) a combination of (i) and (ii). The Indicator does not distinguish between these.<br>There may be under-estimations of the numbers of injuries and poisonings because of accessibility to medical services. However, at local, regional and national levels, the Indicator can be used to monitor the effectiveness of actions and policies. Internationally, the Indicator may be less reliable because of reporting procedures and provision of medical services. |
| *Linkage with other indicators in the set* | Crowding<br>Household hygiene |
| *Related indicator sets* | WHO Children's Environmental Health Indicators –<br>http://www.who.int/phe/health_topics/children/en/<br>Sustainable Measures Indicators –<br>http://www.sustainablemeasures.com/Database/Housing.html<br>http://www.sustainablemeasures.com/Database/Health.html<br>ISS –<br>http://europa.eu.int/comm/health/ph_determinants/environment/IPP/ipp_en.htm |
| *Policy/regulatory context* | Campaigns and education programmes – to inform and make residents more aware of home safety and safety precautions/safe behaviour.<br>Control of new building – regulating for safer design and construction of new dwellings.<br>Controls for existing dwellings – legislation for enforcement and/or subsidies to ensure safety measures in existing dwellings. |
| *Reporting obligations* | none |

| Traf_E2 Potential Years of Life Lost due to road traffic accidents | DPSE**E**A |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Potential Years of Life Lost (PYLL) attributable to transport accidents |
| *Underlying definitions and concepts* | Potential Years of l life lost for premature deaths directly or indirectly attributable to involvement in a traffic accident and<br>Potential years of life lost for all causes including traffic accident |
| *Specification of data needed* | Life expectancy at every age |
| *Data sources, availability and quality* | Potential years of life lost should be calculated using death certificate data. It should be better avoiding the police register because of the poor validity of this kind of data. |
| *Computation* | Numerator: total number of potential years of life lost for traffic accident<br>Denominator: total number of potential years of life lost for all causes |
| *Units of measurement* | Number of years of life lost for traffic accident divided for the years of life lost for all causes |
| *Scale of application* | Local to international. Problems of consistency and availability may limit interpretation at broader scales |
| *Interpretation* | PYLL is and indicator of premature mortality. With respect to mortality rates it gives a measure not only of the mortality impact but also of the characteristics of population involved (young people for road accident). It is useful when assessing community health research priorities allowing at meantime comparison to be made over time and place |
| *Linkage with other indicators* | Driving forces: *Passenger transport demand by mode of transport*<br>Event: *Road accident*<br>Exposure: *Person time spent on the road*<br>Effect: *Injury rate due to road traffic accidents;* ***Potential Years of Life Lost due to road traffic accidents*****;** *DALY lost due to road traffic accidents* |
| *Related data indicators* | WHO Life table and healthy life expectancy data:<br>http://www.who.int/health_topics/global_burden_of_disease/en/ |

| WatSan_A1 Management of bathing waters | DPSEE**A** |
|---|---|
| *Issue* | Water and Sanitation |
| *Definition of indicator* | Percentage of identified bathing waters which are covered by **management systems** as described by WHO (2003). |
| *Underlying definitions and concepts* | The **management system** (WHO, 2003) will facilitate (i) the **real time prediction** of bathing water quality to underpin (ii) provision of **informed choice** to the bathing public through the provision of beach signage and/or equivalent communication methods |
| *Specification of data needed* | The total number of identified bathing waters in a nation, or suitable sub-national reporting unit (T),<br>Number of identified compliance locations covered by a **management system** (M) |
| *Data sources, availability and quality* | Country regulators and Governments and eventually the EEA |
| *Computation* | The indicator can be computed as: (M/T)*100 |
| *Units of measurement* | Percentage |
| *Scale of application* | Regions to international |
| *Interpretation* | High percentage suggests a reduced exposure and health risk. |
| *Linkage with the other indicators* | Pressure: *Wastewater treatment coverage and effluent and disposal policy*<br>State: *Recreational water quality*<br>Effect: *Sporadic cases of self limiting gastroenteritis and potentially outbreaks of waterborne diseases*<br>*Action:* ***Management of bathing waters:*** *Appropriate sewage effluent treatment and disposal, appropriate diffuse source pollution control to limit, principally, zoonotic pathogen exposures from agriculture and finally, management and monitoring of recreational water as recommended in Directive 76/160/EEC ad into the future by WHO (2003) and CEC (2002);* |
| *Related web sites* | Bathing water quality in the EU Directive 76/160/EEC at:<br>http://www.europa.eu.int/water/water-bathing/directiv.html<br>The EU bathing water quality report for 2000 (annually) at<br>http://www.europa.eu.int/water/water-bathing/report.html<br>Data on compliance for the EU-15 with the exception of France for 1992 – 2000 downloaded:<br>http://dataservice.eea.eu.int/dataservice/<br>Proposal for a revised Directive of the European Parliament and of the Council concerning the Quality of Bathing Water COM(2002)581 http://europa.eu.int/eur-lex/en/com/pdf/2002/com2002_0581en01.pdf<br>WHO 2003 Guidelines for safe recreational water environment (GSRWEs): Vol. Coastal and Fresh-waters. Geneva, WHO at:<br>http://www.who.int/water_sanitation_health/bathing/srwe1/en/<br>The Annapolis Protocol: http://www.who.int/water_sanitation_health/bathing/Annapolis.pdf |
| *Policy/ regulatory context* | Directive 76/160/EEC provides the principal health protection instrument in Europe for identified bathing waters which sets out to protect public health as its principal objective.<br>The Bathing Water Directive has been recently revised to incorporate the microbiological criteria of the new WHO Guidelines for Safe Recreational Water Environments (GSRWE, 2003) together with the beach management principles of the Annapolis protocol (WHO, 1999) which accommodate real time prediction of microbiological hazard for public health protection.. The Council has adopted the amended proposal for a Directive of the European Parliament and of the Council concerning the management of bathing water quality on 23 June 2004. This indicator will be refined to reflect the very recent finalization of the revised Directive and associated reporting obligations |

## III. Indicators recommended for further elaboration

| Hous_Ex2 Accessibility | DPSEEA |
|---|---|
| *Issue* | Housing and Settlements – Use and Economy |
| *Definition of indicator* | Accessibility – Physical environmental design details defined as physical environmental barriers in relation to persons with functional limitations. This indicator can be measured from the *accessibility* perspective, i.e. based on objective, professional assessments, or from the *usability* perspective, i.e. based on subjective user perceptions.<br>The indicator is delimited to the dwelling unit and the immediate housing environment. The immediate housing environment consists of the collectively shared spaces of/around the residential building (such as stairwell, cellar rooms, parking lot, entrance area, outdoor spaces), plus the private outside spaces such as gardens and balconies. |
| *Potential health impact* | Activity limitations, restricted participation and social isolation, potentially leading to negative psychological reactions and mental health problems (e.g. stress, depression), impaired body function and other negative health effects (e.g. osteoporosis). |
| *Vulnerable groups* | Elderly people and/or persons with functional limitations (including all ages). |
| *Underlying definitions and concepts* | Physical environmental barrier: Any design feature that acts as a barrier for persons with functional limitations. The demands made by the environment on the individuals are so high that it has a negative influence on their performance of daily activities and participation in society.<br>Functional capacity: A person's ability to perform fundamental physical and mental actions in daily life.<br>Functional limitation: Restriction in a person's ability to perform fundamental physical and mental actions in daily life.<br>Accessibility: The relationship between functional capacity and environmental demands. Accessibility comprises 1) a personal component and 2) an environmental component. |
| *Specification of data needed* | A) Prevalence of physical environmental barriers in dwelling units and their immediate environment<br>➢ High thresholds and/or steps at the entrance<br>➢ Bathtub/showerstall without any place/equipment to sit<br>➢ Narrow door openings in indoor settings<br>B1) Number of persons, and households with at least one person with functional limitations (based on WHO International Classification of Functioning, Disability and Health (ICF), ICF version 2001)<br>➢ Mobility, particularly changing body position (ICF codes d4100 – d4109)<br>➢ Energy and stamina (ICF codes b1300, b1301, b1308, b1309 and b4550 – b4559)<br>➢ Balance and coordination (ICF codes b7600 – b7609)<br>B2) Number of citizens with an age of 75 years and more (as proxy information in case data on functional limitations is lacking)<br>C) Existence of national policies, legislation etc. on housing adaptation/home modification for people with functional limitations<br>D) Annual number of dwellings adapted based on C, i.e. to meet needs of persons with functional limitations.<br>N.B. – Institutional and sheltered housing excluded.<br>E) Amount of public financial resources invested in housing adaptation/home modification to meet needs of persons with functional limitations<br>F) Total population<br>G) Total number of dwellings<br>H) Gross Domestic Product |

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|---|---|
| *Data sources, availability and quality* | Census and surveys. Some information is most likely available in most countries, while its quality in relation to the definitions in this document is doubtful.<br>Numbers and types of housing adaptation/home modification measures. Statistics on housing adaptations are most likely available in those countries having this kind of support system.<br>Prevalence on single functional limitations should be available, at least to some extent. It should be noted that epidemiological data on combinations of functional limitations is scarce if at all available. |
| *Computation* | The indicator contains a technical and a policy dimension.<br><br>Technical dimension:<br>**1)** Accessibility = 100* DEB/DT<br>with DEB being the number of dwellings units with one or more of the three environmental barriers specified; and DT the total number of dwellings.<br>**2)** Functional limitations = 100* FLP/TP<br>with FLP being the number of persons with one or more of the three functional limitations specified; and TP the total population.<br>OR<br>Ageing = 100* OP/TP<br>with OP being the number of persons with an age of 75 and higher, and TP the total population.<br><br>Policy dimension:<br>3) Policy = Existence of any regulation or mechanism through which the specific needs of persons with functional limitations are supported and met (e.g. through public grants for housing adaptation/home modification)<br>4) Housing adaptation/home modification = 100* AD/DT compared to 100* FLH/TH with AD being the number of adapted/modified dwellings and DT being the total number of dwellings; and FLH being the number of households with at least one member with a functional limitation and TH being the total number of households.<br>5) Adaptation investment = 100* AI/GDP<br>with AI being the total amount of public grants and resources invested in housing adaptation/home modification, and GDP being the Gross Domestic Product |
| *Units of measurement* | Percentages<br>Ratio of percentages |
| *Interpretation* | This indicator is based on information that may be collected through regional or local surveys, or aggregated and extrapolated data. Age as a proxy for functional limitations, as well as the selected choice of environmental barriers or functional limitations (if data exists) is applied in order to provide an informed estimation, indicating whether there are specific conditions in countries under which accessibility problems could arise. The results of the indicator therefore demonstrate the scope of the most common potential problems, indicating a need to look into this area in detail. It should be borne in mind that the results of the suggested computations will indicate considerably lower magnitudes of accessibility problems than actually existing.<br>The environmental barriers proposed by the indicator are based on empirical data collected with scientific methodology and represent the highest barrier prevalences in some Western and Eastern European countries (from the EC-funded ENABLE-AGE Project; www.enableage.arb.lu.se. Preliminary data used with permission from the project consortium, Feb 2004). |
| *Scale of application* | Descriptive statistics on the prevalence of environmental barriers can be presented on different levels; for individual dwelling units, local districts, regions, and nations. |
| *Linkage with other indicators in the set* | Housing safety and accidents<br>Affordability |
| *Related indicator sets* | Data on functional limitations in the population.<br>Enable-Age Project: www.enableage.arb.lu.se. |

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|---|---|
| *Policy/regulatory context* | Guidelines on accessibility standards for housing construction<br>Implementation of administrative and/or financial support systems to enhance the adaptation of housing conditions for persons with functional limitations<br>Increased integration of the specific needs of persons with functional limitations into urban planning and design |
| *Reporting obligations* | none |

| Noise_E2 Annoyance and sleep disturbance due to noise | DPSE**E**A |
|---|---|
| *Issue* | Noise |
| *Definition of indicator* | Percentage of the population reporting annoyance by certain sources of environmental noise<br>Percentage of the population with self-reported sleep disturbance by environmental noise |
| *Underlying definitions and concepts* | The indicator is based on the assumption that exposure to high levels of noise originated from different sources, e.g. traffic (road, railway and air), industry, entertainment facilities, induce general annoyance and sleep disturbance. Underlying definitions are:<br>**Annoyance**: "a feeling of displeasure associated with any agent or condition, known or believed by an individual or group to adversely affect them" (cf. Guidelines for Community Noise: B. Berglund, T. Lindvall, D. Schwela Ed, WHO, Geneva, 1999). It can be assessed by standardised questionnaires.<br>**Sleep disturbance**: self-reported noise-induced sleep disturbance and increase of noise-induced awakenings during the habitual sleeping time. Sleep disturbance is seen as a health effect on its own, but may cause also after effects like mood changes, fatigue (and therewith related accidents) and other impaired functions.<br>**Population:** total population surveyed<br><br>For this indicator the use of surveys is recommended. The calculation using dose-effect curves is valuable and will be performed on the scope of the environmental noise directive but surveys allow a better assessment of country differences. |
| *Specification of data needed* | Self-assessment of the extent of annoyance and self-reported sleep disturbance on a standardised questionnaire by source.<br>The subdivision of the source type can be the following: by certain sources:<br>***Road traffic:***<br>▪ highway<br>▪ urban road<br>▪ vans<br>▪ heavy trucks<br>▪ motor bikes<br>▪ mopeds/scooters<br><br>***Air traffic:***<br>▪ civil aviation<br>▪ military flight<br>▪ general aviation<br><br>***Railway traffic:***<br>▪ passenger trains<br>▪ freight trains<br>▪ metro<br><br>***Industry:***<br>▪ factories and manufacturers<br>▪ building equipment<br>▪ load/unload facilities<br><br>***Neighbour noise***<br><br>Total population of the sample surveyed |
| *Data sources, availability and quality* | Data are collected by surveillance of a representative sample of the population, preferably by trained interviewers, although in some circumstances a telephone survey is a viable alternative. Postal surveys are not recommended. Preferably only persons living longer then one year on the address are selected.<br><br>For annoyance the methodology and questionnaire model of the ISO/TS 15666:2003 "Acoustics – Assessment of noise annoyance by means of social and socio-acoustic surveys" should be followed.<br>For sleep disturbance the ICBEN's standardized questionnaires and scales should be used. More information in http://www.xs4all.nl/~rigolett/ENGELS/quest/questionnaire.htm. |

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| *Computation* | **Annoyance**: the indicator can be computed for each source of noise as:<br>100 * ($N_a$/$N_t$ )<br>where $N_a$ is the number of annoyed people and $N_t$ is the total number of surveyed population<br>The number of **annoyed people** is counted by adding the subjects **scoring 6, 7, 8, 9 and 10**.<br>The number of **highly annoyed people** is counted by adding the subjects **scoring 8, 9 and 10**.<br>Information on annoyance should be supplied with description on grouping of the noise sources<br><br>**Sleep**: the indicator can be computed for each source of noise as:<br>100 * ($N_{sd}$/$N_t$ )<br>where $N_{sd}$ is the number of sleep disturbed people and $N_t$ is the total number of surveyed population.<br>The number of **sleep-disturbed people** is counted by adding the subjects **scoring 6, 7, 8, 9 and 10**.<br>The number of **highly sleep-disturbed people** is counted by adding the subjects **scoring 8, 9 and 10**.<br>Information on sleep disturbance should be supplied with description on grouping of the noise sources |
| *Units of measurement* | Percentage |
| *Scale of application* | National as well as local – residential settings |
| *Interpretation* | The indicator provides a measure of health effects related to exposure to high levels of environmental noise by some sources when the survey is carefully designed and the above methodology is used. I |
| *Related web sites* | Noise DG environment policy: http://europa.eu.int/comm/environment/noise/<br><br>WHO noise and health unit: www.euro.who.int/noise<br><br>Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://whqlibdoc.who.int/hq/1999/a68672.pdf<br><br>ISO/TS 15666:2003 Acoustics –Assessment of noise annoyance by means of social and socio-acoustic surveys:<br>http://www.iso.ch/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=28630 |
| *Policy/regulatory context* | European directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 |
| *Reporting obligations* | Practical compliance: MS report on the implementation of limit values of Lden and Lnight for some sources of noise<br>MS inform regularly the EC of major roads, railways, airports and agglomerations with more than 250,000 inhabitants<br>Description of policy measures: strategic noise maps showing the situation for all agglomerations with more than 250,000 inhabitants, all major roads, railways and airports |

| Traf_S3 Speed limit exceedances | DPSEEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Percentage of vehicles exceeding speed limits |
| *Underlying definitions and concepts* | Speed limit: top speed permitted according to the road (motorways, urban areas, other road) and vehicle type (car, motorcycle, bus, lorry)<br>Circulating vehicles: number of circulating vehicles at the site of measurement |
| *Specification of data needed* | Number of vehicles exceeding speed limits<br>Number of circulating vehicles |
| *Data sources, availability and quality* | Data on vehicles exceeding the speed limit are based on surveys systematically conducted. The different methodologies (several technical devices, size of data set, measuring point, measuring time) used for the estimation of this data considerably limit any comparison between different studies. Sometimes, speed limit offences as detected by the police are regarded as an alternative measurement. This, however, has clear restrictions regarding the comparability of results, because the results are strongly influenced by the enforcement strategies of the police. Self-reported speeds from telephone surveys is also a cheap solution already used, even if self-reported behaviours are difficult to interpret. |
| *Computation* | Numerator: number of vehicle exceeding limit respect to the road type (motorway, urban area, other road)<br>Denominator: Number of circulating vehicles stratified by type (motorcycle, car, bus, lorries) |
| *Units of measurement* | Percentage of vehicles exceeding limit |
| *Scale of application* | Usually this data are collected at local level even if cases of national based study are available |
| *Interpretation* | This indicator gives a figure of the level of transport safety and improves the understanding of road accident trends. The regular monitoring gives a good basis of information in order to develop effective measures to reduce the number of killed or injured people because of the strong relationship between speed and the number of accidents and the severity of injuries. |
| *Linkage with other indicators* | State: ***Speed limit exceedances****; Road accident rate*<br>Exposure: *Person time spent on the road*<br>Effect: *Injury rate; Mortality rate; Potential years of life lost; DALY lost due to road traffic accident* |
| *Related data indicators* | ETSC report on transport safety performance indicators<br>http://www.etsc.be/rep.htm |

| Traf_Ex1 Person time spent on the road | DPSEEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Person hour spent on the road to get to the place of work or the school by main mode of travel. "Main mode of travel" means the one used for the longest part of the trip. Within parts of the trip of equal length, it should be used the last one as "mode of travel" |
| *Underlying definitions and concepts* | Number of hour spent on the road: total amount of time spent on the road to get to the usual place of work or the school from home |
| *Specification of data needed* | Number of hour spent on the road to get the place of work or the school by person, by main mode of travel (car, bus, metro, motorcycle, bike, on foot)<br>Total resident population |
| *Data sources, availability and quality* | Estimated time spent on the road should be provided by Household surveys on daily and long distance mobility, Road traffic surveys, surveys of enterprises involved in scheduled and non-scheduled bus services and census data even if this data could be scarcely accurate. National inventories are usually available from national statistics bureau. At international scale Eurostat provide data for EU countries and UNECE for all the countries in the European region. However data on non-motorised mobility (walking and cycling) are extremely scarce for the EU and need to be improved<br>Data on residents should be available from national censuses and should be reliable<br>Eurostat reports for the years 1998–2002 the results of the "time Use Surveys" in ten European Countries. |
| *Computation* | Computation could be given in:<br>– Number of hours spent on the road/inhabitant, or<br>– Number of hours spent on the road by main mode of travel (car, bus, metro, motorcycle, bike, on foot) |
| *Units of measurement* | Person hour per inhabitant or main mode of travel |
| *Scale of application* | Usually national: local or regional should be preferable even if more effort is required |
| *Interpretation* | This indicator should measure the exposure to the risk for different categories of road users classified on the basis of means of transport used. In relation to the distances km travelled, this indicator provides a better estimation about vulnerable users (pedestrians and cyclists) since it is difficult to calculate for these the real amount of distance travelled. On the other hand, for some modes of transport it is possible to convert the time spent to distances travelled using the average speed of vehicles. |
| *Linkage with other indicators* | State:*Speed limit exceedances; Road accident rate*<br>Exposure: *Distances travelled,* ***Person time spent on the road*** |
| *Related data indicators* | European agency for environment:<br>http://themes.eea.eu.int/Sectors_and_activities/transport/indicators<br>European conference of ministry of transport, Trends in the Transport Sector West European Countries: http://www1.oecd.org/cem/stat/trends/west.htm<br>For update methodology see: UNECE transport division,<br>http://www.unece.org/trans/doc/2002/wp6/inf01.pdf |

| Traf_Ex2 Use of vehicle safety devices | DPSEEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Percentage of vehicle safety device use in the circulating population |
| *Underlying definitions and concepts* | Vehicle safety device: the term includes the main device designed to protect car (seat belt, child restrain) and motorcycle occupants (helmet)<br>Circulating population: number of car and/or motorcycle occupants as resulted from surveys |
| *Specification of data needed* | Number of car/motorcycle occupants properly using seat belt, child restrains, helmet<br>Number of car/motorcycle occupants |
| *Data sources, availability and quality* | Data on use of safety devices could be obtained from specific studies and field surveys. The estimates must be based on direct observation of occupants in vehicles on roadways. Some difficulties could be due to the distinction into front/rear passenger and to the identification of children who need restrains according to the national legislation. Rates determined from secondary sources, e.g., police crash reports or self-reported use in telephone surveys, are not widely used because of poor reliability |
| *Computation* | Seat belt use<br>Numerator: number of people using seat belt<br>Denominator: number of car occupants distinguished in driver and front/rear passenger<br><br>Child restrains use<br>Numerator: number of children as car passenger properly restrained<br>Denominator: number of children distinguished in front/rear passenger<br><br>Helmet use<br>Numerator: number of motorcycle occupants using helmet<br>Denominator: number of motorcycle occupants distinguished in driver and passenger |
| *Units of measurement* | Percentage of passengers properly using seat belt, child restrains, helmet |
| *Scale of application* | Usually local |
| *Interpretation* | This indicator measures changes in people behaviours. It could also be used to monitor the efficacy of specific preventive actions |
| *Linkage with other indicators* | Exposure: ***Use of vehicle safety devices***<br>Effect: *Mortality rate; Potential years of life lost; DALY lost due to road accident* |
| *Related data indicators* | Report on availability of seat belt wearing data in OECD countries<br>http://www.bast.de/htdocs/fachthemen/irtad/utility/special_rep_seatbelt.pdf<br>Site of European commission about road safety actions programme<br>http://europa.eu.int/comm/transport/road/roadsafety/index_en.htm |

| Traf_E4 DALY lost due to road traffic accidents | DPSEEA |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | –Number of DALYs lost as a consequence of traffic accident for total resident population standardized per age and sex<br>–Percentage of DALYs lost as a consequence of traffic accident compared to the total number of DALYs lost for all causes |
| *Underlying definitions and concepts* | D.A.L.Y. is an indicator of time lived with a disability and the time lost due to premature mortality.<br>The values incorporated in the DALY indicator are:<br>Duration of time lost due to a death at each age: this measure requires the definition of the potential limit of life. For a specific limit, the expectations are based on life table<br>Disability weights or degrees or suffering associated with different non-fatal conditions.<br>Age Weights which indicate the relative importance of healthy life at different ages<br>Time preferences which is the value of health gains today, compared to the value attached to health gains in the future |
| *Specification of data needed* | Duration of time lost due to a death at each age<br>Disability weights<br>Age-weights<br>Time preferences (discounting)<br>Total resident population<br>Standard population |
| *Data sources, availability and quality* | Data on disability could be provided by health surveys or hospital discharge data, or ad hoc registries on a local basis.<br>Data on mortality could be collected from death registries These data could suffer from limitation due to death cause definitions (reference may be made only to the nature of the injury causing death, not its source) and to a lack of a commonly agreed definition of persons killed in a traffic accident.<br>Disability weights and age weights are those used in the World bank report established with the participation of a group of independent experts.<br>Data on resident population standardized for age and sex should be available from national censuses and should be reliable. European population could be used as standard |
| *Computation* | Numerator: Total number of DALY lost as a consequence of a traffic accident. The DALYs lost due to disability at age "x" is calculated using the following formula<br>$DALYs=(D)*(Cxe^{-Bx})(e^{-r(x-a)})$<br>Where "*D*" is the disability weight (ranging from 1 for death to 0 for perfect health)<br>$(Cxe^{-Bx})$ is the function to calculate the age weights<br>$(e^{-r(x-a)})$ is the discounting function used to convert future benefits into net present value terms<br>Denominator:<br>–total number of DALYs lost for all causes<br>–total resident population standardized for age and sex |
| *Units of measurement* | Number of DALYs lost for traffic accident divided by number of DALYs lost for all causes and<br>Number of DALYs lost divided by the total population standardized for age and sex |
| *Scale of application* | Local to international because problems of consistency and availability may limit interpretation at a broader scale |
| *Interpretation* | This indicator is a combination of years of life lost and years lived with a disability. It offers the possibility to compare the total burden of non fatal illness or injury between different countries |
| *Linkage with other indicators* | State: *Road accident; Speed limit exceedances*<br>Exposure*: Use of vehicle safety device*<br>Effect: *Mortality rate; Injury rate; Potential years of life lost;* ***DALY lost due to road traffic accidents;*** *Mortality due to drinking driving* |
| *Related data indicators* | WHO Life table and healthy life expectancy data:<br>http://www.who.int/health_topics/global_burden_of_disease/en/ |

| Traf_E5 Mortality due to drinking driving | DPSE**E**A |
|---|---|
| *Issue* | Transport, housing and human settlements |
| *Definition of indicators* | Number of deaths due to drunk driving/population |
| *Underlying definitions and concepts* | Alcohol use: data element which describes the suspicion or evidence of alcohol use preceding the event by persons involved in the event.<br>Road accident: any collision that involves at least one vehicle in motion on a road normally open to traffic including those in which a vehicle in collision with a pedestrian is involved and causing at least an injury<br>Total resident population stratified by gender and age. Deaths of tourists could be found in the numerator of the mortality rate, while in the denominator only resident population is counted |
| *Specification of data needed* | Number of drivers under the effect of alcohol involved in fatal road accident<br>Total resident population |
| *Data sources, availability and quality* | Data on deaths in accidents due to alcohol consumption: are collected by death certificate and police reports. Beside the usual problem related to this source of information, several studies, carried out in different countries, have shown that alcohol-related deaths are considerably underreported on death certificates. This underreporting seems to be due to social desirability bias that induce many physicians to avoid using codes that explicitly mention alcohol aetiology. Furthermore many police reports are based on personal opinion of policemen and not on measurements<br>Data on residents are available from national censuses and should be reliable |
| *Computation* | Numerator: Number of deaths in road accidents due to alcohol assumption<br>Denominator: Total resident population |
| *Units of measurement* | Number of deaths in road accidents due to alcohol assumption divided by total resident population |
| *Scale of application* | Local to international, because problems of consistency and availability may limit interpretation at broader scales |
| *Interpretation* | This indicator measures the risk of being involved in a fatal road accident due to alcohol. The numerator includes casualties because this data are more reliable respect to injury ones and allows a better comparison between several countries. |
| *Linkage with other indicators* | State: *Speed limit exceedances*<br>Event: *Road accident*<br>Effect: *Injury rate; Mortality rate; Potential years of life lost; DALY lost due to road accidents;* ***Mortality due to drinking driving*** |
| *Related data indicators* | EUROCARE report on drinking and driving in Europe<br>http://www.epha.org/IMG/pdf/Drinking_and_Drg_in_Euro.pdf<br>ETSC (European transport safety council ) report on transport safety performance indicators<br>SWOV The Netherlands ( Institute for Road Safety Research)<br>http://www.swov.nl/en/kennisbank/ |

| WatSan_E1 Outbreaks of waterborne diseases | DPSEEA |
|---|---|
| *Issue* | Water and Sanitation |
| *Definition of indicator* | Number of outbreaks of water-related illness reported separately for drinking-water and recreational waters |
| *Underlying definitions and concepts* | **Outbreak:** an occurrence of two or more linked cases of the same illness, or an increase in the number of observed cases over the respected number. Outbreaks usually occur in a very short time e.g. les than one month<br>**Waterborne diseases**: diarrhoeal and other infectious diseases |
| *Specification of data needed* | Number of outbreaks of waterborne diseases within a specified period (e.g. a year) |
| *Data sources, availability and quality* | Data on the number of outbreaks of waterborne diseases can be derived from a variety of sources, including:<br>Community-based and national surveillance programmes<br>Special surveys<br>All these are likely to lead to significant under-estimation of the number of outbreaks, due to incomplete referral and reporting. Serious inconsistencies in the estimates also occur between different areas or reporting periods because of variations in referral rates, in diagnosis and in reporting methods and accuracy.<br>Data on the total resident population can usually be obtained from national censuses. |
| *Computation* | **The results for drinking-water and recreational water should be presented separately**. |
| *Units of measurement* | Number |
| *Scale of application* | Local to international, though at broader scales interpretation is limited by problems of data consistency and completeness as well as differences in surveillance approaches |
| *Interpretation* | Careful, because of the inherent inconsistencies and inaccuracies in the available data. |
| *Linkage with the other indicators* | Pressure: *Wastewater treatment coverage*<br>State: *Recreational water quality*, *Drinking-water quality for microbiological parameters*<br>Exposure: *Potentially unsafe drinking-waters*<br>Effect: ***Outbreaks of waterborne diseases***<br>Action: *Water safety plans, Management of bathing waters* |
| *Related web sites* | Current revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines2/en/<br>Rolling revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines3/en/<br>The UNECE/WHO Protocol on Water and Health:<br>http://www.euro.who.int/watsan/MainActs/20030219_1<br>Disease surveillance and waterborne outbreaks<br>http://www.who.int/water_sanitation_health/dwq/en/iwachap6.pdf<br>Computerised Information System for Infectious Diseases http://cisid.who.dk/Csr/outbreaks/ |
| *Policy/ regulatory context* | Currently, there is no EC legislation regarding disease surveillance and waterborne outbreaks.<br>The EC has not ratified the joint WHO and UN ECE Protocol on Water and Health.<br>This statistics is not being collected within the framework of the EC legislation. In the framework of the Community programme for action in the field of public health and the EU Public Health Information Network (EUPHIN) a surveillance system is under establishment for 35 agreed communicable diseases.<br>Data on this indicator is being published in several European countries as well as by WHO/Europe CISID. |

| WatSan_A2 Water safety plans | DPS**E**E**A** |
|---|---|
| *Issue* | Water and Sanitation |
| *Definition of indicator* | Proportion of the population served by a potable water supply covered by a 'water safety plan' as described by WHO (2002). |
| *Underlying definitions and concepts* | **Water safety plan** precludes: (i) risk assessment to define potential health outcomes of water supply, (ii) system assessment to determine the ability of the water supply system to remove pathogens and achieve defined water quality targets, (iii) process control using HACCP, and (iv) process/system documentation for both steady state and incident-based (e.g., failure or fault event) management.<br>An appropriate **water safety plan** will**:** (i) contain a HACCP assessment of the full supply system from raw water gathering grounds to the consumers' tap and (ii) maintain a quality assurance system to monitor and maintain the management performance of the system. |
| *Specification of data needed* | The population served by a regulated water supply covered by a **water safety plan** (N) and the total population (P). |
| *Data sources, availability and quality* | Country regulators and Governments and eventually the EEA |
| *Computation* | The indicator can be computed as:<br>(N/P)*100 |
| *Units of measurement* | Percentage |
| *Scale of application* | Regions to international |
| *Interpretation* | High percentage suggests a reduced exposure and health risk. |
| *Linkage with the other indicators* | Pressure: *Wastewater treatment*<br>State: *Drinking-water quality*<br>Effect: *Outbreaks of waterborne diseases*<br>Action: ***Water safety plans** to ensure source and supply integrity (WHO, 2002) together with effective monitoring of raw and potable water quality.* |
| *Related web sites* | Council Directive 98/83/EC on the quality of water intended for human consumption<br>http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/l_330/l_33019981205en00320054.pdf<br>Current revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines2/en/<br>Rolling revision of the WHO Guidelines for drinking-water quality:<br>http://www.who.int/water_sanitation_health/dwq/guidelines3/en/<br>Water safety plans http://www.who.int/water_sanitation_health/dwq/wsh0207/en/index8.html<br>Water safety plans also:<br>http://www.who.int/docstore/water_sanitation_health/GDWQ/Updating/draftguidel/2003gdwq4.pdf<br>Water Quality – Guidelines, Standards and Health: Assessment of Risk and Risk Management for water-related infectious diseases, WHO, Geneva, 2001<br>http://www.who.int/water_sanitation_health/dwq/whoiwa/en/ |
| *Policy/ regulatory context* | Currently, there is no EC legislation regarding such water safety plans but they have been suggested by the 3rd revision of WHO Drinking Water Guidelines The 3rd edition of the WHO Guidelines for Drinking-water Quality launched on 21 September 2004. This comprehensive and updated edition includes expanded coverage of risk assessment and management for both microbiology and chemicals, as well as guidance on example applications. |

WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

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**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 11-1

# Denmark Report on Pilot Study

## DEVELOPMENT OF ENVIRONMENT AND HEALTH INDICATORS FOR EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

## Development of EH Indicators for EU Countries (ECOEHIS)

### WHO project co-sponsored by EC DG SANCO (SPC 2002300)

# Pilot Study on the Environmental Health Indicators

## Report from Denmark

**June 30, 2004**


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# Summary

The WHO - European Centre for Environment and Health is implementing a project to establish an environmental and health (EH) indicator system co-sponsored by EC DG SANCO (SPC 2002300). The system is designed to serve public health monitoring and environmental policies in Member States as well as to support multinational analyses. The methodology developed by the WHO project provides the basis for a set of core environment and health indicators for European Union (EU) countries. On the basis of the European Commission sponsored WHO project "Development of Environment and Health Indicators for the EU countries" (ECOEHIS) a Working Group in 2003 identified a set of environment and health indicators adequate for EH monitoring in the EU covering the following seven issues: Air quality, Noise, Housing and settlement, Transport accidents, Water and sanitation, Chemical emergencies and Radiation.

In the early spring 2004 WHO started a pilot study on the feasibility of the proposed 45 indicators in the EU Member States (MS). The purpose of the pilot study is to determine the implementability of the proposed EH indicators. The study aims at assessing the feasibility of the data collection and applicability of the information carried by the indicator in the participating MS. This report summarizes the Danish pilot study.

Denmark has in the pilot study reviewed the data availability for the proposed EH indicators. Generally, Danish data are available for the majority of EH indicators and for many of the indicators Denmark are already reporting these data or nearly identical data to international organisations (e.g. WHO, Eurostat, EU Commission or European Environment Agency). It is important that the ECOEHIS project is using this data and in several cases already produced indicators from the international organisations to avoid duplication of national reporting and assessment work.

The Danish National Environmental Health Action Plan (NEHAP) (published in 2003) includes air quality, noise, radiation, water and indoor climate as environmental and health issues and the indicators covering these issues have therefore been rated as policy relevant. Indicators in relation to environmental tobacco smoke exposure, housing, traffic accidents and chemical accidents are not issues included in the Danish NEHAP and have therefore been rated poor in relation to policy relevance in an environment and health context. It should be emphasised here that issues such as environmental tobacco smoke and traffic accidents are not included in the priorities of the NEHAP because these issues administratively are taken care of in other ways in Denmark. Still these items are very important from a public health point of view.

The Danish NEHAP includes areas not covered by the suggested WHO indicator set. Especially indicators on exposure to chemicals are heavily underrepresented by the suggested WHO indicator set, i.e. indicators on exposure from hazardous chemicals through food intake and other consumer goods. Furthermore exposures to chemicals in the working environment and contaminated soil are areas not covered by the present WHO indicator set.

Based on the pilot study it is recommended that WHO starts with the indicators where data are available immediate from international organisations or can be obtained by limited resources from Member States and on the basis of these produce a first pilot version of the EH indicators. The aim of the pilot indicators should among others be to illustrate how WHO wants to present temporal trends and country comparison and to illustrate how the indicators can be used to illustrate progress in relation to policy objective. This exercise will also illustrate aspects of overlap with other documents that include indicator reporting and policy evaluations.

The following summary table provides an overview of the 45 EH indicators, their policy relevance and overall readiness. Indicators that are immediate ready for implementation are marked by bold.

| Indicator ID | Title | Policy relevance | Overall readiness |
|---|---|---|---|
| **Air_D1** | **Passengers-kilometres by mode of transport** | 2 | 1 |
| **Air_D2** | **Freight-transport demand (Tonne-kilometres)** | 2 | 1 |
| Air_D3 | Road transport fuel consumption | 1 | 1 |
| **Air_P1** | **Air pollution emissions (S02, PM10, PM2.5, NOx, CO, NMVOC)** | 2 | 1 |
| **Air_Ex1** | **Population-weighted annual average concentration of air pollutants (NO2, PM10, PM2.5, SO2, O3)*** | 2 | 1 |
| Air_E1 | Years of expected life lost** | 2 | ? |
| Air_A1 | Policies on environmental tobacco smoke (ETS) exposure | 1 | ? |
| **Noise_Ex1** | **Population exposed to various noise levels (Lden and Lnight) by different sources** | 2 | 1 |
| Noise_E1 | Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure | 1 | 1 |
| Noise_E2 | Self reported noise health effects - Annoyance and sleep disturbance* | 1 | 1 |
| Noise_A1 | National regulations on maximum sound levels for indoor and outdoor leisure events | 1 | 1 |
| Noise_A2 | Existence and effectiveness of urban or national action plans to solve noise problems | 1 | 1 |
| Noise_A3 | Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures | 1 | 3 |
| HOUS_P1 | Affordability to buy dwelling | 0 | 1 |
| HOUS_EX1 | Crowding | 0 | 1 |
| HOUS_EX2 | Accessibility | 0 | 4 |
| HOUS_EX3 | Extremes of Indoor Air Temperature | 0 | 1-2 |
| **HOUS_EX4** | **Dampness/Mould Growth** | 1-2 | 1 |
| HOUS_EX5 | Household hygiene | 0 | 1 |
| HOUS_EX6 | Indoor radon in dwellings | 2 | 1 |
| HOUS_EX7 | Crime/Perception of crime | 0 | 1-4 |
| HOUS_E1 | Housing safety and accidents | 0 | 1-2 |
| **Traf_D1** | **Passengers-kilometres by mode of transport (Air_D1)** | 2 | 1 |
| Traf_S1 | Age of vehicle fleet | 0-1 | 1 |
| Traf_S2 | Road accident rate | 0-1 | 1 |
| Traf_S3 | Speed limit Exceedances | 0 | 1-3 |
| Traf_Ex1 | Person time spent on the road | 0 | ? |
| Traf_Ex2 | Use of safety vehicle device* | 0 | 1 |
| Traf_E1 | Mortality due to transport accidents | 1 | 1 |
| Traf_E2 | Potential Years of Life Lost | 1 | ? |
| Traf_E3 | Injury rate | 1 | 1 |
| Traf_E4 | DALY lost for road accidents | 1 | 1-3 |
| Traf_E5 | Mortality due to drinking driving | 0 | 1 |
| **WatSan_P1** | **Wastewater treatment** | 2 | 1 |
| **WatSan_S1** | **Recreational water compliance** | 2 | 1 |
| **WatSan_S2** | **Drinking water compliance** | 2 | 1 |
| WatSan_Ex1 | Safe drinking waters | 0 | |
| WatSan_E1 | Outbreak of water-borne diseases | 2 | 4 |
| **WatSan_A1** | **Management of bathing waters** | 2 | 1 |
| WatSan_A2 | Water safety plans | 2 | 1-4 |
| Chem_P1 | Industrial facilities under EU 'Seveso II' directive | 0 | 3 |
| Chem_A1 | Regulatory requirements for land-use planning | 0 | 3 |
| Chem_A2 | Chemical incidents register | 0 | 3 |
| Chem_A3 | Government preparedness | 0 | 1 |
| **Rad_E1** | **Incidence of skin cancer** | 2 | 1 |
| Rad_A1 | Effective environmental monitoring of radiation | ? | ? |

Policy relevance: 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question
Overall readiness 1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# Sammenfatning

Denne rapport er en sammenfatning af resultaterne fra det danske pilot studie om EU miljø- og sundhedsindikatorer. Rapporten følger den af WHO foreslåede rapportskabelon og resultaterne skal præsenteres på WHO mødet d. 7.-8. juli.

Udover denne raport er der til WHO fremsendt udfyldte spørgeskemaer for hver af de 45 foreslåede miljø- og sundhedsindikatorer. Mange af indikatorerne består af mange dataelementer, eksempelvis består indikator TRAF_ EX2 om trafiksikkerhed af dataelementer om brug af sikkerhedsbælter, barnestole og hjelm på motorcykel. Så reelt er der tale om betydelig flere indikatorer end de foreslåede 45.

WHOs spørgeskemaer var meget omfattende med 20 spørgsmål om datatilgængelig (fx om lovgrundlag for dataindsamling), tre spørgsmål om datakvalitet og fem spørgsmål om datasammenlignelighed. Spørgeskemaerne er besvaret så godt som muligt ud fra den tilgængelig viden og ved at konsulterer eksperter. Der har dog især været fokus på at besvare, om der findes data for Danmark ,og om vi allerede indberetter disse til internationale organisationer.

Spørgeskemaerne indeholdt også seks spørgsmål om ”policy relevance” bl.a. om indikatoren har været grundlag for politiker de seneste fem år, eller om indikatoren har været brugt til at prioritere politiker eller tiltag i forbindelse med miljø og sundhed i Danmark. Spørgsmålene om policy relevance er besvaret ud fra om emnet, som indikatoren dækker er et element i miljø- og sundhedsstrategien – dermed også policy relevant for Danmark. Der er dog ikke vurderet om det er den/de bedste indikatorer til at beskrive emnet.

Efter Danmarks Miljøundersøgelsers opfattelse har WHO forsøgt at inkludere for mange og detaljerede emner i spørgeskemaerne, hvor de vigtigste spørgsmål burde være om data er tilgængelige, om de indberettes til andre internationale organisationer, og om Danmark opfatter indikatoren som et emne i forbindelse med miljø og sundhed.

Generelt viser pilotstudiet at Danmark har data til størstedelen af de foreslåede indikatorer og allerede rapporterer mange af disse til internationale organisationer (fx Eurostat og det Europæiske Miljøagentur). WHO bør starte med disse indikatorer, evt. suppleret med enkelte andre, hvor der let kan fremskaffes nationale data, og herudfra vise hvordan indikatorerne tænkes anvendt på EU niveau, bl.a. for at illustrere aspekter om landesammenligning og relation til EU målsætninger.

Pilotstudiet viste også at omkring halvdelen af de foreslåede indikatorer dækker emner, som vi i Danmark ud fra miljø- og sundhedsstrategien ikke opfatter som miljø- og sundhedsemner, fx trafikulykker og trafiksikkerhed. Mens der omvendt, i forhold til dansk opfattelse af miljø- og sundhed, mangler indikatorer om kemiske stoffer, jordforurening og fødevaresikkerhed.

I spørgeskemaerne og sidst i summaryrapporten stiller WHO spørgsmål om implementering af indikatorerne i Danmark, fx hvornår DK forventes at kunne levere data til X indikator eller omkostninger og organisatoriske aspekter ved et miljø- og sundhedsindikatorer for Danmark. Dette vedrører den fremtidige prioritering af opgaverne med miljø- og sundhedsindikatorer, og bør diskuteres yderligere i miljø- og sundhedsgruppen.

# Table of contents

# 1 Introduction

The WHO - European Centre for Environment and Health is implementing a project to establish an environmental health (EH) indicator system. The system is designed to serve public health monitoring and environmental policies in EU Member States as well as to support multinational analyses. The methodology developed by the WHO project provides the basis for a set of core environmental and health indicators for European Union (EU) countries. On the basis of the European Commission sponsored WHO project "Development of Environment and Health Indicators for the EU countries" (ECOEHIS) a working group in 2003 identified a set of environmental and health indicators adequate for EH monitoring in the EU covering the following seven issues: Air quality, Noise, Housing and settlement, Transport accidents, Water and sanitation, Chemical emergencies and Radiation.

The main objective of the ECOEHIS project was to develop indicators on environmental health to become part of the European Community Health Indicators (ECHI). These would serve as tools to:

- Measure the health impact of selected environmental risk factors, their determinants and trends therein throughout the Community
- Facilitate planning, monitoring and evaluation of Community programmes and actions
- Provide Member States and international organisations with information to make comparisons and evaluate their policies

Based on testing of the feasibility and usefulness and after approval by the EU Member States the indicators would be delivered according to the evidence, data and methodological limitations, in one of three categories: 1) ready and recommended for implementation; 2) ready, but not feasible for immediate implementation, or 3) desirable though requiring further developmental work.

In the early spring 2004 WHO started a pilot study on the feasibility of the proposed 45 indicators in the EU Member States (MS). The purpose of the pilot study is to determine the implementability of the proposed EH indicators. The study aims at assessing the feasibility of the data collection and applicability of the information carried by the indicator in the participating MS.[1]

In April 2004 the National Environmental Research Institute, NERI (Danmarks Miljøundersøgelser) was commissioned by the Danish Environmental Protection Agency (DEPA) on behalf of the Danish inter-ministerial group on environment and health to perform the Danish feasibility study. The resources available was 80.000 Dkr comparable to 15 man-days; *actually more than the double number of man-days has been used.* Due to the limited time and limited resources NERI has performed an inventory of available Danish data/information sources, consulted experts for difficult indicators/data elements and discussed the project results and approach during two meetings with DEPA project manager Jens la Cour and member of the WHO working group Lis Keiding, National Board of Health. The draft summary report has been distributed to the Danish Inter-ministerial Environment and Health group (and their comments will be

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[1] Austria, Belgium, Denmark, France, Finland, Germany, Italy, The Netherlands, Portugal, Spain, Sweden

included in the final summary report), while the optimal national consultation of the Danish responses is not possible within the time frame and with the given financial resources.

# 2 Methods

The National Environmental Research Institute (NERI) (a research institute within the Ministry of the Environment) has been appointed to perform the Danish pilot study.

The task of NERI has been to:

- Perform an inventory of available Danish data sources and where necessary to consult with Danish experts on the feasibility of the data element for Denmark
- Fill the WHO questionnaires and return these to WHO
- Produce a draft summary report of the Danish indicator evaluation results (this report)
- Discuss the approach and results with Jens la Cour, DEPA and Lis Keiding, National Board of Health

WHO has developed a project outline describing the different steps to be performed during the pilot feasibility studies and provided methodology sheets for the 45 proposed EH indicators (updated versions (January-March 2004) of the original WHO methodology sheets) and a template questionnaire to be filled for each indicator.

The NERI approach has been to localise data and fill in WHO questionnaires for each indicator/data element (20 questions on data availability, three questions on data quality; five questions on data comparability and six questions on policy relevance) as well as possible based on available information. No new calculations of data have been performed for the project. Because of the large number of indicators and most of them with more than three data elements, some with more than 30 data elements; it has been a resourceful task to fill in the questionnaires. For the main part of the proposed WHO indicators it has been possible to localise Danish data sources or alternatively references to international reported data sources.

WHO states in the project outline that for the data that are already available from the international agencies (e.g. Eurostat, European Environment Agency (EEA)) WHO/Euro will collect the actual data from the agencies and NFPs will only provide the information about the quality and applicability of the data elements.

Many of the 45 indicators consist of many data elements; for some more than 30 data elements, for others the definition of the actual data requested are unclear or would require extensive national recalculations. Response to questions on the policy relevance of the indicators is based on an assessment of the indicator with respect to relevance according to the Danish National Environmental Health Action Plan[2] (NEHAP) (published in 2003). It should be emphasised here that items such as environmental tobacco smoke and accidents are not included in the priorities of the NEHAP because these items administratively are taken care of in other ways in Denmark. Still, these items are very important from a public health point of view.

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[2] The Danish Government, 2003: Environment and Health are Closely Related. Strategy and Action Plan to Protect Public Health against Environmental Factors.

# 3 Results of the pilot study of the indicators

## 3.1 Air Quality

**National health objectives in relation to proposed indicators:**
The overall objective of the Danish National Environmental Health Action Plan[3] (NEHAP) *is high quality of air, where emissions of harmful substances into the air and impacts harmful to public health are reduced as far as possible*.
Policies on *environmental tobacco smoke (ETS) exposure* are not a direct issue in the NEHAP, but an import aspect of the general strategy for public health[4].

**Overview of Danish and international data sources for the proposed air quality indicators.**

| Indicator ID | Title | DK data source | International data source |
|---|---|---|---|
| Air_D1 = TRAF_D1 | Passengers-kilometres by mode of transport | Statistics Denmark Road Directorate, Ministry of Transport | WHO to collect data from Eurostat |
| Air_D2 | Freight-transport demand (Tonne-kilometres) | Statistics Denmark Vejdirektoratet | WHO to collect data from Eurostat |
| Air_D3 | Road transport fuel consumption | Energy Agency, Ministry of Economic and Business Affairs | WHO to collect data from Eurostat |
| Air_P1 | Air pollution emissions (S02, PM10, PM2.5, NOx, CO, NMVOC) | National Environmental Research Institute, Ministry of Environment | WHO to collect data from UNECE/EMEP emission database |
| Air_Ex1 | Population-weighted annual average concentration of air pollutants (NO2, PM10, PM2.5, SO2, O3)* | National Environmental Research Institute, Ministry of Environment | WHO to collect data from EEA Airbase |
| Air_E1 | Years of expected life lost** | National Board of Health, Ministry of the interior and Health | WHO database on Mortality indicators by cause, age and sex |
| Air_A1 | Policies on environmental tobacco smoke (ETS) exposure | National laws, Danish Cancer Society National Board of Health | |

* Population-weighted annual average concentration is not available, but data elements (average air pollutant concentrations & distribution of urban/rural population) are available.
** Years of expected life lost are not calculated for Denmark, but data elements (average air pollutant concentrations & age specific mortality) are available.

***Template of Summary Table for Each Section: Evaluation of Indicators on Air Quality***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Air_D1 | 2 | 2 | 2 | 2 | 1 |
| Air_D2 | 2 | 2 | 2 | 2 | 1 |
| Air_D3 | 2 | 2 | 2 | 1 | 1 |
| Air_P1 | 2 | 2 | 2 | 2 | 1 |
| Air_Ex1 | 2 | 2 | 2 | 2 | 1 |
| Air_E1 | 2 | 2 | 2 | 2 | ? |
| Air_A1 | 1-2*** | | | 1** | ? |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question
^ Enter 1, 2, 3, or 4 according to your answers to the question
1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006
** Environmental tobacco smoke exposure is not a direct issue in the NEHAP, but an import aspect of the general strategy for public health.
*** Information on Policies on environmental tobacco smoke (ETS) exposure is available; however, a small study has to be performed to evaluate against the 10 criteria mentioned in the methodology sheet. Items such as environmental tobacco smoke and accidents are not included in the priorities of the NEHAP because these items administratively are taken care of in other ways in Denmark. Still these items are very important from a public health point of view.

[3] The Danish Government, 2003: Environment and Health are Closely Related. Strategy and Action Plan to Protect Public Health against Environmental Factors.
[4] Regeringen 2002: Sund hele livet – de nationale mål og strategier for folkesundheden 2002-10
(Life-long health – national objectives and strategies for public health 2002-2010)

**Comments to the proposed indicators**

- Generally the data are available for the proposed *air quality* indicators and Denmark is already reporting the data to international organisations. WHO has to use the data and experierence from these organisations.
- External air quality is an important issue in the Danish NEHAP and therefore the first six indicators are marked as policy relevant for Denmark. Policies on environmental tobacco smoke (ETS) exposure is not administratively taken care of in the inter-ministerial group on EH, but it is an important EH issue in Denmark .
- The action indicator ETS exposure is not linked to and relevant for the other air quality indicators and an action indicator related to external air quality might be relevant.

## 3.2 Noise

**National health objectives in relation to proposed indicators:**

The overall objective of the Danish National Environmental Health Action Plan[5] (NEHAP) *is to remove or quieten sources of noise that emit noise above the limit values. Where this is not immediately possible, the goal is to implement initiatives that reduce the risk of people being exposed to harmful or nuisance noise.*

**Overview of Danish and international data sources for the proposed noise indicators.**

| Indicator ID | Title | DK data source | International data source | |
|---|---|---|---|---|
| Noise_Ex1 | Population exposed to various noise levels (Lden and Lnight) by different sources | Environment Protection Agency, Ministry of Environment | WHO to collect data from EU Commission or Eurostat | |
| Noise_E1 | Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure | The actual data needed are unclear | WHO to collect data or related data from European Health for all database | |
| Noise_E2 | Self reported noise health effects - Annoyance and sleep disturbance* | National Institute of Public Health, Ministry of the Interior and Health | | |
| Noise_A1 | National regulations on maximum sound levels for indoor and outdoor leisure events | Data has not been localised | WHO to evaluate available EU information on noise regulation | |
| Noise_A2 | Existence and effectiveness of urban or national action plans to solve noise problems | ** | | Uncertain what the actual data element should cover. |
| Noise_A3 | Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures | *** Denmark has some information on noise at municipality level. | | Uncertain what the actual data element should contain. |

* Calculating the 30 data elements of this indicator would require more detailed national data of Lden and Lnight that might be available in the future from national monitoring in relation to the new Noise Directive 2002/49/EC

** Data element is described as "*Information on the existing noise-related plans in NEHAPs, public health plans and national law*s" while the methodology sheet has focus on Municipality Master Plans/Urban Development Plans.

*** Data element is described as "Municipality data about noise mapping"

***Template of Summary Table for Each Section: Evaluation of Indicators on Noise***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Noise_Ex1 | 1** | 2 | 2** | 2 | 1 |
| Noise_E1 | 1 | 2 | 1 | 1 | 1 |
| Noise_E2 | 1-2*** | 2 | 2 | 1 | 1 |
| Noise_A1 | 1 | 2 | 2 | 1 | 1 |
| Noise_A2 | 1 | 2 | 2 | 1 | 1 |
| Noise_A3 | 1**** | 2 | 2 | 1 | 3 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

** Monitoring of noise is for the moment (24 hours values weighted by annual traffic values) will change to cover the new Noise Directive 2002/49/EC data elements Lden (day, evening & night) - Lnight (these data elements are not yet available for Denmark)

*** Some information is available on self-reported noise annoyance but not full coverage of the 30 data elements.

**** Some data about noise are available at municipality level; however, it is uncertain how data on this could be an indicator on "*Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures*"

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[5] The Danish Government, 2003: Environment and Health are Closely Related. Strategy and Action Plan to Protect Public Health against Environmental Factors.

**Comments to the proposed indicators**

- Denmark has national surveys/estimates on number of dwellings affected by noise, in particular noise from road traffic, and is able to report information on the main indicator in relation to noise (Noise_Ex1) as well as some information on *self reported noise annoyance*. The validity of the indicator Noise_E1 *Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure* could be discussed and needs to be demonstrated.
- Denmark has some information for the noise action indicators but it can be difficult to transform this information into indicators that can illustrate temporal development and country comparison.
- Noise is an important issue in the Danish NEHAP and therefore the noise indicators are marked as policy relevant for Denmark.

## 3.3 Housing and Settlements

**National health objectives in relation to proposed indicators:**

HOUS_EX4: The overall objective of Danish National Environmental Health Action Plan[6] (NEHAP) is *to ensure a good indoor climate, and to ensure that the risk of nuisance, disease, and symptoms resulting from environmental factors is abated as far as possible*.

HOUS_E1: *Housing safety and accidents* is not a direct issue in the NEHAP, but an aspect of the general strategy for public health[7] (Number of traffic accidents, accidents at home and during leisure time have to be reduced markedly[8]).

**Overview of Danish and international data sources for the proposed housing indicators.**

| Indicator ID | Title | DK data source | International data source | Comments |
|---|---|---|---|---|
| HOUS_P1 | Affordability to buy dwelling | Several sources | Eurostat dataset: *Share of households with/without financial burden due to housing costs* | No Danish data reported. WHO to use WHO data. |
| HOUS_EX1 | Crowding | Statistics Denmark | Eurostat datasets: *Share of households living in overcrowded houses & Rooms per person* | |
| HOUS_EX2 | Accessibility | *Not readily available if existing at all | | Limited resources have been used for search for data for this indicator. |
| HOUS_EX3 | Extremes of Indoor Air Temperature | **Danish Meteorological Institute | | |
| HOUS_EX4 | Dampness/Mould Growth | National Institute of Public Health, Ministry of the Interior and Health | | |
| HOUS_EX5 | Household hygiene | *** Statistics Denmark | | Most of the information is available for Denmark |
| HOUS_EX6 | Indoor radon in dwellings | National Institute of Radiation Hygiene, Ministry of the Interior and Health | | |
| HOUS_EX7 | Crime/Perception of crime | **** Statistics Denmark | | |
| HOUS_E1 | Housing safety and accidents | ***** | WHO European health for all database - Hospital discharges, injury and poisoning | |

* The indicator cover data elements on *Prevalence of physical environmental barriers in dwelling units and their immediate environment* & *Amount of public financial resources invested in housing adaptation / home modification to meet needs of persons with functional limitations.*

** Data elements on outdoor temperature*: i.e. Number of periods of two or more consecutive days when the minimum outdoor air temperature remains above 24 degrees C in 24 hour period & Maximum temperature below 5 degrees.*

*** The indicator covers data elements on *Number of dwellings / persons with adequate – substandard – lacking hygiene amenities* (e.g. hot and cold water, toilet, shower or bath, cooking facilities and food storage (refrigerator))

**** The indicator cover data elements on *Number of thefts in dwellings, Number of crimes against people in public space & Number of citizens reporting "fear of crime" inside the dwelling. The data on crime in Denmark is calculated as a function of type of crime, geographical distribution, tender and age.*

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6 The Danish Government, 2003: Environment and Health are Closely Related. Strategy and Action Plan to Protect Public Health against Environmental Factors.

7 Regeringen 2002: Sund hele livet – de nationale mål og strategier for folkesundheden 2002-10 (Life-long health – national objectives and strategies for public health 2002-2010)

8 Antallet af trafik-, hjemme- og fritidsulykker skal reduceres markant

***** The indicator cover data elements on *Number of burns, physical injuries and poisonings requiring medical attention and which resulted from external causes in and around the dwelling per annum & Number of fatalities resulting from house fires or external causes in and around the dwelling per annum etc.*

***Template of Summary Table for Each Section: Evaluation of Indicators on Housing and Settlements***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| HOUS_P1** | 2 | 2 | 2 | 0 | 1 |
| HOUS_EX1** | 2 | 2 | 2 | 0 | 1 |
| HOUS_EX2 | 0 | | | 0 | 4 |
| HOUS_EX3 | 1 | 2 | 2 | 0 | 1-2 |
| HOUS_EX4 | 1 | 1 | | 1-2 | 1 |
| HOUS_EX5 | 1*** | 1 | 1 | 0 | 1 |
| HOUS_EX6 | 1 | 2 | 2 | 2 | 1 |
| HOUS_EX7 | 1-2 | | | 0 | 1-4 |
| HOUS_E1**** | 2 | 2 | 2 | 0 | 1-2 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question
^ Enter 1, 2, 3, or 4 according to your answers to the question
1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006
** Availability, quality, comparability and readiness answered on the basis that WHO collects data from Eurostat.
*** Some information is available on the percentage of houses with hot and cold water, toilet, shower or bath, cooking facilities and food storage (refrigerator))
**** Availability, quality, comparability and readiness answered on the basis that Denmark reports data to WHO health for Europeans database.

**Comments to the proposed indicators**

- Generally the data are available for the proposed *housing and settlements* indicators and Denmark is already reporting the data for many of these indicators to international organisations. WHO has to use the data and experience from these organisations. In particular, the indicators HOUS_P1 Affordability to buy dwelling and HOUS_EX1 Crowding can be based on Eurostat statistics on *Share of households with/without financial burden due to housing costs; Share of households living in overcrowded houses & Rooms per person.*
- Limited resources have been used for search for data for the indicators HOUS_EX2 Accessibility; HOUS_EX3 Extremes of Indoor Air Temperature (data elements is outdoor temperature); HOUS_EX5 Household hygiene (data elements on houses with hot and cold water, toilet, shower or bath, cooking facilities and food storage). Generally some information on these indicators is available for Denmark; however, it has been difficult to see the issues as indicators in an environment and health context.
- *Indoor climate* is an important issue in the Danish NEHAP and therefore the indicators HOUS_EX4 Dampness/Mould Growth & HOUS_EX6 Indoor radon in dwellings are marked as policy relevant for Denmark. The other proposed indicators for housing are not issues included in the Danish NEHAP and have therefore been rated poor in relation to policy relevance in an environment and health context

## 3.4 Traffic Accidents

**National health objectives in relation to proposed indicators:**
*Traffic accidents* is not a direct issue in the NEHAP, but an aspect of the general strategy for public health[9] (Number of traffic accidents, accidents at home and during leasure time have to be reduced markedly[10]).

Transport including *transport safety* is an important issue in the *National Stategy for Sustainable Development*:[11] To achieve sustainable development in the field of transport, the Government intends to decouple growth in the impacts of transport on the environment and health from economic growth. Concern for health, safety and the environment must be integrated into transport policy. The Government's long-term benchmarks call for the transport sector to make its fair contribution to reducing national emissions of greenhouse gases and to ensuring that air pollution from traffic constitutes no health hazard to the population. Traffic noise must be reduced to a level, which ensures that nobody is exposed to significant negative health impacts. Transport must be safe for everybody.

[9] Regeringen 2002: Sund hele livet – de nationale mål og strategier for folkesundheden 2002-10 (Life-long health – national objectives and strategies for public health 2002-2010)
[10] Sundhedspolitisk mål: Antallet af trafik-, hjemme- og fritidsulykker skal reduceres markant.
[11] The Danish Government, 2002: A shared future - balanced development Denmark's national strategy for sustainable development.

The objectives for traffic safety as set by the Commission on Traffic Safety[12] are a 40% reduction of the number of dead and seriously injured persons in traffic accidents by the end of 2012. The figure from 1998 is the reference point. That year 499 was killed and 4100 seriously injured in traffic accidents. By the end of 2012 these figures are to be reduced to 300 and 2400, respectively.

**Overview of Danish and international data sources for the proposed traffic accident indicators.**

| Indicator ID | Title | DK data source | International data source | Comments |
|---|---|---|---|---|
| Traf_D1 (Air_D1) | Passengers-kilometres by mode of transport | Statistics Denmark Vejdirektoratet | WHO to collect data from Eurostat | |
| Traf_S1 | Age of vehicle fleet | Statistics Denmark | WHO to use EEA fact sheet or collect data from Eurostat | |
| Traf_S2 | Road accident rate | Statistics Denmark | WHO to collect data from Eurostat | |
| Traf_S3 | Speed limit Exceedances | The Danish Road Directorate, Ministry of Transport | | The exact data element is unclear due to different types of roads and speed limits. |
| Traf_Ex1 | Person time spent on the road | This indicator questionnaire has not been filled - Denmark has a regular transport survey - however it is uncertain how to calculate the indicator on number of hours spend on the road to reach the workplace or school by mode of travel (car, bus, metro, motorcycle, bicycle, walk). | | |
| Traf_Ex2 | Use of safety vehicle device* | The Danish Transport Research Institute, Ministry of Transport | | |
| Traf_E1 | Mortality due to transport accidents | Statistics Denmark | WHO to collect data from Eurostat | |
| Traf_E2 | Potential Years of Life Lost | Denmark does not perform calculations of potential years of life lost due to traffic accidents | | |
| Traf_E3 | Injury rate | National Patient Registry, National Board of Health, Ministry of Interior and Health | *No* | |
| Traf_E4 | DALY lost for road accidents | ** | | |
| Traf_E5 | Mortality due to drinking driving | Statistics Denmark | WHO to collect data from Eurostat | |

* The indicator covers data elements on: Use of safety belts; children properly restrained and motorcycle occupants properly using the helmet. Questionnaire has been answered in relation to use of safety belts.
** Data elements required to calculate DALY are requested (e.g. Data on disability; Data on mortality from death registry; Disability weights & Age weights), however, the exact data are uncertain, some data may already be reported by Denmark to WHO - or international data have to be used to ensure comparability of the calculated DALY.

***Template of Summary Table for Each Section: Evaluation of Indicators on Traffic Accidents***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Traf_D1 (Air_D1) | 2 | 2 | 2 | 2** | 1 |
| Traf_S1 | 2 | 2 | 2 | 0-1 | 1 |
| Traf_S2 | 2 | 2 | 2 | 0-1 | 1 |
| Traf_S3 | 2 | 2 | 2 | 0 | 1-3 |
| Traf_Ex1 | 1 | | | 0 | ? |
| Traf_Ex2 | 2 | 2 | 1 | 0 | 1 |
| Traf_E1 | 2 | 2 | 2 | 1 | 1 |
| Traf_E2 | 0 | | | 1 | ? |
| Traf_E3 | 2 | 2 | 2 | 1 | 1 |
| Traf_E4 | 1 | | | 1 | 1-3 |
| Traf_E5 | 2 | 2 | 2 | 0 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

[12] Færdselssikkerhedskommissionens nye mål er, at der inden for de næste 12 år - det vil sige inden udgangen af år 2012 - sker en 40 pct. reduktion i antallet af dræbte og alvorligt tilskadekomne. Trafiktallene fra 1998 er udgangspunktet for denne målsætning. Det år blev 499 dræbt og 4.100 kom alvorligt til skade i trafikken. Ved udgangen af år 2012 skal disse tal være nedbragt til henholdsvis 300 trafikdræbte og 2.400 alvorligt tilskadekomne.

^ Enter 1, 2, 3, or 4 according to your answers to the question
1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006
** Policy relevant in relation to air pollution.

**Comments to the proposed indicators**

- Generally the data are available for the proposed *traffic accidents* indicators and Denmark is already reporting the data for many of these indicators to international organisations. WHO has to use the data and experience from these organisations.
- The indicators TRAF_E2 Potential Years of Life Lost and TRAF_E4 DALY lost for road accidents have not been calculated for Denmark, but some of the underlying data elements are available.
- The other proposed traffic accident and traffic safety indicators are not issues included in the Danish NEHAP and have therefore been rated poor/fair in relation to policy relevance in an environment and health context

## 3.4 Water and Sanitation

**National health objectives in relation to proposed indicators:**
The overall objectives of National Environmental Health Action Plan[13] (NEHAP) in relation to water are

- *That there should continue to be adequate clean groundwater in the future so that there is no need to treat the water for pollutants before it becomes part of the drinking water supply. The current high level of protection from micro-biological pollution in drinking water is considered satisfactory and will therefore be continued.*
- *To ensure the least possible impacts from wastewater on the sea and lakes. Beaches and lakes designated as bathing areas must have good, hygienic quality.*

**Overview of Danish and international data sources for the proposed water and sanitation indicators.**

| Indicator ID | Title | DK data source | International data source | Comments |
|---|---|---|---|---|
| WatSan_P1 | Wastewater treatment | Miljøstyrelsen | WHO to collect data from Eurostat | |
| WatSan_S1 | Recreational water compliance | Miljøstyrelsen | WHO to collect data from EU Commission | Bathing water |
| WatSan_S2 | Drinking water compliance | Miljøstyrelsen | Future reporting in relation to EU Drinking Water Directive | |
| WatSan_Ex1 | Safe drinking waters | * | | Indicator not relevant for Denmark |
| WatSan_E1 | Outbreak of water-borne diseases | Only limited information is available on the number of outbreaks of water-borne diseases. Data source: Miljøstyrelsen & Statens Serum Institut | | |
| WatSan_A1 | Management of bathing waters | The independent non-profit organisation Foundation for Environmental Education (FEE). www.blaaflag.dk | www.blueflag.org | Blue flag beaches |
| WatSan_A2 | Water safety plans | *Unclear indicator*: The counties planning documents have to identify areas with special interest in relation to drinking water. The identified area covers 35% of the territory and should be able to provide sufficient clean drinking water to the Danish population in the future. | | |

*The data elements are Number of people living in household receiving a safe drinking water (safe drinking water is a piped water supply, available 24 hours per day provided by a licensed and regulated water undertaker).

***Template of Summary Table for Each Section: Evaluation of Indicators on Water and Sanitation***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| WatSan_P1 | 2 | 2 | 2 | 2 | 1 |
| WatSan_S1 | 2 | 2 | 2 | 2 | 1 |
| WatSan_S2 | 2 | 2 | 2 | 2 | 1 |
| WatSan_Ex1 | nearly 100% for Denmark | | | 0 | |
| WatSan_E1 | 0 | 0 | 0 | 2 | 4 |
| WatSan_A1 | 2 | 2 | 2 | 2 | 1 |
| WatSan_A2 | Unclear indicator/1 | 2 | 2 | 2 | 1-4 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question
^ Enter 1, 2, 3, or 4 according to your answers to the question
1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

[13] The Danish Government, 2003: Environment and Health are Closely Related. Strategy and Action Plan to Protect Public Health against Environmental Factors.

**Comments to the proposed indicators**

- Generally data are available for the proposed *water and sanitation* indicators and Denmark is already reporting the data for many of these indicators to international organisations. WHO has to use the data and experience from these organisations,
- Denmark has only limited information available for the indicator WatSan_E1 Outbreak of water-borne diseases, while the indicator WatSan_Ex1 Safe drinking water based on WHOs definition: piped water supply, available 24 hours per day provided by a licensed and regulated water undertaker, is not relevant for Denmark.
- The action indicator on water safety is unclear and it will be difficult to provide information that can be used as an indicator.
- Good drinking water and bathing water quality are important issues of the Danish NEHAP and therefore the indicators have been rated as policy relevant for Denmark.

## 3.5 Chemical Emergencies

**National health objectives in relation to proposed indicators:**
Chemical emergencies are not an issue in the National Environmental Health Action Plan[14] (NEHAP). In relation to *chemical substances* the primary objectives of the NEHAP *are to reduce the environmental impacts from chemicals; to phase out or limit particularly harmful chemical substances; to build knowledge about the harmful effects of chemical substances in order to prioritise initiatives; and to develop new methods to acquire data on health effects*.

**Overview of Danish and international data sources for the proposed chemical emergencies indicators.**

| Indicator ID | Title | DK data source | International data source | Comments |
|---|---|---|---|---|
| Chem_P1 | Industrial facilities under EU 'Seveso II' directive | | Major Accident Reporting System (MARS) | |
| Chem_A1 | Regulatory requirements for land-use planning | | | Environmental Impact assessment (EIA) studies required by law (bekendgørelse nr. 428 af 2. juni 1999 – Miljøministeriet) |
| Chem_A2 | Chemical incidents register | | Major Accident Reporting System (MARS) | |
| Chem_A3 | Government preparedness | Danish Emergency Management Agency | | |

***Template of Summary Table for Each Section: Evaluation of Indicators on Chemical Emergencies***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Chem_P1 | 0 | | | 0 | 3 |
| Chem_A1 | 0 | | | 0 | 3 |
| Chem_A2 | 0 | | | 0 | 3 |
| Chem_A3 | 2 | | | 0 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question
^ Enter 1, 2, 3, or 4 according to your answers to the question
1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

**Comments to the proposed indicators**

- Denmark do for the moment not have all the requested information for the indicators on chemicals emergencies. Denmark is establishing a structure to be able to report in relation to the Seveso II Directive, and will be able to provide information for the first three indicators by the end of 2005.
- The other proposed chemical emergencies indicators are not issues included in the Danish NEHAP and have therefore been poorly rated in relation to policy relevance in an environment and health context
- Alternatively Denmark asks for indicators that cover other health effects aspects of exposure to chemical substances, e.g. health effects from exposure through food intake, water contaminations, air exposure etc.

[14] The Danish Government, 2003: Environment and Health are Closely Related. Strategy and Action Plan to Protect Public Health against Environmental Factors.

## 3.6 Radiation

**National health objectives in relation to proposed indicators:**
The overall objective of the National Environmental Health Action Plan[15] (NEHAP) in relation to radiation *is to reduce the harmful effects of radiation on people through influencing people's lifestyle. In particular this includes airing dwellings and sunbathing. The objective is also to retain the generally high level of protection from the use of ionised radiation, and radiation from products.*

**Overview of Danish and international data sources for the proposed radiation indicators.**

| Indicator ID | Title | DK data source | International data source | Comments |
|---|---|---|---|---|
| Rad_E1 | Incidence of skin cancer | National Board of Health, Ministry of the Interior and Health | | |
| Rad_A1 | Effective environmental monitoring of radiation | Danish Emergency Management Agency | | |

* Monitoring of radiation in relation to nuclear accidents is described in the Danish Master Plan (2001)[16]

***Template of Summary Table for Each Section: Evaluation of Indicators on Radiation***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Rad_E1 | 2 | 2 | 2 | 2 | 1 |
| Rad_A1 | Data not collected | | | | |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question
^ Enter 1, 2, 3, or 4 according to your answers to the question
1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

**Comments to the proposed indicators**

- Generally data are available for the proposed incidence skin cancer indicators.
- Indoor radiation is covered by indicator HOUS_EX6 (see section 3.3 on Housing and settlements).
- The action indicator on Effective environmental monitoring of radiation is partly covered by monitoring in relation to the master plan on nuclear accidents.
- Radiation is an issue of the Danish NEHAP and therefore the indicators Incidence of skin cancer and Indoor radiation levels have been rated as policy relevant for Denmark.

[15] The Danish Government, 2003: Environment and Health are Closely Related. Strategy and Action Plan to Protect Public Health against Environmental Factors.
[16] Beredskabsstyrelsen 2001: Plan for det landsdækkende atomberedskab. http://www.brs.dk/nuc/Plan-Master.pdf

# 4 Conclusions

## 4.1 Conclusions of the feasibility study

*Data availability for the proposed indicators*

Denmark has in the pilot study reviewed the data availability for the proposed EH indicators. Generally, Danish data are available for the majority of EH indicators and for many of the indicators Denmark and the other EU countries are already reporting these data or nearly identical data to international organisations (e.g. WHO, Eurostat, EU Commission or European Environment Agency). It is important that the ECOEHIS project is using this data and in several cases the already produced indicators from the international organisations to avoid duplication of national reporting and assessment work.

Several of the proposed indicators, in particular many of the action indicators, are unclear and in many cases not specified as real indicators but as a request of information on national measures/actions in relation to the issue. For example, information is requested on water safety plans, however it is unclear how it can be transformed into an indicator. A more specific questionnaire for these indicators, if they are selected, may be the solution.

Some of the indicators consist of many data elements, e.g. the air emission indicator consists of emissions of six substances from five sectors. It is difficult to see how these data elements can be aggregated into one indicator, if more than one indicator the total indicator set is markedly expanded.

*Policy relevance of the proposed indicators*

The Danish NEHAP includes air quality, noise, radiation, water and indoor climate as environmental and health issues and the indicators covering these issues have therefore been rated as policy relevant. Indicators in relation to environmental tobacco smoke exposure, housing, traffic accidents and chemical accidents are not issues included in the Danish NEHAP and have therefore generally been rated poor in relation to policy relevance in the Danish NEHAP context.

*Implementation of the EH indicators in Denmark*

The current study aimed at assessing the feasibility of the data collection and applicability of the information carried by the indicator in Denmark, while the aspects of implementation of the EH indicators or part of them in a Danish context has not been fully covered. The outcome of the Danish feasibility study together, with the results from the overall WHO ECOEHIS pilot study will create the basis for further discussion of EH indicators in the inter-ministerial environment and health group. This aspect also relates to the available resources for establishing the data for the indicators where data, at the moment are not available for Denmark.

## 4.2 Issues not covered by the ECOEHIS indicators but in the Danish NEHAP

The Danish NEHAP includes areas not covered by the suggested WHO indicator set. Especially indicators on exposure to chemicals are heavily underrepresented by the suggested WHO indicator set, i.e. indicators on exposure from hazardous chemicals through food intake and other consumer goods. Furthermore, exposures to chemicals in the working environment and contaminated soil are areas not covered by the present WHO indicator set.

## 4.3 Recommendations

Based on the pilot study it is recommended that WHO starts with the indicators where data are available immediately from international organisations or can be obtained by limited resources from Member States and on the basis of these produce a first pilot version of the EH indicators. The aim of the pilot indicators should, among others, be to illustrate how the EU countries in the WHO European Region want to present temporal trends and country comparison and how the indicators can be used to illustrate progress in relation to policy objective. This exercise will also illustrate the policy relevance of the indicators in relation to the European Environment and Health Strategy.

# Abbreviations

| Acronyms | Full name |
|---|---|
| DEPA | Danish Environmental Protection Agency<br>Miljøstyrelsen |
| ECOEHIS | Development of Environment and Health Indicators for the EU countries |
| EH | Environment and Health |
| EU | European Union |
| MS | EU Member States |
| NEHAP | Danish National Environmental Health Action Plan |
| NERI | National Environmental Research Institute/<br>Danmarks Miljøundersøgelser |
| WHO | World Health Organisation |

# 5 Acknowledgements

The Danish institutions and colleagues who have helped with information and comments to the different EH indicators are thanked very much. It have been a pleasure to experience that in a stressing daily working day that many colleagues have taken the time to answer telephone calls or Email.

# Annex 11-2

# Finland Report on Pilot Study

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**

Between the European Commission, DG Sanco

and the World Health Organization, Regional Office for Europe

## Development of EH Indicators for EU Countries (ECOEHIS)

### WHO project co-sponsored by EC DG SANCO (SPC 2002300)

# Pilot Study on the Environmental Health Indicators

## Report from Finland

**August 13, 2004**

**Reporting Institute:**

| | |
|---|---|
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| | |
|---|---|
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## Summary

In Finland most of the data asked in the questionnaire is available or can be derived by simple calculations from basic data. Statistics Finland has compiled summaries of data, which in most cases are highly useful. Some of this data are freely available in a book "Statistical yearbook of Finland" with texts in Finnish, Swedish and English. This is published at the end of each year, the latest version is 2003, and it also contains a CD-ROM comprising the publication in pdf format, all the tables in Excel format, and furthermore links to the homepages of main producers of statistics. This probably means that whenever Statistics Finland has data, it would be the easiest source of information, and the original producers of the data should be contacted only in cases where more accurate information is needed or Statistics Finland do not have them.

Mostly the problem is not the availability of the data, but the managerial problem of compiling them from various sources, and at first stage, finding and motivating knowable persons who are usually very busy and also travelling a lot, to answer the queries. This will probably take time, and it would be far easier to start with those indicators that are immediately available, and develop more complicated ones over several years. The most problematic indicators are those collected locally by municipalities. There are 446 municipalities in Finland varying in population from 240 to 559716 (end 2002). Municipalities have a high degree of independence in Finland, but due to variable size their capabilities of producing information are vastly different. This means that in typically local indicators such as chemicals, noise and housing there will be gaps. On the other hand, many of these, e.g. chemicals and noise, are not likely to be very important in small municipalities, so gaps may not be crucial. In some such as drinking water quality and housing, they may be more important.

The most remarkable (and probably true) gap is noise. Also some parts of other information are difficult to find, such as indoor air/housing parameters, especially mould problems. They may need more research and surveys to be ripe for routine monitoring. Most other indicators seem to be available to a reasonable extent though not all details. Also transformation to attributable deaths or DALYs cannot be found, but actual work is needed if they will be used as indicators.

The following summary table provides an overview of overall readiness of the 45 EH indicators.

| Indicator ID | Title | Overall readiness |
|---|---|---|
| **Air_D1** | **Passengers-kilometres by mode of transport** | **1** |
| **Air_D2** | **Freight-transport demand (Tonne-kilometres)** | **1** |
| **Air_D3** | **Road transport fuel consumption** | **1** |
| **Air_P1** | **Air pollution emissions (S02, PM10, PM2.5, NOx, CO, NMVOC)** | **1** |
| Air_Ex1 | Population-weighted annual average concentration of air pollutants (NO2, PM10, PM2.5, SO2, O3) | 2 |
| Air_E1 | Years of expected life lost | 2 |
| Air_A1 | Policies on environmental tobacco smoke (ETS) exposure | 4 |
| Noise_Ex1 | Population exposed to various noise levels (Lden and Lnight) by different sources (partly estimated) | 1 |
| Noise_E1 | Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure | (1?) |
| Noise_E2 | Self reported noise health effects - Annoyance and sleep disturbance | ? |
| Noise_A1 | National regulations on maximum sound levels for indoor and outdoor leisure events | ? |
| Noise_A2 | Existence and effectiveness of urban or national action plans to solve noise problems | 1 |
| Noise_A3 | Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures | ? |
| **HOUS_P1** | **Affordability to buy dwelling** | **1** |
| **HOUS_EX1** | **Crowding** | **1** |
| HOUS_EX2 | Accessibility | ? |
| HOUS_EX3 | Extremes of Indoor Air Temperature | (1?) |
| HOUS_EX4 | Dampness/Mould Growth | ? |
| **HOUS_EX5** | **Household hygiene** | **1** |
| **HOUS_EX6** | **Indoor radon in dwellings** | **1** |
| **HOUS_EX7** | **Crime/Perception of crime** | **1** |
| HOUS_E1 | Housing safety and accidents | (1?) |
| **Traf_D1** | **Passengers-kilometres by mode of transport (Air_D1)** | **1** |
| **Traf_S1** | **Age of vehicle fleet** | **1** |
| **Traf_S2** | **Road accident rate** | **1** |
| Traf_S3 | Speed limit Exceedances | ? |
| **Traf_Ex1** | **Person time spent on the road** | **1** |
| Traf_Ex2 | Use of safety vehicle device | ? |
| **Traf_E1** | **Mortality due to transport accidents** | **1** |
| Traf_E2 | Potential Years of Life Lost | ? |
| **Traf_E3** | **Injury rate** | **1** |
| Traf_E4 | DALY lost for road accidents | ? |
| **Traf_E5** | **Mortality due to drinking driving** | **1** |
| **WatSan_P1** | **Wastewater treatment** | **1** |
| **WatSan_S1** | **Recreational water compliance** | **1** |
| **WatSan_S2** | **Drinking water compliance** | **1** |
| WatSan_Ex1 | Safe drinking waters | 3 |
| **WatSan_E1** | **Outbreak of water-borne diseases** | **1** |
| WatSan_A1 | Management of bathing waters | 4 |
| **WatSan_A2** | **Water safety plans** | **1** |
| Chem_P1 | Industrial facilities under EU 'Seveso II' directive | (1?) |
| Chem_A1 | Regulatory requirements for land-use planning | ? |
| Chem_A2 | Chemical incidents register | ? |
| Chem_A3 | Government preparedness | ? |
| **Rad_E1** | **Incidence of skin cancer** | **1** |
| **Rad_A1** | **Effective environmental monitoring of radiation** | **1** |

Policy relevance: 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question
Overall readiness 1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# Table of contents

# 1 Introduction

Much statistical data in Finland is handled by Statistics Finland, which collects statistical data from a number of primary collectors. Statistics Finland publishes yearly about 500 statistical publications. The most important general source is statistical yearbook of Finland, which is published yearly, and contains cumulative data on the most important areas of life. It also includes a CD-ROM with pdf-version of the book and all tables in excel-format, plus thematic maps, word search and links to the home pages of main producers of statistics. As a starting point, this is probably the most useful compilation and contains some of the statistics to be collected now, and much more that is not published in the book can be obtained from Statistics Finland in electronic form. When primary data are needed e.g. for calculation, this may be very scattered in different organisations, starting from hospital registries, and extending to non-governmental organisations such as Traffic Safety, and in some cases municipalities. This means that the amount of work would be very different for different items, and also availability will likely be different. It was found out during this exercise that civil servants sometimes consider that data are not available or requires special request to justify the use, when in fact they have given the same data to Statistics Finland, and it is publicly available even in printed form.

# 2 Methods

KTL (National Public Health Institute) took the task of providing the pilot information to test the availability and quality of proposed environmental health indicators of WHO ECOEHIS project. Since it was clear that the institute could not do this work directly, it was decided to collect the data from a number of people in various organisations, and some time was spent to find a coordinating person to collect the material. Dr. Tuulia Rotko got this task to collect information concerning WHO ECOEHIS indicators on 18.5.2004. The time schedule was too tight because of other simultaneous commitments, and moreover some of the respondents were already having their summer vacation. Although the compilation has been somewhat slower than anticipated, this method seemed to work in principle, but would have been much easier to do over several months, because many respondents have themselves very tight schedules, and cannot respond immediately. Another problem is to find directly the best person to answer the questions, and this iterative approach is another reason for that rather long time would be preferable.

# 3 Results of the pilot study of the indicators

**General comments from Finnish respondents:**

- Instructions to fill in the questionnaire, grounds and explanations to each indicator and the use of each one of them, as well as description of the whole project were asked for.
- Lots of work, too tight time schedule.
- Some of the indicators (e.g. skin cancer) were not asked in an appropriate/reasonable/practical format (does they understand the phenomenon?)
- Confusing titles/headings above some indicators (what is really wanted?)
- Difficult to answer yes or no; many points need further explanations.
- Criteria is not sensible in Finnish climate (extreme outdoor temperature)
- Has not the reporting to the EU Commission and international databases been checked first?
- Some of the questions are ambiguous and could be interpreted in opposite ways.

## 3.1 Air Quality

Air_D1:

Information on passenger kilometres is available in Statistical yearbook of Finland, and available in electronic form at Statistics Finland. Both availability and quality should be good. There is some uncertainty on human powered transport.

- Data element unit is ambiguous: it is not clear in some cases, if you mean kilometres per unit (one train) or total in the whole country, literally per train per year means per one train. I think the questions should be clarified.
- Jargon abbreviations such as NEHAP and LEHAP should not be used in questions, very limited number of people in a country know what they mean
- Question is ambiguous, when the indicator is ready for implementation may mean in principle (for a new indicator) or when data of a specific year are available, some respondents seem to think readiness of data

Air_D2:
Freight transport tonne kilometres are available in Statistical yearbook of Finland, and available in electronic form at Statistics Finland. Both availability and quality should be good.

Air_D3:

Fuel consumption data of road transport are available in Statistical yearbook of Finland, and available in electronic form at Statistics Finland. Both availability and quality should be good.

What is LPG?; jargon or professional abbreviations should not be used in this kind of questionnaire, because people answering may be from different backgrounds (e.g. statisticians), and moreover do not speak English as their first language. The column was filled in by using the consumption of natural gas in Finland (mostly in city buses). Commented by Jouko Tuomisto.

Air_P1:

Data on some of the missing elements can be found from the following links.
Reference: “ROAD TRAFFIC EXHAUST GAS EMISSIONS IN FINLAND. LIISA 2002 CALCULATION SOFTWARE” in English on web page http://lipasto.vtt.fi/indexe.htm
and in Finnish http://lipasto.vtt.fi/lipasto/liisa/liisa2002raportti.pdf

Air_Ex1:
Population-weighted annual average concentration is not available, but data elements (average air pollutant concentrations & distribution of urban/rural population) are available.
A comment by Mr Timo Salmi from FMI:
The numbers of populations, which the concentration results represent, are not defined and thus the population weighted annual concentrations are not calculated. This could be roughly done using the available population density database in 250 m x 250 m grid for the whole country. This database is updated annually by the Statistics Finland and the cost of the database is about 2000 € per year (one user license). FMI have bought this population density database in 1 km2 grid for the year 1997. It has been used for the preliminary assessments of the air quality daughter directives of EU. With the available data could the air quality indicators be roughly calculated for the pollutants SO2, NO2, PM10 and O3 from the year 1997 for the whole country.
In Finland are developed a sophisticated model based method to calculate the population exposure of air pollutants. It has been used for example to estimate the exposure to NO2 on Helsinki Metropolitan area. (Anu Kousa, Jaakko Kukkonen, Ari Karppinen, Päivi Aarnio, Tarja Koskentalo, 2002. A model for evaluating the population exposure to ambient air pollution in an urban area. Atmospheric Environment 36 (2002) 2109–2119). With this method the population weighted averages can be calculated much more reliably than using only the monitoring results. Maybe the results of this mehtod could be used in defining the values of WHO air indicators in the future. See also

Air_E1:
Years of expected life lost are not calculated, but data elements (average air pollutant concentrations & age specific mortality) are available.

AIR_A1:

Comment by Ms Merja Vuori from STTV:
According to the Act on Measures to Reduce Tobacco Smoking (Tobacco Act) smoking is prohibited on the indoor premises of educational institutions intended for students and day-care centres for children and in their outdoor areas primarily intended for persons under the age of eighteen, in governmental offices and other public buildings, in hospitals, in cinemas, theatres, museums, etc., in public traffic vehicles both in urban areas and long distance. Smoking is also prohibited in work places, also in bars, restaurants, etc. However, the smoking can be allowed in a room intended for this purpose or in part of the facilities as long as no tobacco smoke can enter those indoor premises where smoking is prohibited. Smoking can be allowed in rooms for accommodation in hotels and corresponding establishments, as well as in restaurants whose serving area is not larger than 50 sq.m. On the premises with a larger serving area, maximum 50 per cent can be reserved for smokers as long as no tobacco smoke can enter those indoor premises where smoking is prohibited. On the Agency's point of view the ban and restrictions seems to be broken regularly especially when the pubs and nightclubs and gasoline station bars are in question. In the lunch and dining restaurants the law is complied much better.
According to Tobacco Act advertising, whether direct or indirect of tobacco products is prohibited and the ban seems to bee followed well.
Smoking restrictions are supervised by municipalities (local authorities). The general guidance of the enforcement of the regulations is the responsibility of the National Product Control Agency. Product Control Agency doesn't collected data concerning the issue. However the Agency gets information concerning the issue by the local authorities and the people when they ask advice and guidance. On the Agency's point of view this ban seems to be fairy well complied in the area specified in law. However the ban to allow the smoke enter the premises where smoking is prohibited is not complied very well.

Comment by T. Rotko (KTL) Policy-relevance: fair. ETS restrictions are an important issue, but it is not such a problem in Finland, since most of the public spaces are smoke-free.

*Template of Summary Table for Each Section: Evaluation of Indicators on Air Quality*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Air_D1* | 2 | 2 | 2 | 2 | 1 |
| Air_D2 | 2 | 2 | 2 | 2 | 1 |
| Air_D3* | 2 | 2 | 2 | 2 | 1 |
| Air_P1 | 2 | 2 | 2 | 2 | 1 |
| Air_Ex1* | 2 | 2 | 2 | 2 | 2 |
| Air_E1* | 2 | 2 | 2 | 2 | 2 |
| Air_A1* | N/A | N/A | N/A | 1 | 4 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.2 Noise

The Ministry of Environment (Ms Sirkka-Liisa Paikkala) should have a better understanding of the noise issues in Finland. I contacted Ms Sirkka-Liisa Paikkala from the Ministry of Environment concerning most of the noise indicators, however, after the telephone communication, I have not received any answers to the questionnaire. Also Célia Rodrigues from WHO called to her. Unfortunately we did not receive any answers from there yet.

Noise_Ex1 and _E1:
A specific survey in 1998 (Reference: K. Survo – O. Hänninen (1998), Altistuminen ympäristömelulle Suomessa. Esiselvitys. Suomen ympäristö, Ympäristönsuojelu 241): Number of people exposed to environmental noise levels of >55dB, >60dB and >65dB estimated. Also estimates of number of people exposed to noise levels >55dB at daytime and >50dB at night by noise sources. In addition municipality data and data from different traffic sectors.

A comment by Jouko Tuomisto:
I'd be very cautious in going forward with these parameters coming from different sources; calculating attributable risks from poor information of noise parameters and from cardiovascular disease parameters collected for other purposes is risky to say the least; I believe this is a research issue not ripe for international monitoring at the present stage. At least in Finland combining exposure data and disease data do not seem to be reliable enough, and I doubt the situation would be different elsewhere.

Noise_A2:
'Existence and effectiveness of urban or national action plans to solve noise problems.' The referred report summarizes national action plans concerning noise.

Ministry of the Environment (April 2004):
National guidelines and action plan for noise abatement
The Finnish Environment 696, Environmental Protection
Contact at the Ministry of the Environment: Anni Rimpiläinen, Senior Adviser, phone +358 9 1603 9384
and the same in Finnish
Ympäristöministeriö, Suomen ympäristö 696, Ympäristönsuojelu
Meluntorjunnan valtakunnalliset linjaukset ja toimintaohjelma
Edita Prima Oy, Helsinki 2004, pp. 64.
http://www.ymparisto.fi/julkaisut

*Template of Summary Table for Each Section: Evaluation of Indicators on Noise*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Noise_Ex1* | 1 | 1 | 0 | 1 ? | 1 |
| Noise_E1 | 1 | 2 | 2 | N/A | (1 ?) |
| Noise_E2 | N/A | N/A | N/A | N/A | N/A |
| Noise_A1 | N/A | N/A | N/A | N/A | N/A |
| Noise_A2 | 1 | 1 | N/A | 1 | 1 |
| Noise_A3 | N/A | N/A | N/A | N/A | N/A |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.3 Housing and Settlements

Most of these data are available from Statistics Finland although not necessarily in the requested form, so they might need processing. There is reliable information on affordability, crowding (Statistics Finland). Accessibility may be problematic, because centrally collected data may not exist, and the data is in municipalities. Should search this a bit more.

Hous_Ex1 (Crowding): An asnwer from Statistics Finland came after the Bonn meeting → a little bit different answer than from J. Tuomisto.

Hous_Ex2 (Accessibility):
The most difficult may be the prevalence of physical or environmental barriers, and the number of persons and household with at least one person with functional limitations, my guess is that this info might be in municipalities but not necessarily in any centralised databank (this is a guess!). Commented by Jouko Tuomisto.

Still waiting answer from Stakes (Päivi Nurmi-Koikkalainen), if they have any statistics. Hannu Hirvonen from the Ministry of Environment gave no answer. A brochure by Invalidiliitto on “No barriers” (Esteettömyys) does exist including a list of institutions in Finland interested on the issue in housing, etc. According to Anneli Juntto, Statistics Finalnd, yearly statistics in Finland include information on high rise buildings (more than three floors) without an elevator.

Hous_Ex3
<u>Extremes of air temperature</u> is very specific question, because climate conditions cause dramatic differences between countries. In most Finnish buildings outdoor temperature does not much influence indoor temperature (which is usually 22-25 C), except during the few hot days in the summer, because air conditioning is not common in homes. Only clearly poor quality buildings may be an exception, often inhabited by old people or asocial elements of the society. Therefore some doubts could be expressed as to the usefulness of international comparisons of this indicator.
Mortality is not clear, is it total mortality or mortality accountable by extremes of indoor air temperature
Health effects of hot or cold weather depend highly on equipment and on how accustomed the population is to these. Therefore –5 might be catastrophic in Portugal, but would be nothing in Finland. This restricts severely the usefulness of international data and international comparisons in this kind of question. Commented by Jouko Tuomisto.

Hous_Ex4
<u>Dampness and mould</u> problems are the most difficult part of this group. There are some surveys on Finnish dwellings, as well as public buildings such as schools, showing that some degree of moisture problem is quite prevalent, this does not usually reflect in general humidity of the building, but is related to leaks or condensation, and some percentage of these buildings also show mould growth. Again some percentage of this is reflected in health problems. Much too little is known of this problem, and more surveys should be done before a systematic monitoring is reliable.

Reference: Nevalainen A, Partanen P, Jääskeläinen E, Hyvärinen A, Koskinen O, Meklin T, Vahteristo M, Koivisto J, Husman T. 1998. Prevalence of moisture problems in Finnish houses. Indoor Air Suppl. 4, 45-49.

Hous_Ex7
Crime and the perception of crime V4-6: Some information in the ICVS Tables 24-26 and Optula Table 5 (A specific survey in the following web-page: ).

Haou_E1
Housing Safety and Accidents V1: Some information in the Optula Table 2 (A specific survey in the following web-page: ). Also a request sent to Anne Lounamaa, Stakes, to check their statistics about the issue.

Hous_Ex5
Household hygiene can be expressed in formal terms, of Finnish dwellings 98.1% have piped water, 98.6% sewer, 95.4% flush toilet, 95.8% hot water, 99.1% shower or bath room, 49.0% a private sauna in the dwelling, 92.0% central heating (year 2001). Therefore premises for good hygiene exist, but personal hygiene level in those dwellings is another matter which is not monitored and could only be studied by surveys.

Hous_Ex6
Indoor radon is well covered in Finland, and good-quality information is available at STUK.
According to Heikki Reisbacka, STUK, the last random sampling survey was conducted in 1993 (next one probably ready in 2006). National or even municipal averages can be estimated only from these surveys. Although annual data is collected, it is weighted to the areas were radon concentrations are known to be high and therefore these does not represent average values in Finland (with large spatial variation).

***Template of Summary Table for Each Section: Evaluation of Indicators on Housing and Settlements***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Affordability | 2 | 2 | 2 | 1 | 1 |
| Crowding | 2 | 2 | 2 | 1 | 1 |
| Accessibility | N/A | N/A | N/A | 2 | N/A |
| Dampness/Mould Growth | 0-1 | 0-1 | 0 | 2 | N/A |
| Household hygiene | 2 | 2 | 2 | 2 | 1 |
| Indoor radon in dwellings | 2 | 2 | 2 | 2 | 1 |
| Extreme temperature | 2 | 2 | 2 | 0 | (1?) |
| Housing safety and accidents | 2 | 2 | 2 | N/A | N/A |
| Crime/Perception of crime * | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question 1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.4 Traffic Accidents

Traf_D1: 'Passengers-kilometres by mode of transport'
An answer received after the Bonn meeting from Reijo Prokkola from Tiehallinto; a little bit different answer than from J. Tuomisto Air_D1.

Traf_Ex2 and Traf_S3: A request on 'Use of safety vehicle device' and 'Speed limit exceedance' sent to Pasi Anteroinen, Liikenneturva.

Potential years lost because of traffic accidents (or DALYs) could probably be calculated on the basis of data collected, but would need more work to do it, on the basis of present information it is impossible to calculate the matter.

*Template of Summary Table for Each Section: Evaluation of Indicators on Traffic Accidents*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Traf_D1 * (Air_D1) | 2 | 2 | 1 | 1 | 1 |
| Traf_S1 | 2 | 2 | 2 | N/A | 1 |
| Traf_S2 | 2 | 0/2 | 1/2 | 0/1 | 1 |
| Traf_S3 | N/A | N/A | N/A | N/A | N/A |
| Traf_Ex1 | 2 | 2 | 2 | N/A | 1 |
| Traf_Ex2 | N/A | N/A | N/A | N/A | N/A |
| Traf_E1 | 2 | 2 | 2 | 1 | 1 |
| Traf_E2 | N/A | N/A | N/A | N/A | N/A |
| Traf_E3 | 2 | 1 | 1 | 1 | 1 |
| Traf_E4 | N/A | N/A | N/A | N/A | N/A |
| Traf_E5 | 2 | 2 | 2 | 1 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.5 Water and Sanitation

According to Outi Zacheus (KTL) indicator WatSan_A1: "According to Finnish legislation municipal health protection authorities are responsible for monitoring and management of bathing waters in Finland. However, information concerning management actions are not collected from municipalities to any other organization. In fact, the quality of Finnish bathing water is very high and therefore the need for managements actions has been very low. Bathing water monitoring results are nationally collected from large EU bathing waters as mentioned previously (see WATSAN_S1)."

*Template of Summary Table for Each Section: Evaluation of Indicators on Water and Sanitation*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| WatSan_P1 | 1 | 2 | 1 | 2 | 1 |
| WatSan_S1 | 2 | 2 | 2 | 2 | 1 |
| WatSan_S2 | 2 | 2 | 2 | 2 | 1 |
| WatSan_Ex1 | 1 | 1 | 1 | 1 | 3 |
| WatSan_E1 | 2 | 2 | 2 | 2 | 1 |
| WatSan_A1 | 0? | 1-2 | 1? | N/A | 4 |
| WatSan_A2 | 2 | 2 | 1 | 1 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.6 Chemical Emergencies

Finnish data on chemical indicators should exist in TUKES (Safety Technology authority). Unfortunately respondents from TUKES (although giving some answers) did not yet give an answer to the summary questions.

*Template of Summary Table for Each Section: Evaluation of Indicators on Chemical Emergencies*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Chem_P1 | N/A | N/A | N/A | N/A | (1?) |
| Chem_A1 | N/A | N/A | N/A | N/A | N/A |
| Chem_A2 | N/A | N/A | N/A | N/A | N/A |
| Chem_A3 | N/A | N/A | N/A | N/A | N/A |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.7 Radiation

*Template of Summary Table for Each Section: Evaluation of Indicators on Radiation*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Rad_E1 | 2 | 2 | 2 | 2 | 1 |
| Rad_A1 | 2 | 2 | 1 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# 4 Conclusions

- In Finland most of the data asked in the questionnaire is available and some of this data are freely available in a book "Statistical yearbook of Finland" (also in CD-ROM).
- Mostly the problem is not the availability of the data, but the managerial problem of compiling them from various sources. The most problematic indicators are those collected locally by municipalities.
- It would be easiest to start with those indicators that are immediately available, and develop more complicated ones over several years.
- The data on EH indicators that can be found from international or EU databases should be used first.
- Also transformation to attributable deaths or DALYs cannot be found, but actual work is needed if they will be used as indicators.
- Noise, housing and chemical indicators seem to have the largest gaps in Finland. Noise is a true gap, in housing especially moisture problems and mould problems would require more surveys before routine indicators would be possible, chemical indicators exist; the problem is only locating the data and responsible persons.

# 5 Abbreviations

| Acronyms such as institute names in your country | Full name |
|---|---|
| FMI | Finnish Meteorological Institute |
| KTL | National Public Health Institute |
| STAKES | National Research and Development Centre for Welfare and Health |
| Stat | Statistics Finland |
| STUK | Radiation and Nuclear Safety Authority Finland |
| SYKE | Finnish Environment Institute |
| TUKES | Safety Technology Authority |
| VTT | Technical Research Centre of Finland |

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WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

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**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

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**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 11-3

# France Report on Pilot Study

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**

Between the European Commission, DG Sanco

and the World Health Organization, Regional Office for Europe

Table 2. Scoring of the feasibility of data collection

| | High availability 2 | Medium availability 1 | Low availability 0 |
|---|---|---|---|
| High quality 2 | 4 | 3 | 2 |
| Medium quality 1 | 3 | 2 | 1 |
| Low quality 0 | 2 | 1 | 0 |

In a similar way, the policy-relevance and the comparability of the indicator are scored as high=2, medium=1, or low=0, respectively. Then, the applicability of the indicator is determined by the sum of these scores as shown in Table 3.

Table 3. Scoring of the applicability of the indicator

| | High relevance 2 | Medium relevance 1 | Low relevance 0 |
|---|---|---|---|
| High comparability 2 | 4 | 3 | 2 |
| Medium comparability 1 | 3 | 2 | 1 |
| Low comparability 0 | 2 | 1 | 0 |

### Step 5: Determine the implementability

Based on the analysis results and the feed back from the MS, the indicators are classified into three groups: (i) ready for immediate implementation; (ii) not ready for immediate implementation; (iii) requiring further developmental work. The conceptual classification method using the scores of feasibility and applicability to determine the immediate implementability is shown in Table 4. An exemplary scheme is shown in Annex 2. For the indicators that are not ready for immediate implementation, an assessment about the factors interfering immediate implementation will be made, and the methods to expedite the implementation will be recommended.

Table 4. Classification of the indicators by the implementability

| | High applicability | Low applicability |
|---|---|---|
| High Feasibility | Ready for immediate implementation | Not ready for immediate implementation |
| Low feasibility | Not ready for immediate implementation | Requiring further developmental work |

## Development of EH Indicators for EU Countries (ECOEHIS)

**WHO project co-sponsored by EC DG SANCO (SPC 2002300)**

# Pilot Study on the Environmental Health Indicators

## Report from France


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**September 29, 2004**

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# Summary

This pilot study is part of the process of developing a methodology to implement an Environmental and Health Information System, co-ordinated by the WHO. The availability, quality, comparability and policy-relevance of 46 Environmental Health indicators have been tested in 11 European countries. For France the balance is positive. Most of the data exists in the country even though it is dispersed among many organisms, not always available for all periods and at the national level. Nevertheless, the difficulty lies in the production of an indicator based on these data. On the base of results of experts' interviews, some indicators can be produced quickly, the only specification is an official request and time of calculation and validation (Air_Ex1V1,3,4; Air_E1V1,3,4, Traf_E4). If many indicators are ready for immediate implementation, others that are in fact the concatenation of many specific indicators are only partially ready for immediate implementation (Air_D1, Air_Ex1, Air_E1, Noise_Ex1, Noise_E2, Traf_Ex2). For other indicators (Noise_E1, Rad_A1), information can be produced quickly but due to lack of representativeness and quality of some data elements, the result of the calculation will only be a bench mark at the national level. Other indicators could also be produced quickly but the opinion of the experts is that they need a preliminary international work for precision and standardisation of definitions or data collection.

The pilot study has identified an obvious lack of data in the field of noise monitoring. It has also stressed the necessity of a common work between experts from European countries to precise definitions and standardise data collection to set up housing indicators. Direct contact with relevant experts of the data bases owned by the Ministry of Interior was not possible. The result is that information on data availability and quality was difficult to obtain and incomplete for crime and perception of crime. In consequence, procedures to collect such information will have to be precisely and officially defined.

The creation of Sanitary Security Agencies (AFSSA, AFSSAPS, AFSSE, InVS…), the enacting of a public health law, the implementation of the French NEHAP, make the recent and current situation in France more and more favourable for developing an Integrated Environmental Health Information System. The EH Indicators for EU countries project (ECOEHIS) gave to the French main organisations in charge of centralising the data, the opportunity to exchange information concerning monitoring issues for Europe. ECOEHIS opened a field of synergistic interaction between European countries and experts for implementation of a real European monitoring system. This is the really first step of analysis of availability, quality and comparability of the data. Experts' opinion is essential but not sufficient. The process should continue after ECOEHIS. Therefore it is very important to select a subset of indicators on the basis of their a priori ability to be implemented immediately in most European countries and to test them by actual data collection from all countries for specific periods, and an analysis and comparison at the European level in order to propose them as the first element of the building of a monitoring environmental health system.

Indicators ready for immediate implementation in France are:

Air_D1 (variables 1,3,4,5), Air_D2, Air_D3, Air_P1, Air_Ex1(variables 2,5), Air_E1, Air_A1, Noise_A1, Noise_A2, Noise_A3, Noise_E2 (variable 1), Noise _Ex1 (variables : 1-10,41-45), Hous_Ex1, House_Ex2 (V1-5,7-9), Hous_Ex6, House_Ex3, Hous_E1 (variables 2-6), Traf_S1, Traf_S2, Traf_S3, Traf_Ex1, Traf_E1, Traf_E2, Traf_E6, WatSan_P1, WatSan_S1, WatSan_S2, WatSan_Ex1, WatSan_A1, Chem_A1, Chem_A2, Chem_A3, Rad_E1

# Table of contents

# 1 Introduction

In France, the necessity of an optimisation of health politics and the incurrence of some public health scandals led the French Government to create Health Security Agencies (InVS, AFFSA, AFSSAPS, AFSSE….). Their missions are to monitor and assess the evolution of public health problems and to alert in case of apparition of a specific public health hazard. To fulfil this mission, agencies such as InVS are developing monitoring systems for specific topics. A new public health law, also dealing with environmental health problems (air pollution, lead poisoning, Co intoxications…) is also in curse of publication. In parallel as asked in 1999 at the London conference, France has just finished to implement its NEHAP. To support the further development of such actions and policies, reliable information is essential to set priorities, track the progress and evaluate the effectiveness of the actions that will be carried out. Slowly but surely French experts and deciders integrate this necessity. For each objective of the new public law, indicators and target levels are defined in order to monitor the success of actions. In the French NEHAP one of the actions proposed in priority is to work on harmonisation and standardisation of all necessary databases in order to improve integrated monitoring.

Many environmental health problems are common to all European countries. Some of them are of international dimension. Since the London conference, each country has defined its NEHAP. Experts from this country have surely been confronted with monitoring issues. Furthermore environmental health problems are multi-factorial and multidimensional, demanding integration and sharing of environment and health information between sectors, themes and nations, as well as to provide common access to data and possibilities to link and inter-relate diverse data sets. Therefore, the dimension of that issue is European and sharing information and solutions between countries is a challenge. All this is a point in favours of the building of a real European integrated environmental health information system.

In 1999, WHO supported by DG SANCO proposed the program Environment and Health Information System with the mission of bringing and developing the European expertise concerning that topic. During the last five years, experts participating to this program analysed political, public health and methodological issues in environment and health. Their task was to identify the objectives and needs of a monitoring system, to propose tools and methodologies to answer to these issues and to propose relevant indicators for each area and public health question (water, air, assessment, action). For each domain, indicators were defined after having being tested on field in one or two voluntary countries from large Europe (2002-3). The current pilot study is the most recent step of this process. It consisted in selecting a short sub-set of indicators to determine their implementability in 11 European countries. The study aimed at assessing the feasibility of the data collection and applicability of the information carried by the indicator in the participating MS.[1] It has classified the proposed indicators into three groups: (i) ready for immediate implementation; (ii) not ready for immediate implementation; (iii) requiring further developmental work as of 2004. The practical goal of the study was to identify the indicators that are ready for immediate implementation in most of participating countries.

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[1] Austria, Belgium, Denmark, France, Finland, Germany, Italy, The Netherlands, Portugal, Spain, Sweden

# 2 Methods

The first step of the pilot study consisted in nominating the Steering Committee to oversee the study, appointing National Focal Points (NFP's) from the 11 countries involved, and setting up a Working Group of experts to cover all proposed indicators. Participation of the focal points to a final phase of definition and refining of indicators in May 2003 familiarised them with the general ENHIS process. The team of focal points and experts from WHO met again on the 29-30 January to select a sub-set of 46 indicators for the punctual test of feasibility of data collection process in each country. During this meeting and until the end of March, they also participated in developing the criteria and tools for testing the feasibility and applicability of proposed indicators. The ***feasibility of collecting the data elements*** and the ***applicability of the information carried by the indicator*** are considered as the two most important factors to determine the ***implementability of indicators***. The feasibility of data collection may depend on the **availability** (e.g., existence, accessibility, timeliness), and **quality** (e.g reliability, standardization, completeness) of the data elements among many factors. The applicability of the indicator may depend on the **policy-relevance** (e.g., usefulness, validity and interpretability in terms of policy-making and health-environment assessments) and temporal and spatial **comparability** of the information carried by the indicator. A questionnaire was built to collect all that information.

During March, the NFP had to build a national working group of referees in order to identify data holders and providers and to decide how to contact them. The meeting of this group held in Paris on the 18th of March and included the main organisms in charge of collection or utilisation of data for indicators (AFSSE, DGS, DREES, IFEN, INSEE, InVS, MEDD). The methodology adopted consisted in using the knowledge and network of these institutes to identify relevant data holders or experts to interview. A person has been engaged with the mission to fulfil the questionnaires about the data elements and the indicators and to collect the data when available before the deadline of June. Due to the amount of work and short delays prioritisation was put on census of the data sources and meta-data collection. Data was collected when immediately available on websites, or given by report sent by experts or data owners of the data. In reality this process finished on the 10 th of June.

After a first balance of the data collected and a second tour with data experts when necessary, a first analysis of the NFP has been done. The availability, quality and comparability of the data and policy relevance of the indicator were scored as high=2, medium=1, or low=0, respectively based on the information collected by the questionnaire.

All the questionnaires fulfilled and results of the first analysis were sent to WHO Bonn office for European comparison. More data could be collected with an official request and a specific round of identified data-sources.

# 3 Results of the pilot study of the indicators

The results are presented by topic, section by section. In each section of a specific topic, the main points of answers and comments to the questionnaire are stressed. Tendencies for immediate and medium term (2 years) future are synthesised. Assessment on four criteria (availability, quality, comparability, and policy-relevance) is thereafter summarized in a template as well as a score for the overall readiness.

The scores have to be interpreted with caution. On the contrary of what has been quoted in questionnaires, criteria quotation concerns the whole indicator and not each data (variable=V) necessary to compute the indicator. Some indicators are obviously a computation of different ones. When for them some data is missing, the choice has been made to quote for available variables and not for absent ones. For those indicators there is a short explanation under each template. Sometimes information only available for some years or at regional level can be quoted with good availability. Furthermore these scores are the results of interviews of experts asking them an a priori evaluation of the situation. Such an estimate should be evaluated by actual data collection from all countries for specific periods, and analysis and comparison at the European level.

## 3.1 Air Quality

This is a relatively well advanced area concerning monitoring topics. There is a specific air quality law in France that has been published on the 12/31/96 and demands the monitoring of the air quality and its effects on health and the environment.

Air *Ex1 (Population-weighted annual average concentration of air pollutants: NO2, PM10, PM2.5, SO2, O3),*
*Air* E1*(Death attributable to PM10)*

The « Agence de l'Environnement et de la Maîtrise de l'Energie" (ADEME) coordinates the territorial collectivities that monitor the air quality in regions. It centralizes the results and presents a part of them on its website (http://www.ademe.fr/Buldair). It currently works to assess the weighted mean (on population) of PM10, NOx, and O3 for France. This allowed the production of an estimation of the impact of this air pollution on mortality and hospital admissions (InVs work).

*Air_P1 (Air pollution emissions: S02, PM10, PM2.5, NOx, CO, NMVOC)*

The original information on air pollutant emissions comes from the "Centre Inter Professionnel d'Etude de la Pollution Atmosphérique" (CITEPA). Most of the needed information is available on the web: http://www.citepa.org/emissions and of good quality.

*Air_D1(Passengers-kilometres by mode of transport), Air_D2 (Freight-transport demand (Tonne-kilometres)), Air_D3 (Road transport fuel consumption)*

The complete and exact information concerning the Driving Force of transport couldn't be collected easily in France nevertheless most of it exists. The main source of information in France seems to be the Ministry of Equipment and Transports and some information is available on the web: http://www.transports.equipement.gouv.fr. Due to consumption of fuel from foreign cars or buying of fuel out of the border interviewed experts evaluate as not absolutely reliable the estimations on road transport fuel consumption. We couldn't find any information on human powered and motorbikes transport.

*Air_A1 : Policies on environmental tobacco smoke (ETS) exposure*

Concerning the application of regulations against exposure to tobacco smoke, a law has been edited in France in 1996 banning smoking in public places. This law defines clearly the conditions of smoking in such places. It is nevertheless moderately respected in restaurants, schools and work places (Sources : Direction Générale de la Santé).

**Tendencies**: This area will be better and better covered with new directives. The population weighted mean assessment for various pollutants is on the way. On the other side, health impact assessment should be more accurate in the future due to improvements in quality of specific death declarations, and the modifications of the PMSI (registering of hospitalisations for economic purposes) towards more epidemiologically relevant information. Linking between hospitalisations of the same person is today theoretically possible. Registrations of main and secondary diagnosis will be asked in the future with a new classification of acts more linked to specific diagnosis.

Template of Summary Table for Each Section: Evaluation of Indicators on Air Quality

| Indicator ID | Title | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|---|
| Air_D1** | Passengers-kilometres by mode of transport | 2** | 1 | 1 | 2 | 1 |
| Air_D2 | Freight-transport demand (Tonne-kilometres) | 2 | 2 | 1 | 2 | 1 |
| Air_D3 | Road transport fuel consumption | 2 | 1 | 2 | 2 | 1 |
| Air_P1 | Air pollution emissions | 2 | 2 | 2 | 2 | 1 |
| Air_Ex1## | Population-weighted annual average concentration of air pollutants | 2## | 2 | 2 | 2 | 1 |
| Air_E1 | *Years of expected life lost* | 2 | 2 | 2 | 2 | 1 |
| Air_A1 | Policies on environmental tobacco smoke (ETS) exposure | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

** not available for motorbikes and human powered transports

## currently only available for PM10 and O3

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.2 Noise

***Template of Summary Table for Each Section: Evaluation of Indicators on Noise***

| Indicator ID | | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|---|
| Noise_Ex1** | Population exposed to various noise levels (Lden and Lnight) by different sources | 1** | 1 | 1 | 2 | 1 national old or local new |
| Noise_E1 | Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure | 1 | 1 | 1 | **2** | 2-3 (local new, old national) or 4 for national data |
| Noise_E2## | Self reported noise health effects - Annoyance and sleep disturbance | 2## | 2 | 0 | 2 | 1 annoyance national, or sleep local 4 for new complete data |
| Noise_A1 | National regulations on maximum sound levels for indoor and outdoor leisure events | 1 | 1 | 0 | 2 | 1 |
| Noise_A2 | Existence and effectiveness of urban or national action plans to solve noise problems | 1 | 0 | 0 | 2 | 1 |
| Noise_A3 | Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures | 1 | 1 | 1 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

** : available for old data (1986) considering road and rail traffic aggregated and day, data available only for 10 biggest airports

## only available for annoyance and old data at national level

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

Unfortunately, information collected on noise problems is today very scarce and partial. It is generally of poor quality in France. The annoyance assessment is only qualitative.

*Noise_Ex1, Population exposed to various noise levels (Lden and Lnight) by different sources*

Another study made by the National Research Institute on Transports and their Security (INRETS) allowed to estimate the amount of persons living in places with more than 50 dB during 24 hours, 5dB per 5dB. Nevertheless this information concerns only day periods (8am-8pm) and road and rail traffic aggregated. Information on population exposed to noise near airports is collected by the "Direction Générale de l'Aviation Civile " and concerns only the 10 biggest airports.

The transcription of the European directive is on the way. Next autumn the law asking for mapping of exposure to noises will be edited. Main towns (> 250000) will have to measure, assess and map exposure to noise in 2007. Smaller ones (> 100000) will have to do that before 2012. Paris has already mapped exposure to noise of inhabitants.

*Noise_E2, Self reported noise health effects - Annoyance and sleep disturbance*

One study made by the Institut National des Statistiques et des Etudes Economiques (INSEE) has been launched to assess the degree of annoyance due to traffic noise in France. This data is old (1986). The production of a new one at the national level is unknown. There is no sleep disturbance measurement available at a national or regional level. In 2003, the town of Angers realised a study on housing and environmental conditions of its population (Source WHO). There are measurements of annoyance and sleep disturbance due to noise as advocated by WHO.

*Noise_E1, Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure*

The calculation of the impact indicator is currently difficult in France. But such an assessment can be proposed using old data for exposure to noise, and data from registries for ischemic heart diseases, or from surveys for HTA and stroke. This can serve has a methodology exercise waiting available and reliable data. In the future, the assessment of the incidence of such diseases could be improved in France due to changing of registering methodologies for PMSI and improvement of specific death certificates (Source InVS, DHOS). In conclusion, good data to assess incidence of IHD, stroke or HTA due to exposure to noise in main towns should be available around 2008.

*Noise_A2, Existence and effectiveness of urban or national action plans to solve noise problems , Noise_A3, Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures*

Laws to protect people from overexposure to noise are well implemented in France. Noise is a priority for future strategic national public health plans and the NEHAP. But except for a few towns (ex.: Paris), local and regional noise plans don't seem to exist already, as well as mapping for noise as asked by the Directive (source MEDD).

*Noise_A1 National regulations on maximum sound levels for indoor and outdoor leisure events*

There is a strong legislation concerning noise in public rooms and discotheques. Nevertheless there is no legislation concerning open space concerts and video games (source DGS).

**Tendencies**: The action plan against noise published in October 2003 proposes to realise noise mapping. But the process is just beginning and mapping will be available in four years and not for small towns and rural areas. On the other side, health impact assessment should be more accurate in the future due to improvements in quality of specific death declarations, and the modifications of the PMSI towards more epidemiologically relevant information (cf. air). This indicator also relies on the reliability of the dose-effect model between noise and cardiovascular effects. On the other side, InVS regrets that there is no indicator for monitoring of audition capacities in general and specific populations. This is perhaps a gap that should be filled.

## 3.3 Housing and Settlements

This is the area where the information has been the most difficult to collect. This is due to the numerous organisms in charge of the enormous amount of information to collect. This is also due to the fact that many of these data are controlled by persons working for economic purposes and who are not used to epidemiologic points of view.

*Hous_P1, Affordability to buy dwelling*

The information on cost of construction for a standard dwelling is not exactly available as asked. There is proxy information from DGUHC or INSEE. We were unable to assess if the definition of poverty in France follows an international definition or not.

*Hous_Ex2, Accessibility*

Only partial information could be collected during the delays of the study (source INSEE) for accessibility. We couldn't have information on the amount of public financial resources invested in housing adaptation / home modification to meet needs of persons with functional limitations. This information doesn't seem to be centralised in order to guide and follow political actions concerning persons with functional limitations.

*House_Ex3 ( Mortality and hospitalisations with extreme temperature)*

Outdoor temperature has been used as a dummy variable for indoor temperature (source MeteoFrance). Concerning death and hospital admissions (sources INSERM, DHOS), the information is the same as for Air_E1, Noise_E1.

*Hous_Ex1(Crowding), Hous_Ex6 (Indoor radon in dwellings), Hous_Ex5 (Household hygiene)*

Information exists in France for crowding (source INSEE), household hygiene (source INSEE) or radon (source IRSN) didn't pose any problem. Nevertheless the experts from France asked for more precise definition of Household Hygiene.

*Hous_E1 (Housing safety and accidents)*

Concerning "Housing safety and accidents", the data exists but could be of better quality. A monitoring system concerning injuries, burns and poisoning in and around the dwellings is being implemented at the InVS. This should allow at term a good quality and comparability of the information needed.

*Hous_Ex7, (Crime/Perception of crime)*

As far as now, we didn't succeed in collecting the existing information concerning crimes and fear of crimes. This is due to the functioning frame of the specific ministry in charge of the collect and analysis of this specific information, the "Ministry of Interior". No direct contact with a statistician is allowed, and the communication services are not at all competent to understand the nature of the information needed. This doesn't preclude possibility to have the necessary information, but the process is necessarily long and makes any reaction to a quick modification quite complicate. It was also impossible to assess the quality of the potential information.

*Hous_Ex4 (Dampness/Mould Growth)*

The only information that does not seem to exist currently at a regional or national level is on dampness and mould. A representative study on Indoor Air Quality and dwelling environment is currently being implemented on the base of a representative national sample of 710 inhabitations. This study should give a first benchmark of the assessment of the distribution of such problems in French dwellings. Up to now, just a study made in the town of Angers allows such an estimate.

**Tendencies**: The main issue for this area is precision, standardisation and international comparability of the necessary information. Many definitions should be more precise as well as the collection should be more standardised. Let's cite the definition of poverty, of a standard quality building, of adequate – substandard – lacking hygiene amenities, of dampness and mould. Such a fact is not surprising. The construction of international indicators for this important topic on a public health point of view is not totally finished. Therefore more work is actually necessary to finalise the exact definition of indicators. But the good news is that finally, most of the information necessary should exist and be available in France currently or in two years**.** A working group is being implemented in France to improve the definition of indicators concerning indoor conditions and the availability of necessary information. Finally, indoor air quality is one of the priorities of the NEHAP. This should improve the probability of the persistence of the Observatory of Indoor Air quality (OQAI) that is in charge of the study on the sample of 710 dwellings and should facilitate the studies on housing conditions and the production of necessary information.

***Template of Summary Table for Each Section: Evaluation of Indicators on Housing and Settlements***

| **Indicator ID** | | **Data Availability (1_S) *** | **Data Quality (2_S) *** | **Comparability (3_S) *** | **Policy-relevance (4_S_1) *** | **Overall Readiness (4_S_2) ^** |
|---|---|---|---|---|---|---|
| Hous_P1 | Affordability to buy dwelling | 2 | 2 | 1 | 2 | 1 |
| Hous_Ex1 | Crowding | 2 | 2 | 2 | 1 | 1 |
| Hous_Ex2** | Accessibility | 1 | 1 | N/A | 2 | 1 |
| Hous_Ex4 | Dampness/Mould Growth | 2 | 2 | 1 | 1 | 3 |
| Hous_Ex5 | Household hygiene | 2 | 2 | 1 | 2 | 1 |
| Hous_Ex6 | Indoor radon in dwellings | 2 | 2 | 2 | 2 | 1 |
| House_Ex3 | Mortality with extreme temperature | 2 | 2 | 2 | 2 | 1 |
| Hous_E1## | Housing safety and accidents | 2 | 2 | 2 | 2 | 1 |
| Hous_Ex7 | Crime/Perception of crime | 0 | ?N/A | N/A? | N/A? | 2 |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

** no information on the amount of public financial resources invested in housing adaptation / home modification to meet needs of persons with functional limitations Hous_Ex2V6.

## information on number of burns, physical injuries and poisonings requiring medical attention and which resulted from external causes in and around the dwelling per annum is of less quality and comparability. Hous_E1V1.

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.4 Traffic Accidents

Traffic is one of the priorities of the present government. Therefore most of the information, coming from local agencies of the “Ministère de l’Intérieur (police nationale)” and from the “Ministère de la Défense (gendarmerie)” is gathered and analysed at the “Observatoire National Interministériel de Sécurité Routière” (ONISR). The aim is to guide and assess the success of the policies and actions for traffic security.

*Traf_D1 (Air_D1), Passengers-kilometres by mode of transport (Air_D1)*

First direction of tendencies is assessed by the number of person-kilometres by mode of transport. This information is lacking for motorbikes, human powered mode of transports, but is available for other mode of transport (source Ministry of Equipment and Transport http://www.transports.equipement.gouv.fr).

*Traf_S1 (Age of vehicle fleet), Traf_S2 (Road accident rate), Traf_S3 (Speed limit exceedances), Traf_Ex1 (Person time spent on the road), Traf_Ex2 (Use of safety vehicle device)*

State of the situation and level of exposure is assessed by number of matriculations, circulating car, speed limit excesses, passengers using safety devices, and of hours of transport necessary to reach work or school. Such information is also very difficult to control and assess since it relies on indirect calculations from various sources of information, on regular but hardly representative studies or on registries of infractions. Therefore the quotation on reliability of the data is just fair. Most of these data are available on the website of the ONISR.

*Traf_E1 (Mortality due to transport accidents), Traf_E2 (Potential Years of Life Lost), Traf_E4 (DALY lost for road accidents), Traf_E3 (Injury rate)*

Concerning effects, mortality due to traffic accident at six days is correctly collected and standardised from registrations of the Ministry of interior. More complete information can be found for one department (Rhône) thanks to an exhaustive registry used for research purposes (INRETS). Therefore DALY can be calculated with acceptable reliability in a reasonable period of time. Concerning injuries due to traffic accidents, information is available at the national level, with reliable and comparable information but based on declarations from local police or gendarmerie stations. Many injuries not leading to a report by the police, or to hospital visits are not registered. This is one of the interests of the registry of the Rhône (INRETS) that allows the assessment of this bias by cross-checking of this information with ONISR for the corresponding department. Furthermore weight of injuries can be proposed from the registry. This information allows the calculation of DALYs

*Traf_E6, Mortality due to drinking driving*

Death due to alcohol consumption can be brought by statistics of ONISR**.**

**Tendencies**: Most of the information needed is available in France, but the quality and exhaustiveness of the information has to be assessed since it mainly comes from only one source. The point of view of the experts is that the data even biased is of good quality. The main improvement in that area will be linked to European works to harmonise and standardise definitions and collect methods.

***Template of Summary Table for Each Section: Evaluation of Indicators on Traffic Accidents***

| Indicator ID | | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|---|
| Traf_D1** (Air_D1) | Passengers-kilometres by mode of transport (Air_D1) | 2 | 1 | 1 | 2 | 1 |
| Traf_S1 | Age of vehicle fleet | 2 | 2 | 2 | 2 | 1 |
| Traf_S2 | Road accident rate | 2 | 1 | 1 | 2 | 1 |
| Traf_S3 | Speed limit exceedances | 2 | ? | ? | 2 | 1 |
| Traf_Ex1 | Person time spent on the road | 1 | 2 | 2 | 2 | 1 old , 4 new |
| Traf_Ex2 | Use of safety vehicle device | 1 | ? | ? | 2 | 1 old , 4 new |
| Traf_E1 | Mortality due to transport accidents | 2 | 2 | 2 | 2 | 1 |
| Traf_E2 | Potential Years of Life Lost | 2 | 2 | 2 | 2 | 1 |
| Traf_E3 | Injury rate | 2 | 2 | 1 | 2 | 1 |
| Traf_E4 | DALY lost for road accidents | 2 | 2 | 2 | 2 | 2-3 |
| Traf_E6 | Mortality due to drinking driving | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

** not available for motorbikes and human powered transports

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.5 Water and Sanitation

The responsibility of control and collection of information concerning this area is shared by two organisms, the Ministry of Ecology and Durable Development dealing with Wastewater treatment (WatSan_P1,) and the Ministry of Health dealing with bathing safety (WatSan_S1) and drinking water quality (WatSan_S2, WatSan_Ex1, WatSan_A1). Most of the information is available, existing on data bases and of quite good quality and reliability.

**Tendencies**: This monitoring system has to be modernised. The possibility of adding indicators on water born disease outbreaks (WatSan_E1) and on water safety plans (WatSan_A2) in the future is linked to preliminary stages. First, the definition of water born disease outbreaks has yet to be precised in close relation with validation of such information as indicator of water quality. For France, InVS is currently doing practical research to define water quality indicators easy to collect in relation with disease outbreaks. Second, the concept of water safety plans has to be well defined and adopted by all the authorities of the countries. It will have to be standardised after.

***Template of Summary Table for Each Section: Evaluation of Indicators on Water and Sanitation***

| Indicator ID | Title | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|---|
| WatSan_P1 | Wastewater treatment | 2 | 2 | 2 | 2 | 1 |
| WatSan_S1 | Recreational water compliance | 2 | 2 | 2 | 2 | 1 |
| WatSan_S2 | Drinking water compliance | 1 | 2 | 2 | 1 | 1 |
| WatSan_Ex1 | Safe drinking waters | 2 | 1 | 2 | 1 | 1 |
| WatSan_E1 | Outbreak of water-borne diseases | 0 | NA | NA | 2 | 3-4 |
| WatSan_A1 | Management of bathing waters | 0 | 1 | 1 | 2 | 1 |
| WatSan_A2 | Water safety plans | 0 | 0 | 0 | 2 | 4 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.6 Chemical Emergencies

Only a few indicators are proposed for this area. They concern essentially the application of European directives at national level. Two databases are available to procure the information.

*Chem_A2: Chemical incidents register*.

BARPI registers the incidents and accidents concerning chemical products, and industrial and transport processes

The MEDD manages this well structured database that doesn't give absolute guaranties of exhaustiveness (linked to declaration). Up to the 21st of September 2004 this databases contains 22 556 French accidents or incidents.

*Chem_P1, Industrial facilities under EU 'Seveso II' directive*

The MEDD has also another database of Seveso sites . This database has a good quality and exhaustiveness for recent data, and only a fair one for old ones. Furthermore, the information concerning quantity of products is currently absolutely not exhaustive.

*Chem_A1, Regulatory requirements for land-use planning*

The MEDD can give information on regulatory requirements for land-use planning in regions.

**Tendencies:** In France, work is on the way to improve instruments to respond to a chemical incident at a regional or a national level (*Chem_A3,Government preparedness).* The corresponding indicator is a good tool for comparison of such organisations between lands.

They are also good perspectives to improve the information coming from current databases if the data is used for epidemiological purpose and on the base of the feedback from comparisons between countries.

***Template of Summary Table for Each Section: Evaluation of Indicators on Chemical Emergencies***

| Indicator ID | | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|---|
| Chem_P1 | Industrial facilities under EU 'Seveso II' directive | 1 | 2 | 2 | 2 | 1 |
| Chem_A1 | Regulatory requirements for land-use planning | 1 | 2 | 2 | 2 | 1 |
| Chem_A2 | Chemical incidents register | 2 | 1 | 2 | 1 | 1 |
| Chem_A3 | Government preparedness | 1 | 2 | 2 | 2 | 1 |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.7 Radiation

*Rad_A1, Effective environmental monitoring of radiation*

Concerning the edification of the measuring networks (source IRSN), a good amount and quality of information is available in France.

*Rad_E1, Incidence of skin cancer*

The information on skin cancer (melanoma and others) is more difficult to produce. There is good and comparable information on melanoma but at a regional level (source InVS). The information on other skin cancers is much poorer.

**Tendencies:** InVS is currently working on the making of a national surveillance system for melanoma but is just beginning. IRSN is by the law in charge of the construction of a national network of ionising radiations measurements gathering existing information on the base of all existing networks and systematic measurements. It is also in charge of producing access to this information on the base of a Website. This big work is also just beginning, but it will allow large and easy access to the data for public and organisms.

*Template of Summary Table for Each Section: Evaluation of Indicators on Radiation*

| Indicator ID | Title | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|---|
| Rad_E1** | Incidence of skin cancer | 2 | 2 | 2 | 2 | 1 regional , 4 national |
| Rad_A1 | Effective environmental monitoring of radiation | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

** this score concerns melanoma. For other skin cancers the score would be much poorer.

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# 4 Conclusions

The balance of the pilot study in France is positive. Most of the data exists effectively in the country even if it's dispersed in many organisms. The scoring of availability has nevertheless to be interpreted with caution. Firstly, some indicators are obviously a computation of different ones. The choice has been made to quote the availability of existing parts of this indicator and not of absent ones. In these cases, available variables are specified. Secondly information available only for some years or at a regional level, or on the basis of surveys made of a small sample has sometimes been quoted with a good availability. Thirdly these scores are the results of interviews of experts asking them an a priori evaluation of the situation. Such an estimate should be validated by actual data collection from all countries for specific periods, and analysed and compared at the European level. In annex 1 a template lists indicators well defined and ready for employment. In annex2 the questionnaire results are displayed.

<u>Indicators well defined and ready for employment (1)</u>

Part of the indicators are already produced; some of them are already to be sent to European directions or international organisms (Air_D1V1,3-5, Air_D2, Air_D3, Air_P1, Hous_Ex1, Hous_E1, Traf_S1, Traf_S2, , Traf_E1, Watsan_S1, Watsan_S2, Watsan_Ex1, Watsan_P1, Chem_A1, Chem_A2, Chem_A3), others for national purposes (Air_Ex1V2, Air_Ex1V5, Air_E1, Air_A1, Noise_Ex1(V1-10,41-45), Noise_A1, Noise_A2, Noise_A3, Noise_E2V1, Hous_Ex2(V1-5,7-9), Hous_Ex3, Hous_Ex6, Traf_S3, Traf_Ex1, Traf_E2, Traf_E6, Watsan_A1, Rad_A1). They are therefore, at least partially immediately available.

<u>Indicators well defined but not yet available (2),</u>

Some information could be relatively quickly produced and this process could be accelerated in the framework of an European job (Traf_E2, Air _Ex1V1,3,4).

For others, the information will not necessarily be available soon. Information on kilometres by human powered transport (Air_D1V6) or kilometres by motorbike (Air_D1V2) couldn't be collected. For some indicators as melanoma (Rad-E1), calculation is possible but results reliable at the regional level can be just a benchmark less reliable at the national level due to lacking of information at that scale. Furthermore, the information can be of good quality but outdated (Noise_Ex1(V1-10,40-45). The database of Seveso sites (Chem_P1) does not contain systematically the quantities of products. Noise_Ex1V16 to 40 is not available at a national level and the transposition of the directive is just beginning. Information on accessibility couldn't be obtained completely (Hous_Ex2).;

Information on perception of crime doesn't lack in the country, but was very difficult to procure from the national institutions (Hous_Ex7). It is nevertheless accessible when consulting the International Crime Victim Survey!

Indicators with gaps in definition but already available (3)

For some indicators, more precise and standardised definitions taking into account what exists in nations is necessary before being sure that the info is available and can be produced quickly. To produce Traf_E4, standardised weight for gravity of injuries is necessary (Traf_E3). For household hygiene (Hous_Ex5), dampness and mould (Hous_Ex4), affordability (Hous_P1), some more precise definition and standardisation could improve comparability of the data. Noise_E1 needs more precise definition of effects (cardio–ischemic, or stroke, or HTA) to allow a first calculation on the base of the existing monitored data in France. But it is perhaps a specificity of our country.

Indicators not well defined and not yet available (4)

Watsan_E1 needs more work for definition, validation and also production of the data. There is a problem of definition for Watsan_A2 and such complete management systems are not yet implemented in France.

In France, the pilot study was a good opportunity to identify the organisms in charge of the production of the data. Asking for data feasibility and implementability allowed the identification of the main gaps in the production of relevant and reliable data from those organisms. Most of the organisms accepted to display information in a short period of time and good will was obvious. The contact was only difficult for the "Police Nationale" under the control of the Ministry of the interior and the "Observatoire National Interministériel de la Sécurité Routière" directly under the control of the Prime Minister. Perhaps the reason was that a direct contact with an epidemiologist or a statistician was impossible. Fortunately, for all traffic data, the National Research Institute on Transports and their Security (INRETS) was able to deliver analysis on the quality, advantages and limitations of data delivered on the web by the O.N.I.S.R. For Ministry of Health, and the part of the Ministry of Equipment interested in construction, the difficulty lied in the lack of personnel making difficult to have an appointment and for them to rule their existent databases. Drinking water is under monitoring of the Ministry of Health. Answers were more easy from expertise institutes that are implementing databases and monitoring on specific topics (radioactivity for IRSN, air quality for ADEME, traffic problems for ONISR, housing problems for OQAI, health effects for InVS, death certificates for INSEE and INSERM CepiDC). Information was easy to collect from the MEDD that is monitoring industrial accidents. Production of impact assessment and construction of health impact indicators can be done and is under the responsibility of specific expertise institutes: InVS, AFSSE, IRSN... Only noise public health topics are currently obviously under monitored for exposure and effects. Many data indispensable for the construction of indicators are produced by non health or non environmental targeted institutes. Let's cite INSEE for population, dwelling or mode of transport data, and the Ministry of Transport and Equipment for transport data. Contact with these institutes was very interesting on a public health point of view. Information is obviously there, but way of analysing it as well as specific vocabulary are different between experts from this institute and epidemiologists. In conclusion, this pilot study was the opportunity for multiple contacts between the different actors of a potential future monitoring system. This is also one occasion of sharing specific skills and culture in order to build a monitoring system relevant for orientation of actions and management in the area of environmental health. Results from the pilot study have been distributed to all contributors. This was also the opportunity to tighten links between actors of monitoring in France. For the implementation of ECOEHIS, InVS proposed the creation of an information exchange group of main organisms concerned by data centralisation and monitoring and by collaborations with European organisms. Members of this group were AFSSE in charge of expertise in environment and health, InVS in charge of alert and monitoring for public health problems, IFEN in charge of monitoring and collecting information for environmental issues, DREES in charge of statistics for Ministry of Health, a member of the Haut Comité de Santé Publique (HCSP) also member of the INSEE in charge of demographic and consumption statistics, DGS General Direction for Health and MEDD Ministry of Environment. They decided to maintain this informal group after ECOEHIS. In the French NEHAP, one action concerns the improvement of the efficiency and the integration of the environmental health information systems. This action is coordinated by IFEN and AFSSE with the collaboration of the different organisms. Furthermore a public health law is currently on the verge of being edited defining targets and calling for indicators. In conclusion there is a favourable tendency in our country for the construction of a real monitoring information system in environment and health.

ECOEHIS offered a field of synergic interaction between European countries and experts for implementation of a permanent relevant European information system for environment and health. But this is just the first step of this process that must continue. This first assessment of availability, quality and comparability of indicators should be validated by actual data collection, analysis and comparison from all countries for specific periods. And for each proposed indicator, a field test with a precise analysis of the respect of the definition, the signification of the data behind, as well as an assessment of the standardisation of the collecting would be useful before its permanent implementation. The work realised for mortality data [2] is a good example of what could be done to assure a good quality and good relevance of the data. Even in the framework of precise and standardised definitions, there will be a hard technical work to assure the production of reliable, standardised, harmonised and comparable information from one country to the other. For each information and indicator, this is a short, middle and long term work. A close international and technical coordination between experts is absolutely necessary to attain this goal while sparing costs and efforts. It will also accelerate considerably the implementation of a European environmental health monitoring system. Therefore, it is very important to select a reasonably small subset of indicators on the base of their scored availability, reliability, comparability and policy relevance in most European countries and to make field tests by exchanging the real data at the European level.

# 5 Abbreviations

| Acronyms such as institute names in your country | Full name |
|---|---|
| INRETS | Institut national de recherche sur les transports et leur sécurité |
| ADEME | Agence de l'environnement et de la maîtrise de l'énergie |
| AFSSA | Agence française de sécurité sanitaire de l'alimentation |
| AFSSAPS | Agence française de sécurité sanitaire des produits de santé |
| AFSSE | Agence française de sécurité sanitaire de l'environnement |
| BARPI | Bureau d'analyse des risques et des pollutions industrielles |

[2] référence

| | |
|---|---|
| CITEPA | Centre interprofessionnel d'étude de la pollution atmosphérique |
| CSTB | Centre scientifique et technique du bâtiment |
| DGS | Direction générale de la santé |
| DGUHC | Direction générale de l'urbanisme et de la construction |
| DREES | Direction de la recherche, des études, de l'évaluation et des statistiques |
| HCSP | Haut Comité de Santé Publique |
| IFEN | Institut français de l'environnement |
| INSEE | Institut national de la statistique et des études économiques |
| INSERM | Institut national de la recherche médicale |
| InVS | Institut national de veille sanitaire |
| IRSN | Institut de radioprotection et de sûreté nucléaire |
| MEDD | Ministère de l'écologie et de l'environnement durable |
| OQAI | Observatoire de la Qualité de l'Air |
| PMSI | Programme Médicalisé des Systèmes d'Information |

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# Annexe 1 Template of readiness for implementation

1. Ready for immediate implementation
2. Not ready for immediate implementation because some data are not immediately available
3. Not ready for immediate implementation. Needs precisions in definitions or standardisation efforts
4. Requiring further developmental work

| Indicator names | Title | ready for immediate implementation |
|---|---|---|
| **Air** | | |
| Air_D1V1,3,4,5 | *passenger kilometres by mode of transports* | 1 |
| Air_D2 | *freight transport demand (Tonne-kilometres)* | 1 |
| Air_D3 | *road transport fuel consumption* | 1 |
| Air_P1 | *air pollution emissions* | 1 |
| Air_Ex1V2,5 (PM10, O3) | *population-weighted annual average concentration on air-pollutants* | 1 |
| Air_E1 | *years of expected life losts* | 1 |
| Air_A1 | *Policies on environmental tobacco smoke (ETS) exposure* | 1 |
| **Noise** | | |
| Noise_A1 | *National regulations on maximum sound levels for indoor and outdoor leisure events* | 1 |
| Noise_A2 | *Existence and effectiveness of urban or national action plans to solve noise problems* | 1 |
| Noise_A3 | *Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures* | 1 |
| Noise_E2V1 | *Self reported noise health effects - Annoyance road* | 1 but old data |
| Noise_Ex1 (V1-10) road/rail, Noise_Ex1 (41-45) airport | *Population exposed to various noise levels (Lden and Lnight) by different sources* | 1 National old, very local new |
| **Housing** | | |
| Hous_Ex1 | *Crowding* | 1 |
| Hous_Ex2 (V1-5,7-9) | *Accessibility* | 1 |
| Hous_Ex6 | *Indoor radon in dwellings* | 1 |
| House_Ex3 | *Mortality with extreme temperature* | 1 |
| Hous_E1 | *Housing safety and accidents* | 1 |
| **Traffic** | | |
| Traf_S1 | *Age of vehicle fleet* | 1 |
| Traf_S2 | *Road accident rate* | 1 |
| Traf_S3 | *Speed limit exceedances* | 1 |
| Traf_Ex1 | *Person time spent on the road* | 1 but old data |
| Traf_E1 | *Mortality due to transport accident* | 1 |
| Traf_E2 | *Total number of potential years of life lost for all causes* | 1 |
| Traf_E6 | *Mortality due to drinking driving* | 1 |

| Indicator names | Title | ready for immediate implementation |
|---|---|---|
| **Water Sanitary** | | |
| WatSan_P1 | *Wastewater treatment* | 1 |
| WatSan_S1 | *Recreational water compliance* | 1 |
| WatSan_S2 | *Drinking water compliance* | 1 |
| WatSan_Ex1 | *Safe drinking waters* | 1 |
| WatSan_A1 | *Management of bathing waters* | 1 |
| **Chemicals** | | |
| Chem_A1 | *Regulatory requirements for land-use planning* | 1 |
| Chem_A2 | *Chemical incidents register* | 1 |
| Chem_A3 | *Government preparedness* | 1 |
| **Radiations** | | |
| Rad_A1 | *Effective environmental monitoring of radiation* | 1 |

V = Variable or data codes, since more than one data is necessary to build an indicator

| Indicator names | Title | Not ready for immediate implementation because some data are not immediately available |
|---|---|---|
| **Air** | | |
| Air_D1V2,6 motorbikes, human powered transport | *passenger kilometres by mode of transports* | 2 |
| Air_Ex1V1,3,4 (No2, ,PM2,5) | *population-weighted annual average concentration on air-pollutants* | 2 |
| **Noise** | | |
| Noise_Ex1 | *Population exposed to various noise levels (Lden and Lnight) by different sources* | 2 National new |
| Noise_E1 | *Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure* | 2 |
| Noise_E2V2 | *Self reported noise health effects - sleep disturbance* | 2 |
| **Housing** | | |
| Hous_Ex7 | *Crime/Perception of crime* | 2 |
| Hous_Ex2 V6 | *Accessibility* | 2 |
| **Traffic** | | |
| Traf_Ex2 | *Use of safety vehicle device* | 2 |
| **Chemicals** | | |
| Chem_P1 | *Industrial facilities under EU 'Seveso II' directive* | 2 |
| **Radiations** | | |
| Rad_E1 | *Incidence of skin cancer* | 2 |
| **Indicator names** | **Title** | **Not ready for immediate implementation. Needs precisions in definitions or standardisation efforts** |
| **Housing** | | |
| Hous_P1 | *Affordability to buy dwellings* | 3 |
| Hous_Ex5 | *Household hygiene* | 3 |
| Hous_Ex4 | *Dampness mould and growth* | 3 |
| **Traffic** | | |
| Traf_E3 | *Injury rate* | 3 |
| Traf_E4 | *DALY lost for road accidents* | 3 |
| **Indicator names** | **Title** | **Requiring further developmental work** |
| **Water** | | |
| WatSan_E1 disease outbreaks | *Outbreak of water-borne diseases* | 4 |
| WatSan_A2 Management syst | *Management of bathing waters* | 4 |

1 good definition, immediate use possible, 2 good definition, not available immediately 3 needs precisions in definition or standardisation, but available 4 needs more work on definition and availability

V = Variable or data codes, since more than one data is necessary to build an indicator

## Annexe 2 : Modèle de questionnaire

| | | | |
|---|---|---|---|
| | | **INDICATOR** | |
| | | **INDICATOR CODE** | |
| | | **DATA ELEMENT** | |
| | | **DATA ELEMENT CODE** | |
| | | | |
| **Part 0.** | **INFORMATION ABOUT THE INFORMATION COLLECTOR** | | |
| 0_1 | Name of person who collected information and answer on this data element | | |
| 0_2 | Time needed for answer (from initiation to completion of information collection) | | |
| 0_3 | Email of the information collector | | |
| 0_4 | Telephone number of the information collector | | |
| **Part 1.** | **QUESTIONS ON THE AVAILABILITY OF THE DATA ELEMENT** | | |
| 1_1 | Does the data exist in the country? If yes, go to the next questions. If no, go to 1_S Ces données existent-elles en France ? | 1. Yes<br>2. No | |
| 1_2 | Is the collection of this data element mandated by an international law or treaty (e.g., EC directive)? If yes, specify in the comments sheet. Est-ce que le recueil de ces données est rendu obligatoire par une loi internationale ? | 1. Yes<br>2. No | |
| 1_3 | Is reporting of this data element mandated by a national law (e.g., environment and health standards)? If yes, specify in the comments sheet. Est-ce que le recueil de ces données est rendu obligatoire par une loi nationale ? | 1. Yes<br>2. No | |
| 1_4 | What is the geographical coverage of the information carried by the data element? Quelle est la couverture géographique de ces données ? | 1. National<br>2. Regional<br>3. Local (Cities or townships)<br>4. Unknown | |
| 1_5 | If local coverage, how many communities are covered? Si la couverture est locale, combien de villes sont concernées par ces données? | Enter the number of local government units covered | |

| Part 1. | QUESTIONS ON THE AVAILABILITY OF THE DATA ELEMENT | | |
|---|---|---|---|
| 1_6 | What is the population coverage of the information carried by the data element? If regional or local data element, estimate the population of all studied communities as a pecent of the national population. Quelle proportion de la population est couverte par cette base de données ? | 1. < 50%<br>2. 50-90 %<br>3. >90%<br>4. Unknown | |
| 1_7 | Name and address of organization(s) responsible for data collection Nom et adresse des organismes responsables de la collecte des données | List all if more than one. | |
| 1_8 | Name and address of organization(s) responsible for database management Nom et adresse des organismes responsables du traitement des données | List all if more than one. | |
| 1_9 | What is the method for data element collection? Quelle est la méthode de collecte des données? | 1. Registry<br>2. Periodic survey (eg. census)<br>3. Specially designed survey<br>4. From a research data<br>5. Other (explain) | |
| 1_10 | If answer to 1_9 is 3 (Specially designed survey), is it likely that survey will be performed regularly (at least once every few years) in the future? Est-ce que cette enquête va être réalisée périodiquement dans le futur ? | 1. Yes<br>2. No | |
| 1_11 | Does it exist in electronic form (computer file)? If yes, go to the next question. If no, go to 1_13. Les données sont-elles informatisées ? | 1. Yes<br>2. No | |
| 1_12 | Is the data element freely accessible on the website? Les données sont-elles accessibles gratuitement sur un site ? | 1. Yes<br>2. No | |
| 1_13 | Is the data element being reported to an international organization? Les données sont-elles transmises à un organisme international ? | 1. Yes<br>2. No | |
| 1_14 | Indicate the time period for which the data are available. Depuis combien de temps ces données sont-elles disponibles ? | 1. Last 20 years or more<br>2. Last 10 years<br>3. Last 5 years<br>4. Other (specify):_____ | |
| 1_15 | Can the information collector obtain the data? If yes provide obtained data in the next question. If no, go to 1_18 Pourriez-vous nous les fournir immédiatement ? | 1. Yes<br>2. No | |

| | | | |
|---|---|---|---|
| **Part 1.** | **QUESTIONS ON THE AVAILABILITY OF THE DATA ELEMENT** | | |
| 1_16 | Enter the obtained data elements for the years 1997-2001. | Enter the actual data below | |
| 1_16_1 | | Enter the data of 1997, if any | |
| 1_16_2 | | Enter the data of 1998, if any | |
| 1_16_3 | | Enter the data of 1999, if any | |
| 1_16_4 | | Enter the data of 2000, if any | |
| 1_16_5 | | Enter the data of 2001, if any | |
| 1_17 | What is the cost involved in EURO? | | |
| 1_18 | Is there legal support for the access? Est-ce que par la loi les données doivent être rendues accessibles? | 1. Yes<br>2. No | |
| 1_19 | Is there legal restriction against the access? L'accès à ces données est-il réglementé? | 1. Yes<br>2. No | |
| 1_20 | What is needed for the information collector to access the data? Que faut-il pour accéder à ces données ? | Enter the text. For example, a specific official request, or central collection of scattered data? | |
| **1_S** | **How would you summarize the availability of this data element?** Comment qualifiez-vous la disponibilité de ces données? | **0. Poor**<br>**1. Fair**<br>**2. Good** | |
| **Part 2** | **QUESTIONS ON THE QUALITY OF THE DATA ELEMENT** | | |
| 2_1 | How good is the reliability of the data? Quelle est la fiabilité de ces données ? | 0. Poor<br>1. Fair<br>2. Good | |
| 2_2 | How good is the standardization of the method for data collection? Comment qualifiez-vous la standardisation de la méthode de collecte ? | 0. Poor<br>1. Fair<br>2. Good | |
| 2_3 | How is the overall quality control / assurance procedure for this data? Comment qualifiez-vous la procédure de contrôle qualité de ces données ? | 0. Poor<br>1. Fair<br>2. Good | |
| **2_S** | **How would you summarize the overall quality of this data element?** Comment qualifiez-vous la qualité globale de ces données ? | **0. Poor**<br>**1. Fair**<br>**2. Good** | |

| | | | |
|---|---|---|---|
| **Part 3** | **QUESTIONS ON THE COMPARABILITY OF DATA ELEMENTS** | | |
| 3_1 | Have there been changes in the methods of data collection for this the data element in the past five years? If yes, go to the next queestion. If no, skip to 3_S. Y-a-t-il eu des changements dans la méthode de collecte dans les 5 dernières années ? | 1. Yes<br>2. No | |
| 3_2 | How significantly did it affect the comparability of this data element over time? (Specify in the comments sheet) De quelle façon cela a-t-il affecté la comparabilité des données ? | 0. Negligible<br>1. Minor<br>2. Major | |
| 3_3 | Does the method of data collection follow the methods required by the EC or international agreement? Est-ce que la méthode de collecte suit la méthodologie préconisée au niveau européen ou international ? | 1. Yes<br>2. No | |
| 3_4 | Is the method of data collection different by the regions in your countries? If yes, go to the next question. If no, skip to 3_S. Est-ce que la méthode de collecte diffère selon les régions ? | 1. Yes<br>2. No | |
| 3_5 | How significantly does it affect the data comparability between the regions? (Specify in the comments sheet) Cette différence de méthode a-t-elle un impact sur la comparabilité des données dans les différentes régions? | 0. Negligible<br>1. Minor<br>2. Major | |
| **3_S** | **How would you summarize the comparability of this data element?** | **0. Poor**<br>**1. Fair**<br>**2. Good** | |
| **Part 4.** | **QUESTIONS ON INDICATOR - THE POLICY-RELEVANCE AND COST** | | |
| 4_1 | In the past five years, has the information carried by this indicator been used in formulating a new policy concerning environmental health in the country? Est ce que cet indicateur a été utilisé pour élaborer une nouvelle politique en santé environnementale, dans le pays, au cours des 5 dernières années? | 1. Yes<br>2. No | |
| 4_2 | In the past five years, has the information carried by this indicator been used in monitoring and evaluating a policy concerning environmental health in the country? Est-ce que cet indicateur a été utilisé pour le suivi et l'évaluation d'une politique en santé environnementale dans les 5 dernières années? | 1. Yes<br>2. No | |
| 4_3 | In the past five years, has the information carried by this indicator been used in prioritizing policies and interventions concerning environmental health in the country? Est-ce que cet indicateur a été utilisé pour définir des priorités en terme de politique et d'actions en santé environnement dans les 5 dernières années? | 1. Yes<br>2. No | |

| Part 4. | QUESTIONS ON INDICATOR - THE POLICY-RELEVANCE AND COST | | |
|---|---|---|---|
| 4_4 | Has the information carried by this indicator ever been used in the NEHAP or LEHAP? Est-ce que cet indicateur a été utilisé dans le PNSE ou dans un plan régional ? | 1. Yes<br>2. No | |
| 4_5 | How much additional human cost (person-hours) was spent to obtain the information for this indicator for this pilot project? Combien de temps-personnes va nécessiter la mise à disposition de l'information demandée? | Enter the total person-hrs | |
| 4_6 | How much total cost (including human cost) was spent to obtain and report the information for this indicator for this pilot project? Quel sera le coût total de la mise à disposition des données ? | Enter the total cost in EURO | |
| **4_S_1** | **How would you summarize the policy-relevance of the information carried by this indicator?** Comment évaluez-vous la pertinence en matière de politique en santé-environnement ? | **0. Poor**<br>**1. Fair**<br>**2. Good** | |
| **4_S_2** | **When will this indicator be ready for the implementation in your country? Enter your best estimate based on experts' opinion in your country.** Quand pensez-vous que cet indicateur sera prêt à l'emploi ? | **1. Immediately**<br>**2. By the end of 2004**<br>**3. By the end of 2005**<br>**4. After 2006** | |

# Annexe 3 : protocol

WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

*EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH*

*Bonn Office*

## Development of EH Indicators for EU countries: ECOEHIS

**March 5, 2004**

# Pilot Study on the Environmental Health Indicators: Protocol

This protocol outlines the objectives, scope, methods, timetable to carry out the pilot study of environmental health (EH) indicators as discussed and agreed at the ECOEHIS meeting in Luxembourg on 29-30 January 2004. It also contains the provisional criteria and related questions to be used as tools in the pilot study. A final version of tools will be provided to the NFPs by the 24th of March. Based on theThe study findings, will be evaluated at the ECOEHIS meeting (Bonn, 6-7 July) and decisions will be made concerning potential revisions of the indicators. These along with the proposal for a core set of EH indicators for EU countries will be a part of the final report to be submitted to DG SANCO by September 2004. the definitions of indicators will be revised to enhance the feasibility and applicability, if necessary, and a revised set of indicators will be proposed at the ECOEHIS meeting on the 6th - 7th of July 2004 in Bonn.

### 1. Objectives

The purpose of the pilot study is to determine the implementability of the proposed EH indicators. The study aims at assessing the feasibility of the data collection and applicability of the information carried by the indicator in the participating MS.[3] It will classify the proposed indicators into three groups: (i) ready for immediate implementation; (ii) not ready for immediate implementation; (iii) requiring further developmental work as of 2004. Therefore, the practical goal of the study will be to identify the indicators that are ready for immediate implementation in most of participating countries.

## 2. Scope

All indicators proposed at the ECOEHIS meeting in Luxembourg on 29-30 January 2004 will be studied. When possible, actual data on selected indicators will be collected for realistic assessment of feasibility of data collection process. In most cases, each indicator is computed from a few necessary data elements. Aspects of both 'the data elements' and 'the indicator' will be taken into account to determine the implementability of the indicator. The aspects of the availability and the quality of the data elements will be considered to assess the feasibility of data collection. The aspects of the policy-relevance and the comparability of indicators will be considered to assess the applicability of the information carried by the indicators. The findings from the previous feasibility study will be taken account in drawing conclusions.[4]

## 3. Methods

The pilot study will adopt a five-step approach as illustrated in Figure 1.

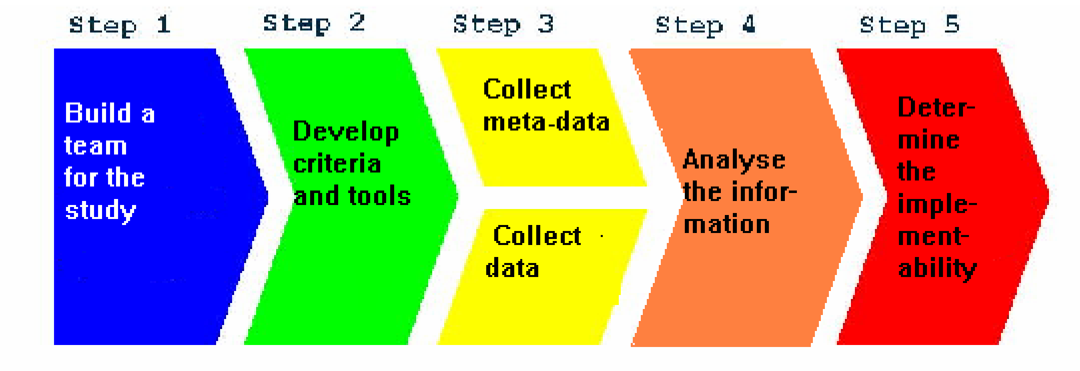


***Figure 1. Approach to performing Pilot Study***

### Step 1: Build a team for the study

This step is comprised of nominating the Steering Committee to oversee the study, appointing National Focal Points (NFP's), and setting up a Working Group of experts to cover all proposed indicators. NFP's will collaborate with the experts for the pilot study. The national and international network currently involved in ECOEHIS project will be utilized in this step. This step should be completed by the end of March.

### Step 2: Develop criteria and tools

This step includes developing the criteria and tools for testing the feasibility and applicability of proposed indicators. This step lays the foundation for how the analysis and assessment are performed in Step 4 and 5. Table 1 summarizes the conceptual frame for the criteria to be used in determining the implementability in this pilot study. The ***feasibility of collecting the data elements*** and the ***applicability of the information carried by the indicator*** are considered the two most important factors to determine the ***implementability of indicators***. The feasibility of data collection may depend on the **availability** (e.g., existence, accessibility, timeliness), and **quality** (reliability, standardization, completeness) of

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[3] Austria, Belgium, Denmark, France, Finland, Germany, Italy, The Netherlands, Portugal, Spain, Sweden

[4] For the past feasibility study and update of methodology, see http://www.who.dk/document/ehi/bonnerepjuly2001.pdf, http://www.euro.who.int/document/E75517.pdf, http://www.euro.who.int/document/E76979.pdf

the data elements among many factors. The applicability of the indicator may depend on the **policy-relevance** (e.g., usefulness, validity and interpretability, both in terms of policy-making and health-environment assessments interpretability in policy making and monitoring) and temporal and spatial **comparability** (e.g., temporal and spatial consistency for monitoring over time and across the countries) of the information carried by the indicator. The tools for collecting data and meta-data in spreadsheet formats will be finalized and provided to the NFPs by the 24th of March.

Table 1. Conceptual framework for the criteria to determine implementability

| Main outcome | Components | Criteria | Data elements | Indicator |
|---|---|---|---|---|
| Implementability | Feasibility | Availability | * | |
| | | Quality | * | |
| | Applicability | Policy-relevance | | * |
| | | Comparability | | * |

### Step 3: Collect meta-data and data

In this step, the data holders and providers will be identified and contacted by NFPs. If the data is known to be available, the actual data contents will also be collected. For the data that are already available from the international agency, NFPs will only provide the information about the quality and applicability of the data elements. For such data elements, WHO/Euro will collect the actual data from the agency in collaboration with the NFPs. The questionnaires about the data elements and the indicators will be filled in by the NFPs with the assistance of the national experts on the topic. The standard tools developed in Step 2 will be used to collect meta-data and data. WHO/Euro and the NFPs will communicate about the progress of data collection every two weeks. The collection of meta-data and data would take eight weeks, and should be completed by the end of May.

### Step 4: Analyse the information

Analyses of data and meta-data are performed to evaluate the data elements and the indicators over the criteria set forth in the previous steps (in Table 1). WHO/Euro will work with the support of experts of the participating MS in this step. The feasibility and applicability will be scored according to the following methods.

Based on the information collected by the questionnaires, the availability and the quality of the data elements are scored as high=2, medium=1, or low=0, respectively. Then, the feasibility of each indicator is determined by the sum of these scores as shown in Table 2.

## 4. Timetable

**Table 5: Timetable of implementing the pilot study: March – July 2004**

| STEP | ACTIVITY | BY | DURATION (Weeks) | ENDS |
|---|---|---|---|---|
| **Step 1** | **Build a team for the study** | | | |
| 1.1 | Nomination of the Steering Committee to oversee the study including, if appropriate, representatives of; the Ministry of Health, the Ministry of Environment, National Public/ Environmental Health institutes, institution responsible for NEHAP evaluation etc. | WHO<br>MS | 3 | End Mar |
| 1.2 | Setting up a Working Group of experts the national focal points (NFP) in the MS to cover proposed indicators and appointment of | MS<br>WHO | 3 | End Mar |
| **Step 2** | **Develop criteria and tools** | | | |
| 2.1 | Determine the criteria to determine implementability | WHO | 3 | End Mar |
| 2.2 | Specification of measurable elements of each criteria | WHO | 3 | End Mar |
| 2.3 | Develop tools to measure specified elements<br>♦ Test meta-data and data form by NFP's<br>♦ Design forms of data and meta-data entry in Excel and EuroIndy | WHO<br>NFP | 3 | End Mar |
| **Step 3** | **Collect data and meta-data** | | | |
| 3.1 | Collect data for 1997-2001 of MS<br>♦ Identify data elements for all indicators<br>♦ Identify dataset holders for each data element<br>♦ Contact heads of dataset holder institutions and<br>  ♦ Nominate the contact person<br>♦ Obtain data (in electronic form if possible)<br>♦ WHO collects the data held by the international agency | NFP<br>WHO | 8 | End May |
| 3.2 | Collect data about data (meta-data) for 1997-2001 of MS<br>♦ Collect information regarding the criteria for evaluation<br>♦ Complete the meta-data entry form for each dataset | NFP | 8 | End May |
| 3.3 | Report collected data and meta-data to WHO/Euro every two weeks<br>♦ Submit country progress to WHO project manager | NFP | 4 | End May |
| **Step 4** | **Analyse the information** | | | |
| 4.1 | Country- and topic-specific analyses of collected data and meta-data by experts of MS or thematic area | WHO | 2 | Early Jun |
| 4.2 | International comparison analysis by experts of thematic area | WHO | 2 | Mid Jun |
| 4.3 | Communicate with NFP's for verification of the analysis results<br>♦ Feedback from MS collected<br>♦ Verify the validity of scores to the experts | WHO<br>NFP | 2 | Mid Jun |
| **Step 5** | **Determine the implementability** | | | |
| 5.1 | Classify indicators by the readiness for immediate for implementation<br>5. Ready for immediate implementation<br>6. Not ready for immediate implementation<br>7. Requiring further developmental work | WHO | 1 | End Jun |

| | | | | |
|---|---|---|---|---|
| 5.2 | Preparation of report of the pilot study<br><br>♦ Revise definitions of indicators if necessary<br>♦ Recommendations to enhance implementability of EHIS | WHO | 4 | Mid Jun |
| 5.3 | ECOEHIS meeting<br><br>♦ Review of report of the pilot study<br>♦ Ascertainment of definitions of indicators<br>♦ Evaluation of the pilot study | WHO<br><br>NFP | 2 days | 6-7 Jul |

NOTE: MS: Member States, NFP: National Focal Point

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**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 11-4

# Germany Report on Pilot Study

## DEVELOPMENT OF ENVIRONMENT AND HEALTH INDICATORS FOR EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

## Development of EH Indicators for EU Countries (ECOEHIS)

**WHO project co-sponsored by EC DG SANCO (SPC 2002300)**

# Pilot Study on the Environmental Health Indicators

## Report from Germany

**August 27, 2004**


Eva Roth

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
Federal Ministry for the Environment

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Bonn, 27 August 2004

**WHO-project "Development of Environment and Health Indicators for EU countries" (ECOEHIS)**

Report about German project participation

In order to reach maximum acceptance of a EU environment and health indicator set as developed by WHO the following criteria should apply:

- relevance of the criteria in order to allow for answering or developing of political questions or problems
- feasiblity of the indicator system in relation to the goal to be achieved (this points to the use of data already available at the national / regional level)
- harmonisation of data already existing in order to reach comparability and to allow for relevant conclusions (yet another scientific data collection without relevance for political purposes should be avoided).

Taking into account the list of indicators proposed in the draft report from the 7-9 July meeting in Bonn (ECOEHIS) the following priority fields of indicators are recommended for EU countries:

- air-indicators (Air Ex1, Air P1)
- noise-indicators (using data that will be available from 2008 according to Directive 2002/49/EC).

## 1. Summary of project participation

The first step of the German participation to the ECOEHIS project was an analysis of existing EU-reporting obligations and current EU-indicators in the fields of interest for ECOEHIS. As a result we found out that for many of the fields identified by ECOEHIS as relevant for the European Community Health Indicator Project (ECHI), there are already similar indicators available at EU-level. Therefore, we did not perform any separate collection of data and meta-data on a national level. Our basic understanding of indicators suitable for implementation at EU-level is that there must be existing data flows from Member States to the European Union. This is a prerequisite in order to avoid duplication of work and to avoid unnecessary reporting obligations. Where there are no such data-flows yet, but nevertheless the ECOEHIS project identifies a priority area of environmental health, a cost benefit analysis on the effectiveness / usefulness of such data needs to be provided for the European Commission. On the basis of this analysis, the European Commission will be able to decide on the initiation of an official decision making process. In order to support this process, we have listed open questions for the respective indicators. There are some general points that we would like to state before starting the analysis of the separate indicators.

- The implementation of additional and costly data flows at EU level will not be approved of by Ministers of Finance. In certain areas, from an environmental health point of view, it might be preferable though to shift priorities in reporting. When proposing an indicator that requires additional data collection, a proposal should be made for data collection that can be dropped in return so that the overall proposal does not imply any additional costs.
- Due to the historical development of the ECOEHIS project, the proposals have been worked out without participation of the Accession Countries / new Member States. This should be kept in mind when considering the proposals.
- One of the goals in the EEA 2005 work plan is to ensure that human health aspects are included in key environmental EEA assessments (e.g. water and air quality). EEA seems to be an ideal contact for questions concerning the development of environment and health indicators for EU Member States.
- In addition, Eurostat is working on indicators for Health and Environment within the process of developing sustainable development indicators. Co-ordination with other projects on indicators for environment and health is needed.

In the following text, we have listed open questions for each indicator. The answers to these questions seem elementary to us for EU Member States to be able to decide on the implementation of the proposals made by the ECOEHIS project. Open questions that cannot be answered by the project need to be passed on to the European Commission. An example for a question that needs to be answered by the European Commission itself might be at which institution / in which forum best to place the decision about implementation of the respective indicators.

## 2. Comments on Indicators that will be proposed by ECOEHIS for the ECHI short-list

### Air_D1 (Passengers-kilometers by mode of transport)

**Proposal according to ECOEHIS-meeting in July 2004:** In the final ECOEHIS Working Group meeting in Bonn, 7-9 July, it has been decided to propose for the ECHI short-list the respective current EU indicator. To support the elaboration of this proposal in the final ECOEHIS-report, we provide information we gathered during our project participation in the text below.

**Data available at EU-level:** Details on data availability see Annex.

**Current EU-indicator:** Based on Eurostat data[1], there is an EEA indicator "Passenger transport demand by mode and purpose (TERM 2002 12 EU)" which shows the share of cars, bus/coach, rail, air and tram/metro in total passenger transport demand. In addition Eurostat calculates the structural indicators "volume of passenger transport relative to GDP" (en032) and "modal split of passenger transport: percentage of cars" (en034).

### Air_D2 (Freight-transport demand [tonne-kilometres])

**Proposal according to ECOEHIS-meeting in July 2004:** In the final ECOEHIS Working Group meeting in Bonn, 7-9 July, it has been decided to propose for the ECHI short-list the respective current EU indicator. To support the elaboration of this

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[1] Eurostat 2002, Transport and environment: statistics for the transport and environment reporting mechanism (TERM) for the European Union, data 1980-2000, unpublished electronic update, January 2002

proposal in the final ECOEHIS-report, we provide information we gathered during our project participation in the text below.

**Data available at EU-level:** Details on data availability see Annex.

**Current EU-indicator:** A Eurostat Structural Indicator "Volume of inland freight transport relative to GDP (in tonne km) is available on the internet.[2]

**Comment of German Project Participation:** The indicator shows efficiency of transport. Effects on health can not **directly** be deducted from this information. Therefore, we do not support the proposal of Air_D2 for the ECHI short-list.

**Air_D3 (Road transport fuel consumption)**

**Proposal according to ECOEHIS-meeting in July 2004:** In the final ECOEHIS Working Group meeting in Bonn, 7-9 July, it has been decided to propose for the ECHI short-list the respective current EU indicator. To support the elaboration of this proposal in the final ECOEHIS-report, we provide information we gathered during our project participation in the text below.

**Data available at EU-level:** Details on data availability see Annex.

**Current EU-indicator:** A ready-made indicator for final energy consumption for transport by mode is available at EEA[3]. It shows total energy consumption for inland navigation, rail, aviation and road as well as the percentage of growth in energy consumption for road and air.

**Air_P1 (Air pollution emissions [$SO_2$, $PM_{10}$, $PM_{2,5}$, $NO_x$, CO, NMVOC])**

**ECOEHIS proposal:** National emissions of $SO_2$, $PM_{10}$, $PM_{2,5}$, $NO_x$, CO and NMVOC split to the sectors

- industry process and energy
- energy industry
- domestic and services
- transport
- agriculture

[2] http://europa.eu.int/comm/eurostat/Public/datashop/print-product/EN?catalogue=Eurostat&product=struct-EN&mode=download

[3] http://themes.eea.eu.int/indicators/all_factsheets_box

**Data available at EU-level:** Emissions of $SO_2$, $NO_x$, and NMVOC have to be reported by EU-Member States under Directive 2001/81/EC on National Emission Ceilings.

There are reporting obligations for emissions of Total Suspended Particulates (TSP), $PM_{10}$ and $PM_{2,5}$ under the UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) to which the EU and all its Member States are party. Member States report data for CLRTAP to the EU and UNECE in parallel. In 2003 however, not all parties reported on all three types of particulate matter[4]. Also DG Environment has identified a lack of data on $PM_{10}$ and $PM_{2,5}$-emissions and has decided to set a priority on the improvement of this situation in the Clean Air For Europe (CAFE) steering group. In this context, the Austrian "International Institute for Applied Systems Analysis" (IIASSA) should be mentioned. It carries out calculations on sectoral emissions of PM for the European Commission and should therefore be contacted when dealing with $PM_{10}$ and $PM_{2,5}$ - emissions on a European scale.

The reporting of CO-emissions is also part of the UNECE CLRTAP.

The calculation of sectoral emissions for pollutants under EC directive 2001/81/EC and under UNECE CLRTAP takes place according to guidelines developed by the United Nations Intergovernmental Panel on Climate Change (IPCC) and the EEA's Coordination of Information on Air (CORINAIR)[5]. The sectors defined for Air_P1 are a subset of the sectors defined in these guidelines. A transformation of available data would therefore be necessary in order to calculate Air_P1.

**Open questions to be included in or answered by the ECOEHIS report:**

- High priority is given to the field of air pollutant emissions by the German project participants. Concerning Air_P1 however, we still see some open questions:
- What is the added value of introducing an indicator that requires an additional calculation step as compared to the above mentioned existing computation?
- Who is going to carry out the necessary additional computation?
- What is the cost of carrying out this additional computation?

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4 Progress report by the Task Force on Emission Inventories and Projections of the Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP); (UNECE EB.AIR/GE.1/2004/9)

5 The IPCC Guidelines for National Greenhouse Gas Inventories, Reporting Instructions, IPCC-Guidelines http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm und CORINAIR Atmospheric Inventory Guidebook, CORINAIR-Handbook http://reports.eea.eu.int/EMEPCORINAIR3/en/

- In any case, the sector split of the emissions used for the indicator should conform to the joint UNFCCC and UN ECE / CLRTAP standard.
- It is important to focus on the availability of data.

**Air_Ex1 (Population-weighted annual average concentration of air pollutants [$NO_2$, $PM_{10}$, $PM_{2,5}$, $SO_2$, Ozone])**

**Original ECOEHIS data requirements:** Population weighted annual average concentration of air pollutants [population exposed to pollutants in micrograms per m³]. Annual mean concentrations of $NO_2$, $PM_{10}$, $PM_{2,5}$, $SO_2$. Frequency distribution of maximum daily eight hour ozone concentration in seven categories[6]. Population weighting is foreseen for urban as well as rural areas.

**Proposal according to ECOEHIS-meeting in July 2004:** In the final ECOEHIS Working Group meeting in Bonn, 7-9 July, it has been decided to propose for the ECHI short-list for $SO_2$ and $NO_2$ the respective current EU indicators. For PM and ozone, the original ECOEHIS indicators will be proposed for the ECHI short-list. To support the elaboration of these proposals in the final ECOEHIS-report, we provide information we gathered during our project participation in the text below.

**Data available at EU-level:**

Especially for $PM_{2,5}$, data availability at EU-level is very low. For ozone and $PM_{10}$, ECOEHIS requirements deviate from data available at EU-level. For more details on data availability see Annex.

**Current EU-indicators to be proposed by ECOEHIS for the ECHI-short list:**

The EEA indicator „Exceedance hours of air quality limit values of **$NO_2$** in urban areas" shows exposure of urban population to 1 hour average $NO_2$ concentrations above 200 µg/m³.

The EEA indicator "Exceedance days of air quality limit values of **$SO_2$** in urban areas" shows exposure of urban population to daily mean $SO_2$ concentrations of more than 125 µg/m³.

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[6] < 40 µg/m³, 40-60 µg/m³, 60-80 µg/m³, 80-100 µg/m³, 100-120 µg/m³, 120-160 µg/m³, > 160 µg/m³.

**Open questions to be included in or answered by the ECOEHIS report:**

- High priority is given to the field of exposure to air pollutants by the German project participation. However, some important questions concerning Air_Ex1 need to be answered.
  For the sake of clarity, the indicator should be split to 5 indicators, one for each pollutant.
- The **current EEA PM-indicator** "Exceedance days of air quality limit values of $PM_{10}$ in urban areas" shows the number of days when urban population is exposed to 24-hour average $PM_{10}$ concentrations above 50 µg/m³. This indicator does not fulfil the ECOEHIS requirement of showing population weighted annual average concentrations.
  - What are the benefits of implementing the ECOEHIS-indicator?
  - What are the costs of changing the current EEA-indicator?
  - Who is going to carry out the necessary calculations?
- The **current EEA ozone-indicator** "Exceedance days of air quality threshold values of **ozone** in urban areas" shows exposure of urban population to 8-hour average ozone concentrations above 110 µg/m³. Air_Ex 1, however, requires a split to different classes of concentrations[6].
  - What are the benefits of implementing the ECOEHIS-indicator?
  - What are the costs of changing the current EEA-indicator?
  - Who is going to carry out the necessary calculations?
- The EEA indicators for $PM_{10}$ and ozone are also part of the Eurostat structural indicators. The Eurostat website informs users **that the indicators are under review because of methodological shortcomings**. Upon request, EEA European Topic Centre of Air and Climate Change (ETC/ACC) informed us, that the review is underway. Strengths and weaknesses of the indicators and the underlying data are being assessed.
  - **The indicator development should be suspended until after the methodological shortcomings have been discussed and overcome by EEA and Euro-stat.**
  - Is the ECOEHIS-proposal co-ordinated with the current review at the ET-C/ACC?
- EEA states that "although the number of cities and stations represented in Air-

Base is large, it is not large enough to provide a basis for quantitative estimates of population exposure."[7]

- What is the relevance of this statement for the Air_Ex1-proposal?
- Where can the necessary population data be found?

**Air_A1 Policies on ETS (environmental tobacco smoke) exposure**

**ECOEHIS proposal:** Existence and enforcement of regulations (regional, national and international) to reduce ETS exposure. The criteria to be assessed (Scoring 0-2)[8] are:

1. Smoking prohibited/restricted in schools
2. Smoking prohibited/ restricted in day-care centres
3. Smoking prohibited/ restricted in governmental offices and other public buildings
4. Smoking prohibited/restricted in public traffic vehicles in urban areas
5. Smoking prohibited/restricted in public traffic vehicles – long distance
6. Smoking prohibited/restricted in hospitals
7. Smoking prohibited/restricted in work places
8. Smoking prohibited/restricted in cinemas, theatres, museums etc
9. Smoking prohibited/ restricted in bars, restaurants
10. Advertisement of cigarettes prohibited

**Open questions to be included in or answered by the ECOEHIS report:**

- The ECOEHIS working group stated that data are not available at EU level but that each country is supposed to assess the composite score.
  - What is the intended mechanism of collecting data? Who will be responsible for the collection of data? What will be the costs and benefits?
- During the ECOEHIS meeting in July in Bonn, the question of comparability of data between countries has repeatedly been raised. How should this difficulty be dealt with?

**Noise_Ex1 Population exposed to different noise levels by different sources**

**Original ECOEHIS proposal:** Lden and Lnight for the noise sources road traffic, air traffic, railway traffic and industry. Data requirements according to Directive 2002/49/EC of the European Parliament and of the Council relating to the assessment and management of environmental noise.

[7] Air pollution in Europe 1990-2000, Topic report 4/2003, page 44, EEA 2004
[8] 0-not existing, not clearly stated; 1-clearly stated, partly implemented or enforced; 2-clearly stated and obeyed, implemented and enforced

**Comments of German project participation:** The required data only have to be submitted by EU Member States from 2008 onwards. Care needs to be taken that data requirements are in line with 2002/49/EC. This is especially important for the reference population used.

**Noise_A1 National regulations on maximum sound levels for indoor and outdoor leisure events**

**ECOEHIS proposal:** Existence and enforcement of regulations for noise abatement measures in leisure activities (indoor and outdoor) that involve music.

The criteria to be assessed (Scoring 0-2)[8] are:

- Legislation for maximum sound levels in discotheques, bars and other similar settlements
- Building regulations for acoustical insulation of discothèques, bars and other similar settlements
- Regulations for music appliances (walkman, discman, ...) and computer games
- Legislation for open-air events, fairs, markets and similar
- Regulations for music concerts
- Local authorities required to deal with noise complaints

**Open questions to be included in or answered by the ECOEHIS report:**

- ECOEHIS has determined that the data required for Noise_A1 are not available on a European level. As already stated in the introduction, the German project participation in this case considers it necessary to officially decide on the installation of the necessary data flow at EU-level. In order to support this decision, we raise the following questions:
    - How is the necessary data flow to the European Commission supposed to be installed?
    - What are the legal requirements?
    - Who is going to collect data and update the indicator?
    - Who is supposed to carry out the necessary computation?
    - What are the benefits of a European indicator on regulations on maximum sound levels for leisure events?
    - What are the expected costs of installing this new data flow?

**House_P1 Affordability to buy dwelling**

**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working group has decided to propose existing Eurostat indicators for the ECHI short-list. To support the elaboration of this proposal in the final ECOEHIS-report, we provide information we gathered during our project participation in the text below.

**Current EU-indicators:** Two Eurostat indicators are available that give an indication about affordability of housing.

- "Share of households owing their accommodation" (cdc10512[9])
- "Share of households with/without financial burden due to housing costs" (cdc12560[10])

**House_Ex1 Crowding**

**Proposal according to ECOEHIS-meeting in July 2004:**

The ECOEHIS working group has decided to propose existing Eurostat indicators for the ECHI short-list. To support the elaboration of this proposal in the final ECOEHIS-report, we provide information we gathered during our project participation in the text below.

**Current EU-indicators:**

- "Share of households living in overcrowded houses" (Eurostat cdc11024[11])
- "Rooms per person" (Eurostat cdc11536[12])

**House_E1 Extremes of indoor air temperature**

**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working group has decided to propose an alternative indicator "**Mortality associated with extreme temperature**". ECOEHIS has determined that relevant climate and mortality data are not sufficiently available at EU-level. Thus, a national collection of data will be proposed. As already stated in the introduction, the German project participation in this case considers it necessary to officially decide on the installation of the necessary data flow at EU-level. In order to support this decision, we raise the following questions:

There, the following **open questions** should be dealt with:

[9] http://europa.eu.int/comm/eurostat/newcronos/queen/display.do?screen=detail&language=en&product=YES&root=YES/yearlies/c/cd/cdc/cdc10512

[10] http://europa.eu.int/comm/eurostat/newcronos/queen/display.do?screen=detail&language=en&product=YES&root=YES/yearlies/c/cd/cdc/cdc12560

[11] http://europa.eu.int/comm/eurostat/newcronos/queen/display.do?screen=detail&language=en&product=YES&root=YES/yearlies/c/cd/cdc/cdc11024

[12] http://europa.eu.int/comm/eurostat/newcronos/queen/display.do?screen=detail&language=en&product=YES&root=YES/yearlies/c/cd/cdc/cdc11536

- Who is going to collect national data and update the indicator?
- Who is supposed to carry out the necessary computation (e.g. special analysis of meteorological data in terms of the indicator)?
- What are the benefits of the indicator?
- What are the costs of installing this new data flow?
- What are costs of the necessary computation? (e.g. mortality data are not available at Eurostat. In Germany they are available in the Federal Health Information System on a yearly basis only. The indicator would however require data analysis on a monthly basis). This analysis however is not free of charge.
- A definition for the indicator needs to be worked out for the ECOEHIS final report.

**House_Ex 3 Dampness and mould growth**

**ECOEHIS proposal**: Percentage of population living in housing suffering from serious dampness. The criteria to be assessed are:

- Total number of occupied dwellings in housing stock
- Total number of persons in housing stock
- Number of occupied dwellings suffering from serious dampness
- Number of persons living in dwellings affected by serious dampness
- If available: Number of occupied dwellings suffering from mould growth
- Number of persons living in dwellings affected by mould growth

**Open questions to be included in or answered by the ECOEHIS report:**

- Dampness and mould growth are considered to be of high relevance for environmental health by the German project participants. Also, the area of indoor air pollution so far is not covered by any EU-indicator activity. The development of a future indicator proposal in the area of indoor air pollution is supported by the German project participation. However, we are in doubt, whether the proposed indicator is the right means of tackling the problem of mould growth in dwellings.
- During the ECOEHIS meeting in July 2004, WHO stated that data where available in the framework of the EU-SILC. However, investigations for the German ECOEHIS-project-participation have revealed, that at least for Germany no data on dampness and mould growth are submitted to the EU.
    - Are all the necessary data available at EU-level?

**House_Ex4 Household Hygiene**

**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working

group has decided to adjust the indicator to data from the European Union Statistics on Income and Living Conditions (EU-SILC) which are established according to Regulation EC/1177/2003.
The new proposal needs to be further specified and a definition for the indicator needs to be worked out.

**House_Ex6 Crime and the perception of crime**
**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working group has decided to propose for the ECHI short-list a modified version of the indicator. A definition is supposed to be worked out which is in accordance with the International Crime Victim Survey (ICVS).

**Traf_S1 Age of vehicle fleet**
**Traf_S2 Road Accident Rate**
**Traf_E1 Mortality due to transport accidents**
**Proposals according to ECOEHIS-meeting in July 2004:** It has been decided by the ECOEHIS working group to adapt the definitions of the three indicators so that they can be calculated from Eurostat data. The adapted definition and exact illustration of data available at Eurostat needs to be included into the ECOEHIS report as basis for the proposal of the indicators for the ECHI short-list. We will comment on the proposal as soon as we receive it.

**Traf_E3 Injury rate**
**Proposal according to ECOEHIS-meeting in July 2004:** It has been decided by the ECOEHIS working group to adapt the definition of the indicator so that it can be calculated from OECD IRTAD (International Road Traffic and Accident Database) data. The adapted definition and exact illustration of data available at OECD IRTAD needs to be included into the ECOEHIS report as basis for the proposal of this indicator for the ECHI short-list. We will comment on the proposal as soon as we receive it.

**WatSan_P1 Waste Water Treatment**
**Proposal according to ECOEHIS-meeting in July 2004:** It has been decided by the ECOEHIS working group to adapt the definition of the indicator so that it can be

calculated from Eurostat data.

**Current EU-indicator:**

- Population connected to urban waste water collecting systems (Eurostat dda19728[13])
- Population connected to urban waste water treatment (Eurostat dda20240[14])

**Open questions to be included in or answered by the ECOEHIS report:**

- Into the above mentioned indicator fact sheets, data are only entered for the Czech Republic, Malta, Austria, Poland, Finland, Bulgaria and Iceland. The reasons for data missing from most Member States should be found out.

**WatSan_S1 Recreational water compliance**

**ECOEHIS proposal:** Proportion of identified bathing water sites in compliance during the specific bathing season with the EC mandatory coliform standards according to Directive 76/160/EC. WHO stated that data are available at EU-level. Directive 76/160/EC currently is under revision. If the indicator is included into the ECHI short-list, it will have to be revised accordingly in order to ensure data availability. The adapted definition and exact illustration of data available at EU-level needs to be included into the ECOEHIS report as basis for the proposal of this indicator for the ECHI short-list. We will comment on this proposal as soon as we receive it.

**WatSan_S2 Drinking water compliance**

**ECOEHIS proposal:** Proportion of the drinking water samples analysed which fail to comply with the EC Drinking Water Directive (98/83/EC).

**Open questions to be included in or answered by the ECOEHIS report:** According to information we gathered during our project participation, Directive 98/83/EC does not require Member States to report the number of non-compliant samples taken in a defined water supply zone. Only the absolute number of samples taken with reference to a specified parameter is reported. Therefore, in order to make sure the indicator is based on data currently available at EU-level, the definition of the indicator needs to be changed.

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[13] http://europa.eu.int/comm/eurostat/newcronos/queen/display.do?screen=detail&language=en&product=YES&root=YES/yearlies/d/dd/dda/dda19728

[14] http://europa.eu.int/comm/eurostat/newcronos/queen/display.do?screen=detail&language=en&product=YES&root=YES/yearlies/d/dd/dda/dda20240

**WatSan_Ex1 Access of the population to safe drinking water**

**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working group has decided to propose the current Eurostat indicator for the ECHI short-list. To support the elaboration of this proposal in the final ECOEHIS-report, we provide information we gathered during our project participation in the text below.

**Current EU-indicator:**

- "Population connected to public water supply" (Eurostat dda 15632[15])

**Open questions to be included in or answered by the ECOEHIS report:**

- Into the above mentioned indicator fact sheets, data are only entered for the Czech Republic, Estonia, Lithuania, Hungary, the Netherlands, Bulgaria Iceland and Norway. The reasons for data missing from most Member States should be found out.

**Chem_P1 Industrial facilities under EU Seveso II Directive**

All 4 indicators on chemical emergencies are given low priority for environment and health indicators as the field of chemical emergencies is already well covered at EU-level and we do not see the usefulness of these indicators for an EU-Health Information System.

**ECOEHIS proposal:** Number of sites containing large quantities of chemicals acco-ording to the criteria of the EU Seveso II directive.

**Open questions to be included in or answered by the ECOEHIS report:**

- According to Commission decision 2002/65/EC, MS are required to report every three years on lower tier/upper tier establishments according to Directive 96/82/EC (Seveso II).
- National data is collected **on a voluntary basis** in the EU-SPIRS-Database (Seveso Plants Information Retrieval System[16]). SPIRS provides the name and address of the establishment and the name and quantity of qualifying substances on-site according to Seveso II. We know that some German Länder do not report their data to SPIRS. According to Directive 2003/105/EC Member states will be obliged to report to SPIRS from July 1st 2005.

[15] http://europa.eu.int/comm/eurostat/newcronos/queen/display.do?screen=detail&language=en&product=YES&root=YES/yearlies/d/dd/dda/dda15632

[16] http://mahbsrv.jrc.it/spirs/Default.html#Downloads

- Availability of data needed for Chem_P1 in SPIRS should be displayed in detail in the ECOEHIS report as basis for a decision of including the indicator into the ECHI short-list.
- Accessibility of SPIRS for ECHI-purposes needs to be checked.
- The German project participation does only support the indicator if data can be obtained at EU-level. The field of chemical emergencies is given low priority for environment and health indicators.

**Chem_A1 Regulatory requirements for land-use planning**

**ECOEHIS proposal:** Regulatory requirements for land-use planning around sites containing large quantities of chemicals according to the upper tier of the Seveso II directive. The regulatory requirement should at least include the following criteria (scoring 0-2[17]):

- Identification and definition of accident scenarios involving dangerous substances.
- Rules for determining the likelihood of and the (health) consequences of these accident scenarios.
- On the basis of the possible health outcomes, determine risk zones around an establishment.
- Clearly outlined restrictions on land use in the safety zone(s).
- Sanctions for non-compliance with the land use planning regulations.

**Open questions to be included in or answered by the ECOEHIS report:**

- Commission Decision 2002/65/EC only requires Member States to report very generally on aspects of land-use planning. To the German project participation, those data seem inadequate for use as an indicator. A requirement for more detailed reporting will be rejected by Member States. The collection of such data would considerably burden the respective agencies.
    - The usefulness of available data for use as an indicator should be discussed in the ECOEHIS report.

[17] **Score 0**: There is no inventory of establishments that could potentially come under the Seveso II directive, ***or*** less than 80% of the inventory of potential sites has actually been assessed for compliance with the Seveso II directive, ***or*** *t*here is no regulatory requirement that meets at least 4 of the above 5 criteria, or the land-use requirements are not enforced, ***or*** *l*ess than 20% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.

**Score 1**: All of the criteria under 1) do not apply, ***and*** *a* proportion of 20% - 80% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.

**Score 2** : All of the criteria under 1) do not apply, ***and*** *m*ore than 80% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.

### Chem_A2 Chemical incidents register

**ECOEHIS proposal:** Presence of an active, cumulative register of chemical incidents with national coverage defining the incident at least in terms of (Scoring 0-3[18]):

- Identification of the source: chemical(s) released (name and CAS number), estimated quantities and the medium to which the chemical(s) have been released.
- Information about the location of the incident: unique identifier of geographical location (grid co-ordinates, latitude and longitude, or similar), fixed site or transportation.
- Outcome: estimate of the number of people actually exposed (population, workers and respond-ers).
- A contact source of further information on the incident

**Open questions to be included in or answered by the ECOEHIS report:**

- According to our findings, the establishment of a chemical incidents register is required by Directive 96/82/EC. The respective data are reported to the MARS-database (Major Accidents Reporting System). A scoring as required by Chem_A2 is not required for reporting to MARS.
    - The German project participation judges the significance of these data as indicator for environment and health as very low. The indicator is only supported if data can be obtained at EU-level.
    - Data availability for Chem_A2 should be discussed in detail in the ECOEHIS report.

### Chem_A3 Government preparedness for chemical incidents

**ECOEHIS proposal:** Evidence of existence at regional or national level of:

- a national advisory board[19]
- environmental / public health plans[20]
- emergency response guidelines[21]
- a public alert system[22]

Data are supposed to be collected at national level.

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[18] **Score 0**: no such instrument. **Score 1**: the conditions are met partly and less than 80% of the country is covered, **Score 2**: the conditions are met completely, i.e. the register is in operation with its full specifications, but less than 80% of the country is covered, or the conditions are met partly, and 80% or more of the country is covered. **Score 3**: the conditions are met completely, i.e. the register is in operation with its full specifications, and 80% or more of the country is covered.

[19] Defined by WHO as an institution/body (ideally centrally funded) staffed by professionals with a background in legislation, chemical incident management and data collation; and with access to specialist professionals. Its function is to advise Government on preparedness, and during significant chemical incidents; it can also coordinate all the regional and local functions.

[20] Defined by WHO as an active, written, document detailing the actions required of public health and environmental health professionals before, during and after a chemical incident.

[21] Defined by WHO as a concentration of a substance in air or drinking water indicating a threshold for a well-defined level of toxic health effect in the general population from an emergency exposure with a specified exposure period.

[22] Defined by WHO as a system with very wide coverage to alert the public that an incident has occurred.

**Comments of German project participation:**

- According to our findings, the required data are not available at EU-level. Considering the large amount of information already available according to Directive 96/82/EC, the German project participation does not see the necessity of installing additional data flows in this area. Therefore, the proposal of this indicator for the ECHI short-list is not supported.

**Rad_E1 Incidence of malignant melanoma**

**Proposal according to ECOEHIS-meeting in July 2004:** It has been decided by the ECOEHIS working group to adapt the definition of the indicator so that it can be calculated from data available at EU-level. Data on malignant melanoma (ICD10:C43) are submitted to the European Network of Cancer Registries (ENCR) and are made available through the EUCAN database[23]. The adapted definition and exact illustration of data available at EU-level needs to be included into the ECOEHIS report as basis for the proposal of this indicator for the ECHI short-list. We will comment on this proposal as soon as we receive it.

**Open questions to be included in or answered by the ECOEHIS report:**

- Is the skin cancer rate a suitable indicator for UV-exposure? (given that skin type and genetic disposition play a role as well)

**Rad_A1 Effective environmental monitoring of ionizing radiation**

**ECOEHIS-proposal:** Existence of effective environmental monitoring of radiation activity in compliance with national and international quality assurance programs. The following criteria shall be assessed :

- media: airborne particles, ambient dose rate, mixed diet and milk (i.e. a representative food package), surface water, drinking water
- density of the network (national, regional), frequency of measurements (continuously or less than one month, monthly or more), sensitivity in comparison with reporting levels (detection limit < reporting level; otherwise), monitoring on a routine basis and not only in case of an accident, successful participation in international inter-comparisons

**Comments of German project participation:**

[23] http://www-dep.iarc.fr/eucan/eucan.htm

According to Commission Recommendation 2000/473/Euratom[24], the criteria set under the above second bullet point are defined. They are thus not required to be reported regularly. The added value and practicability of proposing Rad_A1 for the ECHI short-list is therefore questioned by the German project participation. The German project participation does not support the proposal of Rad_A1 for the ECHI short-list.

## 3. Indicators that will not be proposed for the ECHI short-list

### Air_E1 Years of life lost attributable to air pollution

**ECOEHIS proposal:** Deaths attributable to the long-term exposure to fine particulate matter in the first year of follow-up.

- Annual concentrations of $PM_{2,5}$ or $PM_{10}$. If no $PM_{2,5}$ data are available, WHO proposes estimates[25]
- Population distribution by age
- age specific mortality rates (all causes of death)

**Proposal according to ECOEHIS-meeting in July 2004:** The indicator will not be proposed for the ECHI short-list but is going to be further elaborated in a planned follow-up project of ECOEHIS (ENHIS).

The indicator is supposed to be calculated from Air_Ex1 data. Therefore, the respective questions listed under Air_Ex1 need to be answered before making a proposal.

### Noise_E1 Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure

**Original ECOEHIS proposal:** Number of cases of cardiovascular problems attributable to noise exposure and number of deaths attributable to noise exposure on the basis of

- an estimation of the number of people exposed to Lden > 65 dB(A)
- the prevalence/incidence of cardiovascular diseases

[24] 2000/473/Euratom on the application of Article 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole

**Proposal according to ECOEHIS-meeting in July 2004:** Since the indicator is supposed to be calculated from Noise_Ex1 data, the decision not to propose Noise_E1 for the ECHI-short list has been taken respectively. Noise_E1 is going to be further elaborated in a planned follow-up project of ECOEHIS (ENHIS).

If the indicator is proposed at a later stage, the following **open questions** need to be answered:

- How reliable is an indicator based on two phases of modelling (exposure model and morbidity/mortality estimation)?
- Who is going to carry out the necessary computation?

**Noise_E2 Self-reported noise health effects – annoyance and sleep disturbance**

**ECOEHIS proposal:** Percentage of population reporting annoyance and sleep-disturbance by certain sources of environmental noise[26] on the basis of a standardised questionnaire.

**Proposal according to ECOEHIS-meeting in July 2004:** Instead of proposing Noise_E2 for the ECHI-short-list, the inclusion of a respective questionnaire into the future Eurostat Health Interview Survey will be proposed.

**Open questions to be dealt with when proposing a questionnaire on European level:**

- How will differences in the subjective assessment due to social and cultural differences be dealt with?

How will the instrument used be agreed upon by Member States? (In Germany, national noise annoyance surveys are conducted according to the internationally agreed ISO scheme for noise annoyance during daytime.)

**Noise_A2 Existence and effectiveness of urban or national action plans to solve noise problems**

**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working group has decided to drop the proposal.

[25] According to the Air_E1 fact sheet, factors to estimate $PM_{2,5}$ should be derived from parallel measurements of $PM_{10}$ and $PM_{2,5}$. If such measurements are not available, a factor of 0,6 is proposed.

**Noise_A3 Willingness to enforce and implement the environmental noise EU Directive**

**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working group has decided to drop the proposal.

**House_Ex2 Accessibilitiy**

**Proposal according to ECOEHIS-meeting in July 2004:** The ECOEHIS working group has decided not to propose this indicator for the ECHI short-list.

**House_Ex5 Indoor radon in dwellings**

**Proposal according to ECOEHIS-meeting in July 2004:**

The indicator will not be proposed for the ECHI short-list but is going to be further elaborated in a planned follow-up project of ECOEHIS (ENHIS).

**House_E2 Housing safety and accidents**

**Proposal according to ECOEHIS-meeting in July 2004:** The indicator will not be proposed for the ECHI short-list but is going to be further elaborated in a planned follow-up project of ECOEHIS (ENHIS).

We would like to remark that the DG SANCO Working Group "accidents and injuries" to us seems to be the appropriate place for working out such a proposal for the ECHI short-list.

**Traf_Ex1 Person time spent on the road**

**Proposal according to ECOEHIS-meeting in July 2004:** The indicator will not be proposed for the ECHI short-list.

**Traf_Ex2 Use of safety vehicle device**

**Proposal according to ECOEHIS-meeting in July 2004:** The indicator will not be proposed for the ECHI short-list.

[26] Road traffic (highway, urban road, vans, heavy trucks, motor bikes, mopeds/scooters), railway traffic (passenger trains, freight trains, metro), air traffic (civil aviation, military flight, general aviation), industry (factories and manufacturers, building equipment, load/unload facilities), neighbour noise

**Traf_E2 Potential years of life lost**

**Proposal according to ECOEHIS-meeting in July 2004:** The indicator will not be proposed for the ECHI short-list but is going to be further elaborated in a planned follow-up project of ECOEHIS (ENHIS). The indicator is supposed to be calculated from Traf_E1.

**Traf_E4 DALY (Disability adjusted life years) lost for road accidents**

**Proposal according to ECOEHIS-meeting in July 2004:** The indicator will not be proposed for the ECHI short-list.

**Traf_E5 Mortality due to drinking and driving**

**Proposal according to ECOEHIS-meeting in July 2004:** The indicator will not be proposed for the ECHI short-list.

**WatSan_E1 Outbreaks of waterborne diseases**

**WatSan_A1 Management of bathing waters**

**WatSan_A2 Water Safety Plans**

## 5. Annex (Information about Data availability for certain indicators)

### Air_D1 (Passengers-kilometers by mode of transport)

Data on the share of waterborne transport, air, railway, bus/coach, passenger cars and powered two wheelers in passenger transport in the European Union are presented in the Eurostat report "Panorama of Transport"[27]. EC legal acts on transport statistics cover passenger transport by rail, water and air.[28] Data on passenger transport by car, powered two-wheelers, bus and tram are apparently based on voluntary agreements. To our knowledge, data on person kilometers traveled by bike or on foot are not available on a regular basis and on a European scale. The EEA indicator fact sheet statement that "the inclusion of non-motorised modes of transport (walking and cycling) would be valuable" seems to back our finding.

### Air_D2 (Freight-transport demand [tonne-kilometres])

On the basis of EC legal acts[28], the report "Energy, transport and environment indicators"[29] presents data for all EU-member states for the years 1990 to 2000 on

- the volume of freight transport by rail (tonne-km) relative to GDP,
- the volume of freight transport by road (tonne-km) relative to GDP and on
- the volume of freight transport by inland waterways (tonne-km) relative to GDP.

In Annex D of the report, Eurostat states that the combination with GDP has been made to facilitate comparisons between smaller and bigger countries.

### Air_D3 (Road transport fuel consumption)

On the basis of official EUROSTAT data sources and EEA data, the report "Energy, transport and environment indicators"[29] presents data for all EU Member States for

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[27] Eurostat 2003, Panorama of transport, statistical overview of transport in the European Union

[28] According to Annex D of the report, for transport indicators[29] two main channels are used by Eurostat to collect statistical data for transport: **1. Legal acts on transport statistics** which cover detailed data collections for all the main modes of transport (Rail freight, passengers, traffic and accidents: Regulation (EC) No 91/2003, Road freight: Council Regulation EC 1172/98, Inland waterways: Council Directive 80/1119/EEC, Maritime freight, passengers and traffic: Council Directive 95/64/EC, Aviation passengers, freight and traffic: Regulation (EC) No 437/2003), **2. the so called "Common Questionnaire"** of Eurostat, UN-ECE and ECMT, which is used to collect, on a voluntary basis, annual aggregated data covering many aspects of inland modes of transport (rail, road, inland waterways and pipelines).

[29] Eurostat Pocket books, Energy, transport and environment indicators – Data 1990-2000; European Communities, 2003.

the years 1990 to 2000 on final energy consumption in transport by fuel. Values are available for motor spirit, kerosenes and a combined value for gas and diesel oil. Moreover, the report contains data on final energy consumption by mode of transport, split to rail, road and air.

**Air_Ex1 (Population-weighted annual average concentration of air pollutants [$NO_2$, $PM_{10}$, $PM_{2,5}$, $SO_2$, Ozone])**

Council Decision 1997/101/EC on the exchange of information on ambient air pollution[30] requires EU Member States to provide the EU with data on all five pollutants relevant for Air_Ex1[31].

For $NO_2$, $PM_{10}$, $PM_{2,5}$ and $SO_2$, the Decision refers to Council Directive 1999/30/EC[32]. For $NO_2$, $PM_{10}$ and $SO_2$, 1999/30/EC lays down requirements for the assessment of annual average concentrations by Member States.

For **$PM_{10}$**, a limit value for the protection of human health has been set of a 24 hour average of 50 µg/m³ not to be exceeded more than 35 times a calendar year. Additionally, an annual average limit value of 40 µg/m³ has been set.

For **$NO_2$**, an annual mean limit value of 40 µg/m³ has been set for the protection of human health. In addition an hourly limit value of 200 µg/m³ not to be exceeded more than 18 times a calendar year has been set.

For **$SO_2$**, a 24 hour limit value of 125 µg/m³ for the protection of human health has been set not to be exceeded more than 3 times a year. In addition, an hourly limit value of 350 µg/m³ has been set not to be exceeded more than 24 times a year.

For **$PM_{2,5}$**, 1999/30/EC commits Member States to "ensure that measuring stations to supply data on concentrations of $PM_{2,5}$ are installed and operated. Each Member State shall choose the number and siting of the stations at which $PM_{2,5}$ is to be measured as representative of concentrations of $PM_{2,5}$ within that Member State."

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[30] 97/101/EC: Council Decision of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States. http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31997D0101&model=guichett

[31] Commission Decision of 17 October 2001 **amending** the Annexes to **Council Decision 97/101/EC** establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States. http://europa.eu.int/cgi-bin/eur-lex/udl.pl?REQUEST=Seek-Deliver&COLLECTION=oj&SERVICE=all&LANGUAGE=en&DOCID=2001l282p0069

[32] 1999/30/EC: Council Directive relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.

"…Member States shall send the Commission the arithmetic mean, the median, the ninety-eight percentile and the maximum concentration calculated from measurements of $PM_{2,5}$ over any twenty-four hours within that year." Concerning availability of data on $PM_{2,5}$, EEA states that "Other particle size fractions of health significance [*other than PM 10*], such as $PM_{2,5}$, are measured only at a few stations in Europe"[36]. For **ozone**, the Decision on the exchange of information refers to Directive 92/72/EC which meanwhile has been repealed by Directive 2002/3/EC of the European Parliament and of the Council relating to ozone in ambient air[33]. For the protection of human health, a maximum daily 8 hour mean of 120 µg/m³, not to be exceeded on more than 25 days per calendar year averaged over 3 years has been set as target value. Moreover, a long-term objective has been set of 120 µg/m³ as maximum daily 8-hour mean within a calendar year. Member States are further required to submit to the Commission a list of zones and agglomerations in which the levels of ozone in ambient air are higher than the target values or higher than the long-term objectives set by the directive. Member States are required to install sampling points for the assessment of urban, suburban, rural and rural background concentrations of ozone[34].

Data reported according to the Exchange of Information Decision are included into the AirBase[35] database of the EEA European Topic Centre of Air and Climate Change (ETC/ACC). AirBase is the European air quality information system of the EEA. A recent EEA report presents analyses of these data[36]. It contains estimates of exposure of the European urban population to ozone, $PM_{10}$ and $NO_2$.

[33] http://europa.eu.int/cgi-bin/eur-lex/udl.pl?REQUEST=Seek-Deliver&COLLECTION=oj&SERVICE=all&LANGUAGE=en&DOCID=2002l067p0014
[34] criteria for classifying and locating sampling points for assessments of ozone concentrations (2002/3/EC, Annex IV, Section I)
[35] http://air-climate.eionet.eu.int/databases/airbase.html
[36] Air pollution in Europe 1990-2000, Topic report 4/2003, EEA 2004. http://reports.eea.eu.int/topic_report_2003_4/en/Topic_4_2003_web.pdf

WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 11-5

# Italy Report on Pilot Study

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

# Development of EH Indicators for EU Countries
# ECOEHIS project

**WHO project co-sponsored by EC DG SANCO (SPC 2002300)**

# Pilot Study on the Environmental Health Indicators

## Report from ITALY

**June 18, 2004**


**Reporting Institute:**

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# Summary

APAT, the national Environmental Protection Agency of Italy, welcome the participation to WHO ECOEHIS project, which is currently the only European Project who provides E&H indicators already tested and reviewed by experts, as well as all methodology background.

Indeed APAT itself is involved with a special national Project, the APAT Environment & Health Project, in the ongoing process in EU for the development of E&H indicators and the implementation of Environment and Health Information System network, both aimed to a joint reporting on E&H with Health Authorities..

The feasibility study was based upon the main principles of the APAT Project:

- to share all process with Health and Environmental Authorities
- to promote active participation of E&H authorities and other main subjects involved in data/information system elements management for:
  - planning follow up activities for adjustment of missing/gap information and/or data flow management
  - reviewing information needs updating with national priorities and new socio-environmental scenarios.

More than 50 subjects actively participated to the Study, they were appointed by environmental and health Institutions invited by APAT (see list of participants) .

The participation of many experts required a bigger organizational and coordination effort to make them familiar with ECOEHIS background, aims and questionnaire, but it was quite worth it to launch the participatory and sharing process for the implementation of an integrated E&H information.

Inside this scenario of shared objectives the feasibility study of WHO ECOEHIS project was felt as important opportunity to take part of *a learning by doing* process, and as an essential step to verify "our", meant as Italy information systems, actual and potential capability of building an integrated information on E&H , suitable for supporting national E&H policies and actions to promote health in environmental policies and to better target and prevent health risk from environmental determinants. All objectives promoted by European Environment and Health Strategy and the subsequent Commission Action Plan of june 2004 (COM 2004 416 final)

The study can be considered quite successful under the profile of multidisciplinary commitment.

At the very end of the Study results have been already discussed in a plenary session among participant experts, that were divided in specific WG for ECOEHIS thematic issues ; each WG will prepare a technical papers for follow up activities to be presented to competent authorities to emphasise needs and follow up actions.

Out of a request of more than 250 information of ECOEHIS questionnaire (data elements) we found that more than 75% is already adequately available and ready to be implemented.

The indicators reported in the following list were founded and judged to be considered of national relevance (in terms of comparability and data quality ) implemented within 2004: for metadata information detailed results will be discussed in the specific session.

It's worth here to underline that analysis of meta-information on data availability and quality required by the ECOEHIS questionnaire was an important exercise to know what's behind missing information, and how that can be adjusted allowing a first financial feasibility assessment (missing information requiring new monitoring station and/or regular surveys management could be more costly of data flow/collection adjustment) for future improvements. All aspects will be discussed among participating health and environmental Authorities.

To make visible results achieved in such a short amount of time, as a first follow up action developed E&H indicators will be included in a specific chapter of the next 2004 edition of APAT YearBook [1], which already accounts for a collection of environmental indicators and indicators for cross-cutting policies e.g. like industry, transport, agriculture, anthropogenic risk and natural environmental risk.

On a longer term period, also on the basis of technical reports by ECOEHIS task force, we will promote a regular E&H reporting, together with health authorities, for identified national information needs linked to European network and that can represent a basic referring system for regional implementation for local demands.

| Topic Area | Indicator | Data element Code | Implementation |
|---|---|---|---|
| **AIR** | **1. Passengers-kilometres by mode of transport** *DRIVING FORCE* | Air_D1V1 | Immediately |
| | | Air_D1V2 | Immediately |
| | | Air_D1V3 | Immediately |
| | | Air_D1V4 | Immediately |
| | | Air_D1V6 | Immediately |
| | | Air_D1V7* | Immediately |
| | **2. Freight-transport demand (Tonne-kilometres)** *DRIVING FORCE* | Air_D2V1 | Immediately |
| | **3. Road transport fuel consumption** *DRIVING FORCE* | AIR_D3V1 | Immediately |
| | | AIR_D3V2 | Immediately |
| | | AIR_D3V3 | Immediately |
| | | AIR_D3V4* | Immediately |
| | **4. Air pollution emissions** *PRESSURE* | AIR_P1V2-AIR_P1V12; AIR_P1V19-AIR_P1V36 | Immediately |
| | **5. Population-weighted annual average concentration of air pollutants** *EXPOSURE* | AIR_Ex1V1 | By the end of 2004 |
| | | AIR_Ex1V2 | By the end of 2004 |
| | | AIR_Ex1V3 | By the end of 2004 |
| | | AIR_Ex1V4 | By the end of 2004 |

[1] Annuario APAT, a short version is also available in English at the web site www.sinanet.apat.it

| | | | |
|---|---|---|---|
| | | AIR_Ex1V5 | By the end of 2004 |
| | | AIR_Ex1V6* | By the end of 2004 |
| | | AIR_Ex1V7* | By the end of 2004 |
| | **6. Years of expected life lost**<br>*EFFECT* | AIR_E1V1** | By the end of 2004 |
| | | AIR_E1V2* | Immediately |
| | | AIR_E1V3* | Immediately |
| **WATSAN** | **7. Wastewater treatment**<br>*PRESSURE* | WATSAN_P1V1 | By the end of 2004 |
| | | WATSAN_P1V2 | |
| | **8. Recreational water compliance**<br>*STATE* | WATSAN_S1V1 | Immediately |
| | | WATSAN_S1V2 | |
| **RADIATION** | **9. Incidence of skin cancer**<br>*EFFECT* | RAD_E1V1 | By the end of 2004 |
| | | RAD_E1V2* | |
| | **10. Effective environmental monitoring of radiation**<br>*ACTION* | RAD_A1V1 | Immediately |
| **TRAFFIC** | **11. Age of vehicle fleet**<br>*STATE* | TRAF_S1V1 | Immediately |
| | | TRAF_S1V2 | |
| | **12. Road accident rate**<br>*STATE* | TRAF_S2V1 | Immediately |
| | | TRAF_S2V2 | |
| | | TRAF_S2V3* | |
| | **13. Person time spent on the road**<br>*EXPOSURE* | TRAF_Ex1V1 | By the end of 2004 |
| | | TRAF_Ex1V2* | Immediately |
| | **14. Use of safety vehicle device**<br>*EXPOSURE* | TRAF_Ex2V1 | By the end of 2004 |
| | | TRAF_Ex2V2 | By the end of 2004 |
| | | TRAF_Ex2V5 | Immediately |
| | | TRAF_Ex2V6 | Immediately |
| | **15. Mortality due to transport accidents**<br>*EFFECT* | TRAF_E1V1 | Immediately |
| | | TRAF_E1V2* | |
| | **16. Injury rate**<br>*EFFECT* | TRAF_E3V1 | Immediately |
| | | TRAF_E3V2* | |
| **CHEMICALS** | **17. Industrial facilities under EU 'Seveso II' directive**<br>*PRESSURE* | CHEM_P1V1 | Immediately |
| | | CHEM_P1V2 | |
| | **18. Regulatory requirements for land-use planning**<br>*ACTION* | CHEM_A1V1 | Immediately |
| | | CHEM_A1V2 | Immediately |
| | | CHEM_A1V3 | By the end of 2004 |
| **HOUSING** | **19. Estimated Indoor radon in dwellings**<br>*EXPOSURE* | Hous_Ex6V1 | Immediately |
| | | Hous_Ex6V3 | |
| | | Hous_Ex6V4 | |
| | | Hous_Ex6V5 | |

# Table of contents

# 1 Introduction

**- WHO ECOEHIS project and activities in Italy on E&H indicators and E&H Information System**

ECOEHIS WHO project is one of the activities conducted by WHO inside the major project of developing Environment and Health Information System for a Community Environment and Health Action Programme .

Environment and Health policies (6th EAP, Community Health Programme ) and activities finalized to the development of E&H indicators at the Community level on the issue gathered under the framework of the European Environment and Health Strategy - (COM 2003)338) and the need of integration of information, as well as the ECOEHIS results, have been further stressed in the june 2004 EU Commission Action Plan, the first Commission act following European Strategy presented at the Budapest Conference.

In Italy APAT, the national Environmental Protection Agency, according to the ongoing process in EU for the Environment and Health Information System, related also to many international efforts [2]in the field of developing information for E&H policies, launched a special Project, the APAT E&H Project finalized to the development of E&H indicators and the implementation of a national E&H integrated information System..

The ECOEHIS feasibility study it was experienced as an essential step to verify "our", meant as Italy information systems, actual and potential capability of building an integrated information on E&H , suitable for supporting national E&H policies and actions

The participation as NFP to ECOEHIS WHO project was also very welcome for the chance of implementing a European network on the field of E&H information.

Activities were developed inside APAT E&H Project, since experience taught that no international or European activities can be really implemented and be successful without a network based on an effective organization at Member States level that assures:

i. a dedicated project and personnel to the targeted issue,
ii. mirrored common rules, methodologies and procedures set up at European or International levels, hopefully shared and discussed by an active participation at European and international on going processes
iii. bring at the national level results and targets of international and European strategies and policies;
iv. take into consideration national and local priorities
v. involve national and local competent authorities for policies management
vi. support the development of a national network of local subjects

This is the lesson learnt by APAT, since its beginning as former ANPA in 1998, implementing the National Environmental Information System (SINAnet). After committing efforts SINAnet has provided

- a well organized and effective environmental information system
- subjects network with local environmental Agencies and other main institutions;
- standardization of methodologies and procedures for data collection, monitoring and data flows along with European direction and regulations

[2] OECD, UNEP, UN CSD, and international programmes of EEA and WHO

- the basis for institutional environmental information , implemented in a yearly report, freely accessible on a web site;
- a organizational structure mirroring EIONET network and, of course, an active membership to this EEA network placed inside the European Environmental Information System.

In more recent years Environmental Information is facing new tasks "opening " to cross-cutting issues like environment and health. The 6th Environmental Action programme itself promoted the development of E&H indicators.

The Dept of the State of the Environment , that is APAT Dept which host the National Environmental Information System and other "key" Services like air pollution, waste, impact assessment , sustainable development, in the past two years has set and launch the process leading to the makeover of environmental monitoring also into an integrated information for an informed action of policy makers.

A first working structure is based upon several cross-cutting projects, interlinked among them, like Urban areas , Development of SD indicators and the Environment and Health project.

As already mentioned , the main objectives of APAT E&H Project, who received the support of the Ministry of the Environment, are the development, on medium-long term period, of E&H indicators and the implementation of an E&H information System to support health promotion in environmental policies and a better targeted health risk prevention from environmental determinants and reporting on E&H indicators.

On a first phase indicators are supposed to be derived by the existing information systems and data bases. Meta data analysis will supply the identification and involvement of data holder and collector for the future implementation of a E&H information System.

The first structure of the Project provided for:

a) establishment of a Project leader for the coordination of all activities afferent to the Project;
b) involvement of the Environmental Agencies System with *ad hoc* task
c) establishment of a Scientific Secretariat coordinated by the Project Leader and composed by members of representatives of health and environment institutions (Ministry of Health and Environment, National Institute of Health , National Institute of Cancer, Environmental Local Agencies, University Faculty of Medicine) acting basically as a steering committee of the activities involved in regular meetings.
d) Involvement of participating subjects on define national priorities and information needs

Indeed "sharing " is the key word of all Project, since E&H indicators developing process is planned according to the most quoted definition of E&H indicators *"(Briggs 2003). To be useful E&H indicators must relate to an issue of current or future interest or concern. This implies that we know what purpose we want them for and who will use them in order to define and design them accordingly*

APAT E&H Project activities supporting E&H indicators include also sub-projects to develop with all participating health and environmental authorities about

- monitoring research activities in the field of E&H ;
- promoting studies reviewing the more recent evidence based topics on E&H
- promoting standardization of information collection and data flow
- promoting educational programmes for environmental and health operators
- participating to all major European and international activities and on the field on E&H indicators and E&H information System
- planning on medium term a regular reporting on E&H shared with health authorities.

Inside this scenario of common objectives APAT participation to the feasibility study of WHO ECOEHIS project was felt as important opportunity to take part of *a learning by doing* process .

Thought time assigned to accomplish the feasibility study wasn't very much, coherent with APAT Project belief and aims, it was decided to invest on a sharing, participatory process with all health and environmental institutions (and their experts) represented in the Scientific Secretariat of the Project and also other institutions involved in the data collection and management relevant for WHO E&H indicators.

That took time ( and resources) for a detailed working programme to be approved , experts to be nominated, making experts familiar with the ongoing process and tools ( the questionnaire for example) and coordinate activities of more than 50 participants involved in an unplanned activity. Even though data and metadata collection could have been performed in a faster way APAT considered important to launch a multidisciplinary process which, on the long term , will provide a stable integration of involved subjects on the E&H field.

# 2 Methods

### 2.a -Working programme: activities organization and involvement of participating subjects

After adoption of the ECOEHIS feasibility Protocol following Luxemburg meeting the working Programme for the Study was prepared by APAT and submitted to the Scientific Secretariat for approval . It included the organization of the study : subjects, roles and deadlines. After approval APAT formally invited Institutions members of the Scientific Secretariat (Ministries of Health and Environment, National Institute of Health , National Institute of Cancer), all General Directors of Environmental Regional and Provincial Agencies and other Institutions relevant for the study, in order to appoint own experts to build an *ad hoc* task force.

Local data studies were planned to refer to the 8 major Italian metropolitan cities

The task force of participants was structured in two main collaborating working subjects

i. environmental agencies representatives (APAT and some Regional Agencies) experienced in data collection, flow and construction indicators in order to provide data collection and support to metadata analysis;

ii. a so called Technical Table, that is the group of experts appointed by environmental and health administrations to support metadata collection and analysis and data element collection if representing data holders.

Two plenary session with both group representatives were organized by NFP explaining the expected results, the context of ECOEHIS project inside European and international scenarios, the working programme and Protocol contents.

In the plenary sessions, according to their own expertise, participating subjects were divided in separate working groups related to thematic issue of the E&H indicators

Since plenary participants worked in separate WG meetings with own schedule .

Due to the large number of participants to support NFP supervision, for each working group was identified a contact person for organization and coordination of WG activities (see Acknowledgements - ECOEHIS Task Force and contact person) .

Since many elucidations were asked by participants on the questionnaire, in a separate meeting with NFP and contact persons , it was set up a sort of referring guide lines for misleading questions after a debate with WHO PM .

At the end of the Study results were presented in plenary session

APAT provided for

- coordination and supervision by NFP of all WG activities
- a CIRCA space on SINAnet created ad hoc for common ECOEHIS documents and all information related to participants that were individually provided with password for the access.

- Logistic and support for most of the meetings,
- Own personnel (junior researchers) also to support the contact person on managing WG activities in order to guarantee a closer coordination of NFP coordination with WHO activities and on going requests
- setting up guide lines for the use of protocol to give uniformed answer

.Regarding the latter point , was shared a common interpretation of meta information:

**AVAILABILITY**

We considered as not available data that were not found or that were considered inadequate

- for representing a national level
- for representing a reasonable amount of metropolitan areas whereas local data were requested .

Our targets was to developed information for 8 major Italian cities:

| City | 2002 year of the census | |
|---|---|---|
| | Population | Percent referred to National population (total about 30% %) |
| Turin | 2172226 | 3,79 |
| Milan | 3721428 | 6,49 |
| Genoa | 873604 | 1,52 |
| Bologna | 926637 | 1,62 |
| Florence | 935883 | 1,63 |
| Rome | 3723649 | 6,50 |
| Naples | 3075660 | 5,37 |
| Palermo | 1236799 | 2,16 |

**Not available information** were generally classified as poor and were due to :

- absence of national reporting obligations (e.g. emission/concentration of PM 2.5 since there is no national or European laws setting limits or regulations, or policy monitoring obligations (monitoring tobacco smoke free policies). In the case of PM 2.5. there are scattered experiences in Italy but weren't considered
- too recent reporting obligations (e.g.noise European Directive 2002)
- Absence of reporting and surveys
- Absence of referring data manager subjects of national relevance ( e.g. housing it's hard to say if a group of data are not existent or just they can't be easily tracked down )

**Inadequate information** were generally classified as fair depending on :

- WHO indicators/data element required reorganization of existing information but there was not enough time on performing it on a short period. (for example the basic data element of the indicator TRAF_Ex1[3] implied a reorganization of available data from an *ad hoc* 2001 census that can planned and implemented within 2004) or on a longer period if implies reorganizations of centralizing reporting from several data collectors (e.g. speed limits exceedance TRAF_Ex3)
- Inadequate standardization of data flow to national centralized systems. For example management of drinking water data is hold by Regions which apply different procedures for data management and reporting at national level was referred as irregular[4] .
- Inadequate data to be considered in a national reporting (few scattered experiences or for example for local data we assume we need it at least for the italian big metropolitan areas considered in the Study)
- Inadequate data to fill up all the five years period required by WHO.

**DATA QUALITY**

The quality of data for National reporting was considered poor whereas both the amount of data (local and regional) and/or their quality weren't considered suitable for national reporting . Generally that happens in the case of considered inadequate information, but sometimes also for available information that were considered not reliable (e.g. drinking water data).

A "poor" score was also used in case of not available information.

**COMPARABILITY**

It generally followed the quality score.

**POLICY RELEVANCE**

The score was based upon several considerations (the aptitude of the information on driving E&H policies, it's importance/specificity for the considered E&H issue, the relationship with existing available data, cost/benefit of implementing) and often specified in the comments sheets. It was considered poor in case of inadequate or unavailable information .

**COST:**

We set a common fare of Euro 42/h/person . The (gross) cost was referred to time spent in meetings, questionnaire filling, and other major costs ( travel).The global estimates accounted for about Euro 80.000, 00 for all the study.

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[3] Number of hours spend on the road to reach the workplace or school by mode of travel (car, bus, metro, motorcycle, bicycle, walk)

[4] It has to be reminded that in Italy Regions are in charge of legislation and management for health protection

# 3 Results of the pilot study of the indicators

## 3.1 Air Quality

Generally air quality indicators were quite accomplished (86% without considering A1 on smoking policy). Data missing regards mainly PM 2.5 emission and concentration. Since there is no regulations on PM 2.5 (as in Europe) data for the considered period were not available and, even if since 2001 there are available data for PM 2,5 a quality reporting for national level is still missed.

For local studies in general there is a need to standardize the zone of exposure (strict urban? Suburban? Provincial ? monitoring stations areas ?). We consider as exposed urban population the number of people living in the Provincia .

Other comments were reported below.

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ | N° tot. data element | N° data element filled | N° data element not existent or n.a. |
|---|---|---|---|---|---|---|---|---|
| Air_D1 | 2 | 2 | 2 | 1 | 1 | 7 | 6 | 1 n.e. D1V6 (N° people walking, biking etc) |
| Air_D2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | - |
| Air_D3<br>See general remark | 2 | 2 | 2 | 2 | 1 | 4 | 4 | - |
| Air_P1 | 2 | 2 | 2 | 2 | 1 | 36 | 30 | 6 n.a.P1V13-V18 (PM 2.5) |
| Air_Ex1 | 2 | 2 | 2 | 1 | 2 | 7 | 6 | 1 n.a. (PM 2.5) |
| Air_E1 | 1* | 1 | 1 | 2 | 1 | 3 | 3 | - |
| Air_A1 | 0 | 0 | 0 | 1 | 4 | 10 | 2 | 8 see notes |
| | 78 %<br>92% without A1 | 78 %<br>92% without A1 | 78 %<br>92% without A1 | 78 %<br>83% without A1 | 86% within 2004<br>100% without A1 | 68<br>(58 withoutA1) | 52 (about 75%)<br>86% without A1 | |

General remark Air D3: could be useful to know combustion type of circulating vehicles to better assess health risk

The data for PM 2,5 are available only since 2001, when this pollutant monitoring started (but there's not a complete national coverage).

A1_V1- V2-V4-V9 Smoking prohibition and restrictions on ETS exposure exist in requested places , as defined by laws, but actually there aren't controls and inspections on enforcement and compliance. Inspection procedures of appointed officials are not well defined. Prefectures report to central level (Health Min) possible found violations, but these are rare.

A1 V3 Controls and inspections on enforcement and compliance are limited. Prefecture reports to central level (Health Min) possible found violations. In last report only 40 prefectures (40/100) reported data to central level.

Air-A1 is not fitting with environmental policy but only as a separate, not linked information of indoor air quality. The DPSEEA chain should be improved with indoor air quality information linked to outdoor (environmental ) air quality.

## 3.2 Noise

A zone mapping according to the criteria of the European Directive 2002/49/CE is not available in any of the Italian municipalities. In general there weren't enough data responding to the detailed information requested by the questionnaire both for national level and for the common target of studying the 8 major metropolitan areas.

.The Italian noise framework law 447/95 provides basic principles for noise prevention (type of measures) and remediation for municipalities with more than 50.000 inhabitants. So far there is a low response (only 15 %) from municipalities. Some monitoring campaigns have been carried out; data are expressed in terms of the acoustical indexes of the Italian law (Leq day (6-22) and Leq night (22-6)). As far as it concerns the eight most populous Italian cities, exposure data are available for the population of Bologna (1997), Genoa (1997) and Florence (2003) .

To implement ECOEHIS indicators a major commitment will be needed on a long term.

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ | N° tot. data element | N° data element filled | N° data element not existent or n.a. |
|---|---|---|---|---|---|---|---|---|
| Noise_Ex1 | 0 | 1 | 1 | 0 | 4 | 40 | 10 (see note 1) | 30 |
| Noise_E1 | 0 | 1 | 1 | 0 | 4 | 2 | 2(see note 2) | - |
| Noise_E2 | n.a/0 | m | m | 0 | 4 | 30 | - | 30(see note 3) |
| Noise_A1 | 1 | 1 | 1 | 1 | 3 | 6 | 6 (note 4) | - |
| Noise_A2 | 1 | 1 | 1 | 1 | 3 | 1 | 1(note 5) | - |
| Noise_A3 | n.a./0 | m | m | 0 | 4 | 2 | 1(pop) | 1(see note ) |
| | | | | | | 81 | 20 (49%) | 61 |

1) There are not evaluations on a national level. The reported data are taken from an experimental work on this indicator titled "Percentage of population exposed to different levels of environmental noise" . The evaluations are referred to the three municipalities all together, that means about 72.000 inhabitants.
2) There are not evaluations on a national level. The reported data are taken from an experimental work on this indicator titled "Percentage of population exposed to different levels of environmental noise
3) There are not available data on a national level according to the questionnaire specifications. At the moment in Italy only some local studies have been carried out. They tried to relate the levels of population exposure (expressed in terms of Leq day or Leq night) and the reactions of the exposed population.
4) The score given derives basically from the analysis of the specific national law on this topics (DPCM 215/99). Unluckily there are not information collected in a systematic way on a national level which might permit to have a valuation on the effective implementation of it. Despite of it, the available data give a clear idea of a diffuse exceed of the maximum levels in the country (data derived from a national study by ANPA (1997) [6] and from a local one that took place recently in Lazio region (2002-2004)
5) The framework law L 447/95 prescribes that all the managers of public transport services and related infrastructures draw plans for noise abatement according to the prescriptions stated in a specific decree to this dedicated (DM 29/11/2000). Moreover, the Italian law provides for the zoning of every municipal area and for the drawing of local action plans, where necessary. The score derives from the analysis of the data in the APAT Environmental Yearbook published since 2001 and of all the other information in our possession
6) Nowadays an acoustical mapping according to the criteria of the European Directive 2002/49/CE is not available in any of the Italian municipalities. The Italian noise framework law 447/95 provides for the drawing of a relation about the acoustical climate by the municipalities with more than 50.000 inhabitants, every couple of years. At 31.12. 2002 only about 15% of these municipalities has approved this document; among them: Milan, Bologna, Florence and Naples [2]. Locally, monitoring campaigns have been carried out in some municipalities to characterize the acoustical situation, aiming in some cases to estimate the percentage of population exposed to different levels of noise. The available data are expressed in terms of the acoustical indexes of the Italian law (Leq day (6-22) and Leq night (22-6)). As far as it concerns the eight most populous Italian cities, exposure data are available for the population of Bologna (1997), Genoa (1997) and Florence (2003) [2]..

## 3.3 Housing and Settlement

| Indicator ID | Data Avail-ability (1_S) * | Data Quality (2_S) * | Compara-bility (3_S) * | Policy-relevance (4_S_1) * | Overall Readi-ness (4_S_2) ^ | N° tot. data ele-ment | N° data element filled | N° data element not existent or n.a. |
|---|---|---|---|---|---|---|---|---|
| Affordability* | 2 | 2 | 2* | 0 | 4 | 4 | 3 | 1 (construction cost/m²) |
| Crowding | 2 | 2 | 2 | 0 | 4 | 3 | 3(for 1* see note 1) | |
| Accessibility | 1 | 1 | 0 | 0 | 4 | 9 | 5 + 1 partial | 3 n.a? n.e. ? (physical barriers, public financing, N° houses adapted ) |
| Dampness/Mould Growth | 0 | 0 | 0 | 0 | 4 | 6 | 1+ 1 partial (see note 2) | 4 n.a? n.e. ? (N° houses damp/mould and N° people affected by living in) |
| Household hy-giene | 2 | 2 | 2 | 2 | 4 | 3 | 2 | 1 n.e. N° people living substandard (see note 4) |
| Indoor radon in dwellings (see note 5) | 2 | 2° | 2 | 2 | 1 | 5 | 2 | 3 n.e. (see note 5) |
| Extreme tem-perature | 2 | 2 | 2 | 0 | 4 | 4 | 4 (for 2 see note 3) | |
| Housing safety and accidents | 0 | 0 | 0 | 0 | 4 | 6 | 4 (2 partial only one year) | 2 Condition and/or characteristics of dwellings assessed by census or survey( see note 6) |
| Crime/Perception of crime | 2°°° | 2°°° | 2°°° | 0 | 4 | 8 | 7 (3 partial only one/few years) | 1 (alarms etc) n.e. |
| | | | | | | 48 | 33 (69%) | 15 |

** the WG suggest to consider it as a Driver on the DPSEEA chain*

1) We can insert the data related to number of inhabitants by occupated household ( census 2001): 2.6, or data related to dwelling completed per 1000 inhabitants, total (number): 1997) 3 / 1998) 3 / 1999) 3 /2000) 4

2) only year 2001 -This data element is referred to the total number of occupied dwellings in housing stock by residential population

3) The data are referred to three different towns (Turin, Rome, Palermo) , located in north , central and south of Italy, respectively. ,We suggest to use for this indicator as geografichal coverage the local level.(Only local)

4) The data: "Number of dwellings/ persons with adequate -substandard -lacking hygiene amenities" does not exist in the country . We have only data related to dwelling with bath, toilet and drinking water for the last census (2001) that will be ready at the end of 2004.

5) For radon it's better to refer to the entire comments made by experts in the questionnaire. Scores were based on existing information and reformulating data element ; for indicators Ex-6 V4 e V5.

No national action level has been implemented , so no question could be answered for this data element code (no limits for private dwellings). Expert also suggest to aggregated indicator s Hous_Ex6 V2V3"Number of houses with radon level above 200, ..." should be replaced with "Estimated number of houses with radon level above 200, ..."

6) E1V3 The survey of the buildings constitutes a innovation regarding the previous censuses in which was not previewed, even if in 1981 and 1991 some information about buildings have already been collected like dwellings characteristics.

E1V1 (injuries) The data reported from hospital discharge cards (SDO) is heavy under-estimated (82.3312 cases for the year considered) be-cause often the dynamic of the accident it's not reported (where the accident happened) . A different Estimation of National Institute of Health accounts for approximately 240.000 the number of domestic accidents requiring hospital care.

To implement housing indicators first action needed is to develop a network of referring subjects . Data are scattered in different information system and there is no information system collating them.
About radon: the expert from National Institute of health suggested (see comments in the questionnaire) that inclusion of indoor radon exposure among housing indicators needs to be further discussed. In fact, there is no significant interaction between radon data elements and data elements of all the other indicators presently included in the housing group. Both the method to evaluate health effects and to reduce them are different for radon and all the other housing indicators.

## 3.4 Traffic Accidents

Many data elements were founded belonging to well tested information system; it's general opinion however that also existing data need quality adjustment. Missing data on PYLL or DALY need medium –long term elaboration.

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ | N° tot. data element | N° data element filled | N° data element not existent or n.a. |
|---|---|---|---|---|---|---|---|---|
| Traf_D1 (Air_D1) | 2* | 2* | 2* | 1 | 1 | 7 | 6 | 1 n.e. (N° people walking, biking etc) |
| Traf_S1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | - |
| Traf_S2 | 2 | 2* | 2* | 1 | 1 | 3 | 3 | - |
| Traf_S3 | 1** | 0 | 0 | 1 | 1 | 2 | 1 partial (only from year 2001, note 1) | 1 n.e. (N° circulating vehicles **note 1a)** |
| Traf_Ex1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 (1 data on N° hours spent to reach placet must be disaggregated) | |
| Traf_Ex2 | 2*** | 2*** | 2*** | 2 | 1*** | 6 | 4 (partial only since 2001) | 2 n.e. (N° children passenger and restrained) |
| Traf_E1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | |
| Traf_E2 | 0(n.a.) | 0 | 0 | 0 | 3 | 2 | - | 2 (no data for PYLL see note 2) |
| Traf_E3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | |
| Traf_E4 | 0(n.a) | 0**** | 0**** | 0**** | 4**** | 6 | 2 | 4 (DALYs ) |
| Traf_E5 | 2 | 2 | 0 | 0 | 4 | 2 | 2 (SEE NOTE 2) | |
| | | | | | | 36 | 26 (72%) | 10 |

1) Collected data refer only to POLIZIA STRADALE. No collected aggregated data are available for other public enforcement organizations indicated

1a) There are any instruments for monitoring the N° of circulating vehicles in the same site where speed limits were measured, but the number can be derived by traffic flows in the main roads

2) The PYLL data does not exist directly, but it is obtainable intercrossing the life expectancy and mortality data

3) Mortality traffic accidents: This data source based on the reports of the police enforcements is undervalued regarding the sanitary data of the causes of death. The data quality has gone progressively improving, so that the entity of the undervalue passed from the 30 to 10%

4) The mortality data for street incident correlated alcohol is afflicted from heavy undervalue: to forehead of approximately 60-70 cases reported by statistics of the street incidents, the estimates carried out from the Higher Institute of Health indicate that approximately 30-35% of the serious and mortal incidents are due to alcoholic drink abuse, so it would indicate a total at least 2000 secondary deaths incident correlate to street

## 3.5 Water and Sanitation

Regarding drinking water surveillance in general there is a problem of reporting related to a not efficient data flow from Regions to Ministry of health , this is partially due to existing legislation :egions are quite independent on managing data collection and flow. Implementation of management system for bathing water and water safety management plans need time to be implemented.

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ | N° tot. data element | N° data element filled | N° data element not existent or n.a. |
|---|---|---|---|---|---|---|---|---|
| WatSan_P1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | |
| WatSan_S1 | 2 | 1 | 1 | 0 | 1 | 2 | 2 | |
| WatSan_S2 | 0 | 0 | 1 | 1 | 3 | 2 | 2 (drinking water compliance see note 1) | |
| WatSan_Ex1 (N°people drinking water9 | 0 | 0 | 0 | 0 | 4 | 2 | 2( 1 partial see note 2 | |
| WatSan_E1 (OUTBREAKS) | 2 | 0 | 0 | 0 | 4 | 1 | 1 (see note 3 for poor index) | |
| WatSan_A1 (bathing water9 | 0 | 0 | 0 | 0 | 4 | 2 | | 2 (see note 4) |
| WatSan_A2 | 0 | 0 | 0 | 0 | 4 | 2 | 1 (pop) | 1 (see note 5) |
| | | | | | | 13 | 10 (77%) | |

1) Reported data do not apply to single year, but to three united years 1996-98 and 1999-2001. Data for 1999-2001 are incomplete (11/21 regions) but stable.

Since 2001 the regions have a data management with different procedure and with irregular reporting at national level.(poor quality index)

2)No detailed data . Number of people living in household receiving a safe drinking water is approximately 98% of total population (as estimated by local manager, ARPA, local health units).

3)Regions use a different method of data collection (electronic form, paper ..). There is different sensitiveness between regions in reporting outbreaks of water-borne diseases, consequently regions with major attention seem to be more affected.

4)These data are not collected at national level. Management systems at local level show different features and use for the policy in the area. At present bathing waters which are covered by management systems as described by WHO (2003) are presumably non-existent

5) Water safety plans are made on local scale by the institution responsible for Civil Protection (Protezione Civile) in collaboration with the water utility. The safety plan is included in an emergency plan which gather also actions to be undertaken in case of scarcity of water due to flood, drought and other natural diseases. Civil Protection local authority responsible for this plans maybe the Municipalitiy, the Prefect, the Region depending on the relevance of the emergency and the number of people involved. Data on the safety plans are collected by the local authority with different compliance with the 'water safety plan' as described by WHO (2002).

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.6 Chemical Emergencies

Information required was filled in general, but information more risk management related (land use planning, emergency plan) needs adjustments for consolidate data flow at national level. APAT I is mplementing a data base which is more detailed data on accident compared to European reporting system.

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ | N° tot. data element | N° data element filled | N° data element not existent or n.a. |
|---|---|---|---|---|---|---|---|---|
| Chem_P1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | - |
| Chem_A1* | 1 | 1 | 1 | 2 | 1* | 3 | 3 (see note 1) | - |
| Chem_A2 | 2 | 2 | 2 | 2 | 2/3 | 1 | 1(see note 2) | |
| Chem_A3** | 0 | 1 | 2 | 2 | 3 | 1 | 1 (see note 3) | |
| | | | | | 50 % within 2004 | 7 | 7 100% | |

1)*Chem_A1V3(information on existence and enforcement of land use planning) is considering the more representative for the indicator , then we consider this data element as the referring 1 for the general score. Anyway, actual data are partial and not suitable to represent the national situation. Data are obtained through a census made in communities, provinces and regions, using a specific questionnaire. It is about the adoption of land-use planning instruments in areas where Seveso II establishments are located.

2) Italy collects the information regarding major accidents with the procedures of the Major Accidents Reporting System (MARS) of the EC, but it's also using an own Italian Data base developed by APAT adjusted on the European database which contains more detailed data on accidents, not only relevant ones, but has no institutional value at Community level. It's implementation is still in progress but at a fair level.

Chem A3 emergency plans are available at local level, but centralized data flow must be improved and, so far , at difficult availability of data. Anyway, they are available in the local competent authorities (prefectures)

## 3.7 Radiation

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ | N° tot. data element | N° data element filled | N° data element not existent or n.a. |
|---|---|---|---|---|---|---|---|---|
| Rad_E1 | 1 | 2 | 2 | 0 | 2 | 2 | 2 (1 see note1) | |
| Rad_A1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 (see note 2) | |
| | | | | | | 3 | 3 (100%) | |

1) cancer data are available every 4/6 years and are aggregated in 4 years group. Needs time to disaggregate them. New ones are coming at the end of 2004.

Distribution of Cancer Registry is quite irregular and covers less than 50% of population, further quite few regard Italian areas of major potential exposure (central/south) . (see map below)

2) Italian legislative Decree n. n° 230 of 17/03/1995 ,as modified by Legislative Decree n. 241 of 26/05/2000, "Attuazione delle direttive 89/618/Euratom, 90/641/Euratom, 92/3/Euratom e 96/29/Euratom in materia di radiazioni ionizzanti" states (art. 104): The Ministry of the environment is responsible for the monitoring of the environmental radioactivity; the Ministry of the health is responsible the monitoring of the radioactivity in foods and drinks. There are both regional and national networks that carry out the monitoring of the levels of radioactivity).

CRR (Regional Reference Laboratory for Environmental Radioactivity are present in each Italian Region and are now part of regional agencies for environmental protection .. Information about National Network are available on files since 1993. Papers are available since 1957 (annual /semi-annual reports).

APAT in general is the national authority for civil nuclear surveillance

Geographical distribution of Cancer registries in Italy (darker areas)

# 4 CONCLUSIONS

The feasibility Study was quite successful under the profile of integrating subjects and the participatory process considering the small amount of time.

As a contribution to WHO objectives on implementing European EHIS results can be considered as fairly acceptable: 19 indicators ready within 2004 and more than 75% of requested information were found on existing databases. Not available data were quite few. Many inadequate information for national reporting will need adjustments on central collection of data flow or data elaboration. Inadequate data from lacking regular surveys or monitoring must be evaluated under the profile of cost/benefit analysis comparing to national priorities , existing and emerging.

The study was a concrete experience to verify what's behind missing information, in terms of information system, subject networking and inadequate surveys and monitoring.

The integration process, that is the cooperation among health and environmental authorities was considered constructive and challenging for the development of several integrated planned actions and commitments. Thanks to the experts involvement and expertise many proposals are on the table right now, like :

- Planning an integrated E&H reporting
- select a core list of E&H indicators national relevance to be hopefully implemented and adjusted for local needs and policy needs
- To work for a better standardization of information: e.g. zoning of exposure population, data flow system
- Verify cost/benefit of implementing inadequate or not available information ( e.g. monitoring)
- Verify the cost/benefit of existing information from reporting obligation (e.g. SOx)
- Improve DPSEEA chain according to national priorities.

The feasibility study can be then considered as a first step linked to on going European process on developing integrate action and information on E&H.

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## 5.1 Abbreviations

| Acronyms such as institute names in your country | Full name |
|---|---|
| APAT | National Environmental protection Agency |
| ARPA | Regional Environmental Protection Agency |
| ASP Lazio | Regional Public Health Agency of Lazio |
| CTN ACE | AIR National Topic Centre of National Environmental Information System |
| CTN AIM | Water National Topic Centre of National Environmental Information System |
| CTN AGF | Physical Agents Topic Centre of National Environmental Information System |
| ISS (Istituto Superiore di Sanità) | National Institute of Health |
| ISTAT | National Institute of Statistics |
| MATT | Ministry of Environment |
| MoH | Ministry of Health |
| MIT | Ministry of Infrastructure and Transport |
| | |

| Acronyms such as institute names in your country | |
|---|---|
| APAT National Environmental protection Agency | |
| ARPA Regional Environmental Protection Agency | |
| ASP Lazio Regional Public Health Agency of Lazio | |
| ISS (Istituto Superiore di Sanità) National Institute of Health | |
| MATT Ministry of Environment | |
| MoH Ministry of Health | |
| MIT Ministry of Infrastructure and Transport | |

WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR EUROPE

WELTGESUNDHEITSORGANISATION
REGIONALBÜRO FÜR EUROPA

ORGANISATION MONDIALE DE LA SANTÉ
BUREAU RÉGIONAL DE L'EUROPE

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО

EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH
BONN OFFICE

# Annex 11-6

# Netherlands Report on Pilot Study

**DEVELOPMENT**
**OF**
**ENVIRONMENT AND HEALTH INDICATORS**
**FOR**
**EUROPEAN UNION COUNTRIES**

**ECOEHIS**

**Grant Agreement SPC 2002300**

Between the European Commission, DG Sanco

and the World Health Organization, Regional Office for Europe

## Development of EH Indicators for EU Countries (ECOEHIS)

**WHO project co-sponsored by EC DG SANCO (SPC 2002300)**

# Pilot Study on the Environmental Health Indicators

## Report from the Netherlands

**June 18, 2004**

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# Summary


This pilot study is part of the process of developing an Environment and Health Information System by the WHO. The availability, quality, comparability and policy-relevance of several Environmental Health indicators were tested in 11 European countries. In the Netherlands, standardised data collection of indicators in the field of environment and health has been performed for decades and much of the information is already available and published on the Internet (e.g. Environmental and Nature Data Compendium). The National Institute of Public Health and the Environment is developing a national Environmental Health Information System on the basis of the available sources.

The feasibility study in the Netherlands showed that reliable and complete information is available for almost all of the proposed Environmental Health indicators. Most difficulties arose from the collection of the housing indicators, in which many different data-elements were brought together to form one indicator. Besides that, only low-quality data were available for number of outbreaks of waterborne diseases. The new noise and water directives have not been implemented yet in the Netherlands. There were also no recent data available for some traffic indicators (e.g. speeding on other-than-national roads, helmet use of motorcycle occupants).

Inter-country differences in the definition of data can hamper the direct comparison of some indicators. For the housing indicators small differences exist between the definition used in Dutch surveys and the WHO definition. The question about the overall implementation of the indicator was sometimes difficult to answer, because most indicators exist of many data-elements and these have to be combined. Some of the indicators are not ready for immediate implementation because the data have to be requested from the data holder and this could take some time (and will cost money).

The steering committee, which advises about the further development and implementation of the EH information system in the Netherlands, discussed the usefulness of the individual indicators for the Netherlands. Some indicators (e.g. wastewater treatment, drinking water safety) were not considered very useful for Dutch monitoring purposes, since they have been implemented already for almost 100%. The usefulness of indicators such as crowding and household hygiene is also low, as that is only a problem in some areas in large cities. Maximum sound levels and implementation of the noise directive could be deleted from the list to the opinion of the committee.

Ready for immediate implementation in the Netherlands:

*Air_D1, Air_D2, Air_D3, Air_P1, Air_Ex1, Air_E1, Air_A1*
*Noise_Ex1, Noise_E2, Noise_A1, Noise_A2*
*Hous_Ex7*
*Traf_D1, Traf_S1, Traf_S2, Traf_S3 (national roads only), Traf_Ex1, Traf_Ex2 (no helmet use), Traf_E1, Traf_E2, Traf_E3, Traf_E4, Traf_E5*
*WatSan_P1, WatSan_S2, WatSan_Ex1, WatSan_E1*
*Chem_P1, Chem_A1, Chem_A2, Chem_A3*
*Rad_E1, Rad_A1*

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# 1 Introduction

Currently, on local, national and international level, information on environment and health is available from different institutes, organisations, and authorities, and is not integrated and comparable. Monitoring systems are focused on either environment or health and are not linked. This pilot study is part of the process of developing an Environment and Health Information System by the WHO to contribute to the European Community health-monitoring system. Purpose is to serve monitoring public health and environmental policies, support national and multinational analyses, and facilitate effective decision making related to environmental health risks in the Member States. The project was co-sponsored by EC DG SANCO (SPC 2002300).

In the Netherlands, much environment and health information is already available. The National Public Health Compass website is the gateway to information about health and disease, risk factors, care and prevention in the Netherlands. It is meant for professionals who are active in the field of public health, like policy makers at the ministry of health, local authorities, health care providers, patients, and researchers. The National Public Health Atlas gives a geographical illustration of the distribution of public health and care in the Netherlands. The Environmental balance and Nature balance are yearly reports which describe the national development in the state of environment and nature, and evaluate the efficiency of the current policy. The underlying data are available on the internet in the Environmental and Nature Data Compendium. Once every four years an Environmental Outlook and a Nature Outlook are published to describe trends projected for the next 30 years. These data sources should form the basis for any Environmental Health Information system introduced in the Netherlands.

At the moment, the National Institute of Public Health and the Environment (RIVM) is developing a national information and monitoring system "Environment and Health", as part of the national EH action programme. Purpose is to provide information on the current health risks and effects of environmental pollution in the Netherlands, trends in time and space, and effects of EH policy. Elements are for instance a set of indicators, based on the information demands of national and local authorities, a meta-data system, automated registration of complaints (at Municipal Health Authorities (GGDs)), and a website to make the gathered EH information available for all target groups, with links to already existing information sources in the Netherlands.

In this report the results are described of a pilot project testing the overall availability and quality of a set of EH indicators within the framework of an EC-funded projected coordinated by WHO-ECEH. The indicators have been proposed by a group of experts who adapted an already existing set in consideration of the issues and demands within the EU-15. This set was tested in 12 EU-countries by assessing the availability, quality, comparability, and policy-relevance. This report shows the results for the Netherlands.

# 2 Methods

In the Netherlands, Brigit Staatsen was appointed National Focal Point (NFP), but her task was somewhat different from the description of the NFP in the project protocol. She functioned as co-ordinator and adviser of the project. At the beginning of the study, several people were contacted to join a national steering committee, including representatives of the Ministry of Spatial Planning, Housing and the Environment, the Ministry of Health, Welfare, and Sports, the Ministry of Transport, Public Works and Water Management, and Municipal Health Authorities. This steering committee advised about the further development and implementation of the system, with regard to national, regional, and local needs. One person was appointed to collect the metadata and data for the set of indicators. Instead of setting up a working group of experts, the experts were contacted individually by this person to save time.

The WHO provided the participating countries with a questionnaire to collect the meta-data and data for all indicators. The NFP decided that in the short time frame, collecting the meta-data was more important than collecting the data; data were only collected if available on the Internet. The Netherlands participated in a previous Environmental Health Indicators pilot study in 2001, in which information for a different set of indicators was collected. To prevent duplication, the fact sheets from the 'old' set of indicators were used as starting point to identify the data holders for the 'new' set, and some of the metadata and data could be copied (with some adjustment) from the previous study.

Several of the indicators are collected by Statistics Netherlands, and are available from their website, as well as information about study method, population etc. Data on traffic indicators are available from the website of the Transport Research Centre (SWOV). At the National Institute for Public Health and the Environment (RIVM), experts on many topics are present. For every topic a RIVM expert was contacted and interviewed about the related indicators. After that the questionnaires were filled in by the interviewer and finally checked by the expert. External experts were contacted if no RIVM expert was available.

During the project some problems were encountered. The experts had trouble answering the questions about policy-relevance for all data-elements and stated that these answers were rather subjective. The questions about policy-relevance should have been asked only for the overall indicators and not for every data-element separately, because you want to know if the indicator is policy-relevant. Furthermore, the questionnaire did not apply to all data-elements. If the data-element was for example about current policy (e.g. noise policy) it was difficult to assess the quality/comparability. Determining the overall implementation was also difficult, especially when an indicator existed of many data-elements, of which some were available and others not.

When all questionnaires were answered, the steering committee decided which indicators were useful for the Netherlands in relation to local, regional and national policy issues. An important criterion, apart from availability, quality, and policy-relevance, was if the Netherlands had a reporting obligation for the specific indicator to the EU. It was thought to be convenient for all countries to have these indicators in the core set of indicators. The steering committee also suggested additional indicators that they missed in the list of indicators. These will be presented in the conclusion and recommendations.

# 3 Results of the pilot study of the indicators

## 3.1 Air Quality

In the topic area "Air", almost all data of the indicators are available and of good quality. No data are available for $PM_{2.5}$ (Air_P1 and Ex1), because there is only one location that samples $PM_{2.5}$. At the moment, TNO is listing and documenting $PM_{10}$ and $PM_{2.5}$ emissions and that report should include recommendations for $PM_{2.5}$ protocols and estimation methods, so the $PM_{2.5}$ data will probably be available in the near future. The indicators Air_D1-D3 are collected by Statistics Netherlands (CBS) in specific surveys and reported to Eurostat for international comparisons. These indicators are not directly relevant for evaluating EH policy, but are an important driving force. The information on trends provides an important warning signal for policy makers. Data about emissions (Air_P1) from stationary sources are based among others on the emission data in the annual reports of individual companies and also on estimations on the basis of CBS production and energy data. Emissions from mobile sources are calculated by multiplying activity data such as vehicle kilometres and fuel consumption with emission factors. A certain degree of uncertainty exists in the emission figures, because the emissions cannot *exactly* be measured. It is possible that recalculations are performed for previous years if new insights are available, to keep the data comparable. The indicator is relevant for the evaluation of specific measures. The concentration of air pollutants (Air_Ex1) is measured by continuous sampling at numerous locations throughout the country (number depending on pollutant). The number of monitoring stations has been changed in 2002, but this did not affect the comparability over time much. This indicator is used to evaluate measures and assess the air pollution with respect to limits and goals, for example smog levels. The concentration data can also be used to calculate the amount of life lost due to exposure to particulate matter (Air_E1). This indicator is relevant when comparing the cost-effectiveness of different policy options. The Dutch Tobacco Act changed in 2002 and included more drastic measurements than the "old" law, for example a smoking ban in cinemas and hospitals. No smoking ban in restaurants and bars.

***Template of Summary Table for Each Section: Evaluation of Indicators on Air Quality***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Air_D1 | 2 | 2 | 2 | 2 | 1 |
| Air_D2 | 2 | 2 | 2 | 2 | 1 |
| Air_D3 | 2 | 2 | 2 | 2 | 1 |
| Air_P1 | 2 | 2 | 2 | 2 | 1 |
| Air_Ex1 | 2 | 2 | 2 | 2 | 1 |
| Air_E1 | 2 | 2 | 2 | 1 | 1 (PM10) |
| Air_A1 | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.2 Noise

The exposure of the population to certain levels of noise (Noise_Ex1) is calculated by combining data about noise emission with traffic intensity (road, rail and air transport (not industry). These model calculations result in regional/national noise maps and can be linked to population figures for an estimation of the exposed population. Some uncertainties exist, for instance not much data are available about traffic intensity on municipal roads and this has to be estimated. Currently, it is difficult to make international comparisons, but this will be better when international EC-guidelines are followed. The data for calculation of the attributable fraction of risk of cardiovascular morbidity to noise exposure (Noise_E1) are more difficult to collect, because in the Netherlands data on incidence and prevalence of cardiovascular diseases are coming form different registries. The national incidence and prevalence of ischemic heart disease is calculated/estimated by the RIVM, but this is not done for total cardiovascular disease or high blood pressure. These estimations can be made though. Noise-related disease burden calculations (expressed in DALYs) have been carried out by RIVM. The indicator would be relevant for evaluating the health benefit and cost-effectiveness of noise abatement measures. In the Netherlands, two sources are available concerning annoyance by noise (Noise_E2). Unfortunately, the data of these sources cannot easily be compared because of a difference in the question(s) asked. The TNO-data are more according to the definitions of the WHO-methodology sheet, but are collected only once every five years. The CBS data differ form the WHO-definition, but are provided yearly. The relevance of this indicator depends on policy aims and is for example highly relevant for evaluation of measures e.g. around Schiphol Airport. Maximum sound levels for indoor and outdoor events (Noise_A1) are included in the Environmental Protection Act. No regulations exist for walkmans/computer games yet. Most municipalities have noise action plans (Noise_A2) and in the future a NAP will be required. The EU Noise Directive (Noise_A3) is not implemented in national laws yet, but will be in the future. Nevertheless, this indicator is not regarded very useful for the Netherlands.

***Template of Summary Table for Each Section: Evaluation of Indicators on Noise***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Noise_Ex1 | 2 | 1 | 2 | 2 | 1 |
| Noise_E1 | 2 | 2 | 1 | 1 | 2 |
| Noise_E2 | 2 | 2 | 2 | 2 | 1 |
| Noise_A1 | 2 | 1 | 0 | 0 | 1 |
| Noise_A2 | 1 | 1 | 2 | 1 | 1 |
| Noise_A3 | 0 | N/A | N/A | 1 | 4 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.3 Housing and Settlements

Several housing indicators are available from a 5-yearly survey carried out by the Ministry of Spatial Planning, Housing and the Environment (VROM), although some differences in definitions exist with the WHO fact sheets. In the Qualitative Housing Registration (KWR) from VROM, reliable data are collected via inspections of 15.000 dwellings (in 2000) by an inspector, and by telephone surveys of residents of inspected homes. Every time a basic questionnaire is used, with supplementary questions about policy-relevant issues. The data are comparable over time, but because of the method used international comparison may be difficult. An official request should be submitted to VROM to acquire the data, so they will probably be available end 2004. The inspections focus on several aspects, such as the dwelling floor area and number of rooms (Hous_Ex1), the presence of dampness or mould in the home (Hous_Ex4), the cost of construction (Hous_P1), and the presence of high thresholds/steps and narrow door openings (Hous_Ex2). Overall accessibility is not defined as described by the WHO, but as internal accessibility (all important rooms on the same floor) and external accessibility (no need to climb stairs to enter the dwelling). Household hygiene (Hous_Ex5) is checked in the KWR resident questionnaire, in which is asked for the number of toilets, baths etc. in the home. Crowding and household hygiene are not considered as a very high priority in  Dutch politics. These indicators are only relevant for monitoring in problem areas in large cities. Extremes of outdoor temperature are measured by the KNMI (Hous_Ex3), not normally in periods of 2 days, but that could be calculated and linked to hospital admissions that are registered nationally in the National Patient Register. Radon is measured in dwellings (Hous_Ex6) on an ad hoc basis approximately once every 10 years (last study in 1994); concentrations of later years have been estimated. The next study will be in 2005, and will certainly be continued in the future to monitor trends in indoor radon concentration. At the moment, policy-makers are preparing new legislation on radon emission limits for building materials. Crime and perception of crime (Hous_Ex7) is measured in a yearly survey by Statistics Netherlands (~5000 respondents) and a 2-yearly survey called the Police Monitor (~90.000 respondents), in which respondents are asked about safety in and around the house. This indicator is very useful for evaluation of prevention measures and functioning of the police. Housing accidents (Hous_E1) are monitored by the Injury Surveillance System, in which information on patients that are treated at the ER of a hospital are registered. The data are not complete (not all hospitals included) and are therefore heightened on the basis of other national registers. The collection of information on housing accidents is used to support policies of the ministry of Health, Welfare and Sports (VWS) to improve safety in private settings, for example by prevention campaigns.

*Template of Summary Table for Each Section: Evaluation of Indicators on Housing and Settlements*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Affordability | 1-2 | 2 | 2 | 2 | 2 |
| Crowding | 2 | 2 | 2 | 1 | 2 |
| Accessibility | 1-2 | 2 | 2 | 2 | 2 |
| Dampness/Mould Growth | 2 | 2 | 2 | 2 | 2 |
| Household hy-giene | 2 | 2 | 2 | 0 | 2 |
| Indoor radon in dwellings | 0-1 | 2 | 2 | 2 | 3 |
| Extreme tem-perature | 1 | 2 | 2 | 1 | 2 |
| Housing safety and accidents | 2 | 2 | 2 | 2 | 1-2 |
| Crime/Perception of crime | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.4 Traffic Accidents

In the Netherlands, almost all traffic indicators are available and of good quality, very policy-relevant and ready for immediate implementation. For a long time now, the road safety policy has used quantitative targets. The targets in the National Traffic and Transport Plan (NTTP) are: in 2010 30% less road deaths and 25% less in-patients than in 1998. The Institute for Road Safety (SWOV) reports traffic indicators on the Internet in a “Knowledge Base”. Road accident rate (Traf_S2), injury rate (Traf_E3), mortality rate (Traf_E1), and deaths due to drinking driving (Traf_E5) are registered by the police, who send the information to the Transport Research Centre (TRC). The registration by the police is by no means always complete; the greater the injury severity, the completer the registration. The “real” number of victims has been estimated through a cross-check with hospital records from the National Patient Register, the Injury Surveillance System, and death statistics, and is reported on the SWOV-page as well. Data about number of (circulating) vehicles and new car sales (Traf_S1) are available from Statistics Netherlands (CBS) and based on national vehicle registration. Speed limit exceedances (Traf_S3) on national roads are measured by a national system from TRC that measures both the speed of passing vehicles and the traffic volume (at circa 100 locations) per vehicle type; data about speeding on 80-100km and municipal roads only exist from surveys in 1994-96. CBS carries out the yearly National Travel Survey with the purpose to describe the travelling behaviour of the Dutch population (Traf_Ex1). For each trip, several elements are registered in a diary such as place of origin and destination, time of departure and arrival, and mode of transport. Many mistakes can be made when filling in a diary, but the data are corrected for this. The design changed in 1999 and data of previous years will not be comparable. Observations of whether car occupants are wearing seatbelts and/or using child seats (Traf_Ex2) are made in a random sample of moving traffic on 48 observation locations. Data about helmet use by motorcycle occupants are only available for 1985 and not for recent years. The potential years of life lost due to traffic accidents (Traf_E2) are calculated by multiplying the number of traffic-related deaths per year with the remaining life expectancy at the specific age. Figures are reported 4-yearly in the Dutch Public Health Status and Forecasts Report, the latest available data are for 2000. DALY’s (Traf_4) are also calculated for this report, although much discussion exists about the quality of the disability data and the expert stated that the calculated DALY’s are likely to be an underestimation of the real number.

***Template of Summary Table for Each Section: Evaluation of Indicators on Traffic Accidents***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Traf_D1 (Air_D1) | 2 | 2 | 2 | 2 | 1 |
| Traf_S1 | 2 | 2 | 2 | 2 | 1 |
| Traf_S2 | 2 | 2 | 2 | 2 | 1 |
| Traf_S3 | 1 | 2 | 2 | 2 | 1 (national roads) -4 |
| Traf_Ex1 | 2 | 2 | 1 | 2 | 1 |
| Traf_Ex2 | 1 | 1 | 1 | 2 | 1 – 4 (helmet) |
| Traf_E1 | 2 | 2 | 2 | 2 | 1 |
| Traf_E2 | 2 | 2 | 2 | 2 | 1 |
| Traf_E3 | 2 | 1 | 2 | 2 | 1 |
| Traf_E4 | 2 | 1 | 2 | 2 | 1 |
| Traf_E5 | 2 | 1 | 2 | 2 | 1 |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.5 Water and Sanitation

Complete and reliable information is available for drinking water and recreational water. The district water boards (Waterschappen) perform measurements of recreational water (WatSan_S1) once every two weeks during bathing season (May-October) by a standard protocol, although differences may occur through differences in laboratories. If a site is polluted the province will take measures and if necessary put out a swimming ban. At the end of the season the RIZA tests the results with the European standards for bathing water and reports to the European Commission. Measurement of drinking water (WatSan_S2) is performed by the water supply companies and reported to RIVM. In 2001, the law involving drinking water changed and this resulted in minor changes in method and system, but the overall data are still comparable. The expert states that the overall data do not say much about which standard is exceeded, a better indicator would be the compliance per substance analyzed. The indicators "waste water treatment" (WatSan_P1) and "drinking water supply" (WatSan_Ex1) are not very useful for Dutch monitoring purposes, since they have been implemented already for almost 100%. Data on outbreaks of waterborne diseases (WatSan_E1) are only available from questionnaires which are sent every year to all Municipal Health Authorities (GGDs) and Provinces to make an inventory of the number of outbreaks of diseases probably related to recreation in surface waters. The results are not very reliable, because most of the time the water is not checked on micro-organisms in a laboratory. Furthermore, not all incidents are reported to the authorities (for instance mild cases) and not all water-related cases will be connected to water (food is often thought to be the cause), therefore the real number of incidents will be higher. This indicator does not have a high priority in Dutch politics and the question remains if better studies will be conducted in the future. The new guidelines on bathing water management (WatSan_A1) and water safety plans (WatSan_A2) are currently being implemented in Dutch regulation. The guidelines on water safety plans are regarded not very useful for the Netherlands, because the water quality is already very high and most parts of the guidelines are already in force in the Netherlands (but named differently).

***Template of Summary Table for Each Section: Evaluation of Indicators on Water and Sanitation***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| WatSan_P1 | 1 | 2 | 2 | 0 | 1 |
| WatSan_S1 | 2 | 2 | 2 | 2 | 2 |
| WatSan_S2 | 2 | 2 | 2 | 2 | 1 |
| WatSan_Ex1 | 2 | 2 | 2 | 0 | 1 |
| WatSan_E1 | 2 | 0 | 2 | 0 | 1 |
| WatSan_A1 | 0 | N/A | N/A | 1 | ? |
| WatSan_A2 | 0 | N/A | N/A | 0 | ? |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.6 Chemical Emergencies

In the Netherlands, the SEVESO directive has been implemented in the Prevention of Major Accidents Decree (BRZO). Every year a list is composed in which all establishments are listed that contain large amounts of chemicals according to the SEVESO II directive (Chem_P1). Also listed is the mean amount of substances present and the maximum amount that is permitted. The expert stated that it is the best list possible, although some establishments will be missed. In the past years, some large incidents happened in the Netherlands (for instance the firework disaster in Enschede 2000), which flared up the discussion about legislation. An “Action plan” will be started this year to strengthen the implementation and enforcement of external safety measures by authorities. Furthermore, new laws will be implemented to minimize the risks to the population. According to the BRZO, upper tier establishments have to demonstrate that they have taken sufficient measures to minimize risks by making a “Safety Report”, which includes a QRA (Quantitative Risk Analysis) in which the risks are calculated with respect to houses/schools etc. in the neighbourhood. Notifications of chemical incidents in fixed facilities to EU are required according to SEVESO II and carried out. The Labour Inspectorate reports incidents to the Ministry of Social Affairs and Employment, that reports it to EU. Also available is a risk register which includes the risk evaluation of establishments, transport routes and pipelines. BOTmi is a National Advisory Body with a policy supporting team on environmental incidents. They are on call 24hr a day in case of incidents. The establishments need to have a Health/Environmental Plan in case of an incident, but there are also EH plans available at Municipal, Provincial and Governmental level. ER Guidelines are included in the "intervention levels dangerous substances". In this booklet consequences and measures are described that should be taken if a certain level of a substance is exceeded. A public alerting system is available and promoted on TV and radio. When the siren is heard, all citizens are advised to go inside, close doors and windows and turn on radio or TV. The siren is tested every month.

***Template of Summary Table for Each Section: Evaluation of Indicators on Chemical Emergencies***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Chem_P1 | 2 | 2 | 2 | 2 | 1 |
| Chem_A1 | 2 | 2 | 2 | 2 | 1 |
| Chem_A2 | 2 | 2 | 2 | 2 | 1 |
| Chem_A3 | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.7 Radiation

The Netherlands Cancer Registry collects high quality data on almost all types of cancer in the Netherlands. Basal cell carcinomas are usually treated outside the hospital, and are therefore excluded from the national registry, but on the basis of complete regional data from South-East Netherlands combined with national data about other skin cancers, estimations are made of national basal cell carcinoma incidence. RIVM, RIZA, RIKZ and Inspectorate for Health Protection and Veterinary Public Health carry out sensitive determinations of radioactivity in airborne particles, air, recreational water, drinking water, and food, and this is reported every year to the Government. This is only done for monitoring purposes; in case of an incident action will be taken. The food measurements are not in conformity with the EU standards; a standard food package is not useful for the Netherlands because a lot of import food is eaten. Some food is incidentally checked (for example mushrooms from Russia). The Netherlands have no dense or sparse network, because it is such a small country and therefore seen as one region.

***Template of Summary Table for Each Section: Evaluation of Indicators on Radiation***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Rad_E1 | 2 | 2 | 2 | 1 | 1 |
| Rad_A1 | 2 | 2 | 2 | 0 | 1 |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# 4 Conclusions and Recommendations

In the Netherlands, reliable and complete information is available for almost all indicators. Some of the indicators are not ready for immediate implementation, because the data have to be requested from the data holders. But this will hopefully not take much time (end 2004). The “worst” indicators in terms of readiness are the housing indicators, especially because they are more complex than indicators on other topics. One single housing indicator consists of many data-elements, and therefore the overall readiness is difficult to estimate. Some of the indicators are rather experimental and not generally used as housing indicator in the Netherlands, and as a result small differences in definition exist between the WHO fact sheets and the questions asked in the national surveys. This could be a problem when international comparisons are made.

The data downloaded from the websites of Statistics Netherlands and the Institute for Road Safety Research are available for free (source should be mentioned), as well as some data from the Institute of Public Health and the Environment (RIVM), such as air pollutant emissions and noise exposure. Several other data-elements available from RIVM will cost money, because the data are normally not calculated and extra work is involved. Data of (for instance) housing have to be officially requested from the data holders; the precise costs could not be estimated at this moment.

The steering committee determined that some of the indicators would not be very useful in a nation-wide monitoring system, because the quality of these facilities is already very high in the Netherlands. The indicators that should certainly be included in the set of indicators are the indicators that are already reported to the EU. Most Member States should not have any problems collecting these. Indicators that are not useful for the Netherlands may still be useful for other countries with lower standards. Therefore it is proposed to distinguish a core set and an extended set of indicators: the core set being compulsory for all member states to collect, the extended set should be seen as a guideline for additional monitoring if important for the specific country. Proposed for inclusion in an <u>extended</u> set and important for the Netherlands: *Air_E1* (expected Life lost to PM2.5), *Noise_E1* (attributable fraction of morbidity to noise), *Hous_Ex1* (crowding), *Hous_Ex2* (accessibility), *WatSan_E1* (outbreaks of waterborne diseases), *WatSan_A1* (bathing water management), *WatSan_A2* (water safety plan), and, not important for the Netherlands, but possibly important for other countries: *Hous_Ex5* (Household hygiene), *WatSanP1* (Waste water treatment), *WatSan_Ex1* (Safe drinking water). Not useful at all: *Noise_A1* (maximum sound levels), *Noise_A3* (Noise Directive). The other indicators should be included in the core set of indicators.

The steering committee also made suggestions for additional indicators that could be useful for the Netherlands. In the topic *Air* they suggested: more effect indicators (e.g. asthma due to air pollution), concern about air pollution, population exposed to levels of a pollutant above the maximum permitted risk (MTR), odour annoyance. In the topic area *Housing*: well-being (satisfaction living environment), CO exposure in homes (this may be important in the future because of lack of maintenance of heating devices), energy consumption of households. In the area *Water and Sanitation*: number of risky overflow (risk that sewage water spills in recreational water), number of stops in collection of drinking water from rivers. In the topic *Radiation*: exposure to electromagnetic fields, UV exposure, incidence/prevalence of leukaemia, brain tumours etc. related to radiation. Data on all these suggested indicators are being collected in the Netherlands.

The data holders and experts were enthusiastic about the ECOEHIS project. Also authorities were pleased because the data holders for every topic had been identified and the currently scattered data would become available as an integrated system and accessible for everyone. Some of the experts stated that they had already been contacted several times in the past (for example for the previous pilot project), or that the data were already included in a European database. It is important to identify and link with other national or international initiatives (e.g. the Environment and Health Information System the RIVM is developing) which overlap with the WHO-project. In the Netherlands, the Municipal Health Authorities in collaboration with RIVM are developing an uniform health questionnaire for all regions (at the moment they all have their own questionnaire) which will also include valuable information for indicators in this project. It will be important to keep up with new initiatives and update the ECOEHIS information system when better information becomes available.

# 5 Abbreviations

| Acronyms such as institute names in your country | Full name |
|---|---|
| RIVM | Rijksinstituur voor Volksgezondheid en Milieu |
| CBS | Statistics Netherlands |
| VROM | Ministry of Spatial Planning, Housing and the Environment (VROM) |

EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH
BONN OFFICE

# Annex 11-7

# Portugal Report on Pilot Study

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**
Between the European Commission, DG Sanco
and the World Health Organization, Regional Office for Europe

# Development of EH Indicators for EU Countries (ECOEHIS)

## WHO project co-sponsored by EC DG SANCO (SPC 2002300)

# Pilot Study on the Environmental Health Indicators

## Reports from Portugal

**September, 2004**

This study was developed in Portugal by the Ministry of Health – General Direction of Health.

It was relevant for Portugal to participate in this project.

I manifest my regard and interest by the work developed by Professor João Levy.

Lisboa, 23 September 2004

The Director-General of Health

Professor Doutor José Pereira Miguel

# Report from Portugal Development of EH Indicators for EU Countries (ECOEHIS)

# Pilot Study on the Environmental Health Indicators - Housing

### WHO project co-sponsored by EC DG SANCO (SPC 2002300)

**September, 2004**


**Reporting Institute:**

**Name: Direcção-Geral da Saúde**

**Address: Alameda D. Afonso Henriques, 45**

**1049-005 Lisboa**

**National Focal Point:**

**Name and title: Jorge Mota Prego**

**Telephone: 00351 218 430 500**

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# Summary

Almost all the housing indicators proposed by WHO can be implemented in Portugal at the present time, thought some data depend on other institutions to be collected, or have different classification.

Indicators that are ready to be implemented in Portugal:

- HOUS_P1 - Affordability to buy dwelling
- HOUS_Ex1 - Crowding
- HOUS_Ex3 - Extremes of indoor air temperature
- HOUS_Ex5 - Household hygiene
- HOUS_Ex7 - Crime and the perception of crime
- HOUS_E1 - Housing safety and accidents

Indicators which data depends on other institutions or have different classification:

- HOUS_Ex2 - Accessibility
- HOUS_Ex6 - Indoor radon in dwellings

Indicators very difficult to have data:

- HOUS_Ex4 - Dampness and mould growth

# 1 Introduction

The housing is one of the main priorities of National Health and Environment Program, part of the National Health Plan – 2004/2010, so it's important to develop this indicators in Portugal.

# 2 Methods

In Portugal, the data was collected by the Ministry of Health – General Health Direction, and the National Laboratory of Civil Engineering..

The data was collect directly in files of the Health Ministry or in other departments of the administration during two months, from May to July.

Next we tried to define the different criteria of relevance according to the health priorities.

The comparability is measured by the way the data was collected, if the methods used permit or not the comparison.

The data quality is evaluated according to the identity of the institution that possessed it.

# 3 Results of the pilot study of the indicators

The team assessed the Housing Indicators:

- HOUS_P1 - Affordability to buy dwelling
- HOUS_Ex1 - Crowding
- HOUS_Ex2 - Accessibility
- HOUS_Ex3 - Extreme of indoor air temperature
- HOUS_Ex4 - Dampness and mould growth
- HOUS_Ex5 - Household hygiene
- HOUS_Ex6 - Indoor radon in dwellings
- HOUS_Ex7 - Crime and the perception of crime
- HOUS_E1 - Housing safety and accidents

**HOUS_P1 - Affordability to buy dwelling**

The necessary data for calculating this indicator already exists in Portugal and is immediately available.

The quality of the data is good, and there has been no alteration of our data collection methods and, as such, the comparability is good.

This indicator is considered as being relevant for the definition of new environmental policies.

- **HOUS_Ex1 - Crowding**

The necessary data for calculating this indicator already exists in Portugal and is immediately available.

The quality of the data is good, and there has been no alteration of our data collection methods and, as such, the comparability is good.

This indicator is considered as being relevant for the definition of new environmental policies.

- **HOUS_Ex2 - Accessibility**

Some of the data necessary for calculating this indicator its not available yet.

Some of the data have different classification, and some can be obtained if requested, but is not immediately available.

This indicator is considered as being extremely relevant for the definition of new environmental policies.

- **HOUS_Ex3 - Extreme of indoor air temperature**

The necessary data for calculating this indicator already exists in Portugal and is immediately available.

The quality of the data is good, but there have been an alteration of the data collection methods in the Hospital admission cases, as such, the comparability is difficult.

This indicator is considered as being extremely relevant for the definition of new environmental policies.

- **HOUS_Ex4 - Dampness and mould growth**

The necessary data for calculating this indicator is not available in Portugal.

We still don't know if it will be possible to collect the data to implement this indicator in Portugal.

This indicator is considered as being relevant for the definition of new environmental policies, but it's very difficult to collect the data needed.

- **HOUS_Ex5 - Household hygiene**

The necessary data for calculating this indicator already exists in Portugal and is immediately available.

The quality of the data is good, and there has been no alteration of our data collection methods and, as such, the comparability is good.

This indicator is considered as being extremely relevant for the definition of new environmental policies.

- **HOUS_Ex6 - Indoor radon in dwellings**

The necessary data for calculating this indicator exists only in few regions in Portugal.

It would be necessary to make some more surveys to have the data needed.

This indicator is considered as being not much relevant for the definition of new environmental policies.

- **HOUS_Ex7 - <u>Crime and the perception of crime</u>**

The necessary data for calculating this indicator already exists in Portugal and is immediately available. The quality of the data is good, and there has been no alteration of our data collection methods and, as such, the comparability is good.
This indicator is considered as being relevant for the definition of new environmental policies.

- **HOUS_E1 - <u>Housing safety and accidents</u>**

The necessary data for calculating this indicator already exists in Portugal and is immediately available. The quality of the data is good, but there have been an alteration of the data collection methods in the Hospital admission cases of burns, physical injuries and poisonings, as such, the comparability is difficult.
This indicator is considered as being extremely relevant for the definition of new environmental policies.

***Template of Summary Table for Each Section: Evaluation of Indicators on Housing***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policies-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| HOUS_P1 | 1. Fair | 1. Fair | 1. Fair | 2. Good | 2. By the end of 2004 |
| HOUS_Ex1 | 2. Good | 1. Fair | 2. Good | 2. Good | 2. By the end of 2004 |
| HOUS_Ex2 | 2. Good | 2. Good | 1. Fair | 1. Fair | 2. By the end of 2004 |
| HOUS_Ex3 | 2. Good | 2. Good | 2. Good | 2. Good | 4. After 2006 |
| HOUS_Ex4 | 0. Poor | 0. Poor | 0. Poor | 0. Poor | 4. After 2006 |
| HOUS_Ex5 | 2. Good | 2. Good | 2. Good | 2. Good | 2. By the end of 2004 |
| HOUS_Ex6 | 0. Poor | 2. Good | | | 4. After 2006 |
| HOUS_Ex7 | 2. Good | 2. Good | 2. Good | 2. Good | 2. By the end of 2004 |
| HOUS_E1 | 2. Good | 1. Fair | 2. Good | 2. Good | 4. After 2006 |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# 4 Conclusions

In Portugal, almost all of the housing indicators can be calculated by the end of 2004: P1, Ex1, Ex2, Ex5, Ex7. The remaining indicators will only be able to be calculated after 2006: Ex3, Ex4, Ex6, E1.

During the work we felt that the feasibility of some indicators is very difficult, or impossible, on account of the difficulty of collecting data, namely dampness and mould growth and indoor radon in dwellings.

On the other hand, we also found that the data are classified in different way about such item as the accessibility.

# 5 Abbreviations

| Acronyms such as institute names in your country | Full name |
|---|---|
| DGS | Direcção-Geral da Saúde |
| LNEC | Laboratório Nacional de Engenharia Civil |
| INE | Instituto Nacional de Estatística |
| SNRIPD | Secretariado Nacional para a Reabilitação e Integração das Pessoas com Deficiência |
| IM | Instituto de Meteorologia |
| ITN | Instituto Tecnológico e Nuclear |
| GPLP – MJ | Gabinete de Política Legislativa e Planeamento do Ministério da Justiça |
| ICVS | International Crime Victim Surveys |
| SNBPC | Serviço Nacional de Bombeiros e Protecção Civil |

## Report from Portugal Development of EH Indicators for EU Countries (ECOEHIS)

# Pilot Study on the Environmental Health Indicators – Noise, Water and Sanitation

### WHO project co-sponsored by EC DG SANCO (SPC 2002300)

**September, 2004**

**Reporting Institute:**

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**1049-001 Lisboa**

**National Focal Point:**

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**Eng. Ana Pinela**

**Telephone: 00351 218 418 301**

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# Summary

The noise indicators proposed by Who can not be implemented in Portugal at the present time, due to the fact that the data collection exists for Lden is not yet concluded. The first noise maps which are being carried out with their base in measurements of Lden should be finalised in 2004/2005. These noise maps which are being executed do not include industrial or neighbourhood noise data collection.

In connection with Water and Sanitation indicators, the big majority in Portugal can be calculated immediately. Only the Effect indicators cannot be calculated due to the fact that no data is available, namely, E1, E2 and E3.

The indicators that are ready to be implemented in Portugal are the following:

P1 - Waste water treatment (urban)
S1 – Recreational water compliance
S2 – Drinking water compliance – microbiological parameters
S3 - Drinking water compliance – chemical parameters
Ex1 – Unsafe drinking water
A1 – Management of bathing waters
A2 – Water safety plans

# 6 Introduction

The existence of a range of health and environmental indicators, common to various European Community countries, is of major importance, because it will allow the comparison of the national situation with that of other countries.

This comparison will allow the evaluation of the performance of the measures which are being taken within the country, and facilitate the possible correction of those which prove to be less effective.

Some of the indicators studied cannot, at the present moment, be used because the necessary data have either not been collected or have not been organised. Its existence as an indicator will lead, however, to its reorganisation so as to be usable within a short time.

# 7 Methods

In Portugal, the data was collected by a university which does not belong to any of the official organisations which hold the information. This situation made the collection process more time consuming due to the fact that it was necessary to make enquiries at diverse institutions to ascertain where the information was being kept. Nevertheless, if the fact that they did not belong to the organisation demanded a more lengthy process of research, on the other hand, once the organisation was known, the collection was easier because it was not necessary to follow all the institutional steps normally necessary.

The collection of the information and its treatment was carried out by university scholarship students from the team of temporary consultant, João de Quinhones Levy, and its duration was for approximately two months. In relation to expenses, this exceeded the amount financed by the ECOEHIS project by more than twofold.

# 8 Results of the pilot study of the indicators

The team assessed the Noise, Water and Sanitation Indicators.

## 8.1 Noise

According to measurements of Lden, there is no data about the exposure of people to noise, as such the indicators which have as a basis, for their calculation, this data, cannot be calculated. The indicators which cannot be calculated because we do not have the information relative to Lden are: Ex1, E1 and E2.

<u>**Noise**</u>**:**

**Ex1 - Population exposed to various noise levels ranges per source.**
The data necessary to calculate this indicator will be available in a short period of time. In the last five years, this information has not been used to change the policies, plans or monitoring of the environmental component of the country. Part of the information, contained in the noise maps which are being carried out, will only be available at the end of 2005. The remaining information, industrial and neighbourhood noise, will only be available after 2006. This indicator is considered as being relevant for the definition of new environmental policies.

**E1 - Cardiovascular morbidity and mortality attributable to environmental.**
The data relevant to the number of people exposed to Lden levels which are superior to 65 dB(A), are still not available, the first noise maps of Lden are being carried out. The information contained in the noise maps which are now being carried out, will only be available at the end of 2005. In the last five years, this information has not been used to change the policies, plans or monitoring of the environmental component of the country.

No figures exist for the number of cardiovascular illnesses caused by exposure to noise, only general data about the number of cardiovascular patients in Portugal. It is possible to calculate the indicator by using the figures of LAeq in Portugal and having as a basis the relative risk of RR=1.2 for ischemic heart diseases when the sound levels exceed 65 dB(A), calculated in Germany. However, to be calculated correctly it will be necessary to wait until figures exist of Lden.

**E2 - Self reported noise health effects – Annoyance and sleep disturbance.**
The data necessary for calculating this indicator its not available yet. In the last five years, this information has not been used to change the policies, plans or monitoring of the environmental component of the country. Data does not exist concerning the percentage of people who suffer from disturbances during sleep and, probably, they will only exist after 2006. Part of the information, contained in the noise maps which are being carried out, will only be available at the end of 2005. The remaining information, industrial and neighbourhood noise, will only be available after 2006. This indicator is considered as being relevant for the definition of new environmental policies.

**A1 - Existing national legislation regulations on maximum sound levels outdoor and indoor leisure events.**

The legislation concerning the open air events, fairs markets and similar events, building regulations for acoustical insulation of discotheques, bars and other similar settlements, regulation for music concerts and definition of the local authorities required to deal with noise complains is already available. The legislation in Portugal for sound levels inside discotheques, bars or other similar establishments, nor for musical equipment and devices, does not exist yet. The specific legislation for these areas should be created after 2006. In the last five years, this legislation has been used to change the policies, plans and monitoring of the environmental component of the country.

**A2 - Existence and effectiveness of Urban, National or Action plans for noise.**

In Portugal exists a General Noise Regulation which cover the entire Portuguese population, but it still was to be implemented. In the last five years, this information has been used to change the policies, plans and monitoring of the environmental component of the country. This indicator is considered as being relevant in the policies and will be ready to be implemented at the end of 2005.

**A3 - Enforcement and implementation of the environmental noise European directive**

The necessary data to proceed with the calculation of this indicator already exists. However, only for approximately 10% of the Portuguese population. At the present moment it is not very easy to consult the existing noise maps, nevertheless, it is foreseen that by the end of 2005 consultation will be made much easier due to the fact that it will be possible to find the information gathered in the same Institute. In the last five years, the information contained in this indicator has not been used to change the policies, plans and monitoring of the environmental component of the country.

***Template of Summary Table for Each Section: Evaluation of Indicators on Noise***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policies-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Noise_Ex1 | 0. Poor | N/A | N/A | 2. Good | 3. By the end of 2005 |
| Noise_E1 | 1. Fair | 1. Fair | 1. Fair | 2. Good | 3. By the end of 2005 |
| Noise_E2 | 0. Poor | N/A | N/A | 2. Good | 4. After 2006 |
| Noise_A1 | 1. Fair | 2. Good | 2. Good | 2. Good | 3. By the end of 2005 |
| Noise_A2 | 1. Fair | 2. Good | 2. Good | 2. Good | 3. By the end of 2005 |
| Noise_A3 | 1. Fair | 1. Fair | 2. Good | 2. Good | 2. By the end of 2004 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 8.2 Water and Sanitation

For the indicator A2 (water safety plans), according to the Portuguese legislation, the collective systems of water supply for consumption are subjected to periodical analytical control. For that, if the indicator A2 is the number of controlled systems, its value is always similar to the Ex1 indicator (Unsafe Drinking Water).

**Water and Sanitation:**

**P1 - Waste water treatment (urban).**
The necessary data for calculating this indicator already exists in Portugal. It is immediately available and the quality of the data is good. There has been no alteration of our data collection methods and, as such, the comparability is good. In the last five years, the information has been used to change policies, plans or monitoring of the environmental component of the country. This indicator is considered as being extremely relevant for the definition of new environmental policies.

**S1 – Recreational water compliance.**
The necessary data for calculating this indicator already exists in Portugal and is immediately available. However, the result of the indicator must be presented in two parts, inland bathing areas and costal bathing areas, due to the fact that this data only exists separated. The quality of the data is good, and there has been no alteration of our data collection methods and, as such, the comparability is good. In the last five years, the information has been used to change policies, plans or monitoring of the environmental component of the country. This indicator is considered as being extremely relevant for the definition of new environmental policies.

**S2 – Drinking water compliance – microbiological and chemical parameters.**
The necessary data for calculating this indicator already exists in Portugal, but with some restrictions. For microbiological parameters, the availability is immediate. However, the result of the indicator has to be presented separately for each of the parameters. Concerning the chemical parameters, these will only be available at the end of 2005, because the Decree-Law no. 243/2001, which transforms Directive no. 98/83/EC into national law, became effective at the end of 2003 and there are no available analyses as yet for public consultation.

The quality of the data is good, and there has been no alteration of the data collection methods and, as such, the comparability is good. In the last five years, the information has been used to change policies, plans or monitoring of the environmental component of the country. This indicator is considered as being extremely relevant for the definition of new environmental policies.

**Ex1 – Unsafe drinking water**

This indicator can be implemented immediately in Portugal since the necessary information is already available, even though it is only in relation to last year. However, we will shortly be able to access more information. The quality of the data is good, and there has been no alteration of the data collection methods and, as such, the comparability is good. In the last five years, the information has been used to change policies, plans or monitoring of the environmental component of the country. This indicator is considered as being extremely relevant for the definition of new environmental policies.

**E1 – Outbreaks of water-borne diseases; E2 – Incidence of water-related illness; E3 – Diarrhoeal disease in children**

The necessary data for calculating these indicators are not available in Portugal. These indicators can only be implemented in Portugal after 2006. This indicator is considered as being extremely relevant for the definition of new environmental policies.

**A1 – Management of bathing waters**

This indicator can be calculated in Portugal immediately, for the whole country. The quality of the data is good, and there has been no alteration of our data collection methods and, as such, the comparability is good. In the last five years, the information has been used to change policies, plans or monitoring of the environmental component of the country. Although this indicator is considered as being good for the definition of new environmental policies in Portugal, as a bathing area it is the beaches which are monitored by the competent authorities, the result of this indicator will always be 100%.

**A2 – Water safety plans**

This indicator can be put into action immediately in Portugal but there is only data from last year. The collective systems of water supply of consumption, according with the Portuguese legislation, are subjected to a periodic analytical control. For that if the indicator is the number of controlled systems, its value is always similar of the Unsafe Drinking Water indicator. The quality of the data is good, and there has been no alteration of our data collection methods and, as such, the comparability is good. In the last five years, the information has been used to change policies, plans or monitoring of the environmental component of the country. Although this indicator is considered to be extremely relevant for the definition of new environmental policies, perhaps it should be checked considering the existence of the indicator Unsafe Drinking Water which will have the same value.

*Template of Summary Table for Each Section: Evaluation of Indicators on Water and Sanitation*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policies-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| WatSan_P1 | 2. Good | 2. Good | 2. Good | 2. Good | 1. Immediately |
| WatSan_S1 | 2. Good | 2. Good | 2. Good | 2. Good | 1. Immediately |
| WatSan_S2 | 2. Good | 2. Good | 2. Good | 2. Good | 1. Immediately |
| WatSan_Ex1 | 2. Good | 2. Good | 2. Good | 2. Good | 1. Immediately |
| WatSan_E1 | 0. Poor | N/A | N/A | 2. Good | 4. After 2006 |
| WatSan_A1 | 2. Good | 2. Good | 2. Good | 2. Good | 1. Immediately |
| WatSan_A2 | 2. Good | 2. Good | 2. Good | 2. Good | 1. Immediately |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# 9 Conclusions

In Portugal, almost all of the noise indicators can be calculated by the end of 2005, due to the fact that measurements of Lden still do not exist. The noise measurements in Portugal are of LAeq, which do not allow the calculations of the indicators proposed. The only indicator which could be put into action at the end of the present year is the A3, the remaining indicators can only be calculated at the end of 2005 (Ex1, E1, A1 and A2). The E2 indicator will only be able to be calculated after 2006.

The noise maps which are being carried out already contemplate Lden so that it is foreseen that by the end of 2005 figures will exist which will allow the indicators: Ex1, E1 and E2 to be calculated.

Concerning the water and sanitation indicators, the indicators, P1, S1, S2, Ex1, A1 and A2, can be calculated immediately. There exists only one indicator which can only be implemented after 2006, E1, due to the fact that there is no data concerning illnesses provoked by unsafe drinking water.

The questionnaire supplied is considered, as far as the questions in relation to the evaluation of the existing data and its quality are concerned, untailored to the action indicators. The final classification obtained by averages is not suitable for putting into action each indicator due to the fact that if one of the data for calculating an indicator is only available at a certain period of time, this indicator cannot be calculated beforehand and in this case, the average should not be applied.

With relation to the method of collecting information for obtaining these indicators, we consider that the expense incurred will not be significant from the time that the respective official organisations sort out the available data.

In conclusion, the ECOEHIS project is considered to be a starting block for the definition of a group of indicators which will allow the performance of the countries to be compared as far as the implementation of the health and environment measurements.

# 10 Abbreviations

| Acronyms such as institute names in your country | Full name |
|---|---|
| IA | Instituto do Ambiente |
| INE | Instituto Nacional de Estatística |
| INAG | Instituto da Água |
| IRAR | Instituto Regulador da Água e dos Resíduos |
| INSA | Instituto Nacional de Saúde Dr. Ricardo Jorge – Observatório Nacional de Saúde |

# 11 Acknowledgements

The Institutes that contributed to the pilot study in Portugal as a formal acknowledgement were:

Instituto do Ambiente;
Instituto Nacional de Estatística;
Instituto da Água;
Instituto Regulador da Água e dos Resíduos;
Instituto Nacional de Saúde – Observatório Nacional de Saúde.

WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

ORGANISATION MONDIALE DE LA SANTÉ
**BUREAU RÉGIONAL DE L'EUROPE**

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 11-8

# Spain Report on Pilot Study

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**

Between the European Commission, DG Sanco

and the World Health Organization, Regional Office for Europe

# Development of EH Indicators for EU Countries (ECOEHIS)

## WHO project co-sponsored by EC DG SANCO (SPC 2002300)

# Pilot Study on the Environmental Health Indicators

## Report from Spain

**September 2, 2004**

**Authors:** María José Carroquino
Luis Soldevilla
Manuel Posada

**List of participating institutions:**

**INE** National Institute of Statistic

**MMA** Ministerio de Medio Ambiente (Ministry of Environment

**MSC** Ministerio de Sanidad y Consumo

**DGT** Dirección General de Tráfico

**ISCIII** Instituto de Salud Carlos III

**IEA** Internacional Energy Agency

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# Summary

The WHO - European Centre for Environment and Health is implementing a project to establish an environmental and health (EH) indicator system. The system is designed to serve public health monitoring and environmental policies in Member States as well as to support multinational analyses. The methodology developed by the WHO project provides the basis for a set of core environment and health indicators for European Union (EU) countries. On the basis of the European Commission sponsored WHO project "Development of Environment and Health Indicators for the EU countries" (ECOEHIS) a Working Group in 2003 identified a set of environment and health indicators adequate for EH monitoring in the EU covering the following seven issues: Air quality, Noise, Housing and settlement, Transport accidents, Water and sanitation, Chemical emergencies and Radiation.

In the early spring 2004 WHO started a pilot study on the feasibility of the proposed 45 indicators in the EU Member States (MS). The purpose of the pilot study is to determine the implementability of the proposed EH indicators. The study aims at assessing the feasibility of the data collection and applicability of the information carried by the indicator in the participating MS. This report summarizes the Danish pilot study.

Spain has reviewed the availability of the indicators under important constrains mainly the shortness of time allotted and the changes in responsible officers for departments with competences in Environmental Health, as well as the changes in the Public Health Institutes, as a result of the change in Government in March 2004. We were conservative in making contacts additional to those that had already been established in the previous project coordinated by WHO. However, the Budapest Conference has had an active involvement of the Ministry of Health in the conference, and we anticipate an active support of the activities of Public Health Institute in the following up of this project. Because of this delay, most of the evaluation of the feasibility of ECOEHIS indicators has been made on the basis of previous experience with the WHO EHIS pilot project, except for a few additional informal contacts with independent experts.

Generally, Spanish data are available for those indicators for which reporting to the EU is required, such as Air Quality, Water Quality etc and also for some traditional indicators such as Traffic Mortality and Morbidity, for which data collections has been done for more than 20 years. It is important that the ECOEHIS project is using data reported to international organizations whenever possible to avoid duplication of national reporting and assessment work.

This Summary National Report has been made following the template that WHO provided and using the Denmark National Report as an example, with the adaptations considered desirable for Spain. For example, from the Danish report we have estimated the potential availability of Spanish data in international databases, for which we had not been able to estimate the availability in Spain.

Spain does not have a National Environmental Health Action Plan (NEHAP) so the indicators cannot be measured for the policy relevance in relation to a NEHAP. Environmental Health Policy development in Spain follows to main leads, one the European Union requirements and two the recommendations of organizations such as WHO regarding health and wellbeing. On the other hand, there are some areas where information has been collected since at least 10 years, such as traffic casualties. There is however scant information on other policy relevant indicators such as use of seatbelt by car occupants or mortality due to drunk driving, which comes from independent studies or surveys which are not performed routinely. In the evaluation of policy relevance, it was found difficult to determine whether the information

from indicators serves as a trigger to develop some policy, as there are usually a number of factors that may lead to policy development.
Spain agrees with the Danish report in the recommendation that WHO starts with the indicators where data are available immediate from international organisations or can be obtained by limited resources from Member States and on the basis of these produce a first pilot version of the EH indicators.
The following summary table provides an overview of the 45 EH indicators, the availability and overall readiness. Indicators that are immediate ready for implementation are marked by bold.

| Indicator ID | Title | AVAILABILITY OF DATA | Overall readi-ness |
|---|---|---|---|
| Air_D1 | Passengers-kilometres by mode of transport | - | - |
| Air_D2 | Freight-transport demand (Tonne-kilometres) | - | - |
| Air_D3 | **Road transport fuel consumption** | 2 | 1 |
| Air_P1 | **Air pollution emissions (S02**, PM10, PM2.5, **NOx, CO, NMVOC)** | 2 | 1 |
| Air_Ex1 | **Population-weighted annual average concentration of air pollutants (NO2, PM10,** PM2.5, SO2, **O3)*** | 2 | 1 |
| Air_E1 | **Years of expected life lost**** | 2 | 1 |
| Air_A1 | **Policies on environmental tobacco smoke (ETS) exposure** | 2 | 1 |
| Noise_Ex1 | Population exposed to various noise levels (Lden and Lnight) by different sources | 1 | 1 |
| Noise_E1 | Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure | | |
| Noise_E2 | Self reported noise health effects - Annoyance and sleep disturbance* | 0 | 0 |
| Noise_A1 | **National regulations on maximum sound levels for indoor and outdoor leisure events** | 2 | 1 |
| Noise_A2 | **Existence and effectiveness of urban or national action plans to solve noise problems** | 2 | 1 |
| Noise_A3 | **Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures** | 2 | 1 |
| HOUS_P1 | Affordability to buy dwelling | | |
| HOUS_EX1 | Crowding | | |
| HOUS_EX2 | Accessibility | | |
| **HOUS_EX3** | **Extremes of Indoor Air Temperature** | | |
| HOUS_EX4 | Dampness/Mould Growth | | |
| HOUS_EX5 | Household hygiene | | |
| HOUS_EX6 | Indoor radon in dwellings | | |
| HOUS_EX7 | Crime/Perception of crime | | |
| HOUS_E1 | Housing safety and accidents | | |
| Traf_D1 | Passengers-kilometres by mode of transport (Air_D1) | - | - |
| **Traf_S1** | **Age of vehicle fleet** | **2** | **1** |
| **Traf_S2** | **Road accident rate** | **2** | **1** |
| Traf_S3 | Speed limit Exceedances | 2 | 4 |
| Traf_Ex1 | Person time spent on the road | 0 | - |
| Traf_Ex2 | Use of safety vehicle device* | 1 | 4 |
| **Traf_E1** | **Mortality due to transport accidents** | **2** | **1** |
| **Traf_E2** | **Potential Years of Life Lost** | **2** | **1** |
| **Traf_E3** | **Injury rate** | **2** | **1** |
| **Traf_E4** | **DALY lost for road accidents** | **2** | **1** |
| Traf_E5 | Mortality due to drinking driving | 2 | 4 |
| **WatSan_P1** | **Wastewater treatment** | **0** | **1** |
| **WatSan_S1** | **Recreational water compliance** | **2** | **1** |
| **WatSan_S2** | **Drinking water compliance** | **2** | **1** |
| **WatSan_Ex1** | **Safe drinking waters** | **1** | **1** |
| **WatSan_E1** | **Outbreak of water-borne diseases** | **2** | **1** |
| **WatSan_A1** | Management of bathing waters | 2 | 2 |
| **WatSan_A2** | **Water safety plans** | **1** | **1** |
| **Chem_P1** | **Industrial facilities under EU 'Seveso II' directive** | **2** | **1** |
| Chem_A1 | **Regulatory requirements for land-use planning** | 2 | 1 |
| Chem_A2 | **Chemical incidents register** | 1 | 1 |
| Chem_A3 | **Government preparedness** | 2 | 1 |
| Rad_E1 | Incidence of skin cancer | 1 | 4 |
| **Rad_A1** | **Effective environmental monitoring of radiation** | **2** | **1** |

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# 1 Introduction

The WHO - European Centre for Environment and Health is implementing a project to establish an environmental health (EH) indicator system. The system is designed to serve public health monitoring and environmental policies in EU Member States as well as to support multinational analyses. The methodology developed by the WHO project provides the basis for a set of core environmental and health indicators for European Union (EU) countries. On the basis of the European Commission sponsored WHO project “Development of Environment and Health Indicators for the EU countries” (ECOEHIS) a working group in 2003 identified a set of environmental and health indicators adequate for EH monitoring in the EU covering the following seven issues: Air quality, Noise, Housing and settlement, Transport accidents, Water and sanitation, Chemical emergencies and Radiation.

The main objective of the ECOEHIS project was to develop indicators on environmental health to become part of the European Community Health Indicators (ECHI). These would serve as tools to:

- Measure the health impact of selected environmental risk factors, their determinants and trends therein throughout the Community
- Facilitate planning, monitoring and evaluation of Community programmes and actions
- Provide Member States and international organisations with information to make comparisons and evaluate their policies

Based on testing of the feasibility and usefulness and after approval by the EU Member States the indicators would be delivered according to the evidence, data and methodological limitations, in one of three categories: 1) ready and recommended for implementation; 2) ready, but not feasible for immediate implementation, or 3) desirable though requiring further developmental work.

In the early spring 2004 WHO started a pilot study on the feasibility of the proposed 45 indicators in the EU Member States (MS). The purpose of the pilot study is to determine the implementability of the proposed EH indicators. The study aims at assessing the feasibility of the data collection and applicability of the information carried by the indicator in the participating MS.[1]

In 2001 the WHO Collaborating Centre for the Epidemiology of Environment Related Diseases was appointed by the Ministry of Health to conduct the studies necessary for the establishment of the Environmental Health Information System that WHO leads. The appointment made possible to make official contacts in order to obtain information and data. The task was included in the terms of reference of the WHO Collaborating Centre and one person was hired to run the project/s related to indicators.

[1] Austria, Belgium, Denmark, France, Finland, Germany, Italy, The Netherlands, Portugal, Spain, Sweden

# 2 Methods

Several people were contacted at the beginning in the feasibility phase of the EHIS study, including representatives of the Ministry of Environment, Ministry of Health, National Insitute of Statistics, National Institute for Public Health, Traffic Directorate General, Department of Civil Protection and some national experts on areas such radiation. This contacts were maintained througout this project.

While the plans were to set up a Steering Committee, using the previously responsible people and adding new members, the change in Government on March 14th made this task impossible. Many of the Chiefs of technical departments such as the Dept. Of Environmental Quality of the Ministry of Environment, Environmental Health of the Ministry of Health etc were ceased in their posts and being replaced. It was considered that it would be more productive in the long run to wait until new chiefs of departements were nominated, in order to ensure their continued support in the long-term running of the establishment of the Environmental Health Information System. The decision was made to use the experience and the already known experts from the previous project in order to save time.

Nevertheless, some additional experts from outside the government were contacted and interviewed by phone about indicators that were not included in the previous Environmental Health Information System project. They were mainly asked about the overall availability and implementability of indicators. The answers were useful in order to determine the implementability, but the time allotted was not sufficient to evaluate the methodologies used, and so the overall data quality and comparability was not possible to be evaluated in several cases.

The WHO provided the participating countries with a questionnaire to collect the meta-data and data for all indicators.

Several of the indicators are collected by the National Institute of Statistics, and are available from their website, as well as information about study method, population etc. Data on mortality is available from the National Institute of Statistics. Morbidity on traffic indicators is available from the Traffic General Directorate and was available from the previous project. The National Institute of Statistics also holds some traffic data, such as car registrations. The Ministry of Health holds water sanitation data, which is also managed in part by the National Institute of Public Health (data on water-borne outbreaks). The Ministry of Environment holds data on air emissions and ambient air levels of pollutants. Radiation monitoring information can be collected by the Nuclear Security Council.

The questions on policy relevance were difficult to answer. It was not clear whether the policy relevance was based on whether the indicators had been a trigger for setting up national policies or whether it was simply considered by the expert as a policy – relevant indicators. In most cases in Spain, the establishment of new policies are the consequence of a number of factors including requirements of transpositions of legislation by the EU, promotion by international agencies such as WHO and to some extent the results of analysis of indicators data.

The questions on data quality and comparability would require an in depth study of the data bases available at different institutions and the methodology used. For the indicators that were included in the previous project, it was possible to give an answer based on the previous experience and knowledge of how long the gathering of data had been running, and whether it was reported to international agencies or databases. In general it was assumed that if the data collection has been running for more than 10 years and it was being reported to international databases such as Eurostat, EMEP etc, the methodology followed internationally agreed standards and the quality and comparability of data was at the least acceptable. Determining the overall implementability was also difficult, especially when an indicator existed of many data-elements, of which some were available and others not.

When all questionnaires were answered, a summary table was made, using a summary table of Denmark as an example, with some modifications, including two main characteristics which where availability and implementability. The indicators considered most convenient for Spain at his point were those that were available and easily implementable.

# 3 Results of the pilot study of the indicators

In the topic area "Air", several indicators are available. No data are available for $PM_{2.5}$ (Air_P1 and Ex1),but this report includes a positive answer regarding the availability of this data because from the previous project we learned that it can be estimated. Data on $PM_{10}$ emissions is not available at this point. Data on emissions of the remaining pollutants is obtained from emissions data reported by companies or estimated from fuel consumption, etc and is centralized at the Ministry of the Environment. Data on air emissions is reported to the EMEP database, so the gathering and the management of data follows international standards.

Data on exposure is available for most province capitals and cities greater than 100.000 inhabitants. In the opinion of some experts, the comparability of exposure information over time is difficult to evaluate as the number of monitoring stations is increasing over time and their location can change, however the data is accepted and reported to international institutions.

The indicator Air_A1 can be easily evaluated, as it is only necessary to evaluate the existing policies. Spain is continuously developing new legislation regarding smoking prevention and follows internationally agreed directions in the development of such policies, though the implementation and enforcement of such policies is still a problem.

The indicators Air_D1-D2 may be available from the National Institute of Statistics, although with slightly different definitions. Indicator of road transport fuel consumption (Air_D3) is available from the International Energy Agency, which collects information from the Ministry of Economy and the Ministry of Health.

| **Indicator ID** | **Title** | **Spanish data source** | **International data source** | **Overall Implementability** |
|---|---|---|---|---|
| Air_D1 | Passengers-kilometres by mode of transport | | Eurostat? | |
| Air_D2 | Freight-transport demand (Tonne-kilometres) | | Eurostat? | |
| Air_D3 | Road transport fuel consumption | International Energy Agency – Data from Ministry of Economy and Ministry of Industry | | Immediately |
| Air_P1 | Air pollution emissions (S02, PM10, PM2.5, NOx, CO, NMVOC) | Ministry of Environment | WHO to collect data from UNECE/EMEP emission database | Immediately |
| Air_Ex1 | Population-weighted annual average concentration of air pollutants (NO2, PM10, PM2.5, SO2, O3)* | Ministry of Environment | WHO to collect data from EEA Airbase | Immediately |
| Air_E1 | Years of expected life lost** | Calculation | | Immediately |
| Air_A1 | Policies on environmental tobacco smoke (ETS) exposure | Laws and regulations to prevent ETS exposure | | Immediately |

** Population-weighted annual average concentration is not available, but data elements (average air pollutant concentrations & and population in cities) are available.*

*** Years of expected life lost are not calculated for Spain, but data elements (average air pollutant concentrations & age specific mortality) are available.*

*Evaluation of Indicators on Air Quality*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Air_D1 | 0 | 0 | 0 | 0 | Data not available unless from international source |
| Air_D2 | 0 | 0 | 0 | 0 | Data not available unless from international source |
| Air_D3 | 2 | 2 | 2 | 1 | 1 |
| Air_P1 | 2 | 2 | 1 | 1 | 1 |
| Air_Ex1 | 2 | 2 | 2 | 2 | 1 |
| Air_E1 | 2 | 2 | 2 | 2 | 1 |
| Air_A1 | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.1 Noise

Information on Noise exposure for Spain would be difficult to obtain at the present time. The noise expert indicated that most information gathering on Noise focuses simply on noise mapping, which is done by only a few Autonomous Communities. The Noise Directive has recently been transposed to Spanish legislation as Law 37/2003, so the noise mapping will be required in the future. If combined with the population living in the area, exposure could be roughly calculated. Noise data gathering seldom focuses on response, except for a few individual surveys and independent studies. The National Institute of Statistis included some noise annoyance items in the survey of the Panel of Homes of the European Union, but the variables were much less specific than those requested in the present questionnaires.

Data on cardiovascular morbidity and mortality is available from National Statistics (Noise_E1), but it is not clear how this could be linked to population exposed to noise to estimate the number of deaths attributable to noise exposure. It was not possible to evaluate the Noise legislation on the short-time allotted. Autonomous communities develop their own implementaion plans of the Spanish laws and most municipalities have noise action plans but it was impossible to make an overall evaluation, i.e. to determine to what extent each autonomous community has legislation to control noise from recreational activities, concerts events etc.

Regarding the poolicy relevance of noise indicators, the collection of noise indicators, specially noise levels, exposure and effectes is considered to be very relevant and it would be extremely useful for Spain, which is the second noisiest country in the world. However, this is indicators are not implementable at this point, except for the noise mapping data which would need to be collected region by region. Noise levels could be linked to population in cities in the same way that ambient air levels is, and it would be very useful in order to develop measures to prevent noise from traffic for example, which could be easily controlled by traffic regulations.

**Overview of Spanish and international data sources for the proposed noise indicators.**

| Indicator ID | Title | Spanish data source | International data source | Overall Readiness |
|---|---|---|---|---|
| Noise_Ex1 | Population exposed to various noise levels (Lden and Lnight) by different sources | Noise Maps from municipalities and some regional governments | EU Commission or Eurostat | Limited |
| Noise_E1 | Attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure | Partial data of noise maps as above and data on mortality by CVD from the National Institute of Statistics | WHO to collect data or related data from European Health for all database | Poor |
| Noise_E2 | Self reported noise health effects - Annoyance and sleep disturbance* | Some data (not as specific as in indicator) from "Survey of Family Budgets" | | Poor |
| Noise_A1 | National regulations on maximum sound levels for indoor and outdoor leisure events | Not able to evaluate. Local regulations exist | | Poor |
| Noise_A2 | Existence and effectiveness of urban or national action plans to solve noise problems | | | Poor |
| Noise_A3 | Willingness to enforce and implement the environmental noise EU Directive and to apply noise abatement measures | Law 37/3003 Transposition of Noise Directive | | Poor |

***Evaluation of Indicators on Noise***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Noise_Ex1 | 1 | 1 | 1 | 1 | 3 |
| Noise_E1 | 1 | 1 | 0 | 1 | 4 |
| Noise_E2 | 0 | 0 | 0 | 0 | 4 |
| Noise_A1 | 2 | 2 | 1 | 0 | 4 |
| Noise_A2 | 2 | 2 | 2 | 2 | 4 |
| Noise_A3 | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.2 Housing and Settlements

The information on the Housing and Settlements was the most difficult to collect, as the data belongs to different authorities with whom we had not worked previously.

Data on Extreme Temperatures (House_E1) can be obtained from the National Institute of Metereology by an official request. However hospital admission cases can only be obtained indirectly from hospital discharges, not admissions. The discharge report has the information of the cause of admission, and there is one code in the CMBD (Conjunto Mínimo Básico de Datos - Basic Minimum Data Set) related to extreme temperatures. The limitation of this data set is that it does not include the patients which do not require hosptializations. However, since 2003, there is death registry for deaths ocurred during heat waves.

Data on Household Hygene (House_Ex5) can be obtained from the Survey of Family Budgets and possibly the panel of European Homes which includes several items of household hygene such as lack of toilet, lack of hot water and substandard housing.

Data on injuries (House_E1) could be obtained from the National Institute of Consumer Products, who publishes a yearly report on domestic accidents. There is also information that could be obtained from hospital discharges and from the National Health Survey. The hospital discharges includes burnings as a cause and the data can be combined with a code in order to determine the location where the accident occurred. The National Health Survey has several entries which include lesion type, circumstances of the accident, traffic accident and also loss of at least 1 day of work caused by the injury and inability to perform house work for at least 1 day. The data collected by the Instituted of Consumer Products collects the information regarding to consumer products. It des not follow the ICD codes but it would be possible to see the different types of burnings.

**Overview of Spanish and international data sources for the proposed housing indicators.**

| Indicator ID | Title | Spanish data source | International data source | Overall Implementability |
|---|---|---|---|---|
| HOUS_P1 | Affordability to buy dwelling | Several sources | Eurostat dataset: *Share of households with/without financial burden due to housing costs* | From International Source |
| HOUS_EX1 | Crowding | National Institute of Statistics | Eurostat datasets: *Share of households living in overcrowded houses & Rooms per person* | From National Institute of Statistics or International Source |
| HOUS_EX2 | Accessibility | Estimates may be available from Disability Associations | | Poor |
| HOUS_EX3 | Extremes of Indoor Air Temperature | Spanish National Institute of Meteorology (data on outdoor temperatures) | | Fair |
| HOUS_EX4 | Dampness/Mould Growth | | | |
| HOUS_EX5 | Household hygiene | Data from the Survey of Family Budgets | | Good |
| HOUS_EX6 | Indoor radon in dwellings | CIEMAT<br>Centro de Investigaciones Energéticas Medioambientales y Tecnológicas | | Unable to reach expert |
| HOUS_EX7 | Crime/Perception of crime | | | |
| HOUS_E1 | Housing safety and accidents | National Institute of Statistics<br>Institute of Consumer Products<br>National Health Survey | | Fair |

***Evaluation of Indicators on Housing and Settlements***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Affordability | 1 | 1 | 0 | 0 | 4 |
| Crowding | 1 | 1 | 1 | 1 | 3 |
| Accessibility | Unable to evaluate | | | | |
| Dampness/Mould Growth | Unable to evaluate | | | | |
| Household hygiene | 2 | 1 | 1 | 0 | 4 |
| Indoor radon in dwellings | Unable to evaluate | | | | |
| Extreme temperature | 1 | 1 | 1 | 1 | 2 |
| Housing safety and accidents | 1 | 1 | 1 | 1 | 3 |
| Crime/Perception of crime | Unable to evaluate | | | | |

* Enter 2 for ‘good’, 1 for ‘fair’, or 0 for ‘poor’ according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.3 Traffic Accidents

In Spain, several of the traffic indicators are available and ready for implementation such as traffic mortality and injuries. Traffic deaths and injuries are still a huge problem in Spain, although slight reductions have been observed in the last 10 years. The data on traffic mortality is available from National Statistics. The Traffic Department has information on traffic injuries. Data on mortality and morbidity is reported to IRTAD and follows international standards. Data on circulating vehicles and new car sales (Traf_S1) is available from the National Institute of Statistics and is based on national vehicle registration.

However some very policy relevant traffic indicators such as deaths due to drinking driving (Traf_E5), use of safety devices(Traf_Ex2) and speed limit exceedances (Traf_S3) and drunk driving (Traf_E5) would be difficult to collect, as they are obtained by independent studies or surveys that are not performed routinely.

Data on speed limit exceedances could be obtained from the police and from fines and prosecution statistics or from the traffic department. Data on alcohol levels in blood is requested depending the severity of the accident and it is obtained obviously a posteriori of the accident. At his point we are not sure exactly the flow of information among the different agencies- police- hospital-traffic department. The traffic department has an statistics department and follows internationally agreed methodology in the data collection and treatment. Data is reported to international databases such as IRTAD.

There have been a couple of studies on the use of the seatbelt (Traf_Ex2), one run by the Royal Automobile Club of Spain which has a Department of Road Safety. The study consisted in a field observation in several Spanish cities (Madrid, La Coruña, Sevilla, Valencia and Zaragoza. Data was obtained in different central intersections of the cities at different times of the working hours, between November 1999 and February 2000. The Traffic department was planning to run a control of 60.000 vehicles in 2002 to do another study. The Institute of Toxicology has run studies with the data collected by the police department in several cities and calculated the number of fatalities in which alcohol consumption was involved. The study has been run for at least 3 years, so it is likely that it will continue in the future.

The potential years of life lost due to traffic accidents (Traf_E2) are calculated by multiplying the number of traffic-related deaths per year with the remaining life expectancy at the specific age. It would be possible to calculate this figures with the existing Spanish data, even though it has not been done for this report. DALY's (Traf_4) can also be calculated.

**Overview of Spanish and international data sources for the proposed traffic accident indicators.**

| Indicator ID | Title | Spanish data source | International data source | Overall Implementability |
|---|---|---|---|---|
| Traf_D1 (Air_D1) | Passengers-kilometres by mode of transport | | WHO to collect data from Eurostat | |
| Traf_S1 | Age of vehicle fleet | | WHO to use EEA fact sheet or collect data from Eurostat | |
| Traf_S2 | Road accident rate | Traffic Department And National Institute of Statistics | WHO to collect data from Eurostat | Good |
| Traf_S3 | Speed limit Exceedances | Some data available from studies and surveys | | |
| Traf_Ex1 | Person time spent on the road | | | |
| Traf_Ex2 | Use of safety vehicle device* | Some data available from studies and surveys | | |
| Traf_E1 | Mortality due to transport accidents | Traffic Department and National Institute of Statistics | WHO to collect data from Eurostat | Good |
| Traf_E2 | Potential Years of Life Lost | This is not calculated in Spain but the elements for the calculation are available | | |
| Traf_E3 | Injury rate | National Patient Registry, National Board of Health, Ministry of Interior and Health | *No* | Good |
| Traf_E4 | DALY lost for road accidents | ** This is not calculated in Spain but the elements for the calculation are available | | |
| Traf_E5 | Mortality due to drinking driving | Some data available from studies and surveys | WHO to collect data from Eurostat | |

* The indicator covers data elements on: Use of safety belts; children properly restrained and motorcycle occupants properly using the helmet. Questionnaire has been answered in relation to use of safety belts.
** Data elements required to calculate DALY are requested (e.g. Data on disability; Data on mortality from death registry; Disability weights & Age weights), however, the exact data are uncertain, some data may already be reported by Denmark to WHO - or international data have to be used to ensure comparability of the calculated DALY.

### *Evaluation of Indicators on Traffic Accidents*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Traf_D1 (Air_D1) | 0 | 0 | 0 | 0 | Data not available unless from international source |
| Traf_S1 | 2 | 2 | 2 | 1 | 1 |
| Traf_S2 | 2 | 2 | 2 | 2 | 1 |
| Traf_S3 | 2 | 2 | 1 | 1 | 4 |
| Traf_Ex1 | 0 | 0 | 0 | 0 | |
| Traf_Ex2 | 1 | 1 | 0 | 1 | 4 |
| Traf_E1 | 2 | 2 | 2 | 2 | 1 |
| Traf_E2 | 2 | 2 | 2 | 2 | 1 |
| Traf_E3 | 2 | 2 | 2 | 1 | 1 |
| Traf_E4 | 2 | 2 | 2 | 1 | 4 |
| Traf_E5 | 2 | 2 | 0 | 2 | 4 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.4 Water and Sanitation

Indicators of water compliance (WatSan_S1 and WatSAn_S2) is collected by the Ministry of Health and is complete and reliable. Bathing waters, both continental and maritime are labelled in three categories as “very good quality, good quality and not apt for bathing”. This information is published in the Webpage of the Ministry of Health. The number of registered bathing waters cannot be considered to cover all the waters where people bathe, as there are so many small beaches along the cost of Spain. However it should be a representative figure. The data on number of bathing waters identified for compliance monitoring is also available from this Ministry. Collection of data and analysis of microbiological quality is made according to internationally agreed standards.

The number of outbreaks from water-borne diseases (WatSan_E1) is reported to the Instituto de Salud Carlos III. The data may not be reliable, as many incidents do not result in Doctor or emergency room visit.

Data for the indicators on waste water treatment WatSan_P1 and water safety management plans WatSan__A2 can be obtained from the National Institute of Statistics, which runs a survey called the Survey of Family Budgets. From this source it is possible to obtain the number of connected houses to piped water and the number of dwellings without a toilet. It may be necessary to assume that the number of dwellings with piped water is water regulated by a water safety plan, which is a safe assumption. This indicator do not seem very useful for Spain, as coverage of piped water and waste water is almost 100%.

The new guidelines on bathing water management (WatSan_A1) and water safety plans (WatSan_A2) are not yet implemented in Spain.

**Overview of Spanish and international data sources for the proposed water and sanitation indicators.**

| Indicator ID | Title | Spanish data source | International data source | Overall Implementability |
|---|---|---|---|---|
| WatSan_P1 | Wastewater treatment* | Survey of Family Budgets | WHO to collect data from Eurostat | |
| WatSan_S1 | Recreational water compliance | Ministry of Health | WHO to collect data from EU Commission | |
| WatSan_S2 | Drinking water compliance | Ministry of Health | Future reporting in relation to EU Drinking Water Directive | |
| WatSan_Ex1 | Safe drinking waters | Ministry of Health | | |
| WatSan_E1 | Outbreak of water-borne diseases | Public Health Institute | | |
| WatSan_A1 | Management of bathing waters** | Ministry of Health | | |
| WatSan_A2 | Water safety plans*** | Survey of Family Budgets | | |

*The Survey of Family Budgets provides the number of houses who have a toilet.
**Impossible to register and monitor all bathing waters in Spain
***The Survey of Family Budgets provides the number of houses connected to piped water-and it can be assumed that all piped water is subject of a water safety plan.

*Evaluation of Indicators on Water and Sanitation*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| WatSan_P1 | 0 | 2 | 2 | 1 | 4 |
| WatSan_S1 | 2 | 2 | 1 | 1 | 4 |
| WatSan_S2 | 2 | 2 | 2 | 1 | 1 |
| WatSan_Ex1 | 1 | 1 | 1 | 1 | 1 |
| WatSan_E1 | 2 | 2 | 2 | 1 | 1 |
| WatSan_A1 | 2 | 2 | 1 | 1 | 2 |
| WatSan_A2 | 1 | 1 | 1 | 1 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.5 Chemical Emergencies

In Spain the SEVESO directive has been transposed into Spanish legislation as the Royal Decree 1254/1999 and it is implemented. All the establishments containing large amounts of chemicals according to the Seveso Directive are registered (Chem_P1). The Department of Civil Protection has National Emergency Plans in case of chemical emergencies.

**Overview of Spanish and international data sources for the proposed chemical emergencies indicators.**

| Indicator ID | Title | Spanish data source | International data source | Overall Implementability |
|---|---|---|---|---|
| Chem_P1 | Industrial facilities under EU 'Seveso II' directive | Transposition of Seveso Directive into RD1254/1999 | | |
| Chem_A1 | Regulatory requirements for land-use planning | RD 1254/1999 | | |
| Chem_A2 | Chemical incidents register | Transposition of Seveso Directive into RD1254/1999 | Major Accident Reporting System (MARS) | |
| Chem_A3 | Government preparedness | Department of Civil Protection | | |

*Evaluation of Indicators on Chemical Emergencies*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Chem_P1 | 2 | 2 | 2 | 1 | 1 |
| Chem_A1 | 2 | 2 | 2 | 1 | 1 |
| Chem_A2 | 1 | 2 | 1 | 0 | 1 |
| Chem_A3 | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.6 Radiation

The Euratom Treaty (Rad_A1) is implemented strictly and the variables collected are all those required in the Euratom treaty.

Spain does not have a National Cancer Registry, but there are 12 provincial and regional (at the autonomous community level) registries, validated by IARC of which data is reported to this organization and published in the IARC publication "Cancer Incidence in Five Continents". The latest publication of "Cancer Incidence in Five Continents" has been in 1997 and the new volume was due to be published in 1997.

Not all registries collect information on skin cancer. Practically all do collect information on melanomas and some also register the epidermoid carcinoma. Approximately 60% of the registries collect all the histological types of skin cancer.

There is also the database, EUCAN which has estimates of the cancer incidence by country. The last numbers are of 1997. The problem is that there is only data of melanoma type cancer.

Another possibility is to obtain data from EUROCIM, which is similar to Cancer Incidence in five continents but differentiates different histological types of cancer. EUROCIM is not available for public use. In this database it is possible to botain the rates of all the different Spanish registries and it is also possible to obtain an average rate for Spain, which is an average of the rates in all registrties. This would probably be the best source because it differentiates histological type and it includes the dat of all registries of cancer that belong to the European Network of Cancer Registries.

For monitoring purposes it is recommended to select a set of registries in which monitorization is possible. She provided data of a few registries for the period 1994-1996, covering both the north and south of Spain and areas more and less industrialized, which were the years for which data was available for all the registries selected. Data for subsequent years was available for a few years. A data quality aspect that was brought up by the expert was the fact that skin cancer is often underreported, as it may take ambulatory treatment or private health coverage.

***Evaluation of Indicators on Radiation***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Rad_E1 | 1 | 1 | 1 | 1 | 4 |
| Rad_A1 | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# 4 Conclusions

The results of the implementation of this project in Spain have been reported to WHO and served for the analysis of implementability of ECOEHIS indicators in Spain and the selection of a reduced number of selected indicators.

Spain data are available for the majority of EH indicators. For many indicators Spain and the other EU countries are already reporting this data or nearly identical data to international organizations (e.g. WHO, Eurostat, EU Commission or European Environment Agency). However, the availability and completeness of Spanish data for each specific indicator in international databases needs to be evaluated.

The indicators most difficult to evaluate were the Housing indicators, as the include data of a wide spectrum of environmental, economic and social aspects. Indicators on noise legislation and policy actions would be readily available and implementable, however there is very little information available on noise exposures and noise health effects.

Data on the traffic indicators such as morbidity and mortality is available and complete and their methodology follows international standards. There is a lack of complete data of some important traffic indicators such drunk driving, seat belt use and speed limit exceedances, although some information can be found from small studies or surveys.

Data on chemical emergencies and water and sanitation are widely available and most of them would be implementable immediately. Most of Air indicators were also classified as readily implementable, and they are available at international databases.

Based on the results of the evaluation of availability, data quality and comparability, policy relevance and overall readiness of the ECOEHIS indicators in the participating countries, WHO selected a reduced number of indicators for proposal to be included in the European Commission Health Information Database. Indicators were selected that were available in most Member States, and based on routinely collected information and if possible, available at international organizations.

In summary, most indicators selected for the core set are available from international databases or can be easily evaluated in Spain (such as the case of action indicators), so that is anticipated that Spain will be able to satisfy the reporting requirements posed by the inclusion of the ECOEHIS indicators in the EU reporting requirements.

WORLD HEALTH ORGANIZATION
**REGIONAL OFFICE FOR EUROPE**

WELTGESUNDHEITSORGANISATION
**REGIONALBÜRO FÜR EUROPA**

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ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
**ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО**

**EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH**
**BONN OFFICE**

# Annex 11-9

# Sweden Report on Pilot Study

## DEVELOPMENT
## OF
## ENVIRONMENT AND HEALTH INDICATORS
## FOR
## EUROPEAN UNION COUNTRIES

## ECOEHIS

**Grant Agreement SPC 2002300**

Between the European Commission, DG Sanco

and the World Health Organization, Regional Office for Europe

## Development of EH Indicators for EU Countries (ECOEHIS)

### WHO project co-sponsored by EC DG SANCO (SPC 2002300)

# Pilot Study on The Environmental Health Indicators

## Report from Sweden

**1 September 2004**

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# Summary

By way of introduction, we can say that all the proposed indicators are interesting from a European perspective. As far as Sweden is concerned, some of them are more interesting as they reflect specific Swedish conditions. It is desirable for us to use them in our work with the Swedish environmental quality objectives and we are keen to avoid as much work duplication as possible.

An overall assessment shows that there is a lot of work, considerable costs and substantial personnel resources involved in developing such a large indicator system (46 indicators, more than 250 elements and 45 questions for each element). One indicator, Air_P1 emissions, consists of 36 different sub-elements.

An established national organisation is required to develop data collection further and send it on to the international organisation whose task it is to compile the data.

It is possible to identify a few indicators that show how human health is affected by the environment in a way that can be monitored over time. A number of the suggested indicators include elements that are N/A in Sweden. This makes the indicator as a whole less interesting than if the elements that are N/A were not part of it. A number of indicators need to be further developed.

The results of the pilot study show that either data is missing or it has not been adapted to the proposed indicators.
The section on policy relevance is difficult to manage. Both health assessment and political appraisal can be included.

**Air**
We use a number of air quality indicators in Sweden. These mainly show concentrations of different substances in the air. The data is relatively easily accessible. In order to indicate the impact on health, it is important to obtain data in health problems and link them to the air quality in the exposed groups. This work is part of our overall efforts to attain the Swedish environmental quality objectives.
The *Air_ EX1 Population-weighted annual average concentration of air pollutants (NO2, PM10, PM2.5, SO2, O3)*, *Air E1 Years of expected life lost* and *Air A1 Policies on environmental tobacco smoke (ETS) exposure* indicators are most interesting from a purely environmental medicine point of view.

**Noise**
In Sweden we have implemented directive 2002/49/EC but measurements with $L_{den}$ have yet to have an impact in all sectors. Only aircraft noise is reported in $L_{den.}$ This means that the indicators are not considered to be policy-relevant at the moment. Sweden will obviously work in accordance with the intentions of the directive in the future and be able to make a different assessment later on but it is important for Sweden to retain the current indicator LA $_{eq,24h}$ in parallel to the indicators required under the directive.
We will continue our environmental health surveys every four years and noise is a topic included. The Environmental Health Report 2005 (national reporting) also reports the problems experienced by children.

In our opinion $L_{night}$ must also be specified for lower levels than those proposed for ECOEHIS. Swedish guideline values, as is the case with WHO guideline values to protect people from sleep disturbance, are more stringent (WHO $L_{night}$ 45 dB). $L_{night}$ needs also to be specified in the 40-44 dB and 45-49 dB intervals and not just from 50 dB.
Similarly, $L_{den}$ needs to be specified from 45-50 dB.
In Sweden we feel that people's experienced problems are important indicators from an environmental medicine point of view. Annoyance and disturbance are appropriate to use as indicators and it is important for them to be measured in a standardised way (ISO technical specifications exist). Annoyance has considerable impact on decision-makers as there are many international studies that have investigated the link between noise levels and disturbance. The indicator needs to be supplemented with indicators for the impact on various activities (of which sleep is one).
Postal questionnaires are useful. Interviews are costly to perform and it is doubtful as to whether the response rate is higher. If we still wish to perform telephone interviews, the number of questions must be limited and not be as many as is proposed in this document.
*Noise_ E2 self reported noise health effects - annoyance and sleep disturbance* is therefore the most relevant indicator for Swedish conditions.

**Housing and Settlements**
An overall assessment of the indicators is that they are all relevant as indicators of health impact. Some of them might be better suited in a system of indicators designed to track public health or climate change. This is true of *Hous_P1 affordability, Hous_Ex1 crowding*, *Hous_ Ex2 accessibility*, Hous_ *Ex7 crim/perception of crime* and *Hous_ E1 housing safety and accidents*. Indicators *Hous_ E4 dampness/mould*, *Hous_E5 household hygiene* and *Hous_Ex6 indoor radon* are however suitable from an environmental medicine point of view.
We do not have any data on the number of dwellings but there is data from 1999 onwards on the number of people who have reported on the questionnaire that they have had health problems caused by dampness and mould in their dwelling. It is highly relevant for indoor air and health. Dampness and mould are very relevant for policy-making and we do have problems with them in Sweden both in new and old dwellings.
A radon exposure indicator is important for Swedish conditions and hence relevant for Sweden. *Hous_ Ex6 indoor radon* should either be moved to Indicators of Radiation or be further developed. It is important to weigh up exposure data against population health loss. In many cases, we have no data concerning housing and settlements, especially when it comes to policy relevance. The main reason for this is that we don't feel they are relevant as environmental health indicators but are suitable as pure public health indicators.

**Traffic Accidents**
Traffic accidents are not included in Swedish environmental health work. Many of these indicators are therefore unsuitable for Sweden.
*Traf_D1 (Air_D1) passengers-kilometres by mode of transport* has good policy relevance both nationally and regionally even for Swedish conditions.
*Traf_S1 age of vehicle fleet* is suitable to be used immediately with good policy relevance for air quality, energy consumption and accident frequency.
*Traf_S2 road accident rate*, *S2V1 number of road accidents* - it is possible to make comparisons but the coverage rate is too low to obtain reliable data.

**Water and Sanitation**
Sweden is privileged with ample access to relatively clean raw water from both surface and ground supplies. This, in turn, means that the public municipal supply of drinking water is generally of good quality. The NFA Ordinance sets quality requirements on surface raw water as well as on the waterworks that have the responsibility for treatment and purification prior to the distribution of drinking water. The Swedish waterworks generally have adequate control data on the quality of their supply. Temporary failures do occasionally occur. The importance of planning for emergencies has been given priority at the NFA.
Out of Sweden's total population of 9 million, about 1.2 million permanent dwelling residents and 1.2 million holiday home residents obtain their drinking water from their own private wells or small-scale treatment plants. Most of these wells are drilled into the bedrock. This means that the bedrock itself can have a significant impact on the water quality, which can vary considerably. The residents themselves are responsible for the well and the drinking water quality.
None of *WatSan* is of direct use or interest when it comes to reflecting Swedish conditions.

**Chemical Emergencies**
None of the proposed indicators are felt to have any policy relevance and are not applicable to Swedish conditions. We work with indicators such as allergens in products, number of contaminated sites and disbursed subsidies for carrying our inventories and surveys or measures and the number of eco-labelled products.
Environmental health-related indicators currently being developed include prevalence of nickel-allergy, based on questionnaire data from 1999, urinary-Cd and tubular proteinuria in women, persistent organic pollutants in breast milk and mercury in hair from pregnant women.

**Radiation**
We feel the proposed indicators *Rad_E1 incidence of skin cancer* and *Rad_A1 effective environmental monitoring of radiation* are policy relevant. *Rad_E1* should however be split so that Annual number of skin cancer cases are divided into epithelial cancer and malignant melanoma cases.

**List of indicators ready for immediate use**
*Air_ D1* is the same as *Traf_ D1 passengers-kilometres by mode of transport* - is considered to have good policy-relevance and be ready for immediate use.
*Air_ D3 road transport fuel consumption* - good policy-relevance and ready for immediate use.
*Noise_ E2 self reported noise health effects* - annoyance and sleep disturbance - in Sweden we feel that people's experienced problems are important indicators from an environmental medicine point of view. We perform this type of survey on the local, regional and national level.
*Hous_P1 affordability* - data has been available for several years. It is ready for use within ECOEHIS but *is not suited to Swedish conditions as an environmental health indicator.*
It is ready for use within ECOEHIS but is not suited to Swedish conditions as an environmental health indicator.
*Hous_E1 housing safety and accidents*-we have good-quality data but do not feel that injuries and accidents are policy-relevant indicators for environmental health, they are more suitable as public health indicators.

*Traf_D1 (Air_D1) passengers-kilometres by mode of transport* has good policy relevance both nationally and regionally even for Swedish conditions.
*Traf_S1 age of vehicle fleet* is suitable to be used immediately with good policy relevance for air quality, energy consumption and accident frequency.
*Traf_S2 road accident rate, S2V1 number of road accidents* - it is possible to make comparisons but the coverage rate is too low to obtain reliable data.
*Traf_E1 mortality due to transport accidents*, the new directive 93/704/EC: Council Decision of 30 November 1993 on the creation of a Community database on road accidents changes our data collection somewhat. Sweden has a decree in which it is stated that the police must report information concerning deaths, accidents, etc. Statistics Sweden was in charge of the "final" database 1997-2001. Statistics Sweden reports the data to DG TREN. The police fill out forms about the accident and register it in a database, administrated by the National Road Administration. Data on micro level is reported to DG TREN.
*Traf_E3 injury rate* - only persons injured in police-reported accidents are registered. This is an unsuitable indicator for Swedish environmental health work since inter alia neither personal injuries nor accidents are included in the indicator. The new STRADA information system will provide better statistics on those injured in traffic accidents registered in the healthcare system.
*Traf_5 mortality due to drink driving* - we need more specifications to know which deaths to count. The data are based on suspicion by the police. All fatalities are not tested but most of the victims are autopsied. This is an unsuitable indicator for Swedish environmental health work since accidents are not included with our work with the environmental objectives.
The *WatSan_ P1 wastewater treatment* indicator has fair policy relevance and can be used immediately.
The *WatSan S1 recreational water compliance* indicator has fair policy relevance and can be used in 2004. This will be more relevant for Swedish conditions now when the directive is amended so that samples are mainly taken during our relatively short bathing season.

*WatSan_ Ex1 safe drinking water* - is intended for municipal water and we don't feel it is an important environmental health indicator in Sweden as we are more concerned about water quality in private wells.
The *WatSan_ A1 management of bathing waters* indicator is ready for use this year and assessed as having fair policy relevance.
The *Chem_P1 industrial facilities indicator specified under the Seveso ll directive* is ready to use this year and has fair policy-relevance
The *Chem_A1 regulatory for land use planning, Chem_ A1V3* indicator is not available. The others are available and ready for use in 2004 and are assessed as having fair policy-relevance.
The *Chem_ A2 chemical incidents register* is a recently started register and ready for use sometime this year. The *Chem_A2V1 pollutant and transfer register* is policy relevant for Sweden. Dangerous goods and fire rescue is of less interest for policy-making in Sweden.
The *Rad_A1 indicator is effective environmental monitoring* and has good policy relevance.
The *Rad_E1 incidence of skin cancer* indicator has good policy relevance but should however be divided up so that annual number of skin cancer cases is divided into epithelial cancer and malignant melanoma.

The following 6 indicators concur with the indicators that are already included in our monitoring of the Swedish environmental quality objectives or are currently being developed for this purpose in Sweden.

- Air_ Ex1V2- V3

Years of expected life lost due to long-term exposure to particulate matter.

- Rad_ A1 and Rad_E1

Number of annual cases of skin cancer, divided into epithelial cancer and malignant melanoma.

- Hous_ Ex6

The average radon level in the country's housing.

- Hous_ Ex4

Percentage of housing with damp, mould or mouldy smell

- Air_A1 policies on ETS exposure

Percentage exposed to environmental tobacco smoke at home, at work or in other environments

- Noise_ E2

Percentage who are often disturbed by road traffic noise in their homes.

# Table of contents

# 1 Introduction

Sweden works with indicators in the fields of environment and public health.

Projects aimed at identifying environment-related health indicators are under way in many different areas; in the domain of public health, regarding sustainable development and in the field of environmental health. In some cases, the systems overlap. In Sweden, the main focus of our work in the environmental field is governed by the 15 environmental quality objectives adopted by the Swedish Riksdag. We have been working for several years to identify indicators that can describe trends in relation to the work being done with the environmental quality objectives. These 15 objectives have been broken down into intermediate targets each with a specific time-frame within which it is to be achieved. The objectives are expressed as intermediate targets both regionally and locally and vary depending on the prevailing conditions within each region and any identified problem areas. The most important environmental quality objectives from a health point of view are: Clean air, Good urban environment, Non-toxic environment and Safe radiation environment.

We have felt it important to participate in this pilot study in order to identify those areas where there are acceptable statistics, where there are shortfalls in the background data or where there is no comparable data at all. It has also been important for us to have the opportunity to influence which indicators will be proposed for ECHI (European Community Health indicators).

Regarding our work with the environmental quality objectives, the following indicators are of relevance when it comes to tracking trends. As far as Sweden is concerned, indicators that are population-related and where people themselves report the problems they experience are important to develop. The following indicators are discussed or used in Sweden:

- Percentage of people who complain of ill effects from vehicle emissions, ready for use from autumn 2004
- Percentage of people who complain of ill effects from wood burning smoke, ready for use from autumn 2004
- Allergy-sufferers/asthmatics self-reported problems caused by air pollution, ready for use from autumn 2004
- Emergency hospital admissions and deaths from asthma caused by short-term exposure to air pollution.
- Hospital admissions for croup/bronchitis in children <2 years old purged of RS virus epidemics. To be further evaluated.
- Years of expected life lost due to long-term exposure to particulate matter. To be further evaluated.
- Nickel allergy prevalence, ready for use from autumn 2004
- Occurrence of cadmium in urine and tubular proteinuria in some population groups, under development.
- Levels of mercury in hair of pregnant women, under development.
- Formaldehyde in housing, to be developed further
- Number of annual cases of skin cancer, divided into epithelial cancer and malignant melanoma.
- The average radon level in the country's housing. A survey has started in 2004 in western Sweden.
- Percentage of people who complain of ill effects caused by the indoor environment - ready for use in autumn 2004

- Percentage of people who complain of ill effects from traffic noise - ready for use in autumn 2004
- Percentage of the population who experience complain of ill effects of damp, mould r mouldy smell in their dwelling ready for use in autumn 2004 after survey in 1999
- Percentage exposed to environmental tobacco smoke at home, at work or in other environments - ready for use in autumn after survey in 1999
- Percentage who are often disturbed by road traffic noise in their homes. As road traffic noise is the single biggest source of noise, noise disturbance from road traffic has been chosen as an indicator.

We have statistical data in various environmental fields but Swedish environmental monitoring has not always been related to human health. We have more statistics and longer data series that describe pollutant emissions but haven't always related pollution levels to the exposed population. There are also statistics on various types of morbidity, hospital admissions, accidents and causes of death but these are not yet linked to environmental factors. There is on-going research in this area.

# 2 Methods

The National Board of Health and Welfare has been appointed the national focal point for the pilot study in Sweden. Eighteen authorities and institutes responsible for statistics have been identified. One person was temporarily employed from 15 February to 15 June to collect data and keep in regular contact with WHO. A letter was also sent to all the authorities/institutes responsible for statistics and others who might be able to help to submit data to the project (see acknowledgements). Within each authority and institute, a number of people were identified who could contribute data and knowledge and a wide network was formed. The work has been very time-consuming for all those involved and it was particularly difficult since the pilot study was not planned at an early stage as part of regular activities. It is not possible to summarise the person hours and costs involved. All those involved have understood the importance of performing this kind of work despite the call for participation coming at rather short notice. Most communication has occurred by telephone and/or email. Personal visits were made on isolated occasions. The available data has been identified and in most cases collected for use in the project. In some cases, the data has been so extensive that figures have not been compiled or they have already been reported to EUROSTAT or similar authority.

All the indicators can be said to be relevant from a European perspective. The problem of evaluating which indicators are of interest was solved in the following way: In the templates presented in the report, we have performed the evaluation mainly so that if the requested data is immediately available, the indicator should then be policy-relevant in ECOEHIS. If the data is unavailable of the existing data is not comparable with the indicator's definition, then it is neither suitable nor policy-relevant. To assess whether the indicator is suitable for Swedish conditions, an assessment was also made as to whether the indicator was suitable as part of the existing indicator system we use for our work with the environmental quality objectives.

# 3 Results of the pilot study of the indicators

## 3.1 Air Quality

We use a number of air quality indicators in Sweden. These mainly show concentrations of different substances in the air. The data is relatively easily accessible. In order to indicate the impact on health, it is important to obtain data in health problems and link them to the air quality in the exposed groups. This work is part of our overall efforts to attain the Swedish environmental quality objectives. A considerable proportion of the measurements are carried out by the municipalities. The data is used for direct measures on the local level. It is also sent on to a national data host.

*Air_ D1* is the same as *Traf_ D1 passengers-kilometres by mode of transport* and is considered to have good policy-relevance and be ready for immediate use.
*Air* D2 freight-transport demand - no data on freight transport demand exists but there is data on person-transport for domestic flight transport.
*Air_ D3 road transport fuel consumption* has good policy-relevance and is ready for immediate use.
*Air_ P1 air pollution emissions (S02, PM10, PM2.5, NOx, CO, NMVOC)*. PM2.5 is assessed as having fair policy-relevance and is not ready for use yet, CO likewise. NMVOC may be of interest regarding industrial processes and transport but is not ready for use yet. 16 elements ready for immediate use, 19 after 2006. The fiercest criticism of the indicator is that it consists of 36 sub-elements and is virtually impossible to manage especially as it is presented on an Excel spreadsheet and is accompanied by 45 questions to be answered.
*Air* E1 years of expected life lost - no material for E1V1, annual concentration for PM2.5 or PM10 is currently available. The indicator is hence not yet applicable. *Air_E1V2* and *E1V3* - Swedish statistics on causes of deaths are among the oldest worldwide. They go back to 1749 when a nationwide reporting system was first introduced.
*Air_Ex1 population-weighted annual average concentrations of pollutants (NO2, PM10, PM2.5, SO2, O3)* - there is no data for PM2.5 and Ozone. *Air_ExV2 particle measurements* have changed from black smoke to PM10. A gravimetric method is used on most sites, TEOM is used at some of them. Different TEOM factors are used in different regions. *Air_ExV1, ExV2* and *ExV4* are based on quality measurements in around 50 out of 290 municipalities. These are annual calculations on available air quality data.
*Air_ A1 policies on ETS exposure*, there is national legislation restricting smoking in certain places such as in schools, on public transport, in governmental or public buildings and we are also discussing introducing a ban on smoking in restaurants.
As far as Sweden is concerned, indicators that are population-based and where people report the problems they experience themselves are of interest. The following indicators are of interest in order to track trends in our work with the environmental quality objectives.

- Percentage of people complaining of ill effects from vehicle emissions, ready for use from autumn 2004
- Percentage of people complaining of ill effects from wood burning smoke, ready for use from autumn 2004
- Allergy-sufferers/asthmatics self-reported problems caused by air pollution, ready for use in autumn 2004

The following 3 indicators are to be evaluated from an environmental medicine point of view to see if they are suitable for use from a Swedish standpoint as part of our efforts to achieve the environmental quality objectives.

- Emergency hospital admissions and deaths from asthma caused by short-term exposure to air pollution.
- Hospital admissions for croup/bronchitis in children <2 years old purged of RS virus epidemics. To be further evaluated.
- Years of expected life lost due to long-term exposure to particulate matter. To be further evaluated.

***Template of Summary Table for Each Section: Evaluation of Indicators on Air Quality***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Air_D1 passengers-kilometres by mode of transport | 2 | 1 | 1 | 2 | 1 |
| Air_D2 freight transport demand | N/A[1] | N/A | N/A | N/A | N/A |
| Air_D3 road transport fuel consumption | 2 | 2 | 2 | 2 | 1 |
| Air_P1air pollution emissions | 2 | 1 for 17<br>2 for 18[2] | 2 | 1 for 18<br>2 for 17[3] | 1 for 16 ind.<br>4 for 19 ind. |
| Air_Ex1 population weighed annual average concentration | 1 | 0.7 | 1 | 1.1 | 1 for 5 ind.<br>0 for 2 ind. |
| Air_E1 years of expected life lost | N/A[4] | 1.3 | 1.3 | N/A | 2 for 2 ind.<br>0 for 1 ind. |
| Air_A1 policies on ETS exposure | N/A[5] | N/A | N/A | N/A | N/A |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

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[1] Air_D2V1 No information on freight-transport demand, there is only information on person-transport for domestic flight transport

[2] Air_P1 emissions, data are good or fairly good

[3] Air_P1 emissions, policy-relevance is good or fairly good

[4] The information for Air_E1V1 annual concentration of PM 2.5 does not currently exist in this form in Sweden

[5] The availability and nature, as well as the quantity and quality of data in existence vs. enforcement or compliance are so disparate that no single answer is possible.

## 3.2 Noise

- In Sweden we have implemented directive 2002/49/EC but measurements with $L_{den}$ have yet to have an impact in all sectors. Only aircraft noise is reported in $L_{den.}$ This means that the indicators are not considered to be policy-relevant at the moment. Sweden will obviously work in accordance with the intentions of the directive in the future and be able to make a different assessment later on.

*Noise Ex1 population exposed to various levels from different sources* - no policy relevance at present. Ready for use at the end of 2005 and should at that time have good policy relevance.
*Noise_E1 attributable fraction of risk of cardiovascular morbidity/mortality to noise exposure* - no policy relevance at the moment since we don't have data on estimated numbers of people exposed to $L_{den}$>65 dB(A) see comments on indicator *Noise_Ex1*. There is of course data available for morbidity *Noise_E1V2* and the indicator will probably have good policy relevance at the end of 2005.
*Noise_ E2 self reported noise health effects - annoyance and sleep disturbance* - in Sweden we feel that people's experienced problems are important indicators from an environmental medicine point of view. We perform this type of survey on the local, regional and national level.
*Noise_ A1 national regulations on maximum sound levels for indoor and outdoor leisure events*, Sweden has guidelines for sound levels in discotheques, at concerts and other places where sound levels are expected to be high indoors and outdoors. The recommendations are based on the Swedish Environmental Code and are monitored by the municipalities. Other questions concerning data collection are not applicable (N/A). We feel there is good policy relevance even though we have no data *on Noise_A1V2* and *A1V3*.
*Noise_A2 existence of effectiveness of urban or national action plans to solve noise problems* - we have taken noise issues into consideration in our NEHAP. In Sweden there are no existing urban or national action plans to solve noise problems according to the Environmental Noise Directive. National and urban action plans do however exist, based on noise mapping using Swedish calculation methods and measures.
Noise A3 willingness to enforce and implement the Environmental Noise Directive and to apply noise abatement measures - noise maps according to the Environmental Noise Directive are not mandatory in Sweden today and therefore in general no noise maps or action plans according to the Environmental Noise Directive have been made. Noise abatement measures are however taken on the national and regional level.

In our opinion Lnight must also be specified for lower levels than those proposed for ECOEHIS. Swedish guideline values, as is the case with WHO guideline values to protect people from sleep disturbance, are more stringent (WHO $L_{night}$ 45 dB). $L_{night}$ must also be specified in the 40-44 dB and 45-49 dB intervals and not just from 50 dB.
Similarly, $L_{den}$ needs to be specified from 45-50 dB.

As far as Sweden is concerned, it is important to retain the existing LAeq,24h indicator parallel to the indicators required under the EU directive.

The classification of every type of noise source is too detailed (e.g. the classification of road traffic on highways, urban roads, vans, heavy trucks, motorcycles, mopeds/scooters). Annoyance is appropriate to use as an indicator and it is important for it to be measured in a standardised way (ISO technical specifications exist). In the studies performed at the Department of Environmental Medicine at the Sahlgrenska University Hospital, the verbal 5-point question on **degree of**

**disturbance** and in several cases the numerical 0-10 scale have been used for several years. In previous Swedish studies, a 4-point disturbance scale was used (e.g. pre-1990 studies). In the 1999 environmental health survey, Environmental Health Report 2001, disturbance was measured only by asking the question **how often**people were disturbed, which is unacceptable.

Annoyance has considerable impact on decision-makers as there are many international studies that have investigated the link between noise levels and disturbance. There is a Dutch database in which the dose-response relationship for noise from different modes of transport is regularly updated. (Miedema).

For many politicians and other decision-makers, **disturbance** is a vague concept that has little impact.

Annoyance needs to be supplemented with indicators for the impact on various activities (of which sleep is one). Studies on noise from road traffic, trains and aeroplanes are ongoing in Sweden. The indicators that are probably the most suitable (indoors and outdoors adjacent to dwellings) are **disturbance of rest/recuperation during daytime** and**disturbance of conversation**. These indicators include frequency (never, sometimes, often) as well as degree (not disturbing at all, fairly disturbing, very disturbing). Good dose-response relationships have been obtained in previous and ongoing studies.

Sleep disturbance is a suitable indicator. A verbal categorisation classified by frequency and degree is being used in ongoing studies. The proposed indicator is suitable despite not being standardised within ISO. It is reasonable to assume that decision-makers feel that sleep disturbances are serious and the indicator should therefore be policy-relevant.

We will continue our environmental health surveys every four years and noise is a topic included. The Environmental Health Report 2005 (national reporting) also reports the problems experienced by children. Postal questionnaires are very useful. The studies, e.g. those among about 3,000 people exposed to noise from trains (1991-1994), those performed as part of the Mistra programme (about 1,000 people) and the ongoing studies in Lerum municipality (about 2,000 people) have all been performed using postal questionnaires. The response rate in the latest study was very good (just over 70 per cent) and in the other above-mentioned previous studies, it was between 60 and 65 per cent. Interviews are costly to perform and it is doubtful as to whether the response rate is higher. For example, the response rate in an 'omnibus' survey performed by Statistics Sweden (SCB) in autumn 2003 to monitor the environmental quality objective relating to noise was about 65 per cent. If we still wish to perform telephone interviews, the number of questions must be limited and not be as many as is proposed here.

In Sweden, we are working to design noise indicators such as:

- Degree of experienced disturbance
- Impact of noise on quality of sleep
- Impact of noise on rest and recuperation outdoors
- Access to a quiet side of the dwelling, i.e. lower than 45 dB not as in the directive, that is to say more than 20 dB lower than the noise level.
- Access to quiet/relatively quiet green area within 5 minutes walk from dwelling
- Percentage of people who complain of ill effects from traffic noise - ready for use in autumn 2004
- Percentage of people often disturbed by road traffic noise in their homes. As road traffic noise is the single biggest source of noise, noise disturbance from road traffic has been chosen as an indicator.

*Template of Summary Table for Each Section: Evaluation of Indicators on Noise*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Noise_Ex1 population exposed to various levels from different sources | 0.1[6] | 0.1 | 0.1 | 0 | 3 |
| Noise_E1 attributable fraction of risk of cardio-vascular morbidity/mortality | 0.75 | 0.75 | 0.75 | N/A | 1 for 3 ind.<br>2 for 1 ind. |
| Noise_E2self reported noise health effects | 0 | 0 | 0 | 2 | 3 |
| Noise_A1national regulations on max. sound levels, events | N/A[7] | N/A | N/A | 2 | N/A |
| Noise_A2 action plans | 0[8] | 0.25 | 0.25 | 2 | 3 for 1 ind. |
| Noise_A3 noise maps as EU dir. | 0[9] | 0 | 0 | 0 | 4 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.3 Housing and settlements

The Housing indicators are the most difficult data and meta-data to collect and it is therefore also difficult to evaluate their policy relevance. One of the main reasons for that is that in Sweden we do not use socio-economic indicators within our environmental work. Socio-economic aspects have had little bearing on new policies, their monitoring and evaluation and the prioritisation of measures. A large number of housing indicators are more suitable in other systems than as environmental health indicators. We feel that indicators concerning segregation, crowding rate in housing area, income rate/proportion of low income households in area, housing area environment, services in housing area and similar indicators can give us a clearer picture.

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[6] Noise_Ex1 population exposed. Air traffic: 1 point for Lden and 0 for Lnight. Road & Rail: 0 for both Lden and Lnight

[7] No Information on Noise_A1V2 and Noise_ A1V3-V6 Sweden has a recommendation for sound-levels in discothèques, concerts and other places where high sound levels are expected to be high indoors and outdoors. The recommendations are based on the Swedish Environmental Code and are followed up by the municipalities. Other questions concerning data-collection are not applicable

[8] Noise_A2 - In Sweden there are no existing urban or national action plans to solve noise problems according to the Environmental Noise Directive. National and urban action plans do however exist, based on noise mapping using Swedish calculation methods and measures.

[9] Noise_A3 - Noise maps according to the Environmental Noise Directive are not mandatory in Sweden today and therefore in general no noise maps or action plans according to the Environmental Noise Directive have been made. Noise abatement measures are however taken on the national and regional level

*Hous_P1 affordability* - data has been available for several years. It is ready for use within ECOEHIS but is not suitable for Swedish conditions as an environmental health indicator.
*Hous_Ex1 crowding* - is ready for use within ECOEHIS but is not suitable for Swedish conditions as an environmental health indicator. The Swedish housing stock is in the main in good condition. There is legislation prescribing a lowest acceptable standard. The municipalities are responsible for ensuring that people live in acceptable housing. Complaints from individuals are followed up.
*Hous_Ex2 accessibility* – socio-economic conditions have had little bearing on Swedish environmental health work. This indicator is hence not suitable for Swedish conditions.
*Hous_Ex3 extremes of indoor temperature* - we have temperature data and data on number of deaths and morbidity. It was quite difficult to link this data probably because of how we ordered the data from the data provider. Data can be generated, however. We have not thus far been able to link mortality to high temperature. *Hous_Ex3* is however not suitable for Swedish conditions due to the standard of housing and the climate. The indicator is hence of no policy relevance in Sweden. The indicator is maybe of more relevance in southern Europe and as an indicator for climate change.
*Hous_Ex4 dampness and mould growth* - we do not have any data on the number of dwellings but there is data from 1999 on the number of people who have reported on the questionnaire that they have had health problems caused by damp and mould in their dwelling. We do think it is an interesting indicator and for the future it might be possible to collect data that describes the housing stock. It is highly relevant for indoor air and health. Dampness and mould are very relevant for policy-making and we do have problems with them in Sweden both in new and old dwellings.
*Hous_Ex5 household hygiene*, there is legislation prescribing the lowest acceptable standard, see *Hous_Ex1* and this is not suitable as an environmental health indicator in Sweden.
*Hous_Ex6 Indoor radon in dwellings* - we use 200 Bq as a threshold value in new dwellings and 200 Bq as a guideline value in old dwellings. We have tried for many years to locate property that has high radon levels. This is the responsibility of the municipality. There are no acceptable statistics on levels in housing nor how many dwellings in each municipality have increased levels. Nor are there statistics on how many dwellings have been treated. There is data from 1991 but this does not reflect the current situation. A new large-scale survey has started in western Sweden and will be performed in other parts of the country at a later date. This will probably not cover the entire country, however. Radon indicators are relevant for Sweden and the average radon level in the country's housing is used as a Swedish indicator.
The proposed indicator *Hous Ex6* should, however, either be moved to Indicators on Radiation or developed so that it relates more explicitly to human health.
*Hous_E1 Housing safety and accidents* - data is available but not suitable for Swedish conditions as an environmental health indicator.
*Hous_ E1V6, data for number of dwellings that need renovation* - we only have data from surveys and only on the local level. We can generate data on the age of the housing stock and estimate renovation requirements.
*Hous_Ex7 crime and perception of crime* - ready for immediate use in ECOEHIS apart from *Hous_Ex7v5* and *Hous_Ex7v6* which don't have sufficient data. It is not suitable for Swedish conditions as an environmental health indicator.

These are indicators used or to be used in a near future in Sweden.

- Formaldehyde in housing, to be developed further
- The average radon level in the country's housing. A survey has started in 2004 in western Sweden.
- Percentage of people who complain of ill effects caused by the indoor environment - ready for use in autumn 2004
- Percentage of population who experience ill effects of damp, mould or mouldy smell in their homes- ready for use in autumn 2004 after survey in 1999
- Percentage exposed to environmental tobacco smoke at home, at work or in other environments - ready for use in autumn after survey in 1999

*Template of Summary Table for Each Section: Evaluation of Indicators on Housing and Settlements*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Hous_P1 Affordability | 2 | 2 | 2 | 2 | 1 |
| Hous_ Ex1 Crowding | 2 | 2 | 2 | 1 | 1 |
| Hous_ Ex2 Accessibility | 1.7 | 1.7 | 1.6 | 1.6 | 1 and 4[10] |
| Hous_ Ex4 Dampness/ Mould Growth | 0 | 0 | 0 | 2[11] | 4 |
| Hous_ Ex5 Household hygiene | 1.3[12] | 1.3 | 1.3 | 0.7 | 4 |
| Hous_ Ex6 Indoor radon in dwellings | 0 | 0[13] | 0 | 2 | 3 |
| Hous_ Ex3 Extreme temperature | 1 | 1.5 | 1.5 | 0 | 4 |
| Hous_ E1 Housing safety and accidents | 2 | 2 | 2 | 1.2 | 1 |
| House_ Ex7 Crime/Perception of crime | 1.85 | 1.75 | 1.5 | 0.25 | 1 and 4[14] |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.4 Traffic Accidents

Of the suggested indicators the ones related to environmental effects are of interest to the Swedish environmental health work. Traffic accidents are not included in Swedish environmental health work and are therefore unsuitable for Sweden.
*Traf_D1 (Air_D1) passengers-kilometres by mode of transport* - good policy relevance both nationally and regionally even for Swedish conditions.
*Traf_S1 age of vehicle fleet* - suitable to be used immediately with good policy relevance for air quality, energy consumption and accident frequency.
*Traf_S2 road accident rate*, S2V1 Number of road accidents - it is possible to make comparisons but the coverage rate is too low to obtain reliable data.

[10] 4 only for Hous_Ex2V1 and Hous_Ex2V2

[11] It is very relevant for policy-making

[12] Legislation exists for hygiene standards, Hous_Ex 5V1 number of dwellings lacking hygiene amenities are N/A.

[13] We use 200 Bq as threshold value in new dwellings and 200 Bq as guidelines in old dwellings.

[14] Hous_Ex7V5 and House_Ex7V6 after 2006

*Traf_S3 speed limit exceedance* - these questions are not possible to answer. We don't have any data on the number of vehicles exceeding the speed limit, we have estimates of the percentage of traffic volume exceeding the limit for different speed limits, therefore it is N/A. We have good statistics on the number of road users who exceed the specified speed limit, what proportion wear a seat-belt, helmet, etc.
*Traf_Ex1 person time spent on road*- average time for journeys to workplace, etc. are more suitable for Sweden. We feel it is better to relate this to a certain population group and thereby make it more policy relevant.
*Traf_Ex2 use of safety vehicle device* - we have no data, it is possible only after specific surveys.
*Traf_E1 mortality due to transport accidents*, the new directive 93/704/EC: Council Decision of 30 November 1993 on the creation of a Community database on road accidents changes our data collection somewhat. Sweden has a decree in which it is stated that the police must report information concerning deaths, accidents, etc. Statistics Sweden was in charge of the "final" database 1997-2001. Statistics Sweden reports the data to DG TREN. The police fill out forms about the accident and register it in a database, administrated by the National Road Administration. Data on micro level is reported to DG TREN.
*Traf_E3 injury rate* - only persons injured in police reported accidents are registered. This is an unsuitable indicator for Swedish environmental health work since inter alia neither personal injuries nor accidents are included in the indicator. The new STRADA information system will provide better statistics on those injured in traffic accidents registered in the healthcare system.
*Traf_E4 DALY lost for road accidents*, we need more specifications to know which deaths to count. Unsuitable indicator for Swedish environmental health work since accidents are not included.
*Traf_5 mortality due to drink driving*, We need more specifications to know which deaths to count. The existing Swedish data are based on suspicion by the police. All fatalities are not tested but most of the victims are autopsied. Unsuitable indicator for Swedish environmental health work since accidents are not included in our work with the environmental objectives.

*Template of Summary Table for Each Section: Evaluation of Indicators on Traffic Accidents*

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Traf_D1 (Air_D1) passengers-kilometres by mode of transport | 2 | 1 | 1 | 2 | 1 |
| Traf_S1 age of vehicle fleet | 2 | 2 | 2 | 2 | 1 |
| Traf_S2 road accident rate | 2 | 1 | 1 | 2 | 1 |
| Traf_S3 speed limit exceedance | N/A[15] | N/A | N/A | N/A | N/A |
| Traf_Ex1 person time spent on the road | 1 | 0.5 | 0 | 0 | 4 |
| Traf_Ex2 use of safety vehicle device | N/A[16] | N/A | N/A | N/A | N/A |
| Traf_E1 mortality due to transport accidents | 2 | 2 | 2 | 2 | 1 |
| Traf_E2 Called Traf E1 in Excel | 2 | 2 | 2 | 2 | 1 |
| Traf_E3 injury rate | 1 | 1 | 2 | 1 | 1 |
| Traf_E4 DALY lost for road accidents | N/A[17] | N/A | N/A | N/A | N/A |
| Traf_E5 mortality due to drink driving | 0 | 0 | 1 | 1 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

[15] we have estimates of the percentage of the traffic volume not number of vehicles exceeding different speed limits

[16] no data at the moment only after specific surveys

[17] The indicator needs to be better specified so that we know which fatalities are to be included

## 3.5 Water and Sanitation

Sweden is privileged with ample access to relatively clean raw water from both surface and ground supplies. This, in turn, means that the public municipal supply of drinking water is generally of good quality. The National Food Administration (NFA) Ordinance sets quality requirements on surface raw water as well as on the waterworks that have the responsibility for the preparatory treatment and distribution of drinking water. Swedish waterworks generally have adequate control data on the quality of their supply. Temporary failures do occasionally occur. The importance of planning for emergencies has been given priority at the NFA.

The EC Directives are transposed into NFA Ordinances and published in the NFA's own Code of Statutes, LIVSFS (previously SLVFS). EC Regulations are directly applicable in Sweden. The authority for the NFA to issue legislation is primarily laid down in the Food Act and the Food Decree.

The NFA is responsible at the national level for enforcing the Food Act and regulations issued under the provisions thereof. It also initiates food control projects that are carried out by municipalities and follows up the results of food control carried out at the municipal level. The municipal Environment and Health Protection Committees carry out food control at all food handling establishments, except larger facilities that are under the supervision of the NFA, including waterworks. Food samples collected by the municipal food control authorities are usually analysed by private laboratories accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC). At present there are about 60 such laboratories in Sweden, 47 of which work mainly with analysis of drinking water.

Regular control of waterworks is essential and there are regulations laid down, instructing the Municipal Boards to report annually to the NFA on the public supervision carried out. These reports are intended to help achieve uniformity in the public supervision of drinking water in Sweden. Carrying out regular controls is seen as a tool for both the producers and municipalities to assess the chemical and microbiological quality of drinking water supplied to the general public.

Out of Sweden's total population of 9 million, about 1.2 million permanent dwelling residents and 1.2 million holiday home residents obtain their drinking water from their own private wells or small-scale treatment plants. Most of these wells are drilled into the bedrock. This means that the bedrock itself can have a significant impact on the water quality, which can vary considerably. The residents themselves are responsible for the well and the drinking water quality.
*WatSan_ P1 wastewater treatment* - fair policy relevance and can be used immediately.
*WatSan_S1 recreational water compliance* - fair policy relevance, can be used in 2004. This will be more relevant for Swedish conditions now when the directive is amended so that samples are mainly taken during our relatively short bathing season.
*WatSan_ S2 drinking water compliance* – data is available but it is not an important environmental health indicator in Sweden, see above.
*WatSan_ Ex1 safe drinking water* – data is available for municipal water and we don't feel it is an important environmental health indicator in Sweden, see above
*WatSan_ E1 outbreak of waterborne diseases* - we have no acceptable reporting of the number of outbreaks when it comes to drinking water. There is no reporting at all for bathing water. It is not applicable in Sweden.
*WatSan_ A1 management of bathing waters* -ready for use this year and assessed as having fair policy relevance.

*WatSan_ A2 water safety plans* - there are no such plans in Sweden.
None of *WatSan* are of direct use or interest when it comes to reflecting Swedish conditions.

***Template of Summary Table for Each Section: Evaluation of Indicators on Water and Sanitation***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| WatSan_P1 wastewater treatment | 2 | 2 | 1 | 1 | 1 |
| WatSan_S1 recreational water compliance | 2 | 2 | 2 | 1 | 2 |
| WatSan_S2 drinking water compliance | 1 [18] | 1 | 1 | 0 | 3 |
| WatSan_Ex1 Safe drinking water | 1 | 1 | 1 | 1 | 1 |
| WatSan_E1 Outbreak of waterborne diseases | 0.5 [19] | 0 | 0 | 0 | 1 and 4 |
| WatSan_A1 Management of bathing waters | 2 | 2 | 2 | 1 | 2 |
| WatSan_A2 water safety plans | N/A [20] | N/A | N/A | 0 | 4 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

## 3.6 Chemical Emergencies

Since there are good statistics for most of the indicators, we have assessed them as fair from a policy point of view. However, we feel none of the proposed indicators have complete policy relevance and are not applicable to Swedish conditions.

*Chem_P1 industrial facilities under Seveso ll directive*, ready to use this year but only fair policy-relevance
*Chem_ A1 regulatory for land use planning*, *Chem_A1V3* not available, the others are available and ready for use in 2004 and are assessed as having fair policy-relevance.

[18] 0 points for WatSan_S2V1 number of non-compliance samples, and 2 points for WatSan_S2V2 total number of samples

[19] No data for WatSan_S2 recreational waters.

[20] There are no water safety plans for drinking water in Sweden, in this sense.

*Chem_ A2 chemical incidents register* - a recently started register and ready for use sometime this year. *Chem_A2V1* pollutant and transfer register - is policy relevant for Sweden. Dangerous goods and fire rescue is of less interest for policy-making in Sweden.
*Chem_ A3 government preparedness* – Sweden has sufficient legislation and organisation. The Swedish Rescue Services Agency (SRSA) is responsible for supervision in four fields: The Swedish Rescue Services Act; the Transport of Dangerous Goods Act (the part that covers safety advisers); the Law on Measures to Prevent and Limit the Consequences of Serious Chemical Incidents (Seveso Directive); and the Flammable and Explosive Goods Act. The SRSA also exercises supervision of SOS Alarm AB (Regional alarm centres) to ensure that they meet the requirements of their agreement with the state.

Work in the respective areas is, via supervision, monitored and evaluated so that incidents and accidents can be prevented.

The SRSA provides guidance and support to the county administrative boards, the municipalities, and the police, for their supervisory activities at regional and local levels. This covers:
· the county administrative boards' supervision of the municipalities' responsibilities in connection with the fire & rescue services, and of certain industrial operations that handle hazardous substances;
· the municipalities' supervision of operations that handle flammable goods; and
police supervision of operations that store and sell explosive goods.

Local rescue services are responsible for clean-up and safety measures in the event of a chemical accident where there is a risk of harm to humans, animals or the environment.

Indicators that concern human health more directly are currently being developed as part of the monitoring system that Sweden employs to attain the environmental quality objective of A non-toxic environment.

- prevalence of nickel-allergy, based on questionnaire data from 1999
- urinary-Cd and tubular proteinuria in women
- persistent organic pollutants in breast milk
- mercury in hair from pregnant women

***Template of Summary Table for Each Section: Evaluation of Indicators on Chemical Emergencies***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Chem_P1 | 2 | 2 | 2 | 1 | 2 |
| Chem_A1 | 1.5 [21] | 1.5 | 1.5 | 1 | 2 |
| Chem_A2 | 2 | 1.3 | 1.3 | 1 | 1 |
| Chem_A3 | 2 | 2 | 2 | 2 | 2 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

[21] No information on Chem_A1V3 information on existence and enforcement of regulatory requirement for land use planning

### 3.7 Radiation

We feel the proposed indicators Rad_E1 and Rad_A1 are policy-relevant both within ECOEHIS and for Swedish environmental health work.
*Rad_A1 effective environmental monitoring*, good policy relevance.
*Rad_E1 incidence of skin cancer*, should be divided up so that annual number of skin cancer cases is divided into epithelial cancer and malignant melanoma.

***Template of Summary Table for Each Section: Evaluation of Indicators on Radiation***

| Indicator ID | Data Availability (1_S) * | Data Quality (2_S) * | Comparability (3_S) * | Policy-relevance (4_S_1) * | Overall Readiness (4_S_2) ^ |
|---|---|---|---|---|---|
| Rad_E1 | 2 | 2 | 2 | 2 | 2 |
| Rad_A1 | 2 | 2 | 2 | 2 | 1 |

* Enter 2 for 'good', 1 for 'fair', or 0 for 'poor' according to your answers to the question

^ Enter 1, 2, 3, or 4 according to your answers to the question

1. Immediately, 2. By the end of 2004, 3. By the end of 2005, 4. After 2006

# 4 Conclusions

As far as Sweden is concerned, we are keen to avoid as much work duplication as possible. It is desirable for us therefore to make the indicators proposed within ECOEHIS as applicable as possible to Swedish conditions and this means that we would like to be able to use them in our work with the above-mentioned environmental quality objectives.

An overall assessment shows that there is a lot of work, considerable costs and substantial personnel resources involved in developing such a large indicator system (46 indicators, more than 250 elements and 45 questions for each element). One indicator, Air_P1 emissions, consists of 36 different sub-elements. This is presented on a single Excel spreadsheet and is impossible to manage from an administrative point of view even if the data exists. Individuals who have been collecting data have put a great deal of work into it. A lot of time has been spent since this is a new system and a new way of working with existing or non-existent data. Most of those working with data collection have not specified how much time and money they have spent since it would be difficult to estimate and would be even more time-consuming. They have worked within their ordinary working hours but they have pointed out that the work has been time-consuming.

It is possible to identify a few indicators that show how human health is affected by the environment in a way that can be monitored over time. A number of the suggested indicators include elements that are N/A in Sweden. This makes the indicator as a whole less interesting than if the elements that are N/A were not part of it. A number of indicators need to be further developed.

An established national organisation is required to develop data collection further and send it on to the international organisation whose task it is to compile the data.

The following indicators from the ECOEHIS list are important for Sweden to work on and coincide with our current efforts based on the Swedish environmental quality objectives.

- Air Ex1V2- V3

Years of expected life lost due to long-term exposure to particulate matter.

- Rad A1 and RadE1

Number of annual cases of skin cancer, divided into epithelial cancer and malignant melanoma.

- Hous Ex6

The average radon level in the country's housing.

- Hous Ex4

Percentage of housing with damp, mould or mouldy smell

- Air_A1 policies on ETS exposure

Percentage exposed to environmental tobacco smoke at home, at work or in other environments

- Noise E2

Percentage of people often disturbed by road traffic noise in their homes.

# 5 Abbreviations

| Acronyms such as institute names in your country | English name |
|---|---|
| BRÅ Brottsförebyggande rådet | National Council for Crime Prevention |
| EPER | European Pollutant Emission Register (Se KUR) |
| FHI Folkhälsoinstitutet | National Institute of Public Health in Sweden |
| GU Göteborgs Universitet | Göteborg University |
| IVL IVL Svenska Miljöinstitutet AB | IVL Swedish Environmental Research Institute Ltd |
| LFV Luftfartsverket | Swedish Civil Aviation Administration |
| LV Livsmedelsverket | National Food Administration |
| NV NAturvårdsverket | Swedish Environmental Protection Agency |
| SCB Statistiska Centralbyrån | Statistics Sweden |
| SIKA Statens Institut för Kommunikationsanalys | Swedish Institute for Transport and Communication Analysis |
| Vägverket | Swedish National Road Administration |
| SMHI Sveriges meteorologiska och hydrologiska institut | Swedish Meteorological and Hydrological Institute |
| SMI Smittskyddsinstitutet | The Swedish Institute for Infectious Disease Control |
| SoS Socialstyrelsen | The National Board of Health and Welfare |
| SRSA Räddningsverket | Swedish Rescue Services Agency |
| SSI Strålskyddsinstitutet | The Swedish Radiation Protection Authority |
| BV Banverket | National Rail Administration |
| BoV Boverket | The National Board of Housing, Building and Planning |
| SSF Svenska Stöldskyddsföreningen | The Swedish Theft Prevention Association |

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