Grant Agreement n.2003118
Project leader: Simona Giampaoli

FINAL REPORT

UPDATED MAY 2006
The EUROCISS Project (European Cardiovascular Indicators Surveillance Set http://www.cuore.iss.it/eurociss/eurociss.asp) was set up in 2000 by a partnership of EU countries under the co-ordination of the Istituto Superiore di Sanità (ISS), Centre of Epidemiology, Surveillance and Health Promotion, Unit of Epidemiology of Cerebro and Cardiovascular Disease, Rome, Italy, as part of the Health Monitoring Programme (HMP) of the European Commission (EC).

The project has received financial support from the European Commission, Health and Consumer Protection Directorate-General.

Neither the European Commission nor any person acting on its behalf is responsible for any use that might be made of the following information.

The information contained in this report does not necessarily reflect the opinion or the position of the European Commission.

In the year 2004 the Project was re-funded and more European countries were involved. The Project actually involves 18 European countries and the European Heart Network.
Partners of the EUROCISS project

AUSTRIA
BELGIUM
CZECH REPUBLIC*
DENMARK
FINLAND
FRANCE
GERMANY
GREECE
HUNGARY*
ICELAND*
ITALY
THE NETHERLANDS
NORWAY
POLAND*
PORTUGAL
SPAIN
SWEDEN
UNITED KINGDOM

EUROPEAN HEART NETWORK

*: partners involved in the Project 2nd phase
This report resulted from cooperation among the following partners:

K. Steinbach AUSTRIA
M. Kornitzer (200-2005), Guy De Backer (2006-) BELGIUM
J. Holub (2004-) CZECH REPUBLIC
M. Madsen DENMARK
V. Salomaa FINLAND
T. Lang, S. Paterniti (2000-2003), J. Bloch (2004-) FRANCE
V. Benetou (2000-2003), A. Trichopoulou (2004-) GREECE
R. Adany (2004-) HUNGARY
V. Gudnason (2004-) ICELAND
S. Giampaoli, S. Panico, D. Vanuzzo, L. Palmieri, P. Ciccarelli, V. Rebella ITALY
S. Graff-Iversen NORWAY
A. Pajak (2004-) POLAND
S. Sans SPAIN
N. Hammar SWEDEN
M. Rayner, S. Petersen (2000-2003), S. Allender (2004-) EUROPEAN HEART NETWORK
EUROCISS WORKING GROUP

AUSTRIA
Konrad K. STEINBACH
Ludwig-Boltzman-Institut für Arrhytmieforschung
Austrian Heart Foundation
Türkenstraße 12 / 3, 1090 Vienna, A-1090 Wien
Tel.: +43 1 405 91 55
Fax: +43 1 405 91 56
E-mail: office@herzfonds.at

BELGIUM
Marcel KORNITZER (former representative)
Guy DE BACKER
Dept. of Public Health
University Hospital
Ghent

CZECH REPUBLIC
Jiri HOLUB
Institute of Health Information and Statistics
of Czech Republic
Palackeho namesti 4 P.O. Box 60
128 01 Praha 2
Tel.: +420 224 972 243
Fax: +420 224 972 659
E-mail: holub@uzis.cz

DENMARK
Mette MADSEN
National Institute of Public Health
Oester farimagsgade 5, DK1399, Copenhagen
Tel.: +45 39 20 77 77
Fax: +45 39 20 80 10
E-mail: mm@niph.dk

FINLAND
Veikko SALOMAA
National Public Health Institute, KTL
Department of Epidemiology
Mannerheimintie 166, 00030 Helsinki
Tel.: +358 9474 48620
Fax: +358 9474 48338
E-mail: veikko.salomaa@ktl.fi

FRANCE
Juliette BLOCH
Institut de Veille Sanitaire
Dept Maladies Chronique et Traumatismes
12, rue du Val d’Osne, 94415 Saint-Maurice
Tel.: +33 1 41796829
Fax: +33 1 41796811
E-mail: j.bloch@invs.sante.fr

GERMANY
Angela DORING
Institute für Epidemiologie, GSF Forschungszentrum
für Umwelt und Gesundheit
Ingolstaedter Landstr. 1, D-85764 Neuherberg
Tel.: +49 89 31 87 4153
Fax: +49 89 31 87 3667
E-mail: doering@gsf.de
GREECE
Antonia TRICHOPOULOU
Dept. of Hygiene and Epidemiology
School of Medicine, University of Athens
75 Mikras Asias Str., Athens GR 115 27
Tel.: +30 210 7488 042
Fax: +30 210 7488 902
E-mail: antonia@nut.uoa.gr

HUNGARY
Roza ADANY
School of Public Health, University of Debrecen
Kassai str. 26/B – H-4012 Debrecen
Tel.: +36 52 460-190
Fax: +36 52 460-195
E-mail: adany@jaguar.dote.hu

ICELAND
Vilmundur GUDNASON
Icelandic Heart Association Research Institute
Holtasmara 1, 201 Kopavogur
Tel.: +354 535 1800
Fax: + 354 535 1801
E-mail: v.gudnason@hjarta.is

ITALY
Simona GIAMPAOLI (Project Leader)
Luigi PALMIERI
Paola CICCARELLI
Valentina REBELLA
Istituto Superiore di Sanità
Viale Regina Elena 299 – 00161 Rome
Tel: +39-06-49904231
Fax: +39-06-49904230
E-mail: sgiamp@iss.it
Salvatore PANICO
Università di Napoli Federico II
Via Pansini 5 – 80131 Napoli
Tel.: +39 081 7463687
Fax: + 39 081 5466152
E-mail: spanico@unina.it
Diego VANUZZO
Azienda per i servizi Sanitari 4 Medio Friuli
Piazza S.Maria della Misericordia, 15 – 33100 Udine
Tel.: +39 0432 552451
Fax: + 39 0432 552452
E-mail: diego.vanuzzo@sanita.fvg.it

THE NETHERLANDS
WM Monique VERSCHUREN
National Institute of Public Health and Environment (RIVM)
Box 1, NL-3720 BA Bilthoven
Tel.: + 31 30 274 3508
Fax: +31 30 274 4407
E-mail: wmm.verschuren@rivm.nl
NORWAY
Sidsel GRAFF-IVERSEN
Norwegian Institute of Public Health
P.O. Box 4404 Nydalen, 0403 Oslo
Tel.: +47 23408171
Fax: +47 23 40 82 60
E-mail: sidsel.graff-iversen@fhi.no

POLAND
Andrzej PAJAK
Department of Epidemiology and Population Studies
Institute of Public Health, Medical College
Jagellonian University
St. Grzegórzecka, 20., 31-531 Kraków
Tel.: +48 12 4248321
Fax: +48 12 4218660
E-mail: mmpajak@cyf-kr.edu.pl

PORTUGAL
Evangelista Casimiro ROCHA
Faculdade de Medicina de Lisboa, Instituto de Medicina Preventiva
Av. Prof. Egas Moniz, P-1649-028 Lisbon
Tel.: +351 21 798 5130
Fax: +351 21 795 7409
E-mail: evangelistarocha@hotmail.com

SPAIN
Susana SANS
Institut d'Estudis de la Salut
Balmes 132
Barcelona 08008
Tel.: 
Fax:
E-mail: susana.sans@uab.es

SWEDEN
Niklas HAMMAR
Department of Epidemiology
Norrbacka Building, S-17176 Stockholm
Tel.: +46 8 51 77 6606
Fax: +46 8 51 77 6529
E-mail: niklas.hammar@imm.ki.se

UNITED KINGDOM
Paola PRIMATESTA
University College London Medical School
Department of Epidemiology and Public Health
1-19 Torrington Place, London WC1E 6BT
Tel.: +44 20 76791269
Fax: +44 20 78130280
E-mail: p.primatesta@ucl.ac.uk

EUROPEAN HEART NETWORK
Steven ALLENDER
Research Fellow
Department of Public Health
University of Oxford
Old Rd Campus
Oxford OX3 7LF
Tel: 01865 226837
Fax: 01865 226720
E-mail: steven.allender@public-health.oxford.ac.uk
1. Summary

2. Organisation and management

3. Introduction

4. Aims and objectives
   Cardiovascular diseases to be considered

5. Indicators: list and definition
   Health status indicators
   6.1.a Mortality
   6.1.b Morbidity
   6.1.c Disability
   6.2 Determinants of health
   6.2.a Personal biological factors
   6.2.b Health behaviours
   6.3 Health system indicators
   6.3.a Medicine use
   6.3.b Surgical operations
   6.3.c In-patient care utilisation

7. Sources of information
   7.1 Hospital discharge records
   7.2 Surveys
   7.3 Longitudinal studies
   7.4 GP networks
   7.5 Registers based on administrative data
   7.6 Population-based registers

8. Validation and quality of data

9. Data availability
   9.1 EU level
      9.1.a WHO
9.1.b EUROSTAT
9.1.c OECD
9.1.d MONICA

9.2 National level
9.2.a Inventory
9.2.b Main differences between registers

10. Definition of cardiovascular
10.1 Nosologic definition
10.2 Nosographic definition
10.3 Standardised diagnostic criteria
   10.3.a Acute Myocardial Infarction (WHO, MONICA, ESC–ACC)
   10.3.b Unstable angina
   10.3.c Ischaemic heart disease
   10.3.d Heart failure (Framingham, Boston, ESC)
   10.3.e Stroke (WHO, MONICA)

11. Recommended indicators
   11.1 Acute myocardial infarction
   11.2 Acute coronary syndrome
   11.3 Ischaemic heart diseases
   11.4 Heart failure
   11.5 Other forms of heart diseases
   11.6 Stroke
   11.7 Medication use for cardiovascular diseases and their risk factors

12. Conclusions

References
Appendix 1
Minutes of 1st EUROCISS II Partners’ Meeting, 11-12 October 2004

Appendix 2
Minutes of the EUROCISS II Steering Committee Meeting, 24-25 February 2005

Appendix 3
Minutes of 2nd EUROCISS II Partners’ Meeting, 4-6 October 2005

Appendix 4
Minutes of the EUROCISS II Steering Committee Meeting, 11-13 May 2006
Figure 1 – Data flow in population-based registers

Table 1a - WHO: HFA-DB, Hospital discharges: circulatory system disease

Table 1b - WHO: HFA-DB, Hospital discharges: ischaemic heart disease

Table 1c - WHO: HFA-DB, Hospital discharges: cerebrovascular disease

Table 2 - EU population involved in the MONICA Project for monitoring coronary events

Table 3 - EU population involved in the MONICA Project for monitoring cerebrovascular events

Table 4 - Hospital discharge records

Table 4a - Hospital discharge records (updated 2006)

Table 5a - Surveys at national level

Table 5b - Surveys at regional level

Table 5c - Health Examination Survey (updated 2006)

Table 5d - Health Interview Survey (updated 2006)

Table 6 - Longitudinal studies

Table 7 - General practitioner networks

Table 8 - Population-based registers for acute myocardial infarction

Table 8a - Regional Population-based registers for acute myocardial infarction (updated 2006)

Table 8b - National Population-based registers for acute myocardial infarction (updated 2006)

Table 9 - Population-based registers for cerebrovascular diseases

Table 9a - Regional Population-based registers for cerebrovascular diseases (updated 2006)

Table 9b - National Population-based registers for cerebrovascular diseases (updated 2006)
Table 10 - Population-based register: case definitions

Table 11 - Population-based register: case definitions

Table 12 - Conversion table between ICD–VIII, IX, and X revision

Table 13 - Indicators for acute myocardial infarction

Table 14 - Indicators for acute coronary syndrome

Table 15 - Indicators for ischaemic heart diseases

Table 16 - Indicators for heart failure

Table 17 - Indicators for other forms of heart disease

Table 18 - Indicators for cerebrovascular diseases
### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS</td>
<td>Acute Coronary Syndromes</td>
</tr>
<tr>
<td>ADL</td>
<td>Activities of Daily Living</td>
</tr>
<tr>
<td>AMI</td>
<td>Acute Myocardial Infarction</td>
</tr>
<tr>
<td>ATC</td>
<td>Anatomical Therapeutic Chemical</td>
</tr>
<tr>
<td>CABG</td>
<td>Coronary Artery By-pass Grafting</td>
</tr>
<tr>
<td>CAD</td>
<td>Coronary Artery Disease</td>
</tr>
<tr>
<td>CVA</td>
<td>CerebroVascular Accidents</td>
</tr>
<tr>
<td>CVD</td>
<td>CardioVascular Disease</td>
</tr>
<tr>
<td>DDD</td>
<td>Defined Daily Dose</td>
</tr>
<tr>
<td>DG</td>
<td>Directorate General</td>
</tr>
<tr>
<td>DRG</td>
<td>Diagnosis Related Groups</td>
</tr>
<tr>
<td>EHRM</td>
<td>European Health Risk Monitoring</td>
</tr>
<tr>
<td>EQ</td>
<td>EuroQol</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EUROCISS</td>
<td>European Cardiovascular Indicators Surveillance Set</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organisation</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>HDR</td>
<td>Hospital Discharge Records</td>
</tr>
<tr>
<td>HES</td>
<td>Health Examination Surveys</td>
</tr>
<tr>
<td>HF</td>
<td>Heart Failure</td>
</tr>
<tr>
<td>HFA-DB</td>
<td>Health For All statistical DataBase</td>
</tr>
<tr>
<td>HIS</td>
<td>Health Interview Surveys</td>
</tr>
<tr>
<td>HMP</td>
<td>Health Monitoring Programme</td>
</tr>
<tr>
<td>I</td>
<td>incidence</td>
</tr>
<tr>
<td>ICD</td>
<td>International Classification of Diseases</td>
</tr>
<tr>
<td>ID</td>
<td>IDentification number</td>
</tr>
<tr>
<td>IHD</td>
<td>Ischaemic Heart Disease</td>
</tr>
<tr>
<td>LSHTM</td>
<td>London School of Hygiene and Tropical Medicine</td>
</tr>
<tr>
<td>MDB</td>
<td>Mortality DataBase</td>
</tr>
<tr>
<td>MDC</td>
<td>Major Diagnostic Categories</td>
</tr>
<tr>
<td>MONICA</td>
<td>Monitoring trends and determinants of Cardiovascular diseases</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>P</td>
<td>prevalence</td>
</tr>
<tr>
<td>PTCA</td>
<td>Percutaneous Transluminal Coronary Angioplasty</td>
</tr>
<tr>
<td>SD</td>
<td>Sudden Death</td>
</tr>
<tr>
<td>TIA</td>
<td>Transient Ischaemic Attack</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
1. **Summary**

Although cardiovascular disease (CVD) has been identified as one of the leading contributors to the global disease burden, the number of reliable indicators for monitoring CVD and for which data are available on a comparable basis across EU countries is currently limited. Therefore, the aims of the EUROCISS project were to define indicators for monitoring CVD and to recommend standardised methods for future data collection in the European Union (EU). The achievement of these aims will facilitate cross-country comparisons and will assist efforts to improve CVD prevention and control.

Specific project objectives included:

1. prioritise CVD of importance in public health;
2. identifying specific indicators for assessing morbidity;
3. developing recommendations for collection and harmonisation of data that can be easily applicable within member countries in order to obtain reliable and significant data for the periodic monitoring of CVD.

**Objective 1 - prioritise CVD of importance in public health**

In prioritising CVD of greatest interest, two criteria have been selected: high prevalence of disease, in terms of mortality, morbidity and disability; and the possibility of prevention, in terms of modifiable risk factors.

On the basis of these criteria, acute myocardial infarction/acute coronary syndromes, ischemic heart diseases, heart failure and cerebrovascular accidents are considered the most important CVD.

**Objective 2 - Identifying specific indicators for assessing morbidity**

**Acute myocardial infarction/acute coronary syndromes (AMI/ACS)**

Recommended indicators include mortality, hospital discharge rates, incidence/attack rates and case fatality. Only mortality and hospital discharge diagnoses are available for all countries. Information about incidence/attack rate and case fatality is available in some countries through population-based registers, usually implemented at the regional level. These registers are based on record linkage of mortality and hospital discharge diagnoses and apply some validation procedures.

Recently, sensitive serologic biomarkers have become available for the identification of very small myocardial infarctions that would not have been detected earlier. The application of new and more sensitive biomarkers criteria will potentially cause a rise in the myocardial infarction incidence and a fall in the case fatality rate.

**Heart failure and Ischemic Heart Diseases**

Heart failure is a frequent complication of myocardial infarction and hypertensive disease. Hospitalisation rates are not sufficient to evaluate the frequency of the disease, because heart failure
does not necessarily require routine hospitalisation. For this reason, the EUROCISS working group suggests review of GP medical records, health examination surveys or CVD surveys and the adoption of standardised criteria. If hospital discharge records are used, validation studies are recommended because heart failure can be found under other diagnoses.

Other indicators can be used as a proxy to measure the burden of the disease if integrated with other sources of information, e.g. national consumption of drugs used to treat heart failure and its complications. Among the recommended indicators, functional disability and quality of life are suggested in patients with HF.

Prevalence of ischemic heart diseases is assessed by surveys, but information on important clinical measures is often lacking.

Cerebrovascular accidents

Recommended indicators for cerebrovascular accidents include mortality, hospital discharge rate, incidence/attack rate, case fatality and prevalence. Mortality and hospital discharge diagnoses are available for all countries. Information about incidence/attack rate and case fatality of stroke is available in some countries through population-based registers; prevalence is assessed by CVD surveys, health interview surveys and health examination survey. Special surveys at 1 year follow-up of stroke patients are recommended to evaluate the functional disability and the quality of life.

Objective 3 - Developing recommendation for data collection

The list of the new recommended indicators is based on available data and can be generated over a relatively short period of time: these indicators are called short-term implementation indicators. Others, called long-term implementation indicators, need a longer period of time to be implemented; most of these indicators represent validated versions of the available and short-term indicators and require, for each country, the training of a dedicated team of epidemiologists to support their development.

Following the experience of many Northern European countries, it is also recommended that all medical and death records across Europe adopt a personal identification number, which would allow an easier and more accurate record linkage among the different sources of information.

The application of the recommended indicators, validated through standardised methodology in all countries will result in the availability of reliable, valid and therefore comparable data on CVD morbidity at the European level.

In the year 2004 the Project was re-funded and one of the main objective of the 2nd phase is the preparation of the Manual of Operations for the implementation of population-based registers of acute myocardial infarction/acute coronary syndrome, stroke and of CVD surveys.
To this purpose, three Writing Groups have been formed in order to elaborate each Manual: the Writing group of the Manual of Operations of AMI/ACS Registers, the Writing group of the Manual of Operations of Stroke and the Writing group of the Manual of Operations of CVD Surveys.

Partners have been grouped according to their expertise. Each group is coordinated by a member of the Steering Committee who has the task to organize the activities of the members.

After an accurate bibliography revision (see Interim report 2005), the three Writing Groups have started the elaboration of the Manuals and they are still working on them.

The procedures described in the Manuals aim to be very simple. Starting from a minimum data set and following a step-wise procedure, a standardized model for the implementation of registers and surveys is provided.

A draft version of each Manual is enclosed to this Report.

Another achievement of the EUROCISS phase II has been the further development of the project WEB SITE (http://www.cuore.iss.it/eurociss/en/progetto/progetto.asp):
- under the section “Data at national level” tables summarising data about cardiovascular diseases by single country are now available in a more updated and completed version;
- a forum for discussion has been set up. This internal ‘working page’ can be accessed exclusively by EUROCISS partners through a password. Tables summarizing data from partner countries, draft Manuals of Operations, minutes of previous meetings and the Interim Report are among the most important documents available on the forum;
- a new page on the EUROCISS web site has been created to allow visitors to view all the past meetings where EUROCISS project had been presented;
- a list of future meetings can be found on the EUROCISS web site as well. This page contains the submitted proposals and abstracts and will be continually updated.

Being the web site the best and fastest way to spread information all over the world, all partners strongly contribute to its continuous development and updating.
2. Organisation and Management

The project is a collaborative effort of 18 different member states and the European Heart Network. Initially, twelve countries signed the agreement to participate (Austria, Belgium, Finland, France, Germany, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom). Two other countries (Denmark and Greece) joined the project later on. In the year 2004 four further countries (Czech Republic, Hungary, Iceland, Poland) were involved in the Project.

A questionnaire for the creation of an of the available information sources and indicators was prepared and sent to each partner country who returned it completed.

A list of possible indicators and recommendations was generated during the meetings open to all formal participants. Six meetings were organised during the I phase of EUROCISS project:

- Rome, 5-6 April 2001;
- Amalfi, 18-21 October 2001;
- Luxembourg, 7-8 March 2002;
- Taormina, 17-20 April 2002;
- Dresden, 28-30 November 2002;
- Varese, 8-10 April 2003.

During the II phase of the project, two Partners’ meetings were held:

- Rome, 11-12 October 2004
- Barcelona, 4-6 October 2005

The minutes of these meetings are reported in Appendix 1 and 3 respectively

At the beginning of the second phase, a Steering Committee was set up. It is constituted of 4 members (S Giampaoli, M Madsen, A. Pajak, P Primatesa, S Sans) who will undertake to perform the following activities:

- support the coordinating centre in its main decisions;
- represent the project in all occasions;
- assure the involvement of all participating in supporting the objectives of the project;
- contribute to the coordination of working groups;
- plan the dissemination of final results;
- give its contribution to other EU projects;
- assist the writing groups in organizing the work, discussing and reviewing the Manuals of Operations (Manual of Operations of Cardiovascular Surveys; Manual of Operations of AMI/ACS; Manual of Operations of CVD Registers) in collaboration with the coordinating centre.

Up to now, the Steering Committee members met twice:
- on February 24-25, 2005 in Rome
- on May 11-13 in Athens, on the occasion of the EUROPREVENT meeting

The minutes of these meetings are reported in Appendix 2 and 4 respectively

The EUROCISS project was presented:
- at the European Society of Cardiology Working Group on Epidemiology and Prevention (Taormina, 17-20 April 2002) in the symposium Surveillance of Cardiovascular Diseases ‘The EUROCISS Project: the need for a common health currency in Europe’ (S.Giampaoli);
- at the tenth Annual Meeting of the European Public Health Association (Dresden, 28-30 November 2002): Workshop ‘Monitoring of Cardiovascular Diseases and Risk Factors: results from the EUROCISS Project’ proposed by the EUROCISS Research Group: ‘Monitoring of acute myocardial infarction and coronary heart disease’ (N. Hammar); ‘Monitoring of stroke and other cerebrovascular diseases’ (V. Salomaa); ‘Monitoring of cardiovascular risk factors’ (S. Sans); ‘Recommendations from the EUROCISS Project’ (S. Giampaoli);
- at the International Epidemiological association - European Epidemiology Federation (Toledo, 1-4 October 2003): Workshop ‘Monitoring of Cardiovascular Diseases and Risk Factors: results from the EUROCISS Project’ proposed by the EUROCISS Research Group: ‘Monitoring of acute myocardial infarction and coronary heart disease’ (N. Hammar); ‘Monitoring of stroke and other cerebrovascular diseases’ (V. Salomaa); ‘Monitoring of cardiovascular risk factors’ (S. Sans); ‘Recommendations from the EUROCISS Project’ (S. Giampaoli);
- at the 11th Annual Meeting of the European Public Health Association (Rome, 20-22 November 2003): Workshop ‘Monitoring of Cardiovascular Diseases: results from the EUROCISS Project’ proposed by the EUROCISS Research Group: “The burden of cardiovascular diseases in Europe” (S Sans); “Recommended indicators for monitoring acute myocardial infarction and ischemic heart diseases” (N Hammar); “Recommended indicators
for monitoring stroke and other cerebrovascular diseases” (S Petersen); “Recommended indicators for monitoring of heart failure and other forms of heart disease” (K Steinbach);

- at the Workshop “A Canadian Best Practices system for chronic disease prevention and control” (Toronto Ontario, Canada 10-11 March 2005);

- at the Sixth International Conference on Preventive Cardiology (Foz do Iguassu, Brazil, 21-25 May 2005): “European Cardiovascular Indicators Surveillance Set (EUROCISS): Recommendations for monitoring cardiovascular disease” (poster);

- at the ESC Congress 2005 (Stockholm, Sweden, 3-7 September 2005): “Population-based registers of Myocardial Infarction in Europe: results of the EUROCISS Project” (D. Vanuzzo);

- at the EUPHA 13th European Conference on Public Health (Graz, Austria, 10-12 November 2005): “The EUROCISS Project: development of cardiovascular morbidity indicators for the European Community” (S. Giampaoli); “Cardiovascular registers in Europe: results from EUROCISS Project” (S. Giampaoli);

- at the EUROPREVENT Congress (Athens, 10-13 May 2006): “EUROCISS: recommendations for coronary event surveillance in Europe” (S Giampaoli); “The EUROCISS Project: development of standardized measure for monitoring Coronaty Heart Disease in Europe” (M. Madsen);

- at the European Congress of Epidemiology (Utrecht, The Netherlands, 28 June-1 July 2006): “Population-based Registers for Myocardial Infarction in Europe: results from EUROCISS Project” (WM Monique Verschuren);

The following manuscripts have been published on behalf of the EUROCISS Working Group:

- Coronary and cerebrovascular population-based registers in Europe: are morbidity indicators comparable? Results of the EUROCISS Project (European J Public Health 2003;13, suppl3);

- “Population-Based Registers Of Acute Myocardial Infarction In Europe: Are Their Indicators Comparable?” (article to be submitted to European Journal of Cardiovascular Prevention and Rehabilitation)
The Project is coordinated by Simona Giampaoli, head of Unit of Epidemiology of Cerebro and Cardiovascular Diseases, National Centre for Epidemiology, Surveillance and Health Promotion.

She avails herself of the support of the following national officials: L.Palmieri, P.De Sanctis, C.Lo Noce, A.Giannelli, C.Donfrancesco, F.Dima.

Two full time researchers, P.Ciccarelli and V.Rebella are assigned to the activities of the Project and are paid by project funds.
3. Introduction

The EUROCISS Project (European Cardiovascular Indicators Surveillance Set) was launched in 2000 by a partnership of EU countries to develop health indicators and recommendations for the monitoring of CVD. It is part of the Health Monitoring Programme (HMP) financed by the European Commission.

As stated by the ECHI Project\(^1\), health indicators describe the health status of a community and typically include measures of mortality, morbidity and disability; they also include determinants of health (biological, behavioural and socio-demographic risk factors) and health systems (use of health services, medication use, surgical procedures). Health indicators are essential to quantify the burden of diseases.

CVD has been identified as one of the leading contributors to the global disease burden. Fortunately, much is known about the risk factors and means of reducing CVD\(^2-10\). Many epidemiological studies have been conducted to identify CVD risk factors and demonstrate reversibility of risk through primary and secondary prevention. Among these studies, the most important are:

- the *Seven Countries Study* that identified several major risk factors for CVD: smoking, rich diet, with consequent high levels of total cholesterol, and high blood pressure. Differences in the prevalence of these risk factors among participating countries\(^2-4,7\) have been ascertained to be responsible for differences in the incidence of stroke and coronary heart disease (CHD);

- the *WHO European Collaborative Trial in the Multifactorial Prevention of CHD* that demonstrated the reversibility of risk among European populations, through healthier lifestyles and high risk individuals treatment\(^9\). The North Karelia Project constitutes an example of well-recognised approach to community-based primary prevention\(^10\);

- the *WHO-MONICA Project* that was carried out to assess the relative contribution of CHD incidence, case fatality, trends in classical risk factors and advancements in coronary care to the decline in CVD mortality in some industrialised countries\(^11\). In particular, one third of the decline in CHD mortality was due to changes in case fatality as a consequence of advancements in coronary care\(^12\) and two/thirds to declining incidence in coronary events, as partly explained by the reduction of classical risk factors\(^13\).

Others have contributed to the knowledge of CVD risk factors and demonstrate that factors such as low socio-economic status\(^14,15\), physical inactivity\(^16\) and diabetes\(^17\) are also responsible of the increased CVD risk.

CVD and its risk factors were shown to be associated with other adverse health outcomes including cognitive impairment, dementia and decreased physical performance in the elderly\(^18,19\).
Overall, the major message emerging from all these studies is that a decrease in the level of these risk factors in the population can prevent CVD and that a reduction of CVD may result in considerable benefits for public health care, cost and quality of life.
4. Aims and objectives

The aims of the EUROCISS project were to identify, among existing data-sets, the essential information required to objectively define morbidity indicators for CVD and to recommend standardised methods for future data collection in the European Union. The achievement of these aims permits cross-country comparisons and improve CVD prevention and control.

Specific objectives of the I phase of the project (2000-2004) included:

- prioritising CVD of importance in public health, on the basis of available knowledge, incidence, attack rate and prevalence in the population;
- identifying specific indicators for assessing morbidity in both genders, youths, adults and older people, taking into account differences in socio-economic status across countries; an inventory of available indicators was made to describe the different methods of data collection and assess the degree of comparability and quality control of existing data-sets;
- developing recommendations for collection and harmonisation of data that are easily applicable within the different countries in order to obtain reliable and significant data for the periodic monitoring of cardiovascular morbidity in the EU.

To evaluate the health status of a population and set appropriate prevention programs, mortality and morbidity data are necessary, along with data on prevalence of risk factors. Partners of EUROCISS Project decided to focus only on morbidity because mortality and risk factors have already been studied in other Health Monitoring Projects, in particular the European Health Risk Monitoring (EHRM)\(^2\).

The main objectives of the II phase of the EUROCISS Project include:

4. To develop knowledge, tools and expertise among Member States (MS) for CVD surveillance and prevention;
5. To complete the technical and scientific work begun during the first phase of EUROCISS project and necessary to finalise the list of indicators, the standardised procedures and methods of data collection that will assist MS in producing reliable, valid and comparable data;
6. To prepare the manual of operations for the implementation of surveillance systems for the collection and validation of indicators, in particular of population-based registers of myocardial infarction and stroke;
7. To prepare the manual of operations for the implementation of CVD surveys for collecting standardised indicators, in particular for prevalence of ischemic heart diseases, heart failure,
stroke and other CVD, and to identify a minimum set of questions and exams to be included in the health information surveys/health examination surveys (HIS/HES) for evaluating the prevalence of CVD at European level;

8. To assist in implementing recommendations for the development of population-based registers and surveys for monitoring temporal trends and geographical differences of CVD in MS.
5. Cardiovascular diseases to be considered

Two criteria have been followed in prioritising CVD of greatest interest: high frequency of disease, in terms of mortality, morbidity and disability; and the possibility of prevention, in terms of modifiable risk factors.

The most important CVD are ischemic heart diseases (IHD), which include acute myocardial infarction (AMI), acute coronary syndromes (ACS), effort angina, other forms of coronary heart disease; heart failure (HF); and cerebrovascular accidents (CVA), including ischemic and haemorrhagic stroke. In the section on Health Status indicators, under diseases of large impact, the European Community Health Indicators, ECHI Project\(^1\), recommends AMI, IHD, CVA and HF within the CVD. It is also advisable that other poorly defined CVD of atherosclerotic origin and venous thromboembolic diseases be included as well.

Diseases of the heart and circulatory system (CVD) are the main cause of death in Europe: accounting for over 4.35 million deaths each year. Nearly half (49%) of all deaths are from CVD (55% of deaths in women and 43% deaths in men). The main forms of CVD are coronary heart disease and stroke. Just under half of all deaths from CVD are from CHD and nearly a third are from stroke. CHD by itself is the single most common cause of death, accounting for 1.95 million deaths in Europe each year. Over one in five women (23%) and over one in five men (21%) die from the disease. Stroke by itself is the second single most common cause of death, accounting for 1.28 million deaths in the EU each year. Over one six in women (18%) and one in ten men (11%) die from the disease\(^2\). IHD contributes to about 40% and CVA to an additional 25% of total CVD mortality\(^2\). Mortality data on HF are not available \(^3\). Although not currently included in most evaluations of CVD mortality, sudden death (SD) should also be considered among causes of death of interest.

Morbidity data are not available at the European level, in part because they are difficult to collect. Moreover, standardised morbidity rates are difficult to produce. One of the aims of the MONICA Project was to obtain valid and reliable information on fatal and non-fatal acute coronary and cerebrovascular events in different populations. Attack rates collected by MONICA have provided useful, accurate and reliable indicators for cross-country comparisons of acute coronary and cerebrovascular trends in men and women in the age range 35-64 years\(^4\). The MONICA study showed that for the age group 35-64 years, 1.0 to 1.5 events of hospitalised non-fatal AMI were registered for every death due to CHD\(^1\). Attack rates of acute coronary and cerebrovascular events, however, are in themselves not sufficient to describe the impact of CVD on the population. The demographic changes in Europe with the increasing proportion of older people and the advancements in treatment have resulted in an increasing prevalence of chronic forms of IHD.
Because of their frequency and cost there is a need to monitor the occurrence of both acute and chronic forms of the disease.

Interest has recently been focused on heart failure (HF) because of the poor quality of life among affected patients and the high cost of the disease. In the United States, it is estimated that the leading diagnosis in hospital admission of patients 65 years and over is heart failure\(^2\).
6. **Indicators: list and definitions**

Health status indicators are a set of surveillance data that has been analysed in a way that permits assessment of the health status of the population so that public health priorities and actions can be appropriately identified. The selection of indicators should be primarily based on existing and comparable data sets for which regular monitoring is feasible, but it should also take into consideration likely future data needs and diagnostic and treatment developments. Indicators should be comprehensive, valid (sensitive), standardised, meet quality criteria, and be flexible (never fixed and final) to support evolving health policies.

Based on the suggestions of the ECHI project, indicators are subdivided into **health status indicators** (disease specific mortality, morbidity and disability), **determinants of health** (biological risk factors and health behaviours) and **health systems** (surgical procedures, medication use, use of health services).

6.1 **Health status indicators**

Disease-specific mortality, morbidity and disability should be available for the overall population and for age and sex subgroups. For each country or area it would be useful to have absolute numbers, crude and age-standardised rates according to a standard population (i.e. European standard population); standardisation in this case would improve comparability between countries with different age distribution in the population.

6.1.a **Mortality, cause specific**

Mortality data may provide a crude but simple way to assess health conditions; the source of information are death certificates where the underlying cause of death is coded. The reliability of mortality data depends on the completeness and accuracy of the vital registration system of the country.

CVD causes of death are coded according to the International Classification of Diseases and Causes of Death (ICD). Problems of temporal and geographic comparisons derive from the different versions of the ICD adopted over time (8th, 9th, 10th revision) and from different coding practices in each country.

**Definition of specific indicators:**

i) **crude death rate:** the number of overall and cause-specific deaths divided by estimated mid-year population per 1,000;
ii) **age-standardised death rate:** death rate estimated after age-standardisation has been performed\(^{25}\);

iii) **age-specific death rate:** the number of deaths divided by estimated mid-year population per 1,000 for specific age groups\(^{25}\).

### 6.1.b Morbidity, diseases specific

Morbidity can be described using the following frequency measurements: hospital discharge rate, attack/incidence rate, prevalence and case fatality. In CVD, attack rates generally include first and recurrent events, while incidence rates represent only first event.

The importance of these measures differs according to the disease as well as the age range. In younger age groups the most important indicators are incidence, case fatality and prevalence; in older people, attack rate and prevalence are more important since patients with chronic diseases require more continuous therapy and rehabilitation, and have a greater impact on the public health system. For acute events, incidence rates are in general target measures, while for chronic conditions incidence as well as prevalence may be of interest. Incidence is used mostly for etiological research objectives; attack rate and prevalence are useful for hospital planning and for primary care.

Standardised rates are important to make cross-group comparisons and to investigate time trends, although absolute numbers are often necessary to evaluate the burden of the disease.

**Definitions of specific indicators:**

i) **hospital discharge rate or hospitalisation rate:** the number of hospital discharge records of a specified main diagnosis divided by the estimated mid-year population per 1,000\(^{25}\);

ii) **attack rate:** the number of events (first and recurrent) divided by the estimated mid-year population per 1,000\(^{25}\);

iii) **incidence rate:** the number of first events divided by the population at risk per 1,000 or person/years at risk. Person/years at risk consists of the sum of periods of time (years) at risk contributed by each of the person included in the study. Incidence may be estimated through the follow-up of a population enrolled in a cohort or the identification of new events in a dynamic population. It can be obtained using longitudinal studies or disease registers, when it is possible to eliminate those who have already experienced an event\(^ {25}\);

iv) **prevalence:** the proportion of persons with the disease in a population per 100 or per 1000 at a particular time. It is assessed by surveys;
v) *case fatality*: the number of fatal cases divided by the total number of events. It is usually expressed as the percentage of persons diagnosed as having a specified CVD who die from that disease within a given period\(^25\).

6.1. c  **Disability**

The following indicators have been used in literature to evaluate the consequences of CVD as well as the effectiveness of intervention. We propose to consider disability as a composite measure of health status according to ECHI definitions\(^1\).

**Definition of specific indicators:**

i) *Disability-Adjusted Life Year (DALY)*: takes into account years lost due to premature mortality and years lived with disability\(^26\). It is equal to the sum of the *number of years of life lost due to CVD in a population (YLL)* and the *number of years lived with disability of known severity and duration for a CVD in a population (YLD)*;

ii) *Potential Years of Life Lost (PYLL)*: it is a measure of the impact of premature mortality on the population. PYLL is the sum of the years that people dying from a CVD would have lived, had they experienced a normal life expectancy, usually determined at 65 years\(^25\);

iii) *Activities of Daily Living (ADL)*: the ADL index measures six basic functions (moving between rooms, using the lavatory, washing and bathing, dressing and undressing, getting in and out of bed, and feeding oneself) and has a score of A (independent in every item), B (dependent in one item), C (dependent in two items), D (dependent in three items), E (dependent in four items), F (dependent in five items) and G (dependent in all functions)\(^27,28\);

iv) *Instrumental Activities of Daily Living (IADL)*: the IADL-scale measures more complex functions (using the telephone, getting to places beyond walking distance, grocery shopping, preparing meals, doing housework or handyman work, doing laundry, taking medications, managing money). The score ranges from 8 (able to perform all functions) to 0 (cannot perform any function)\(^29\);

v) *EuroQol (EQ)*: the EQ is a standardised instrument for use as a measure of health outcome. Applicable to a wide range of health conditions and treatments, it provides a simple descriptive profile and a single index value for health status that can be used in the clinical and economic evaluation of health care as well as population health surveys\(^30\).

6.2 **Determinants of health**

Blood pressure, tobacco smoking, total cholesterol, body mass index and physical activity are important determinants of the health status of the population. In particular, it is important to have
estimates on the prevalence of persons with hypertension, hypercholesterolemia, obesity, physical inactivity and smoking.

The main source of information on risk factors are CVD surveys conducted with internationally standardised procedures and methods; they are exhaustively described in the EHRM project.

*Definition of specific indicators:*

### 6.2.a Personal biological factors

**i) prevalence of hypertension:** number of persons with systolic blood pressure or diastolic blood pressure equal to or greater than 140/90 mmHg or undergoing specific treatment divided by the total population. Blood pressure measurements should be obtained calculating the meaning of at least two consecutive readings.\\n
**ii) proportion of hypertensives under control:** number of hypertensives undergoing specific treatment with systolic blood pressure or diastolic blood pressure equal to or lower than 140/90 mmHg divided by the total number of hypertensives.\\n
**iii) prevalence of hypercholesterolemia:** number of persons with serum total cholesterol equal to or greater than 193 mg/dl or 5.0 mmol/l or undergoing specific treatment divided by the total population. Hypercholesterolemia should be determined from at least two consecutive tests.\\n
**iv) prevalence of overweight:** number of persons with body mass index equal to or greater than 25 kg/m² and lower than 30 kg/m² divided by the total population.\\n
**v) prevalence of obesity:** number of persons with body mass index equal to or greater than 30 kg/m² divided by the total population.

### 6.2.b Health behaviours

**i) prevalence of physical inactivity during leisure time:** available questionnaires include many integrated questions measuring time spent in sport or other activities during leisure time; however it is easier to measure the prevalence of inactive persons during leisure time.\\n
**ii) prevalence of current, former and non smokers:** number of current, former and non-smokers divided by the total population; smokers are persons who smoke one or more cigarettes a day.\\n
**iii) number of cigarettes smoked per day:** number of cigarettes smoked per day divided by the total number of current smokers.

### 6.3 Health system indicators

Other indicators which measure health utilisation can be used as a proxy measures for CVD: national drug consumption, surgical operations, and use of health services. These indicators are not
sufficient to evaluate morbidity, but they can be used if integrated with other sources of information.

6.3.a Medication use
Drug consumption figures should preferably be presented as numbers of ATC-DDD/1000 inhabitants/day or, when in-hospital drug use is considered, as DDDs per 100 bed days. ATC is the acronym for anatomical therapeutic chemical; DDD is the acronym for defined daily dose. Prescription data presented in DDD/1000 inhabitants/day may provide a rough estimate of the proportion of the population treated daily with certain drugs; DDD is the average maintenance dose of a medication used for its main indication in adults and assumed per day.

Drugs are classified in groups at five different levels: they are divided into fourteen main groups (1st level), with one pharmacological/therapeutic subgroup (2nd level); the 3rd and 4th levels are chemical/pharmacological/therapeutic subgroups and the 5th level is the chemical substance. DDDs are assigned per ATC 5th level by the WHO Collaborating Centre for Drug Statistics Methodology in Norway. Drug consumption information on antihypertensives, diuretics, beta-blocking agents, calcium channel blockers, ACE-inhibitors, nitrates, anti-arrhythmics, antithrombotic agents and cholesterol and triglycerides reducers are of interest. They are used in both primary and secondary prevention. However, they are not sufficient to evaluate morbidity and need to be integrated with other data, such as surveys. Thrombolytic treatment is used only in hospital in acute myocardial infarction. Drug consumption information is not very specific in the long term, because importance of medicine use changes with time.

6.3.b Surgical operations and invasive procedures
Surgical operations and invasive procedures, in particular coronary artery by-pass grafting (CABG), percutaneous transluminal coronary angioplasty (PTCA), heart transplantation, carotid angioplasty, pace-maker, implantable cardioverter defibrillator, catheter ablation and peripheral vascular operations are indicators of health care utilisation for CHD, stroke and other CVD in the population. These indicators are expressed as number of surgical operations divided by the total population.

6.3.c In-patient care utilisation and technology
Definition of specific indicators:

i) cause-specific aggregate bed-days: the number of days spent in hospital for specific disease per population;

ii) mean and median length of stay: mean and median number of days spent in hospital per patient;

iii) brain imaging: number of CT-scans or MRI per population;
iv) *coronary angiography:* number of coronary angiographies per population;

v) *stroke unit:* number of stroke units per population.
7. **Sources of information**

Indicators are obtained using different sources of information. The most important for CVD are briefly described below.

7.1 **Hospital discharge records**

Hospital discharge records (HDR) give the number of hospitalisations by disease. Hospitalisation does not include less serious events. Problems arise when an acute event is followed by a period of rehabilitation or a transfer to other wards and the event could be counted more than once. Hospital discharge registers do not include emergency room records, seldom includes nursing homes and only in some instances private hospitals. Discharge diagnoses are rarely validated; validity may vary by case mix and total number of discharges. Hospital admission policies vary over time and place; the adoption of new diagnostic techniques, such as troponine for AMI/ACS, CT-scan and MRI for strokes, may cause major changes in event rates calculated from hospital discharge data.

In general, discharge records are more reliable than admission records. Hospital discharge data are available in most EU countries, but data may not be organised by age and sex.

*Diagnosis Related Groups (DRG)*

In some countries, hospital reimbursement is based on the DRG tariff system. The DRG system is based on equal-resources criteria and aggregates events in major diagnostic categories (MDC). Homogeneous groups of patients are defined as those requiring similar facilities, similar levels of organisation and diagnostic procedures. This system has been used in the United States for over 10 years, and is the basis for the prospective payment system of hospital stay for Medicare patients (elderly over 65 years). DRG may be useful in hospitals for acute events, but are not reliable for chronic diseases requiring a long hospital stay and rehabilitation. The DRG system takes into account the main hospital discharge diagnosis according to the MDC, complications, age and sex.

The main hospital discharge diagnosis is the condition identified for reimbursement of treatments and/or diagnostic procedures. Hence, information is synthesised and organised by economic objectives that could overestimate or underestimate seriousness, complications and co-morbidity; i.e. stroke units or specialist wards may selectively admit the most severe cases. For this reason, the use of the hospital discharge diagnosis may be misleading in countries applying the DRG tariff system. One of the advantages of the DRG tariff system, however, is its availability for the entire population of a country. This overcomes one of the drawbacks of hospital records, which is the difficulty of determining the population denominator by identifying the total country population as a reference.
Countries using the DRG system are Denmark, Finland, France, Italy, Norway, Portugal, Spain and Sweden. Countries where the DRG system will be implemented in the near future are Germany and the Netherlands.

7.2 Surveys
Health Interview Surveys (HIS) may be part of a permanent system of data collection at the national level. They are usually repeated periodically; information is self-reported and may not be sufficient to assess CVD morbidity.

High costs of clinical examination make the Health Examination Surveys (HES) difficult to carry out; they are usually based on a general broad health focus and conducted at the regional level. Only few HIS and HES use properly standardised and sensitive methods to assess CVD morbidity. Ad hoc CVD surveys provide important information on risk factors and disease prevalence but are seldom representative of the whole country. They are usually conducted on adults and often exclude individuals older than 70 years. Their reliability greatly depends on the participation rate and methodologies adopted. If conducted in representative population samples, they may provide a reliable estimation of CVD prevalence. Standardised procedures and methods are available\textsuperscript{34,35} such as the questionnaires from the London School of Hygiene and Tropical Medicine (LSHTM), used to identify angina pectoris, myocardial infarction and intermittent claudication. These have been used for many years in population studies and are available in different languages. They may evaluate the presence of symptoms of great importance for the health system when evaluating the burden of disease because not only the acute manifestations of the diseases, for example, myocardial infarction, but also the symptoms, for example, chest pain, contribute to the use of health services and to health costs. ECG, read according to the Minnesota Code (the Minnesota Code changes qualitative diagnoses into quantitative results), blood pressure, weight, height, total and HDL-cholesterol are usually collected to assess cardiovascular disease and risk factors. Echocardiography is recommended to make a reliable diagnosis of heart failure.

7.3 Cohort longitudinal studies
Cohort longitudinal studies are usually very comprehensive: they enrol a large healthy population, measure risk factors and observe over a long period, commonly years, the development and evolution of the disease. Incidence of disease can be determined in groups that differ in exposure level. These studies are very expensive, therefore seldom used for studying rare diseases, for example, CHD in women. They are useful for both aetiologic and public health administrative purposes. Their validity greatly depends on the representativeness of the enrolled population and on the number of persons lost during the follow-up. Almost all countries of the European Union have ongoing longitudinal studies of CVD. They include relatively small samples of the population and
in general involve collecting and validating hospital discharge diagnoses and deaths of the enrolled cohort. Diagnostic criteria for the definition of CVD events are specific to each study. Diagnostic criteria are based on history, clinical examination, hospital records, blood tests, and autopsies in cases of death.

Cohort longitudinal studies have contributed to the understanding of the differences in incidence across countries, to the measurement of the importance of risk factors in the prediction of disease and to the establishment of causality. Other longitudinal studies are those following cohorts of patients enrolled through registers. These studies lack the information on risk factors at baseline; they are defined as long-term survival of population-based registers.

7.4 GP networks

In some countries networks of general practitioners (GPs) can be useful when dealing with conditions not necessarily requiring hospitalisation. They may provide an adequate coverage for prevalence of chronic conditions such as IHD or HF. In a few countries these networks are operative (e.g. The Netherlands and UK). Information on this source has been exhaustively covered by the Project Health Monitoring in Sentinel Practice Network. GP networks may be affected by selection bias; usually not all GPs participate in studies but only volunteers. Data from GPs networks require validation.

7.5 Registers based on administrative data

In some countries registers are available, based on record linkage of mortality and hospital discharge records. These registers have existed for many years in a number of Nordic countries, where individuals are identified by a personal identification number (ID) thus allowing record linkage of all information sources. These registers are economical, cover the whole country, all age groups and collect large numbers of events; they are limited because they are not planned for scientific research and data are not standardised. Changes in the ICD version or the introduction of new diagnostic criteria may have unpredictable effects. These registers can be used when carefully validated.

7.6 Population-based registers

Population-based registers are usually formed through the linkage of various sources of information (mortality data, hospital discharge and GP records) and the validation of suspected events. Registers cover large samples of population, usually entire municipalities. Case finding (in- and out-of-hospital events, in-hospital events which occurred out of the region, home treatment events) and validity depend on the health system, medical care and diagnostic criteria applied in the definition of events. Potential sources of bias are the following: incompleteness of hospital records, death
certificates and autopsy records; coding errors; inaccuracy and non-comparability of the diagnostic criteria and autopsy rate.

The accuracy of rates produced using registers is related to the completeness and quality control of the data collected for the numerator (death and hospital discharge registers) and the denominator (population). Completeness also involves tracing subjects treated outside hospitals (nursing homes, clinics). In order to have a valid population-based register, the register should also collect events that happen to the residents but occur outside the area of surveillance. Data inaccuracy may be a problem for stroke: 50% of “new stroke diagnoses” are merely sequelae of an old stroke. This problem increases with ageing. Deaths occurring within 28 days are considered to reflect the same event. A unique ID for each subject would be very useful in linkage procedures between hospital discharge diagnoses and death certificate data sets; alternatively, multiple variables (e.g. name, date of birth, sex, residence), deterministic or probabilistic methods can be used for record linkage. Figure 1 shows the data flow in a population-based register.

The identification of events can be obtained by hot pursuit or cold pursuit. Hot pursuit means identifying case admissions to hospital usually within one or two days from the event onset and acquiring relevant information by visiting the ward or interviewing the patient. Information bias is minimised by the hot pursuit approach as information is collected immediately after the event. The process is expensive. The method was used in the WHO European Office Myocardial Infarction Registers in 1970 and in the WHO MONICA project. Cold pursuit implies the use of routine and delayed procedures, hospital discharge and death records. The process is easier and less expensive than hot pursuit; the number of cases studied is smaller because discharge diagnoses are more precise and specific than those on admission, but there is a possibility of missing important information. Both methods are used to identify suspected events, which must be validated applying the criteria of the WHO community register, or the MONICA methodology, or the new criteria of the European Society of Cardiology (see paragraph 10.3).

Registers are the best and most feasible source of morbidity data at a population level; they provide key indicators such as attack rate and case fatality. Incidence can be assessed if information on first event is available. If survival rates are available, also prevalence can be assessed. The high cost of registers limits their implementation at a national level; therefore, they should be established in representative areas of a country (regions, macro-areas, etc). Several countries have registers for AMI/ACS (Belgium, Denmark, Finland, France, Germany, Iceland, Italy, Norway, Poland, Spain and Sweden), fewer have them for stroke (Denmark, Finland, France, Germany, Greece, Italy, Norway and Sweden). Most adopt simplified methods derived from the MONICA project, which involves record linkage of death, hospital discharge and autopsy;
almost all apply the MONICA diagnostic criteria for the validation of all suspected events, or on a random sample or periodically.

8. Validation and quality of data

A measure of health status must not only be reliable but also valid. An indicator is valid if it measures the disease or condition it claims to measure. Validation evaluates the sensitivity and specificity. To validate coronary events collected within registers, the WHO diagnostic criteria, or the MONICA diagnostic criteria or the New Criteria of the Joint ESC/ACC, described later in this report (10.3), are applied as golden standard.

Validation can be carried out in all or in a sample of suspected cases; the choice will depend on factors such as the type and the frequency of the disease and the precision desired. Examples of validation procedures are: first 500 cases identified in one year; all cases during one month; or a randomly selected sample. In order to produce validated indicators, a *conditio sine qua non* is to allow the epidemiological teams involved in the validation access to relevant medical records and routine raw data of health statistics.

Quality of data depends on:

- completeness of coverage in terms of cases and place of treatment (hospitals, nursing homes, clinics, etc.);
- completeness of records and information (date of admission, date of discharge, ID, gender, hospital discharge diagnostic codes, intervention/procedure codes, department/ward, date of birth);
- methods for checking duplicate records;
- methods for record linkage between different sources of data;
- consistency of coding with the diagnosis;
- autopsy rate, especially for out-of-hospital events;
- consistency of coding/comparability of the information for different areas of the country;
- consistency of coding over time;
- representativeness of the different areas in the country.
9. Data availability

9.1 Databases available at a European level

9.1.a WHO statistical databases

WHO produces two main health databases: the Health for All Statistical Data Base (HFA-DB) and the WHO Mortality Data Base (HFA-MDB) \(^{50}\)

WHO HFA-DB database contains data on about 600 health indicators grouped into the following categories: demographic and socio-economic statistics, mortality-based indicators, morbidity, disability and hospital discharges, lifestyles, environment, health care resources, health care utilization and expenditure, maternal and child health. They allow a simple and user-friendly analysis of trends and international comparisons for a wide range of health statistics to support the formulation and monitoring of health policies at the national and international level.

The HFA-DB is used by the WHO for the routine analysis and assessment of the health situation in Europe; it provides easy and rapid access to a wide range of basic health statistics for the 51 (52 since 2004) Member States of the WHO European Region (including countries of the former Soviet Union). It was developed by the WHO Regional Office for Europe in the mid-1980s to support the monitoring of health trends in the Region.

The data are either submitted by European Member States to the Regional Office or collected from other international organizations or sources. The Regional Office continuously collects new data and issues updated versions of the database twice a year, generally in January and June. Data are presented in a user-friendly, graphical or tabular form.

There are two versions of the database:

- An **on-line** version, which allows rapid access to the data via the Internet \(^{50}\); and
- An **off-line** version, which can be downloaded from the Regional Office Website \(^{50}\).

For CVD morbidity, the HFA-DB provides the following indicators for each country:

- number of hospitalisations for *circulatory system diseases* (ICD-9 390-459);
- hospitalisation rates/100,000 for *circulatory system diseases*, *ischaemic heart diseases* (ICD-9 410-414), and *cerebrovascular diseases* (ICD-9 430-438) (tables 1a,1b,1c);
- *new cases of ischaemic heart diseases* and *new cases of cerebrovascular diseases*;
- *incidence of ischaemic heart diseases*/100,000 and *incidence of cerebrovascular diseases*/100,000.

There is no regular data collection for incidence and ad hoc sources are used when available; therefore, availability of data for this indicator is very limited. Furthermore, this indicator cannot be
used for comparisons between countries and/or time periods on account of the great differences in national definitions and registration practices.

Not all morbidity indicators are available by sex or age groups. In particular, in the HFA-DB only a relatively small number of indicators are directly collected from each country.

Tables 1a, b and c report, as an example, years of the first and last available data, and the sources of the indicators mentioned.

Limitations involving the use of the morbidity WHO-HFA database can be summarised as follows:

- definitions of morbidity indicators are lacking;
- morbidity data are not available by ICD code; they are grouped within the nosologic definition as circulatory system diseases, ischaemic heart diseases, and cerebrovascular diseases;
- morbidity data are not available by sex and age;
- morbidity data are not always available for the same calendar years.

Mortality data by leading causes and more detailed age-groupings are available in the off-line HFA-DB supplementary mortality database (HFA-MDB). In June 2004, the HFA-MDB was improved and actually includes about 2500 mortality indicators by 67 causes of death, by age and sex; diseases of the circulatory system (ICD-9 390-459), Ischemic Heart Disease (ICD-9 410-414) and Cerebrovascular diseases (ICD-9 430-438) are available as cardiovascular diseases.

Overall, absolute number of deaths are available by sex and calendar year. Age-standardized death rate (SDR), calculated using the direct method and standard European population structure, are available for men and women separately, for all ages or grouped into 0-65, 65+, 25-64 years, or in the age ranges 0-14, 15-29, 30-44, 45-59, 60-74, 75+, 25-64 and for various calendar years. Along with mortality data, mid-year population by 5-year age range, sex and calendar year are available (being 0 and 85+ the first and the last age ranges). ICD version used by each country and calendar year is also available.

Mortality detailed basic underlying raw data files for the world WHO Member States, together with the necessary instructions, file structures, code reference tables, etc., which can be used by institutions and organizations requiring access to this level of detail, are also available.

9.1.b EUROSTAT (The statistical office of the European communities)

EUROSTAT was established in 1953 to meet the requirements of the Coal and Steel Community. Over the years, its task has broadened and, when the European Community was founded in 1958, it became a Directorate General (DG) of the European Commission. EUROSTAT is the only provider of statistics at the European level; its key role is to provide statistics to other DGs and to the
Commission, and to other European Institutions in support of their role in defining, implementing
and analysing Community policies.
EUROSTAT’s main role is to process and publish comparable statistical information at the
European level. Its efforts are directed towards a common statistical ‘language’ that embraces
concepts, methods, structures and technical standards. EUROSTAT does not collect data: these are
provided by the Member States. EUROSTAT’s role is to consolidate the data, ensuring
comparability through the use of harmonised methodology.
Health statistics cover all 15 Member States as well as Iceland, Norway and Switzerland.
EUROSTAT integrates information from the most relevant data sources existing at international
level: OECD (Organisation for Economic Co-operation and Development), WHO, FAO (Food and
Agriculture Organisation), etc. Data are available from as far back as 1960 in some cases. Most
EUROSTAT publications and data are available for a fee on the Internet. Information and tables about cardiovascular disease morbidity are included in the second edition of
the publication Key data on health 2002 – Data 1970–2001. This second edition of Key Data on
Health includes a comprehensive, consistent and internationally comparable set of health data and
indicators, highlighted in New Programme of Community Action in the field of Public Health
(2003-2008); this programme was adopted by the European Parliament and the Council on 23 of
September 2002 in the framework for action in the field of public health. In this report Eurostat try
to bring together information on a wide range of health topics from the most relevant data-sources
available around the world: New Cronos of Eurostat, Ecosante from OECD, Health for All from
WHO, FAO, International Agency for Cancer, Euro HIV, specific epidemiological studies, etc.
Information on the Health Status of the population, the main Diseases as well as the statistical
description of Health Care systems are at the core of this publication; however, Key Data on Health
also addresses the issues of lifestyles (nutrition, smoking, drinking, physical activity, drug use),
mortality (infant, causes of death) and health risks associated with environment, work, leisure and
traffic. Key Data on Health covers the 15 EU Member States, as well as Iceland, Norway,
Liechtenstein and Switzerland. Tables and graphs provide, where possible, data from 1970 onwards
disaggregated by gender and age. The publication is divided into six chapters: the first presents data
on populations; the second focuses on lifestyle issues; the third describes health risks associated
with the environment, working conditions, leisure time, and traffic; the fourth describes the health
status of EU populations. For Cardiovascular diseases Chapter four contains the table Coronary
event rates, coronary case fatalities, and annual changes; adults aged 35–64, by sex; years in
1980s and early 1990s (graph. 4.7.29) using data from the MONICA project. Chapter five
presents a detailed picture of mortality, while the last chapter gives an overview of the health care
system.
9.1.6 OECD

The Organisation for Economic Co-operation and Development (OECD) provides the *OECD-Health Data 2006* (realised on the 6th June 2006), a unique software package consisting of an interactive database and query modules to provide a user-friendly tool for the comparative analysis of health systems within and among the 30 OECD Member countries. It is available for a fee on the Internet or in a CD-ROM version; this edition contains more than 1200 indicators across 30 countries up to 2004, with some time series as far back as 1960. Most data cover the 1980s and 1990s, many series continue up to 2003 or 2004, including selected preliminary data for 2005. The 1200 series cover Health status, Health care resources, Health care utilisation, Expenditure on health, Health care financing, Social protection, Pharmaceutical market, Non-medical determinants of health, Demographic references, Economic references. The list of all variables is downloadable from the following internet address ‘http://www.oecd.org/dataoecd/43/5/36946481.pdf’.

The OECD also provides a trial version of the *OECD Health Data 2006*, freely downloadable to evaluate the database and access the OECD Health Data 2006 software; the only restriction is the data coverage: 1990-1995 in the trial version instead of 1960-2005 in the database. Sources and Methods, software tools, map and chart modules are identical to the final release version of OECD Health Data 2006 (CD-ROM and online).

Data are gathered from different sources, mainly from public institutions such as Ministries of Health and Welfare, National Statistical Institutes, Research Institutes and hospital morbidity databases.

For cross-national comparisons of health care data, there are still important gaps with respect to international agreements on statistical methods. The same term can refer to very different things among the 30 OECD countries. Despite efforts to develop homogeneity, standardized health statistics is still a goal, not a reality. The statistics contained in *OECD Health Data 2006* reflect the situation at the time of release; they have been refined and improved year after year. The aim of the files and the accompanying sources and methods is to provide an objective working tool: the cooperation and, indeed, the criticism of the various national data providers and users will enable improvements in the future.

Under the Ageing-Related Disease Project, for the Study of Cross National Differences in the Treatment, Cost and Outcome of Ageing-Related Diseases, a final report with data on mortality, morbidity health system indicators and determinants of health is available on AMI, IHD and stroke.
9.1.d MONICA – Monitoring cardiovascular disease

The WHO MONICA (MONItoring trends and determinants of CArdiovascular diseases) Project was developed to answer questions arising from the 1978 Bethesda Conference on the decline in CHD mortality.

MONICA aimed at measuring, within defined populations, 10-year trends of CHD and stroke, and their case fatality rates\(^{11,41,57,58}\), trends in CVD risk factors\(^{13}\), and trends in acute coronary and stroke health care for men and women, 35 to 64 years of age\(^{12}\). Indeed, MONICA has provided a unique opportunity for exploring the relationship between CVD morbidity and mortality\(^ {24}\).

*Tables 2 and 3* list the EU countries involved in MONICA surveillance during the study\(^ {58,59}\).

Public access to MONICA data is available at the MONICA website\(^ {61}\). The website provides quality assessment reports on coronary and stroke event registration and demographic data.

*Fatal and non-fatal coronary* events are reported as the total number of definite coronary events for each year, with separate totals for men and women, for the age range 35-64 years. The data are also presented as crude percentage of first, recurrent and indeterminate events from previous history\(^ {58}\).

*Fatal and non-fatal stroke* events are reported for each year, and separately for men and women, as the total number of definite strokes, stroke following a coronary event and non-classifiable because of insufficient data; for the age ranges 35-64 and 65-74 years, data are also presented as crude percentages of first and recurrent events\(^ {59}\).
9.2 Databases available at a national level and methodologies adopted

9.2.a Inventory

For the previously mentioned sources of information (HDR, surveys, registers, cohort longitudinal studies and GP networks), tables were developed to summarise the available data, providing a comprehensive overview and facilitating a comparison between countries.

To update the inventory of available data in countries participating to the first phase of the EUROCISS Project and in those participating for the first time at EUROCISS II, the original questionnaire was updated taking into account the discussions on recommended indicators arisen during the first phase: available indicators in the country, sources of information, ICD codes used (ICD VIII, ICD IX, ICD X), operational definitions used, whenever the data are available, references of calendar years, all information necessary towards a valid inventory.

The questionnaire prepared during the first months of activity of the Project II phase is more detailed than the one produced during the first phase, making the most of the results of the previous phase. In order to provide greater reliable information on CVD indicators, much more questions on validation and more complete data were included in the questionnaire. This gives all partners the possibility to meditate upon the already proposed indicators and to find the best way to develop them in the future. The new questionnaire is divided into the following sections: AMI, ACS, IHD, HF, CVA, OFHD.

Before each section a table showing the recommended indicators (available, short-term, long-term) is provided.

At bottom of each section there are few lines dedicated to comments, where partners can indicate what they might consider useful and helpful for the comprehension of the methods adopted.

Table 4 reports information about HDR. In all countries HDR cover almost the entire population, both genders and all ages. National reimbursement systems based on DRG are applied in all countries except Austria, Belgium, Germany, The Netherlands and the UK. ICD-9 is used in Belgium, Italy, The Netherlands, Portugal and Spain. Linkage with mortality is possible for Denmark, Finland, The Netherlands, Sweden and the UK by different methods: ID in Denmark, Finland and Sweden; date of birth, sex and zip code in The Netherlands and UK. The in-hospital case fatality is computed in all partner countries except Belgium and Spain. In Finland the validation of HDR is implemented; in other countries validation is not performed (Austria, Belgium, Germany, Italy, The Netherlands, Norway) or has been performed by retrospective review on an ad hoc basis (Sweden and Denmark) or only in a sample of the population (France and Spain).
Data are generally accessible with previous written request of authorisation, through national health or statistical institutions. 

**Table 4a** reports information about HDR in actual partner countries updated 2006. 

**Tables 5a and 5b** provide the main surveys on CVD. HIS performed by national statistical institutes are included in **Table 5a**; they usually report generic questions on health conditions and use a self-reported questionnaire. Therefore, some conditions such as the prevalence of hypertension and diabetes could be underestimated. 

Finland, Germany, Italy, The Netherlands, Portugal and Spain carry out CVD surveys periodically (**Table 5b**). All these include the LSHTM questionnaire for the evaluation of symptoms, medical examination and ECGs. 

Information is available for 20-80 year-old men and women. The response rate is over 60% in all countries except in the MORGEN survey in The Netherlands (55%). The majority of CVD surveys adopt MONICA standard methodologies; WHO standard methods are used in CARDIO 2000 (Greece) and ERGO (The Netherlands). Data are accessible through national health or statistical institutions, universities and MONICA reference centres. 

**Table 5c** and **5d** provide the main Health Examination Survey and Health Interview Survey on IHD in actual partner countries updated 2006 respectively. 

Available information on cohort longitudinal studies is summarised in **Table 6**. These studies are performed in Belgium, Denmark, Finland, France, Germany, Italy, The Netherlands, Sweden and the UK. Age ranges between 20 and 84 years. Cohort longitudinal studies are predominantly performed at the regional level. Most do not include HF. Denmark and the UK include HF as well as The Netherlands. Some started in the 80’s (Belgium, Germany-KORA, Italy-Progetto CUORE, The Netherlands-Zutphen and Doetinchem), some in the 90’s (France-PRIME, The Netherlands-ERGO, Sweden-Stockholm), and others more recently, in the year 2000 (Finland-HEALTH 2000 and Germany); the Finland FINMARK started in 1972 and the British Regional Heart Study in 1978. The data are accessible through national health institutes or universities. 

GP networks provide data only in The Netherlands, Portugal and UK (**Table 7**). 

EUROCISS Project II phase is particularly focused on population-based Registers and the new questionnaire is an useful mean to collect sources of information, methods to define events, record linkage procedures and validation techniques which contribute to give a picture of the health status of populations. 

**Table 8** reports information on AMI population-based registers collected through the first questionnaire (2003). 

**Table 8 a** reports information on AMI population-based registers updated 2006.
Population-based registers are available at the regional level in Belgium, Denmark, Finland, France, Germany, Italy, Norway, Poland, Spain and Sweden. Most of the registers started between the second half of the 80s and the first half of the 90s (Finland, France, Germany, Spain and Sweden) within the MONICA Project framework. The others are more recent (Belgium-Bruges, Italy and Norway), nevertheless they adopt simplified methodologies derived from the MONICA Project. The Danish register goes back to 1978.

Age of persons included ranges between 25 and 74 years or more. Many of the population-based registers adopt simplified methodologies derived from the MONICA Project and validate the events applying the MONICA diagnostic criteria.

In Denmark, Iceland, Sweden, and Finland, national AMI registers are compiled using a linkage of administrative records from national hospital discharge and mortality registers; they cover the entire population and all ages.

Available data on stroke population-based registers collected through the first questionnaire (2003) are summarised in Table 9.

Table 9a reports information on stroke population-based registers updated 2006.

Out of 18 partner countries with available data, 5 participated in the MONICA stroke registration. Nine countries have regional stroke population-based registers, but only 2 have also a national stroke population-based register. Registers differ from each other in case definition -- ICD codes, record linkage (probabilistic, deterministic by personal identification number or by first name, last name, date of birth), and validation procedures (i.e. MRI, TAC, MONICA criteria) -- and population characteristics -- population size, age range (35-64, 35-74, all ages), and years covered. These differences make morbidity indicators difficult to compare.

### 9.2.b Main differences between registers

In different countries AMI and stroke population-based registers use different procedures for the selection of events. Record linkage of mortality and HDR and validation methods are reported in Table 10.

In the definition of AMI/ACS, countries use different ICD revisions (ICD-8, ICD-9 or ICD-10) to code death certificates (Table 2). Denmark never used ICD-9 but replaced ICD-8 with ICD-10. Denmark and Norway select only acute myocardial infarction (ICD-10: I21, I22), Sweden considers acute myocardial infarction (ICD-10 I21, I22) and other acute and subacute forms of ischemic heart diseases (ICD-10 I20.0), while all other countries include all ischaemic heart diseases (ICD-9: 410-414; ICD-10: I20-I25); Belgium, Finland, France, Poland and Spain add also heart failure (ICD-9: 428; ICD-10: I50) and sudden non-violent death (ICD-9: 798,799; ICD-10: R96-R98). Germany and Italy add sudden non-violent death as well. In addition, Italy, Spain and France consider other
causes of death. Italy, in particular, considers diabetes (ICD-9: 250), hypertension (ICD-9: 401-404), other forms of heart disease (ICD-9: 420-429) and disease of arteries, arterioles and capillares (ICD-9: 440-447), when one of the contributory causes of death is ischaemic heart disease.

Selected diagnoses for the identification of suspected non-fatal events from hospital discharge records are as follows: acute myocardial infarction (ICD-10: I21, I22) in Denmark; acute myocardial infarction (ICD-10: I21, I22) and other acute and subacute forms of ischaemic heart disease (ICD-10: I20.0) in Finland, Germany and Sweden; all ischaemic heart diseases (ICD-9: 410-414; ICD-10: I20-I25) in Belgium, France, Italy and Spain; Belgium and France add also heart failure (ICD-9: 428; ICD-10: I50); percutaneous transluminal coronary angioplasty (PTCA, ICD-9 CM 36.0) and coronary artery by pass grafting (CABG, ICD-9 CM 36.1) are selected in Belgium, Finland, Germany and Norway.

Linkage procedures between mortality and HDR are performed through the ‘personal identification number’ (ID) only in Denmark, Finland, Norway and Sweden. In Germany, Italy, Belgium, France and Spain events are identified through deterministic (first name, last name, date of birth) or probabilistic record linkage procedures since these countries do not have ID.

Validation of events can be realized on each single case or on a randomly selected sample. The validation of events is usually based on MONICA diagnostic criteria using an algorithm based on various combinations of symptoms, ECG changes, cardiac enzymes elevation, history of ischaemic heart diseases and, in fatal cases, autopsy findings. Some registers also adopt more sensitive and specific biomarkers of myocardial injury, such as creatine kinase MB mass (CK-MBm) and cardiac troponins (troponin T and troponin I) to recognize myocardial necrosis.

In the Swedish national register, the events are validated on a random sample of patients using diagnostic criteria recommended for use in Swedish hospitals. In Denmark the national register is validated through record linkage with the Danish MONICA register.

Table 11 summarises the codes used for the selection of stroke. Denmark, Finland (only national register), France, Germany, Greece, Norway and Sweden select all CVD for mortality and HDR.

All stroke registers adopt the personal ID number except for Italy and Germany which links mortality and HDR by name, birth date and place of residence. Validation is based on MONICA diagnostic criteria in all countries, except for Germany where validation takes use of health insurance data and CT-scans.
10. Definition of cardiovascular diseases

10.1 Nosologic definitions

*Acute myocardial infarction:* myocardial cell death due to prolonged ischaemia\(^{62}\).

*Acute coronary syndrome:* it is a big category which includes myocardial infarction, both Q-wave and non-Q-wave, and unstable angina. Unstable angina is an acute ischaemia without myocardial necrosis.

*Angina pectoris:* a pain in the chest and/or adjacent area associated with myocardial ischaemia but without myocardial necrosis\(^{62}\). It is an old term used to describe myocardial ischemia without necrosis. It is generally divided into unstable, which is part of acute coronary syndrome, and stable angina.

*Ischaemic heart diseases and coronary heart diseases:* are commonly due to the obstruction of coronary arteries by atheromatous plaques. These include acute myocardial infarction, other symptomatic and asymptomatic (silent) myocardial ischaemia, old myocardial infarction, angina pectoris, and other forms of chronic ischaemic heart disease. Generally speaking, congestive heart failure, cardiac arrhythmias and sudden death recognise the same etiology. There are also non-atherosclerotic causes of obstructive coronary artery diseases (CAD). Myocardial ischaemia may also occur in the absence of obstructive CAD, as in the case of aortic valve disease, hypertrophic cardiomiopathy, idiopathic dilated cardiomiopathy, and luetic aortitis\(^{63}\); they are rare.

*Heart failure:* it is a pathophysiological state in which an abnormality in cardiac function is responsible for the failure of the heart to pump blood at a rate commensurate with the requirements of metabolising tissues\(^{62}\). Hypertension, myocardial infarct, and coronary heart disease are the major causes of heart failure.

*Cerebrovascular accidents:* stroke is characterised by rapidly developing clinical symptoms and signs of focal, at times global, loss of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin\(^{62}\).

There are four main types of stroke: two caused by blood clots or other particles and two by haemorrhage. Ischaemic stroke (thrombosis and embolism) is the most common, accounting for about 70-80% of all strokes\(^{62}\).

*Cerebral thrombosis:* it occurs when a blood clot (thrombus) forms and blocks blood flowing in an artery that supplies blood to part of the brain. Blood clots usually form in arteries damaged by atherosclerosis\(^{62}\).

*Cerebral embolism:* it occurs when a clot (an embolus) or some other particle formed in a blood vessel, usually in the heart, is carried in an artery leading to or in the brain, blocking the flow of blood. The most common cause of embolism is atrial fibrillation\(^{63}\).
Subarachnoid haemorrhage: it occurs when a blood vessel on the surface of the brain ruptures and bleeds into the space between the brain and the skull.\textsuperscript{63}

Intracerebral haemorrhage: it occurs when a defective artery in the brain bursts, flooding the surrounding tissue with blood.\textsuperscript{63}

Other cardiovascular diseases: include rheumatic heart disease, hypertensive heart diseases, other forms of heart diseases, atherosclerosis, aortic aneurysm, acute cor pulmonale, dysrhythmias, acute pulmonary oedema and venous thromboembolic diseases.

10.2 Nosographic definitions

Table 12 shows the diseases and their codes following the ICD, 8th, 9th, and 10th Revisions. Most countries have adopted ICD-10 Revision, however ICD-9 is still used by almost all countries for coding HDRs, because of the classification of procedures (ICD9-CM). In 1996 the Nordic Medico-Statistical Committee (NOMESCO) published the Classification of Surgical Procedures adopted in the five Nordic Countries (Denmark, Sweden, Finland, Norway, and Iceland).\textsuperscript{67}

10.3 Standardised diagnostic criteria

Diagnostic criteria are used to validate clinical diagnoses. Those used in standardised studies are here reported in detail.

10.3.a MYOCARDIAL INFARCTION

**WHO criteria**\textsuperscript{46}

Myocardial infarction is defined as definite on the basis of history, ECG, enzyme and necropsy, as follows:

1) ECG with unequivocal serial changes, or 2) typical history or atypical history together with equivocal ECG and elevated enzymes, or 3) typical history and elevated enzymes with negative or non available ECG, or 4) fatal cases whether sudden or not, with naked-eye appearance of fresh myocardial infarction and/or recent coronary occlusion at necropsy (ante-mortem thrombus, haemorrhage into an atheromatous plaque or embolism).

**MONICA criteria**\textsuperscript{24}

Non-fatal coronary events are classified as definite and possible. The major difference with the WHO criteria is the use of the Minnesota code, a quantitative system for coding ECGs.\textsuperscript{68,69}

A definite non-fatal event is defined as:

1) Progression of Minnesota codes on serial ECGs;
   - Progression from no Q-wave to a definite Q-wave; or
• A lesser Q-wave progression combined with progressive ST-segment depression, developing
  ST-segment elevation, or progressive T-wave inversion; or
• Persistent ST-segment elevation with progressive T-wave inversion in sequential daily
  ECGs; or
(2) Cardiac enzyme levels two times the normal cut-off point, either with typical symptoms and an
  abnormal ECG, or with lesser symptoms and an ECG progression labelled probable.
Non-fatal events are placed in the category possible if a typical prolonged chest pain (20 minutes)
occurs together with lesser or no ECG and enzyme findings.
*Fatal coronary events* are classified as *definite, possible, and unclassifiable.*
Events are *definite* if they satisfy the following criteria:
• definite criteria reported for non-fatal events; or
• when autopsy shows recent myocardial infarction or coronary thrombosis.
*Possible* coronary death involves suggestive terminal symptoms, or a CHD history in the absence of
chronic occlusive CHD, or old myocardial infarction without pathological findings suggestive of a
fatal disease.
*Limitations of the coronary MONICA criteria* 45
The MONICA Project provides thorough information on mortality and morbidity, diagnostic
criteria, standardisation, validation, quality control and data comparability for the years 1985-1994.
Consistent methodology and diagnostic criteria were used to identify coronary events over time.
The methodology was expensive, however. Available indicators were attack rate and fatality rate.
There are some aspects that limit the study’s generalisability:
- the age group under surveillance was limited to 35-64 year old individuals;
- areas selected for the study were those registering 100 to 300 coronary deaths in men below age
  65 years;
- the selected areas were not necessarily representative of the whole country;
- it could not identify silent forms of myocardial infarction and misdiagnosed events.

*New Criteria of the Joint ESC/ACC Committee for the Redefinition of Myocardial Infarction* 70
Recently, sensitive and specific serologic biomarkers have become available for the identification
of very small myocardial infarctions that would not have been detected earlier. The biomarker of
myocardial damage is cardiac troponine, which has nearly absolute myocardial tissue specificity, as
well as a high sensitivity.
The application of these new, more sensitive criteria for MI will potentially cause the rise of MI
incidence and the fall of case fatality rate. Thus, the new definition of MI may confuse efforts to
follow trends of disease rates in populations. Continued tracking of these trends will require methods for adjusting to the new criteria.

*Criteria for acute, evolving or recent AMI*

Either one of the following criteria satisfies the diagnosis for an acute, evolving or recent AMI:

1. Typical rise and gradual fall (troponine) or more rapid rise and fall (CK-MB) of biochemical markers of myocardial necrosis with at least one of the following:
   (a) Ischaemic symptoms;
   (b) Development of pathologic Q-waves on the ECG;
   (c) ECG changes indicative of ischaemia (ST-segment elevation or depression); or
   (d) Coronary artery intervention (e.g., coronary angioplasty).

2. Pathologic findings of an acute MI.

*Criteria for established MI (past)*

Anyone of the following criteria satisfies the diagnosis for established MI:

1. Development of new pathologic Q-waves on serial ECGs. The patient may or may not remember previous symptoms. Biochemical markers of myocardial necrosis may have normalised, depending on the time elapsed since the infarct developed.

2. Pathologic findings of a healed or healing MI.

*Limitations of the Joint ESC/ACC criteria*

These new criteria, based on the rise and fall of the cardiac troponine marker, can be observed if myocardial infarction comes under care immediately after the onset of symptoms and the patient survives for several days, in order to guarantee the fall of the biochemical marker. Therefore the definition is not comprehensive of fatal cases.

10.3.b UNSTABLE ANGINA

According to the New Criteria of the Joint ESC/ACC Committee unstable angina is defined as an ACS with no ST-segment elevation at the ECG and no elevation of biochemical markers such as troponine or CK-MB measured by mass assay.

10.3.c ISCHAEMIC HEART DISEASE

The LSHTM questionnaires for angina pectoris on effort and myocardial infarction identify the characteristics of ischaemic pain - i.e., occurrence usually on walking, in certain chest site, usually causing the individual to slow his pace or stop, and promptly relieved by rest. ECG Minnesota Code provides a framework for uniform reporting in reasonably homogeneous, precisely defined classes, and includes instructions to reduce coding variability. Definition of the Minnesota ECG Codes are
given in the Publication of Rose and Blackburn\textsuperscript{34,35}; diagnostic criteria for IHD are reported in the publication of Keys\textsuperscript{36}:
- major Q-waves corresponding to Minnesota Codes 1.1
- lesser Q-waves plus major T-wave findings, corresponding to Minnesota Codes 1.2 plus 5.1 or 1.2 plus 5.2
- major specific resting ECG abnormalities corresponding to one of the following Minnesota Codes: 1.2, 1.3; 5.1, 5.2; 6.1, 6.2; 7.1, 7.2, 7.4 or 8.3.

10.3.d HEART FAILURE

\textit{Framingham Criteria}\textsuperscript{23}

Criteria for HF as specified in the Framingham Study may be distinguished into major and minor criteria.

Major criteria include:
- paroxysmal nocturnal dyspnoea
- neck vein distension
- rales
- radiographic cardiomegaly (increasing heart size on chest X-ray film)
- acute pulmonary oedema
- third sound gallop
- increased central venous pressure (>16 cm H\textsubscript{2}O in the right atrium)
- circulation time ≥25 seconds
- hepatojugular reflux
- pulmonary oedema, visceral congestion or cardiomegaly at autopsy
- weight loss ≥4.5 kg in 5 days in response to treatment of HF.

Minor criteria include:
- bilateral ankle oedema
- nocturnal cough
- dyspnoea on ordinary exertion
- hepatomegaly
- pleural effusion
- decrease in vital capacity by 33\% from maximal value recorded
- tachycardia (rate ≥120 beats/min)

Diagnosis of HF is given for two major or one major and two minor criteria\textsuperscript{23}.
**Boston Criteria**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Category</th>
<th>Point value [*]</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>Category I:</td>
<td>history</td>
</tr>
<tr>
<td>Rest dyspnoea</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Orthopnea</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Paroxysmal nocturnal dyspnoea</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Dyspnoea while walking on level area</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Dyspnoea while climbing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Physical Examination</td>
<td>Category II:</td>
<td>physical examination</td>
</tr>
<tr>
<td>Heart rate abnormality</td>
<td>1 if 91 to 110 beats per minute</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 if more than 110 beats per minute</td>
<td></td>
</tr>
<tr>
<td>Jugular venous elevation</td>
<td>2 if greater than 6 cm H₂O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 if greater than 6 cm H₂O plus hepatomegaly or oedema</td>
<td></td>
</tr>
<tr>
<td>Lung crackles</td>
<td>1 if basilar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 if more than basilar</td>
<td></td>
</tr>
<tr>
<td>Wheezing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Third heart sound</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Chest Radiography</td>
<td>Category III:</td>
<td>chest radiography</td>
</tr>
<tr>
<td>Alveolar pulmonary oedema</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Interstitial pulmonary oedema</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Bilateral pleural effusion</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cardio thoracic ratio greater than 0.50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Upper zone flow redistribution</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

[*] The composite score (the sum of the subtotal from each category) has a possible maximum of 12 points. The diagnosis of heart failure is classified as **definite** at a score of 8 to 12 points, **possible** at a score of 5 to 7 points, and **unlikely** at a score of 4 points or less.

**ESC definition of HEART FAILURE**

1. Symptoms of heart failure (at rest and during exercise) 

   and 

2. Objective evidence of cardiac dysfunction (at rest) 

   and 

3. Response to treatment directed towards heart failure (in cases where the diagnosis is in doubt)
Criteria 1 and 2 should be fulfilled in all cases.

**Limitations of HF case finding**

To obtain an exhaustive picture regarding HF, which does not necessarily require routine hospitalisation, review of GP records or ad hoc surveys are necessary.

In HDRs, HF can be found under different diagnoses. Therefore if validation studies on HF are carried out these codes should be taken into account:

- Heart failure: ICD-9 428, ICD-10 I50
- Hypertensive heart disease: ICD-9 402, ICD-10 I11
- Other primary cardiomyopathies: ICD-9 425.4, ICD-10 I42.5, I42.8
- Alcoholic cardiomyopathy: ICD-9 425.5, ICD-10 I42.6
- Secondary cardiomyopathy, unspecified: ICD-9 425.9, ICD-10 I42.9
- Chronic cor pulmonale: ICD-9 416.9, ICD-10 27.9

10.3.e STROKE

**WHO criteria**

The recommended WHO stroke definition is a focal (or at times global) disturbance of cerebral function lasting more than 24 hours (or leading to death) with no apparent cause other than that of vascular origin. Transient episodes of cerebral ischaemia were excluded by definition. Cerebrovascular lesions discovered at autopsy without having shown clinical manifestations in life were not registered as stroke. A careful review of the patient’s history is required to differentiate a previous stroke from previous TIA, as the two episodes may be misclassified.

This definition is normally used in longitudinal studies. When possible, incidence studies should register TIA because mild strokes are often misdiagnosed as TIA.

**MONICA criteria**

Definite stroke is a rapid development of focal signs (or global) or disturbance of cerebrovascular function lasting more than 24 hours (unless interrupted by surgery or death), with no apparent cause other than that of vascular origin; this category includes patients presenting clinical signs and symptoms suggestive of subarachnoid haemorrhage, intracerebral haemorrhage, or cerebral ischaemic infarct. The term “global” refers to patients with subarachnoid haemorrhage or deep coma but it excludes coma of systemic vascular origin such as shock, Stokes-Adams syndrome or hypertensive encephalopathy.

This definition of stroke includes reference to a focal or global disturbance of the cerebral function. One or more of the following definite focal signs must be present to make a diagnosis of stroke: unilateral or bilateral motor impairment (including un-coordination), unilateral or bilateral sensory
impairment, aphasia/dysphasia (non-fluent speech), hemianopia (half-sided impairment of visual fields), diplopia, forced gaze (conjugate deviation), apraxia of acute onset, ataxia of acute onset (muscular un-coordination), perception deficit of acute onset.

Time dimension has to be met and the signs should have developed from a presumed vascular origin.

*Limitations of stroke case finding*

The above criteria were developed to allow comparisons of stroke rates in communities with different availability of diagnostic image technologies (CT and MRI) necessary for stroke type definition (ischaemic and hemorrhagic).
11. **Recommended indicators**

Despite efforts to develop homogeneity, internationally standardised statistics still remain a goal to be achieved. The definition of disease differs from country to country, sometimes only slightly but sometimes more fundamentally, and it varies over time.

With the aim of improving future monitoring of CVD morbidity in Europe, indicators have been divided into 3 categories: already available indicators; those that should be implemented in the short-term; and those recommended for long-term implementation. Some countries have already implemented data collection for all three categories of indicators. For those which have not, stepwise implementation is strongly recommended, with development of adequate systems for collecting the short term indicators prior to proceeding with systems for collection and validation of the long-term indicators.

**Available indicators** are simple and already available in almost all countries of the EU, for example, hospital discharge rates or mortality figures. Usually, these indicators are available for an entire country.

**Short-term implementation** are built on the available indicators but offer a more exhaustive and desirable overview of CVD. The data derive from a variety of currently available sources but require a further level of processing to ensure accuracy. The data can be collected in samples representative of the population or in representative areas of the countries. Registers, which have already been implemented in many countries, represent an important source of this type of indicator (e.g. attack rates and incidence). Other available sources for indicators in this category include data collection systems that can be used to obtain indirect estimates of frequency of CVD. Examples of this group are medication use, data sets which can be used as a proxy for burden of diseases and public health expenditures. It should be noted that, due to the ongoing evolution of treatment strategies over time and the appearance of new drugs, their consumption is not dealt with in detail in the current document.

**Long-term implementation** indicators will require more time and more resources to be operational. Most of these indicators represent validated versions of the available and short term indicators in which medical records are carefully reviewed by expert epidemiologists using standardised diagnostic criteria. Long-term indicators would be collected in addition to available and short-term indicators. In order to develop and validate long-term indicators it is highly recommended that each country invests in dedicated population epidemiology. As reported in chapter 8, validation can be carried out in all or in a sample of suspected cases; the choice will depend on factors such as the type and the frequency of the disease and the precision desired.
Five final tables (tables 13–19) summarise the common set of recommended indicators for each nosographic group.

For each **health status** and **health system indicator** we provide its **operational** and **ICD nosographic definition**, and describe the appropriate **data sources**. All indicators should be provided for both genders and for men and women separately, for all ages and for age-specific groups. Indicators should be reported as absolute numbers and as crude population rates. Recommended age groups for monitoring morbidity are decennia. It is particularly important to present data for the age ranges 35-44 years, 45-54 years, 55-64 years, 65-74 years, 75-84 years, 85 years and over. To ensure comparability between different countries, indicators should be directly standardised by age and sex using the European population as a reference.

### 11.1 ACUTE MYOCARDIAL INFARCTION (*Table 13*)

Following recommendations issued by the WHO and MONICA Project, AMI was defined by a combination of symptoms, enzyme and ECG patterns. With their high sensitivity, technology advances (serologic biomarkers and imaging techniques) allow the identification of very small infarcts that would not have been considered an AMI adopting WHO or MONICA criteria. With the new diagnostic criteria, any amount of myocardial necrosis caused by ischaemia is labelled as an infarct, so an individual who was formerly diagnosed as having severe stable or unstable angina pectoris might be diagnosed today as having had a MI.

The adoption of the new criteria may lead to a separate treatment of AMI and ACS. Therefore, as _available_ they are considered jointly, but as _short-term implementation_ and _long-term implementation_ they will be distinct.

#### 11.1.a Available indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th><strong>mortality rate</strong> – health status: mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>annual AMI deaths per 100,000 population</td>
</tr>
</tbody>
</table>
| **ICD codes** | ICD-9 410-414  
 | | ICD-10 I20-I25 |
| **Data source** | vital statistics |

<table>
<thead>
<tr>
<th>Indicator</th>
<th><strong>hospital discharge rate</strong> - health status: morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>annual AMI hospitalisations per 100,000 population</td>
</tr>
</tbody>
</table>
| **ICD codes** | ICD-9 410  
 | | ICD-10 I21, I22 |
| **Data source** | hospital discharge records (main diagnosis) |
Indicator | in-hospital case-fatality - health status: morbidity
---|---
Operational definition | annual proportion of deaths among AMI hospitalisations
ICD codes | ICD-9 410
 | ICD-10 I21, I22
Data source | hospital discharge records

Indicator | aggregate bed-day rate – health system: health care utilisation
---|---
Operational definition | sum of days in one year spent in hospital for AMI per 100,000 population
ICD codes | ICD-9 410
 | ICD-10 I21, I22
Data source | hospital discharge records

Indicator | mean length of stay – health system: health care utilisation
---|---
Operational definition | mean number of days spent in hospital per patient with AMI
ICD codes | ICD-9 410
 | ICD-10 I21, I22
Data source | hospital discharge records

11.1.b Short-term implementation

Indicator | mortality rate – health status: mortality
---|---
Operational definition | annual AMI deaths from per 100,000 population
ICD codes | ICD-9 410
 | ICD-10 I21-I22
Data source | vital statistics

Indicator | attack rate/incidence rate - health status: morbidity/mortality
---|---
Operational definition | annual AMI events (first and recurrent) per 100,000 population
ICD codes | - non-fatal AMI events (ICD-9 410, ICD-10 I21-I22 from HDRs-main diagnosis) and
 | - coronary deaths (ICD-9 410-414, ICD-10 I20-I25 from mortality-underlying cause). Events less or equal 28 days apart are counted only once.
Data source | population-based AMI register, record linkages between HDRs and death records (figure 1)
<table>
<thead>
<tr>
<th>Indicator</th>
<th>1-day, 28-day case-fatality - health status: morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>proportion of fatal AMI within the specified period of time</td>
</tr>
<tr>
<td>ICD codes</td>
<td>non-fatal AMI and coronary deaths (ICD-9 410, ICD-10 I21-I22 from HDRs and ICD-9 410-414, ICD-10 I20-I25 from mortality)</td>
</tr>
<tr>
<td>Data source</td>
<td>population-based AMI registers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>thrombolytic therapy - health system: health care utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>proportion of AMI patients treated with thrombolytic therapy</td>
</tr>
<tr>
<td>ICD codes</td>
<td>ICD-9-CM 99.10 (injection or infusion of thrombolytic agent)</td>
</tr>
<tr>
<td>Data source</td>
<td>population-based AMI registers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>median length of stay – health system: health care utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>median number of days spent in hospital per patient with AMI</td>
</tr>
<tr>
<td>ICD codes</td>
<td>ICD-9 410  ICD-10 I21, I22</td>
</tr>
<tr>
<td>Data source</td>
<td>hospital discharge records</td>
</tr>
</tbody>
</table>

11.1.c Long-term implementation

It is suggested to validate a sample of hospital discharge and mortality records using medical records and adopting diagnostic criteria described in paragraph 10.3. This will allow to estimate the sensitivity and specificity of hospital discharge diagnoses and mortality causes for AMI (see chapter 8).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>validated mortality rate – health status: mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>validated AMI annual deaths per 100,000 population</td>
</tr>
<tr>
<td>ICD codes</td>
<td>ICD-9 410-414  ICD-10 I20-I25</td>
</tr>
<tr>
<td>Data source</td>
<td>vital statistics, medical records</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>validated attack rate/incidence rate - health status: morbidity/mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>validated annual first (and recurrent) AMI per 100,000 population</td>
</tr>
<tr>
<td>ICD codes</td>
<td>first non-fatal AMI (ICD-9 410, ICD-10 I21-I22) and coronary deaths (ICD-9 410-414, ICD-10 I20-I25)</td>
</tr>
</tbody>
</table>
| Data source | - population-based AMI registers, record linkage between HDRs and death records by a unique ID  
- cohort longitudinal studies  
- medical records |
**Indicator**

**re-admission after 1 year - health status: morbidity**

**Operational definition**

re-admission one year following initial admission for AMI due to re-infarction, IHD, HF and all causes

**ICD codes**

AMI: ICD-9 410, ICD-10 I21-I22
IHD: ICD-9 410-414, ICD-10 I20-I25
HF: ICD-9 428, ICD-10 I50

**Data source**

population-based AMI register

**Indicator**

**1 year survival - health status: morbidity**

**Operational definition**

proportion of patients who survived a non-fatal AMI, who are alive after 1 year

**ICD codes**

non-fatal AMI (ICD-9 410, ICD-10 I21-I22) and coronary deaths (ICD-9 410-414, ICD-10 I20-I25)

**Data source**

population-based AMI registers, population cohort studies

**Indicator**

**28-day case-fatality among first day survivors - health status: morbidity**

**Operational definition**

proportion of fatal AMI within the specified period of time

**ICD codes**

non-fatal AMI and coronary deaths (ICD-9 410, ICD-10 I21-I22 from HDRs and ICD-9 410-414, ICD-10 I20-I25 from mortality)

**Data source**

population-based AMI registers

**Indicator**

**CABG per AMI – health system: health care utilisation**

**Operational definition**

proportion of AMI patients who have received a CABG up to 90 days following the initial admission for AMI

**ICD codes**

CABG: ICD-9-CM 36.1; NOMESCO: FNA-FNE
AMI: ICD-9 410, ICD-10 I21-I22

**Data source**

population-based AMI register linked with hospital discharge records or procedure register

**Indicator**

**PTCA per AMI – health system: health care utilisation**

**Operational definition**

proportion of AMI patients who have received a PTCA up to 90 days following the initial admission for AMI

**ICD codes**

PTCA: ICD-9-CM 36.01, 36.02, 36.05, 36.06 (stent); NOMESCO: FNG0
AMI: ICD-9 410, ICD-10 I21-I22

**Data source**

population-based AMI register linked with hospital discharge records or procedure register
Indicator emergency CABG (within 24 hrs) rate – health system: health care utilisation
Operational definition proportion of CABG performed within 24 hours from the onset of the AMI
ICD codes ICD-9-CM 36.1; NOMESCO: FNA-FNE
Data source - hospital discharge records
- population-based AMI and procedure registers

Indicator emergency PTCA (within 24 hrs) rate – health system: health care utilisation
Operational definition proportion of PTCA performed within 24 hours from the onset of the AMI
ICD codes PTCA: ICD-9-CM 36.01, 36.02, 36.05, 36.06 (stent);
NOMESCO: FNG0
Data source - hospital discharge records
- population-based AMI and procedure registers

Indicator 30-day case-fatality for CABG – health system: health care utilisation
Operational definition 30-day case fatality of hospital discharges of CABG
ICD codes ICD-9-CM 36.1; NOMESCO: FNA-FNE
Data source linkage between hospital discharge records for CABG and mortality

11.2 ACUTE CORONARY SYNDROMES
11.2.a Short-term implementation

Indicator mortality rate – health status: mortality
Operational definition annual ACS deaths per 100,000 population
ICD codes ICD-9 410, 411
ICD-10 I20.0, I21, I22
Data source vital statistics

Indicator hospital discharge rate - health status: morbidity
Operational definition annual ACS hospitalisations per 100,000 population
ICD codes ICD-9 410, 411
ICD-10 I20.0, I21, I22
Data source hospital discharge records
**Indicator**  
**aggregate bed-day rate** – *health system: health care utilisation*

**Operational definition**  
sum of days in one year spent in hospital for ACS per 100,000 population

**ICD codes**  
ICD-9 410, 411  
ICD-10 I20.0, I21, I22

**Data source**  
hospital discharge records

**Indicator**  
**mean length of stay** – *health system: health care utilisation*

**Operational definition**  
mean number of days spent in hospital per patient with ACS

**ICD codes**  
ICD-9 410, 411  
ICD-10 I20.0, I21, I22

**Data source**  
hospital discharge records

### 11.2.b Long-term implementation

It is suggested to validate a sample of hospital discharge and mortality records using medical records and adopting diagnostic criteria described in paragraph 10.3. This will allow to estimate the sensitivity and specificity of hospital discharge diagnoses and mortality for ACS (see chapter 8).

**Indicator**  
**validated mortality rate** – *health status: mortality*

**Operational definition**  
validated annual deaths of ACS per 100,000 population

**ICD codes**  
ICD-9 410, 411  
ICD-10 I20.0, I21, I22

**Data source**  
vital statistics

**Indicator**  
**validated attack rate/incidence rate** - *health status: morbidity/mortality*

**Operational definition**  
annual ACS (first and recurrent) per 100,000 population

**ICD codes**  
non-fatal ACS (ICD-9 410, 411; ICD-10 I20.0, I21, I22) and coronary deaths (ICD-9 410-414; ICD-10 I20-I25)

**Data source**  
population-based ACS registers, record linkage between HDRs and death records by a unique ID; medical records

**Indicator**  
**CABG per ACS** – *health system: health care utilisation*

**Operational definition**  
proportion of ACS patients who have received a CABG up to 90 days following the initial admission for ACS

**ICD codes**  
CABG: ICD-9-CM 36.1; NOMESCO: FNA-FNE  
ACS: ICD-9 410, 411, 413, ICD-10 I20.0, I21, I22, I24

**Data source**  
population-based AMI register linked with hospital discharge records or procedure register
<table>
<thead>
<tr>
<th>Indicator</th>
<th>PTCA per ACS – health system: health care utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>proportion of ACS patients who have received a PTCA up to 90 days following the initial admission for ACS</td>
</tr>
<tr>
<td>ICD codes</td>
<td>PTCA: ICD-9-CM 36.01, 36.02, 36.05, 36.06 (stent) NOMESCO: FNG0</td>
</tr>
<tr>
<td>ACS: ICD-9 410, 411, 413, ICD-10 I20.0, I21, I22, I24;</td>
<td></td>
</tr>
<tr>
<td>Data source</td>
<td>population-based ACS register linked with hospital discharge records or procedure register</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>emergency CABG (within 24 hrs) rate – health system: health care utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>proportion of CABG performed within 24 hours from the onset of the ACS event</td>
</tr>
<tr>
<td>ICD codes</td>
<td>ICD-9-CM 36.1</td>
</tr>
<tr>
<td>Data source</td>
<td>population-based ACS and procedure registers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>emergency PTCA (within 24 hrs) rate – health system: health care utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>proportion of PTCA performed within 24 hours from the onset of the ACS event</td>
</tr>
<tr>
<td>ICD codes</td>
<td>PTCA: ICD-9-CM 36.01, 36.02, 36.05, 36.06 (stent)</td>
</tr>
<tr>
<td>Data source</td>
<td>population-based ACS and procedure registers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>median length of stay – health system: health care utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>median number of days spent in hospital per patient with ACS</td>
</tr>
<tr>
<td>ICD codes</td>
<td>ICD-9 410, 411</td>
</tr>
<tr>
<td>ICD-10 I20.0, I21, I22</td>
<td></td>
</tr>
<tr>
<td>Data source</td>
<td>hospital discharge records</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>ACS patients in ICU – health system: health care utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational definition</td>
<td>percentage of ACS patients admitted in Intensive Care Units (ICU) per year</td>
</tr>
<tr>
<td>ICD codes</td>
<td>ICD-9 410, 411</td>
</tr>
<tr>
<td>ICD-10 I20.0, I21, I22</td>
<td></td>
</tr>
<tr>
<td>Data source</td>
<td>population-based ACS register</td>
</tr>
</tbody>
</table>
11.3 ALL ISCHAEMIC HEART DISEASES

11.3.a Available indicators

Indicator | mortality rate – health status: mortality
Operational definition | annual deaths from IHS per 100,000 population
ICD codes | ICD-9 410 - 414
| ICD-10 I20 - I25
Data source | vital statistics

Indicator | hospital discharge rate - health status: morbidity
Operational definition | annual IHD hospitalisations per 100,000 population
ICD codes | ICD-9 410 - 414
| ICD-10 I20 - I25
Data source | hospital discharge records

11.3.b Short-term implementation

Indicator | mortality rate – health status: mortality
Operational definition | annual deaths from HIS and SD per 100,000 population
ICD codes | ICD-9 410 - 414, 798
| ICD-10 I20 - I25, R96, R98
Data source | vital statistics

Indicator | prevalence of effort angina - health status: morbidity
Operational definition | number of subjects who have experienced typical angina per 100,000 population
ICD codes | ICD-9 413
| ICD-10 I20
Data source | HES and CVD surveys which include the LSHTM questionnaire

Indicator | CABG rate – health system: health care utilisation
Operational definition | annual CABG hospitalisations per 100,000 population
ICD codes | ICD-9-CM 36.1
| NOMESCO: FNA-FNE
Data source | hospital discharge records
Indicator | PTCA rate – health system: health care utilisation
---|---
Operational definition | annual PTCA hospitalisations per 100,000 population
ICD codes | ICD-9-CM 36.01, 36.02, 36.05, 36.06 (stent)
Data source | hospital discharge records, NOMESCO: FNG0

Indicator | coronary angiography rate – health system: health care utilisation
---|---
Operational definition | annual number of coronary angiographies per 100,000 population
ICD codes | ICD-9-CM 88.55-88.57
Data source | hospital discharge records

### 11.3.c Long-term implementation

Indicator | prevalence of IHD - health status: morbidity
---|---
Operational definition | number of subjects who have experienced IHD (myocardial infarction AND/OR by-pass AND/OR PTCA AND/OR angina) per 100,000 population
ICD codes | in the first hospital discharge diagnosis:
- IHD: ICD-9 410-414, ICD-10 I20-I25
- CABG: ICD-9-CM 36.1; NOMESCO FNA-FNE
- PTCA: ICD-9-CM 36.01, 36.02, 36.05, 36.06 (stent); NOMESCO FNG0
Data source | - HES which include the LSHTM questionnaire, questions on re-vascularisation procedures, ECG (Minnesota code) and physician diagnoses
- linkage between specific registers (AMI, CABG, PTCA) and mortality

Indicator | functional disability and quality of life - health status: disability
---|---
Operational definition | proportion of patients affected by IHD impaired in ADL or positive to EuroQol questionnaire
Data source | HES or CVD surveys which include the ADL questionnaire or the EuroQol questionnaire

### 11.4 HEART FAILURE

11.4.a Available indicators
Currently no specific indicators for HF are available directly from routine health statistics. However data exist for mortality and hospital discharge records at a national level. To obtain routine HF indicators for each country is only a matter of reporting existing routine data in different formats.
**Indicator** heart transplant rate - health system: health care utilisation

**Operational definition** annual heart transplant hospitalisations per 100,000 population

**ICD codes** ICD-9-CM 37.5

**Data source** hospital discharge records

**11.4.b Short-term implementation**

**Indicator** mortality rate - health status: mortality

**Operational definition** annual HF deaths per 100,000 population

**ICD codes** ICD-9 428
ICD-10 I50

**Data source** vital statistics

**Indicator** hospital discharge rate - health status: morbidity

**Operational definition** annual HF hospitalisations per 100,000 population

**ICD codes** ICD-9 428
ICD-10 I50

**Data source** hospital discharge records

**Indicator** aggregate bed-day rate – health system: health care utilisation

**Operational definition** annual sum of number of days spent in hospital for HF per 100,000 population

**ICD codes** ICD-9 428
ICD-10 I50

**Data source** hospital discharge records

**Indicator** mean length of stay – health system: health care utilisation

**Operational definition** mean number of days spent in hospital per HF patient

**ICD codes** ICD-9 428
ICD-10 I50

**Data source** hospital discharge records

**11.4.c Long-term implementation**

It is suggested to validate a sample of hospital discharge and mortality records using medical records and adopting diagnostic criteria described in paragraph 10.3. This will allow to estimate the sensitivity and specificity of hospital discharge diagnoses and mortality causes for HF (see chapter 8).

**Indicator** validated mortality rate - health status: mortality

**Operational definition** validated annual deaths from HF per 100,000 population in the following causes of death: heart failure, hypertensive heart disease,
other primary cardiomyopathies, alcoholic cardiomyopathy, secondary cardiomyopathy, chronic cor pulmonale

**ICD codes**
- ICD-9: 428.0, 428.1, 428.9, 402, 416, 425.4, 425.5, 425.9
- ICD-10: I27.9, I50, I11, I42.5, I42.8, I42.6, I42.9

**Data source**
- vital statistics
- medical records

**Indicator** validated hospital discharge rate - *health status: morbidity*

**Operational definition** validated annual HF hospitalisations per 100,000 population in the following diagnoses: heart failure, hypertensive heart disease, other primary, cardiomyopathies, alcoholic cardiomyopathy, secondary cardiomyopathy, chronic cor pulmonale

**ICD codes**
- ICD-9: 428.0, 428.1, 428.9, 402, 416, 425.4, 425.5, 425.9
- ICD-10: I27.9, I50, I11, I42.5, I42.8, I42.6, I42.9

**Data source**
- hospital discharge records, medical records

**Indicator** prevalence of HF - *health status: morbidity*

**Operational definition** number of patients with HF per 100,000 population

**ICD codes**
- heart failure: based on Framingham or Boston or ESC criteria.

**Data source**
- HES surveys
- CVD surveys
- GP-network

**Indicator** median length of stay – *health system: health care utilisation*

**Operational definition** median number of days spent in hospital per patient

**ICD codes**
- ICD-9 428
- ICD-10 150

**Data source**
- hospital discharge records

**Indicator** functional disability and quality of life - *health status: disability*

**Operational definition** proportion of patients affected by HF impaired in ADL or positive to EuroQol questionnaire

**Data source**
- HES or CVD surveys which include the ADL questionnaire or the EuroQol questionnaire

### 11.5 OTHER FORMS OF HEART DISEASES

11.5.a *Available indicators*

**Indicator** mortality rate – *health status: mortality*

**Operational definition** annual deaths per 100,000 for the following causes: rheumatic heart disease, hypertensive disease, other forms of heart diseases

**ICD codes**
- ICD-9: 393-398, 401-405, 420-429
ICD-10: I05-I09, I11-I13, I30-I49, I51

Data source: vital statistics

Indicator: **hospital discharge rate** - health status: morbidity

Definition: annual hospitalisations per 100,000 population for the following diagnoses: rheumatic heart disease, hypertensive disease, other forms of heart diseases

ICD codes:
- ICD-9: 393-398, 401-405, 420-429
- ICD-10: I05-I09, I11-I13, I30-I49, I51

Data source: - hospital discharge records

Indicator: **mean length of stay** – health system: health care utilisation

Operational definition: mean number of days spent in hospital per patient

ICD codes:
- ICD-9: 393-398, 401-405, 420-429
- ICD-10: I05-I09, I11-I13, I30-I49, I51

Data source: hospital discharge records

Indicator: **aggregate bed-day rate** – health system: health care utilisation

Operational definition: sum of days in one year spent in hospital for other forms of heart diseases (rheumatic heart disease, hypertensive disease, other forms of heart diseases) per 100,000 population

ICD codes:
- ICD-9: 393-398, 401-405, 420-429
- ICD-10: I05-I09, I11-I13, I30-I49, I51

Data source: hospital discharge records

11.5.b Short-term implementation

Indicator: **mortality rate** – health status: mortality

Operational definition: annual deaths per 100,000 for the following causes: atherosclerosis, aortic aneurisms, acute cor pulmonale, dysrhythmias, acute pulmonary oedema

ICD codes:
- ICD-9: 440, 441, 444, 415, 426-427, 428, 429
- ICD-10: 170, 171, 182, I44-I49, I50, I51

Data source: vital statistics

Indicator: **hospital discharge rate** – health status: morbidity

Operational definition: annual hospitalisations per 100,000 for the following causes: atherosclerosis, aortic aneurisms, acute cor pulmonale, dysrhythmias, acute pulmonary oedema

ICD codes:
- ICD-9: 440, 441, 444, 415, 426-427, 428, 429
- ICD-10: 170, 171, 182, I44-I49, I50, I51
Data source: hospital discharge records

**Indicator**: mean length of stay – *health system: health care utilisation*

**Operational definition**: mean number of days spent in hospital per patient

**ICD codes**
- ICD-9: 440, 441, 444, 415, 426-427, 428, 429
- ICD-10: 170, 171, 182, I44-I49, I50, I51

**Data source**: hospital discharge records

**Indicator**: aggregate bed-day rate – *health system: health care utilisation*

**Operational definition**: number of days spent in hospital for other forms of heart diseases (atherosclerosis, aortic aneurisms, acute cor pulmonale, dysrhythmias, acute pulmonary oedema) per 100,000 population

**ICD codes**
- ICD-9: 440, 441, 444, 415, 426-427, 428, 429
- ICD-10: 170, 171, 182, I44-I49, I50, I51

**Data source**: hospital discharge records

**Indicator**: hospital discharge rate for surgical operations and invasive procedures - *health system: health care utilisation*

**Operational definition**: annual hospitalisation for valvular operations, aortic aneurism operations, other aneurism operations, pace makers, implantable cardioverter defibrillators, catheter ablation per 100,000 population

**ICD codes**
- valvular: ICD-9-CM 35.0-35.3, 35.95, 35.96, 35.99
- pacemaker: ICD-9-CM 00.50, 37.7-37.8, 39.64, 39.8, 89.4
- catheter ablation: ICD-9-CM 37.34
- implantable cardioverter defibrillators: ICD-9-CM 37.94, 00.51

**Data source**: hospital discharge records

**11.5.c Long-term implementation**

**Indicator**: validated mortality rate – *health status: mortality*

**Operational definition**: validated annual deaths per 100,000 for the following causes: rheumatic heart disease, hypertensive disease, other forms of heart diseases, atherosclerosis, aortic aneurisms, acute cor pulmonale, dysrhythmias, acute pulmonary oedema

**ICD codes**
- ICD-9: 393-398, 401-405, 420-429, 440, 441, 444, 415, 426-427, 428, 429

**Data source**: vital statistics, medical records

**Indicator**: validated hospital discharge rate – *health status: morbidity*

**Operational definition**: validated annual hospitalisations per 100,000 for the following causes: rheumatic heart disease, hypertensive disease, other forms of heart diseases, atherosclerosis, aortic aneurisms, acute cor pulmonale, dysrhythmias, acute pulmonary oedema
diseases, atherosclerosis, aortic aneurisms, acute cor pulmonale, dysrhythmias, acute pulmonary oedema

**ICD codes**

ICD-9: 393-398, 401-405, 420-429, 440, 441, 444, 415, 426-427, 428, 429
ICD-10: I05-I09, I11-I13, I30-I49, I51, I70, I71, I82, I44-I49, I50

**Data source**

Hospital discharge and medical records

**Indicator**

**median length of stay** – health system: health care utilisation

**Operational definition**

median number of days spent in hospital per patient

**ICD codes**

ICD-9: 393-398, 401-405, 420-429, 440, 441, 444, 415, 426-427, 428, 429
ICD-10: I05-I09, I11-I13, I30-I49, I51, I70, I71, I82, I44-I49, I50

**Data source**

hospital discharge records

### 11.6 CEREBROVASCULAR DISEASES AND VASCULAR DEMENTIA

#### 11.6.a Available indicators

**Indicator**

cerebrovascular mortality rate – health status: mortality

**Operational definition**

annual deaths from cerebrovascular diseases per 100,000 population

**ICD codes**

ICD-9 430 - 438
ICD-10 I60 - I69, G45

**Data source**

vital statistics

**Indicator**

dementia mortality rate – health status: mortality

**Operational definition**

annual deaths from dementia per 100,000 population

**ICD codes**

ICD-9 290.4
ICD-10 F01

**Data source**

vital statistics

**Indicator**

cerebrovascular hospital discharge rate - health status: morbidity

**Operational definition**

annual hospitalisations for cerebrovascular diseases per 100,000 population

**ICD codes**

ICD-9 430 – 438
ICD-10 I60 - I69, G45

**Data source**

hospital discharge records

**Indicator**

dementia hospital discharge rate - health status: morbidity

**Operational definition**

annual hospitalisations for dementia per 100,000 population

**ICD codes**

ICD-9 290.4
ICD-10 F01
**Data source**
- hospital discharge records

**Indicator**
- **aggregate bed-day rate** – *health system: health care utilisation*

**Operational definition**
- sum of days in one year spent in hospital for stroke

**ICD codes**
- ICD-9 430-438
- ICD-10 I60 - I69, G45

**Data source**
- hospital discharge records

**Indicator**
- **mean length of stay** – *health system: health care utilisation*

**Operational definition**
- mean number of days spent in hospital per patient

**ICD codes**
- ICD-9 430-438
- ICD-10 I60-I69, G45

**Data source**
- hospital discharge records

**Indicator**
- **carotid angioplasty rate** – *health system: health care utilisation*

**Operational definition**
- annual procedures of carotid angioplasty per 100,000 population age 40 years and over

**ICD codes**
- ICD-9-CM 39.50 NOMESCO: XAC85 (Denmark)

**Data source**
- hospital discharge records

### 11.6.b Short-term implementation

**Indicator**
- **mortality rate** – *health status: mortality*

**Operational definition**
- annual deaths from ischaemic stroke, subarachnoid haemorrhage, intracerebral haemorrhage, unspecified stroke per 100,000 population

**ICD codes**
- occlusion, stenosis and thrombosis of cerebral arteries: ICD-9 434; ICD-10 I66, I63
- subarachnoid haemorrhage: ICD-9 430, ICD-10 I60
- intracerebral haemorrhage: ICD-9 431, 432, ICD-10 I61, I62
- unspecified stroke: ICD-9 436-437; ICD-10 I64, I67, I68 (check)

**Data source**
- vital statistics

**Indicator**
- **hospital discharge rate** - *health status: morbidity*

**Operational definition**
- annual hospitalisations for ischaemic stroke, subarachnoid haemorrhage, intracerebral haemorrhage, unspecified stroke per 100,000 population

**ICD codes**
- occlusion, stenosis and thrombosis of cerebral arteries: ICD-9 434; ICD-10 I66, I63
- subarachnoid haemorrhage: ICD-9 430, ICD-10 I60
- intracerebral haemorrhage: ICD-9 431, 432, ICD-10 I61 I62
- unspecified acute stroke: ICD-9 436; ICD-10 I64
Data source hospital discharge records

Indicator **attack rate/incidence rate** - *health status: morbidity*

Operational definition annual stroke events (first and recurrent) per 100,000 population

ICD codes fatal and non-fatal: ICD-9 430-438 ICD-10 I60-I69, G45

Data source - HDRs linked with mortality

Indicator **7-day case-fatality rate** - *health status: morbidity*

Operational definition the proportion of ischaemic and haemorrhagic (subarachnoidal and intracerebral) stroke events that are fatal within 7 days from the onset

ICD codes fatal and non-fatal: ICD-9 430-438 ICD-10 I60-I69, G45

Data source - HDRs linked with mortality

Indicator **brain imaging per population** – *health system: health care utilisation*

Operational definition number of CT-scans (Computerized axial Tomography of head) and MRI (Magnetic Resonance Imaging of brain and brainstem) per 100,000 population

ICD codes CT-scan: ICD-9-CM 87.03 MRI: ICD-9CM 88.91

Data source hospital discharge records

Indicator **median length of stay for cerebrovascular diseases** – *health system: health care utilisation*

Operational definition mean or median number of days spent in hospital per patient

ICD codes ICD-9 430-438 ICD-10 I60-I69, G45

Data source hospital discharge records

11.6.c **Long-term implementation**

It is suggested to validate a sample of hospital discharge and mortality records using medical records and adopting diagnostic criteria described in paragraph 10.3. This will allow to estimate the sensitivity and specificity of hospital discharge diagnoses and mortality causes for cerebrovascular accidents (see chapter 8).
**Indicator** validated mortality rate – health status: mortality

**Operational definition** validated annual deaths from ischaemic stroke, subarachnoid haemorrhage, intracerebral haemorrhage, unspecified stroke per 100,000 population

**ICD codes**
- occlusion, stenosis and thrombosis of cerebral arteries: ICD-9 434; ICD-10 I66, I63
- subarachnoid haemorrhage: ICD-9 430, ICD-10 I60
- intracerebral haemorrhage: ICD-9 431, 432, ICD-10 I61, I62
- unspecified stroke: ICD-9 436-437; ICD-10 I64, I67, I68 (check)

**Data source** vital statistics, medical records

**Indicator** validated attack rate/incidence by subtype of stroke – health status: morbidity

**Operational definition** validated annual subtype (ischaemic, subarachnoidal haemorrhage, intracerebral haemorrhage) of stroke events (first or recurrent) per 100,000 population

**ICD codes**
- non-fatal:
  - occlusion and stenosis of cerebral arteries and cerebral infarction: ICD-9 434, 436; ICD-10 I66; I63, I64
  - subarachnoid haemorrhage: ICD-9 430, ICD-10 I60
  - intracerebral haemorrhage and other non-traumatic intracranial: ICD-9 431-432, ICD-10 I61-I62
  - unspecified acute stroke: ICD-9 436
- fatal: ICD-9 430-438
  ICD-10 I60-I69, G45

**Data source** population-based stroke registers, cohort longitudinal studies if population acute stroke registers unavailable, medical records

**Indicator** prevalence of stroke - health status: morbidity

**Definition** number of subjects who survived a cerebrovascular event per 100,000 population

**ICD codes**
- occlusion, stenosis, thrombosis of cerebral arteries and not specified: ICD-9 434, 436; ICD-10 I66, I64
- subarachnoid haemorrhage: ICD-9 430; ICD-10 I60
- intracerebral haemorrhage and other non-traumatic intracranial: ICD-9 431-432; ICD-10 I61-I62

**Data source** - CVD surveys, HIS and HES, ad hoc elderly HES.
- prevalence can be derived from other indicators: incidence (I) and duration (D) of CVA as follows: \( P = I \times D \)
- population registers: prevalence can be calculated if there is a long period of registration and there is information on incidence and survival \( (P = I \times S) \)
**Indicator**  
**stroke units per population** – *health system: health care utilisation*

**Operational definition**  
number of stroke units per 100,000 population (*A stroke unit is a pool of dedicated human and technological resources used in the treatment of stroke*)

**Data source**  
Ministry of Health

**Indicator**  
**functional disability and quality of life** - *health status: disability*

**Operational definition**  
proportion of patients affected by stroke impaired in ADL or positive to EuroQol questionnaire

**Data source**  
HESor CVD surveys which include the ADL questionnaire or the EuroQol questionnaire; ad hoc surveys at 1 year follow-up of stroke patients

### 11.7 MEDICINE USE FOR CARDIOVASCULAR DISEASES AND THEIR RISK FACTORS

**Indicator**  
**medication use** - *health system: health care utilisation*

**Definition**  
annual DDDs / 1000 inhabitants

**ATC codes**  
- antihypertensives C02
- diuretics C03
- beta blocking agents C07
- calcium channel blockers C08
- ACE inhibitors C09A, C09B
- nitrates C01DA
- statins C10AA
- fibrates C10AB
- acetylsalicylic acid (aspirine) B01AC
- antithrombotic agents, vitamin K antagonist B01AA
- antithrombotic agents, heparin group B01AB
- digitalis glycosides C01AA
- spironolactone C03DA01

**Data source**  
Ministry of Health, register of medicine consumption

**Indicator**  
**medicine use for patients with diagnosed IHD** - *health system: health care utilisation*

**Operational definition**  
proportion of patients with IHD using

**ATC codes**  
- beta blocking agents C07
- calcium channel blockers C08
- ACE inhibitors C09A, C09B
- nitrates C01DA
- acetylsalicylic acid (aspirine) B01AC
- statins C10AA

**Data source**  
CVD surveys
**Indicator**  proportion of patients using evidence-based drugs - health system: health care utilisation

**Operational definition**  proportion of stroke patients using:
- antithrombotic B01
- antiplatelet B01AC
- anticoagulant B01AA

**Data source**  population-based stroke registers

A page on the EUROCISS website (http://www.cuore.iss.it/eurociss/en/dati/altri.asp) provides all recommended indicators available in each partner country.
12. Conclusions

The ultimate aim of this project was to prepare a list of recommended indicators to improve the information and knowledge needed for monitoring cardiovascular diseases of major importance and to contribute to the promotion of health and prevention throughout the European Union. In addition to developing the lists of indicators, a major outcome of this project was the development of a spirit of collaboration among participating countries. The suggested recommendations described in this final report have been developed through a close collaboration among the partner countries. They derive from the work partners have undertaken to compile a detailed inventory of data sources already available in the different countries and the methods used by each country to collect them, and from detailed discussions of proposed indicators and the best way of prioritising them, as well as how to maximise the use and quality of existing data. The collaboration developed as a result of the project will undoubtedly have long term positive implications for future CVD monitoring efforts in Europe.

A list of new indicators was proposed. Some are based on available data and can be produced over a relatively short period of time: these are called short-term implementation indicators. Others, which are called long-term implementation indicators, need a longer period of time to be implemented, and require, for each country, the training of a dedicated team of epidemiologists to support their development. Outcome and quality care indicators were not included: these go beyond the scope of the project and are to be developed in the future.

Cardiovascular diseases are responsible for a great deal of hospitalisation and death. However, to obtain a comprehensive picture of those diseases, many sources of information must be integrated. Clinical events may be acute or chronic and vary in their severity; hospitalisation may be for the first occurrence of a disease or for treatment of further episodes or sequelae. Validation of data thus becomes essential and the ability to temporally link events in time is of great potential interest. Following the experience of the Nordic countries, it is therefore also recommended that all medical and death records across Europe adopt a personal identification number, which would allow an easier and more accurate record linkage among the different sources of information.

In summary, the project added value by:

• creating of a network of experts from each country to support the monitoring of cardiovascular diseases across Europe;
• defining a list of common indicators to be adopted by each country;
• underlining the need for each country to invest in a dedicated population epidemiology team to develop validated data sources which will allow cross national monitoring;
• establishing the basis for an improved future regulation in public health policies concerning the surveillance of cardiovascular diseases throughout European countries;
• proposing a stepwise procedure for the implementation of the recommended indicators (registers of AMI, Stroke and CVD Surveys).

The application of the recommended standard methodology in all countries will result in the availability of reliable, valid and therefore comparable data on CVD morbidity at the European level.
Figure 1: Data flow in a population-based register

- MORTALITY SUSPECTED CAUSES
  - Cross-check with the mortality register
    - Death certificates with suspected causes
      - FATAL EVENT
  - Discharged before the 28th day
- HOSPITAL DISCHARGE SUSPECTED EVENTS
  - Alive at the 28th day
  - NON-FATAL EVENT
  - Alive at the 28th day
  - NON-FATAL EVENT
<table>
<thead>
<tr>
<th>Country</th>
<th>Rates (per 100,000)</th>
<th>First Year</th>
<th>Last Year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>3087.2</td>
<td>1989</td>
<td>4009.3</td>
<td>Ministry of Social Affairs, Public Health and the Environment</td>
</tr>
<tr>
<td>Belgium</td>
<td>1766.8</td>
<td>1992</td>
<td>2070.8</td>
<td>Institute of Health Information and Statistics of CR (IHIS CR)</td>
</tr>
<tr>
<td>Czech</td>
<td>2358.8</td>
<td>1981</td>
<td>3634.8</td>
<td>National Patient Registry, Ministry of Health. Only patients discharged from public hospitals are included. From 1994 Denmark started using ICD-10</td>
</tr>
<tr>
<td>Denmark</td>
<td>2185.1</td>
<td>1987</td>
<td>2412.7</td>
<td>Hospital Discharge Register, Stakes. From 1998 Stakes Care Register</td>
</tr>
<tr>
<td>Finland</td>
<td>3259.5</td>
<td>1987</td>
<td>3670.4</td>
<td>Hospital Discharge Register, Stakes. From 1998 Stakes Care Register</td>
</tr>
<tr>
<td>France</td>
<td>2219.1</td>
<td>1993</td>
<td>2218.3</td>
<td>Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10. Day cases are not included.</td>
</tr>
<tr>
<td>Greece</td>
<td>777.7</td>
<td>1970</td>
<td>2196.1</td>
<td>Center for Health Care Information (GYOGYINFOK)</td>
</tr>
<tr>
<td>Hungary</td>
<td>2798.9</td>
<td>1992</td>
<td>4288.0</td>
<td>The Directorate of Health / Ministry of Health and Social Security.</td>
</tr>
<tr>
<td>Iceland</td>
<td>1939.5</td>
<td>1989</td>
<td>1797.3</td>
<td>Hospital in-Patient Enquiry. Figures refer to discharges and not to individual people. Data refer to discharges from publicly funded acute hospitals and (from 2003) to two private hospitals.</td>
</tr>
<tr>
<td>Ireland</td>
<td>1424.4</td>
<td>1994</td>
<td>1437.5</td>
<td>Data on discharges are obtained by a sample survey referred to discharges over the first week in each month of the year. Under the hypothesis of uniform distribution of the discharges in the whole month, an estimation of annual discharges is obtained multiplying the sample data by a coefficient (4.35 = average number of weeks in month). Source until 1996: ISTAT. Source from 1997: Data derived from S.D.O. (Scheda di Dimissione Ospedaliera) and refer to all public and private hospitals. Source: Ministry of Health.</td>
</tr>
<tr>
<td>Italy</td>
<td>1807.5</td>
<td>1982</td>
<td>2552.1</td>
<td>Data on discharges are obtained by a sample survey referred to discharges over the first week in each month of the year. Under the hypothesis of uniform distribution of the discharges in the whole month, an estimation of annual discharges is obtained multiplying the sample data by a coefficient (4.35 = average number of weeks in month). Source until 1996: ISTAT. Source from 1997: Data derived from S.D.O. (Scheda di Dimissione Ospedaliera) and refer to all public and private hospitals. Source: Ministry of Health.</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>2481.0</td>
<td>1998</td>
<td>2433.2</td>
<td>Data on discharges are obtained by a sample survey referred to discharges over the first week in each month of the year. Under the hypothesis of uniform distribution of the discharges in the whole month, an estimation of annual discharges is obtained multiplying the sample data by a coefficient (4.35 = average number of weeks in month). Source until 1996: ISTAT. Source from 1997: Data derived from S.D.O. (Scheda di Dimissione Ospedaliera) and refer to all public and private hospitals. Source: Ministry of Health.</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1419.7</td>
<td>1990</td>
<td>1549.2</td>
<td>Dutch Centre for Health Care Information: National Medical Registry.</td>
</tr>
<tr>
<td>Poland</td>
<td>1343.5</td>
<td>1980</td>
<td>2483.7</td>
<td>Source: Hospital Discharge Register, NBHW</td>
</tr>
<tr>
<td>Portugal</td>
<td>714.5</td>
<td>1991</td>
<td>1247.6</td>
<td>November 2001: Only the acute hospitals that belong to the National Health Service (NIHS) on the mainland are included. The data from the hospitals located in the autonomous regions of Azores and Madeira, and the private hospitals are not included.</td>
</tr>
<tr>
<td>Spain</td>
<td>675.9</td>
<td>1986</td>
<td>1412.6</td>
<td>National Patient Registry, Ministry of Health. Only patients discharged from public hospitals are included. From 1994 Denmark started using ICD-10</td>
</tr>
<tr>
<td>Sweden</td>
<td>2815.3</td>
<td>1987</td>
<td>2481.0</td>
<td>Source: Hospital Discharge Register, NBHW</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1475.6</td>
<td>1996</td>
<td>1452.2</td>
<td>1. covers UK National Health Service hospitals only; 2. financial year (01-04 to 31-03) basis, e.g. 1996-97 presented for 1996; 3. excludes one-day cases i.e. when admission and discharge date the same; 4. based on diagnosis recorded at discharge</td>
</tr>
</tbody>
</table>
### Table 1b - WHO: HFA - DB

"Hospital discharges: ischaemic heart disease / 100 000" available years and source

<table>
<thead>
<tr>
<th></th>
<th>FIRST Rate</th>
<th>FIRST Year</th>
<th>LAST Rate</th>
<th>LAST Year</th>
<th>SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRIA</td>
<td>723.1</td>
<td>1989</td>
<td>991.9</td>
<td>2003</td>
<td>Ministry of Social Affairs, Public Health and the Environment</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>544.3</td>
<td>1992</td>
<td>733.4</td>
<td>2003</td>
<td>Institute of Health Information and Statistics of CR (IHIS CR)</td>
</tr>
<tr>
<td>CZECH</td>
<td>1091.5</td>
<td>1981</td>
<td>1070.9</td>
<td>2004</td>
<td>National Patient Registry, Ministry of Health. Only patients discharged from public hospitals are included. From 1994 Denmark started using ICD-10</td>
</tr>
<tr>
<td>DENMARK</td>
<td>704.6</td>
<td>1987</td>
<td>794.4</td>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>FINLAND</td>
<td>1094.1</td>
<td>1987</td>
<td>1091.3</td>
<td>2004</td>
<td>Hospital Discharge Register, Stakes. From 1998 Stakes Care Register</td>
</tr>
<tr>
<td>FRANCE</td>
<td>489.8</td>
<td>1993</td>
<td>513.4</td>
<td>2003</td>
<td>Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10. Day cases are not included.</td>
</tr>
<tr>
<td>GERMANY</td>
<td>798.7</td>
<td>1993</td>
<td>959.8</td>
<td>2003</td>
<td>Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10. Day cases are not included.</td>
</tr>
<tr>
<td>GREECE</td>
<td>190.8</td>
<td>1970</td>
<td>751.9</td>
<td>1999</td>
<td></td>
</tr>
<tr>
<td>HUNGARY</td>
<td>838.5</td>
<td>1994</td>
<td>833.9</td>
<td>2004</td>
<td>Center for Health Care Information (GYOGYINFOK)</td>
</tr>
<tr>
<td>ICELAND</td>
<td>812.0</td>
<td>1989</td>
<td>726.7</td>
<td>2003</td>
<td>The Directorate of Health / Ministry of Health and Social Security.</td>
</tr>
<tr>
<td>IRELAND</td>
<td>455.4</td>
<td>1994</td>
<td>464.0</td>
<td>2004</td>
<td>Hospital in-Patient Enquiry. Figures refer to discharges and not to individual people. Data refer to discharges from publicly funded acute hospitals and (from 2003) to two private hospitals.</td>
</tr>
<tr>
<td>ITALY</td>
<td>343.8</td>
<td>1982</td>
<td>606.4</td>
<td>2002</td>
<td>Data on discharges are obtained by a sample survey referred to discharges over the first week in each month of the year. Under the hypothesis of uniform distribution of the discharges in the whole month, an estimation of annual discharges is obtained multiplying the sample data by a coefficient (4,35 = average number of weeks in month). Source until 1996: ISTAT. Source until 1996: ISTAT. Source from 1997: Data derived from S.D.O. (Scheda di Dimissione Ospedaliera) and refer to all public and private hospitals.</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>545.6</td>
<td>1990</td>
<td>555.3</td>
<td>2004</td>
<td>Dutch Centre for Health Care Information: National Medical Registry.</td>
</tr>
<tr>
<td>NORWAY</td>
<td>860.5</td>
<td>1991</td>
<td>969.8</td>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>POLAND</td>
<td>331.9</td>
<td>1980</td>
<td>945.9</td>
<td>2003</td>
<td></td>
</tr>
<tr>
<td>PORTUGAL</td>
<td>205.7</td>
<td>1994</td>
<td>285.3</td>
<td>2004</td>
<td>November 2001: Only the acute hospitals that belong to the National Health Service (NHS) on the mainland are included. The data from the hospitals located in the autonomous regions of Azores and Madeira, and the private hospitals are not included.</td>
</tr>
<tr>
<td>SPAIN</td>
<td>160.7</td>
<td>1986</td>
<td>362.2</td>
<td>2003</td>
<td>Total number of patients discharged from all hospitals during the given calendar year with the principal diagnosis falling into the group of Chapter II of ICD-9MC. Source: National Statistics Institute. Hospital Morbidity Survey.</td>
</tr>
<tr>
<td>SWEDEN</td>
<td>866.1</td>
<td>1987</td>
<td>818.1</td>
<td>2004</td>
<td>ICD-9: 390-459. Source: Hospital Discharge Register, NBHW</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>535.4</td>
<td>1996</td>
<td>532.5</td>
<td>2003</td>
<td>1. covers UK National Health Service hospitals only; 2. financial year (01-04 to 31-03) basis, e.g. 1996-97 presented for 1996; 3. excludes one-day cases i.e. when admission and discharge date the same; 4. based on diagnosis recorded at discharge</td>
</tr>
<tr>
<td>EU members before May 2004</td>
<td>582.1</td>
<td>1992</td>
<td>648.9</td>
<td>2003</td>
<td></td>
</tr>
<tr>
<td>EU members since May 2004</td>
<td>590.4</td>
<td>1981</td>
<td>973.8</td>
<td>2004</td>
<td></td>
</tr>
</tbody>
</table>
**Table 1c - WHO: HFA - DB**

"Hospital discharges: cerebrovascular disease / 100 000" available years and source

<table>
<thead>
<tr>
<th>FIRST</th>
<th>LAST</th>
<th>SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Year</td>
<td></td>
</tr>
<tr>
<td>AUSTRIA</td>
<td>620.8</td>
<td>1989 617.3 2003 Ministry of Social Affairs, Public Health and the Environment</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>119.1</td>
<td>1992 392.1 2003 Institute of Health Information and Statistics of CR (IHIS CR)</td>
</tr>
<tr>
<td>CZECH</td>
<td>492.9</td>
<td>1981 626.2 2004</td>
</tr>
<tr>
<td>FINLAND</td>
<td>643.97</td>
<td>1987 632.6 2004 In 1996 the change to ICD-10 classification occurred and in Finland it appears that the ICD-9 codes 430-438 and the ICD-10 codes I60-I69 do not totally correspond to each other. Source: Hospital</td>
</tr>
<tr>
<td>FRANCE</td>
<td>279.3</td>
<td>1993 212.7 2003 Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10.</td>
</tr>
<tr>
<td>GERMANY</td>
<td>441.03</td>
<td>1993 453.2 2003</td>
</tr>
<tr>
<td>GREECE</td>
<td>117.11</td>
<td>1970 387.4 1999 Center for Health Care Information (GYOGYINFOK)</td>
</tr>
<tr>
<td>HUNGARY</td>
<td>601.3</td>
<td>1994 1192.8 2004 The Directorate of Health / Ministry of Health and Social Security.</td>
</tr>
<tr>
<td>ICELAND</td>
<td>242.2</td>
<td>1989 251.3 2004</td>
</tr>
<tr>
<td>IRELAND</td>
<td>225.52</td>
<td>1994 251.4 2004 Source: Hospital In-Patient Enquiry. Figures refer to discharges and not to individual people. Data refer to discharges from publicly funded acute hospitals and (from 2003) to two private hospitals.</td>
</tr>
<tr>
<td>ITALY</td>
<td>369.34</td>
<td>1984 502.8 2002 ISTAT-Data on discharges are obtained by a sample survey referred to discharges over the first week in each month of the year. Under the hypothesis of uniform distribution of discharges in the whole month, an estimation of annual discharges is obtained multiplying the sample data by a coefficient (4.35 = average number of weeks in a month); January 2001, Ministry of Health: information derives from S.D.O. (Scheda di Dimissione Ospedaliera) and refers to all public and private hospitals</td>
</tr>
<tr>
<td>LUXEMBOURG</td>
<td>207.55</td>
<td>1998 164 2003 Dutch Centre for Health Care Information: National Medical Registry</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>175.3</td>
<td>1990 213.3 2004</td>
</tr>
<tr>
<td>NORWAY</td>
<td>292.06</td>
<td>1991 344.2 2004 Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10.</td>
</tr>
<tr>
<td>POLAND</td>
<td>130.0</td>
<td>1980 365.6 2003 Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10.</td>
</tr>
<tr>
<td>PORTUGAL</td>
<td>287.48</td>
<td>1994 336.2 2004 Dutch Centre for Health Care Information: National Medical Registry</td>
</tr>
<tr>
<td>SPAIN</td>
<td>104.78</td>
<td>1986 267.8 2003</td>
</tr>
<tr>
<td>SWEDEN</td>
<td>617.17</td>
<td>1987 418.4 2004 Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10.</td>
</tr>
<tr>
<td>UNITED</td>
<td>210.94</td>
<td>1996 224.9 2003 1. covers UK National Health Service hospitals only; 2. financial year (01-04 to 31-03) basis, e.g. 1996-97 presented for 1996; 3. excludes one-day cases i.e. when admission and discharge date the same; 4. based on Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10.</td>
</tr>
<tr>
<td>KINGDOM</td>
<td>333.4</td>
<td>1992 351.4 2003 Federal Statistical Office, Hospital statistics - diagnostic data of the hospital patients. From the reporting year 2000, for the first time, data have been collected according to ICD-10.</td>
</tr>
</tbody>
</table>

**EU members before May 2004**

<table>
<thead>
<tr>
<th>FIRST</th>
<th>LAST</th>
<th>SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Year</td>
<td></td>
</tr>
<tr>
<td>245.6</td>
<td>1981</td>
<td></td>
</tr>
</tbody>
</table>

**EU members since May 2004**

<table>
<thead>
<tr>
<th>FIRST</th>
<th>LAST</th>
<th>SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Year</td>
<td></td>
</tr>
<tr>
<td>351.4</td>
<td>2003</td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Population</td>
<td>Years of Study</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Belgium</td>
<td>Charleroi</td>
<td>1983-1992</td>
</tr>
<tr>
<td></td>
<td>Ghent</td>
<td>1983-1992</td>
</tr>
<tr>
<td></td>
<td>Luxembourg</td>
<td>1985-1991</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Czech Republic</td>
<td>1984-1993</td>
</tr>
<tr>
<td>Denmark</td>
<td>Glostrup</td>
<td>1982-1991</td>
</tr>
<tr>
<td>France</td>
<td>Lille</td>
<td>1985-1994</td>
</tr>
<tr>
<td></td>
<td>Strasbourg</td>
<td>1985-1993</td>
</tr>
<tr>
<td></td>
<td>Toulouse</td>
<td>1985-1993</td>
</tr>
<tr>
<td>Germany</td>
<td>Augsburg</td>
<td>1985-1994</td>
</tr>
<tr>
<td></td>
<td>Bremen</td>
<td>1985-1992</td>
</tr>
<tr>
<td></td>
<td>East Germany (**)</td>
<td>1984-1993</td>
</tr>
<tr>
<td></td>
<td>Rhein-Neckar Region</td>
<td>1984-1988</td>
</tr>
<tr>
<td>Hungary</td>
<td>Budapest</td>
<td>1982-1989</td>
</tr>
<tr>
<td></td>
<td>Pecs</td>
<td>1984-1989</td>
</tr>
<tr>
<td>Iceland</td>
<td>Iceland</td>
<td>1981-1994</td>
</tr>
<tr>
<td>Italy</td>
<td>Area Brianza</td>
<td>1985-1994</td>
</tr>
<tr>
<td></td>
<td>Friuli</td>
<td>1984-1993</td>
</tr>
<tr>
<td>Poland</td>
<td>Tarnobrzeg Voivodship</td>
<td>1984-1993</td>
</tr>
<tr>
<td></td>
<td>Warsaw</td>
<td>1984-1994</td>
</tr>
<tr>
<td>Spain</td>
<td>Catalonia</td>
<td>1985-1994</td>
</tr>
<tr>
<td>Sweden</td>
<td>Gothenburg</td>
<td>1984-1994</td>
</tr>
<tr>
<td>UK</td>
<td>Belfast</td>
<td>1983-1993</td>
</tr>
<tr>
<td></td>
<td>Glasgow</td>
<td>1985-1994</td>
</tr>
</tbody>
</table>

(*) ICD version used indicates the version of the International Classification of Diseases. 8, 9 (1987) means that version 8 was used until 1986, and version 9 was used thereafter.

(**) “H” indicates hot pursuit, non-fatal events identified mainly at hospital admission; “C”, cold pursuit, non-fatal events identified from hospital discharge; and “M”, mixed pursuit, the combination of hot and cold pursuit.

(***) More fatal and non-fatal events are to be added.
Table 3: Table summarising EU population involved in the MONICA Project for Stroke (Quality Assessment of Stroke Event Registration Data in the WHO MONICA Project)

<table>
<thead>
<tr>
<th>Country</th>
<th>Population</th>
<th>Years of Study</th>
<th>ICD Version Used (*)</th>
<th>Finding Methods (***)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Halle County</td>
<td>1984 – 1988</td>
<td>9</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>Karl-Marx Stadt</td>
<td>1985 - 1989</td>
<td>9</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>Rest of DDR</td>
<td>1984 - 1989</td>
<td>9</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>Rhein-Neckar Region</td>
<td>1984 - 1987</td>
<td>9</td>
<td>M</td>
</tr>
<tr>
<td>Hungary</td>
<td>Budapest</td>
<td>1983 - 1989</td>
<td>9</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>Pecs</td>
<td>1984 - 1989</td>
<td>9</td>
<td>H</td>
</tr>
<tr>
<td>Italy</td>
<td>Friuli</td>
<td>1984 - 1993</td>
<td>9</td>
<td>C</td>
</tr>
<tr>
<td>Poland</td>
<td>Warsaw</td>
<td>1984 - 1994</td>
<td>9</td>
<td>C</td>
</tr>
</tbody>
</table>

(*) ICD version used indicates the version of the International Classification of Diseases. 8, 9 (1987) means that version 8 was used until 1986, and version 9 was used thereafter.

(**) “H” indicates hot pursuit, non-fatal events identified mainly at hospital admission; “C”, cold pursuit, non-fatal events identified from hospital discharge; and “M”, mixed pursuit, the combination of hot and cold pursuit.

(***) More fatal and non-fatal events are to be added.
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Disease</th>
<th>Area</th>
<th>DRG</th>
<th>ICD</th>
<th>1st-last years</th>
<th>Age range</th>
<th>Population</th>
<th>Coverage</th>
<th>Mortal. linkage</th>
<th>Indicators</th>
<th>In hospital</th>
<th>Access data</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>IX 1997</td>
<td>all 3,941</td>
<td>4,170</td>
<td>8,111%</td>
<td></td>
<td>Statist. Austria</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>IX 1995</td>
<td>all 5,018</td>
<td>5,245</td>
<td>10,263%</td>
<td></td>
<td>Minist. Health</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>VII I,X</td>
<td>all 2,654</td>
<td>2,714</td>
<td>5,368%</td>
<td></td>
<td>Nat. Board Health</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>X 1982</td>
<td>all 2,500</td>
<td>2,500</td>
<td>5,000%</td>
<td></td>
<td>KTL, Stakes *</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>France</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>X 1997</td>
<td>all all</td>
<td>all 60,000</td>
<td>100%</td>
<td></td>
<td>Minist. Health</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>X 1993</td>
<td>all all</td>
<td>all 80,000</td>
<td>99.9%</td>
<td></td>
<td>Minist. Health</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>IX 1998</td>
<td>all 28,000</td>
<td>29,000</td>
<td>57,000%</td>
<td></td>
<td>Minist. Health</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>&gt;120 hosp</td>
<td>IX 1978-2000</td>
<td>all all</td>
<td>16,000%</td>
<td></td>
<td>Web site</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>X 1990-2000</td>
<td>all all</td>
<td>all 4,400</td>
<td>100%</td>
<td>- yearly yearly</td>
<td>✓</td>
<td>Statist. Norway</td>
<td>-</td>
</tr>
<tr>
<td>Portugal</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>IX 1993-2000</td>
<td>all all</td>
<td>4,570</td>
<td>4,919</td>
<td>9,490</td>
<td>90%</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Spain (***)</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>IX 1977-1998</td>
<td>all all</td>
<td>all 39,413</td>
<td>100%</td>
<td>- ✓ ✓ ✓ ✓</td>
<td>-</td>
<td>Ist.Nat. Estadist</td>
<td>✓</td>
</tr>
<tr>
<td>Sweden</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>X 1987</td>
<td>all 4390</td>
<td>4490</td>
<td>8880%</td>
<td>✓</td>
<td>NBHW #</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>UK - England</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>X 1989-2002</td>
<td>all all</td>
<td>all all</td>
<td>90-95%</td>
<td>✓</td>
<td>Dept of Health</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>UK - Scotland</td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat.</td>
<td>X 1962-2002</td>
<td>all all</td>
<td>all all</td>
<td>100%</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓</td>
<td>NHS Scotland</td>
<td>✓</td>
</tr>
</tbody>
</table>

(*) National Centre of Welfare and Health
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Estimated coverage</th>
<th>Estimated % of discharges</th>
<th>ICD version</th>
<th>1st year of appl. of ICD X</th>
<th>Instit. resp.of data collect.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>all hospitals</td>
<td>sample (%)</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>√</td>
<td>84%</td>
<td>√</td>
<td>1996</td>
<td>Statistik Austria</td>
</tr>
<tr>
<td>Belgium</td>
<td>√</td>
<td></td>
<td>√</td>
<td>1998</td>
<td>Ministry of Health/Hosp dep.</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>√</td>
<td>100%</td>
<td>√</td>
<td>1996</td>
<td>National Inst. of Welfare &amp; Health</td>
</tr>
<tr>
<td>Denmark</td>
<td>√</td>
<td>100%</td>
<td>√</td>
<td>1994</td>
<td>National Board of Health</td>
</tr>
<tr>
<td>Finland</td>
<td>√</td>
<td>100%</td>
<td>√</td>
<td>1996</td>
<td>National Institute of Welfare &amp; Health</td>
</tr>
<tr>
<td>France</td>
<td>√</td>
<td></td>
<td>√</td>
<td>1997</td>
<td>ATIH</td>
</tr>
<tr>
<td>Germany</td>
<td>√</td>
<td>99%</td>
<td>√</td>
<td>2000</td>
<td>Inst. of Statistics of G. Countries</td>
</tr>
<tr>
<td>Greece</td>
<td></td>
<td>15%</td>
<td>√</td>
<td></td>
<td>National Inst. Of Statistics</td>
</tr>
<tr>
<td>Hungary</td>
<td>√</td>
<td></td>
<td>√</td>
<td>1996</td>
<td>Centre for Healthcare Information</td>
</tr>
<tr>
<td>Iceland</td>
<td></td>
<td></td>
<td>√</td>
<td></td>
<td>Ministry of Health/ISTAT</td>
</tr>
<tr>
<td>Netherlands</td>
<td>√</td>
<td>90%</td>
<td>√</td>
<td></td>
<td>Prismant</td>
</tr>
<tr>
<td>Norway</td>
<td>√</td>
<td></td>
<td>√</td>
<td>1999</td>
<td>Statistics Norway/SINTEF Helse</td>
</tr>
<tr>
<td>Poland</td>
<td></td>
<td>85% 90%</td>
<td>√</td>
<td>2002</td>
<td>National Inst.of Hygene</td>
</tr>
<tr>
<td>Portugal</td>
<td>(√(excl psych))</td>
<td>100%</td>
<td>√</td>
<td></td>
<td>IGIF</td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>√</td>
<td>100%</td>
<td>√</td>
<td>1997</td>
<td>National Board of Health and Welfare</td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Blank spaces: missing or unclear information
**Statistical data are available only for 50% of the total HDR; (#) National Board of Health and Welfare**

**TABLE 5 a 2003**

**DISEASE:** ISCHAEMIC HEART DISEASE, ACUTE MYOCARDIAL INFARCTION, CEREBROVASCULAR ACCIDENTS, HEART FAILURE

**SOURCE:** SURVEYS AT NATIONAL LEVEL

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Disease</th>
<th>Sample</th>
<th>Indicators</th>
<th>Periodicity</th>
<th>Source</th>
<th>1st year</th>
<th>Age range</th>
<th>Population</th>
<th>Response rate</th>
<th>Access data</th>
<th>Stand meth.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td></td>
<td></td>
<td></td>
<td>Men x1000</td>
<td>Women x1000</td>
<td>Total x1000</td>
<td>%</td>
</tr>
<tr>
<td>Austria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Belgium HIS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>4-years</td>
<td>1987</td>
<td>16-20</td>
<td>8.2</td>
<td>8.5</td>
<td>16.7</td>
</tr>
<tr>
<td>Denmark HIS</td>
<td>General questions on health</td>
<td>5-20</td>
<td>✓</td>
<td>-</td>
<td>4-years</td>
<td>2000</td>
<td>25-2500</td>
<td>2500</td>
<td>5000</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Finland HEALTH 2000</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>8</td>
<td>-</td>
<td>2000</td>
<td>15-years</td>
<td>8.2</td>
<td>8.5</td>
<td>16.7</td>
</tr>
<tr>
<td>France</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>-</td>
<td>1960</td>
<td>10-years</td>
<td>0</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Germany- National HIS/HES</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>7.124</td>
<td>-</td>
<td>1998</td>
<td>4-8-years</td>
<td>3.4</td>
<td>3.7</td>
<td>7.2</td>
</tr>
<tr>
<td>Greece CARDIO 2000</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>✓</td>
<td>2000</td>
<td>26-84</td>
<td>0.7</td>
<td>0.148</td>
<td>0.848</td>
</tr>
<tr>
<td>Italy HIS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>70</td>
<td>✓</td>
<td>1980</td>
<td>3-4 years</td>
<td>-</td>
<td>-</td>
<td>70</td>
</tr>
<tr>
<td>Netherlands POLS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>18</td>
<td>✓</td>
<td>1981</td>
<td>yearly</td>
<td>5.4</td>
<td>5.5</td>
<td>10.9</td>
</tr>
<tr>
<td>Norway HIS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>5</td>
<td>✓</td>
<td>1998</td>
<td>3-years</td>
<td>#CAPI</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Portugal HIS</td>
<td>Question about circulatory system</td>
<td>49.718</td>
<td>-</td>
<td>% by cause</td>
<td>1987, 1995, 1998</td>
<td>✓</td>
<td>1987</td>
<td>1-79</td>
<td>20</td>
<td>22</td>
<td>42</td>
</tr>
<tr>
<td>Portugal EPICA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>6.3</td>
<td>✓</td>
<td>1998</td>
<td>25-80+</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Spain - Encuesta nacional de salud</td>
<td>Only one question on disease in general</td>
<td>8.4</td>
<td>-</td>
<td>-</td>
<td>Irregular, lately every two years</td>
<td>✓</td>
<td>1987</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Sweden National survey on living conditions</td>
<td>General questions on health</td>
<td>12-13</td>
<td>every 2 yrs</td>
<td>✓</td>
<td>1975</td>
<td>16-84</td>
<td>7.5</td>
<td>Statistic Sweden</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK Health Survey for England</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>23</td>
<td>✓</td>
<td>1993</td>
<td>16-74</td>
<td>7</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>UK – Scottish Health Survey</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>12</td>
<td>✓</td>
<td>1995</td>
<td>16-74</td>
<td>-</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>Disease</td>
<td>Sample</td>
<td>Indicators</td>
<td>Periodicity</td>
<td>Source</td>
<td>1st year</td>
<td>Age range</td>
<td>Population</td>
<td>Resp. rate</td>
<td>Access data</td>
<td>Standard method.</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>--------</td>
<td>------------</td>
<td>-------------</td>
<td>--------</td>
<td>----------</td>
<td>-----------</td>
<td>------------</td>
<td>-----------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>HD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>x 1000</td>
<td>Preval</td>
<td>Other</td>
<td>Source</td>
<td>1983</td>
<td>1992 last</td>
<td>1990</td>
</tr>
<tr>
<td>Austria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- x 1000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Belgium Ghent</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1992 last</td>
<td>1983</td>
<td>25-64</td>
<td>50</td>
</tr>
<tr>
<td>Charleroi</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1992 last</td>
<td>1983</td>
<td>25-64</td>
<td>50</td>
</tr>
<tr>
<td>Finland</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>6 x 1000</td>
<td>✓</td>
<td>-</td>
<td>5-years</td>
<td>1972</td>
<td>25-74</td>
<td>78</td>
</tr>
<tr>
<td>FINRISK</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>5-years</td>
<td>1983</td>
<td>25-74</td>
<td>66</td>
</tr>
<tr>
<td>Germany</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>6.5 x 1000</td>
<td>✓</td>
<td>-</td>
<td>5-years</td>
<td>1984</td>
<td>25-74</td>
<td>66</td>
</tr>
<tr>
<td>Augsburg</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>5-years</td>
<td>1984</td>
<td>25-74</td>
<td>66</td>
</tr>
<tr>
<td>Germany</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>7 x 1000</td>
<td>✓</td>
<td>-</td>
<td>5-years</td>
<td>1997</td>
<td>20-80</td>
<td>69</td>
</tr>
<tr>
<td>SHIP</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>5-years</td>
<td>1997</td>
<td>20-80</td>
<td>69</td>
</tr>
<tr>
<td>Italy</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>6 x 1000</td>
<td>✓</td>
<td>-</td>
<td>no</td>
<td>1998</td>
<td>35-74</td>
<td>6.4</td>
</tr>
<tr>
<td>OEC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>ISS</td>
<td>1998</td>
<td>35-74</td>
<td>6.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>10.3 x 1000</td>
<td>✓</td>
<td>Incid.</td>
<td>-</td>
<td>1990</td>
<td>55-78</td>
<td>78</td>
</tr>
<tr>
<td>Rotterdam ERGO</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>± 10 x 1000</td>
<td>✓</td>
<td>± 5-years</td>
<td>± yearly</td>
<td>± 1993</td>
<td>± 20-59</td>
<td>± 78</td>
</tr>
<tr>
<td>Netherlands</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>10 x 1000</td>
<td>✓</td>
<td>-</td>
<td>yearly</td>
<td>± 1993</td>
<td>± 20-59</td>
<td>± 78</td>
</tr>
<tr>
<td>Morgen</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>10 x 1000</td>
<td>✓</td>
<td>-</td>
<td>yearly</td>
<td>± 1993</td>
<td>± 20-59</td>
<td>± 78</td>
</tr>
<tr>
<td>挪威(*)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>10 x 1000</td>
<td>✓</td>
<td>-</td>
<td>yearly</td>
<td>± 1993</td>
<td>± 20-59</td>
<td>± 78</td>
</tr>
<tr>
<td>Nord-Trondelag</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>10 x 1000</td>
<td>✓</td>
<td>-</td>
<td>yearly</td>
<td>± 1993</td>
<td>± 20-59</td>
<td>± 78</td>
</tr>
<tr>
<td>Norway</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>37 x 1000</td>
<td>✓</td>
<td>-</td>
<td>5 to 10 yrs</td>
<td>± 37 x 1000</td>
<td>± 1992</td>
<td>± 60</td>
</tr>
<tr>
<td>Hordaland</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>37 x 1000</td>
<td>✓</td>
<td>-</td>
<td>5 to 10 yrs</td>
<td>± 37 x 1000</td>
<td>± 1992</td>
<td>± 60</td>
</tr>
<tr>
<td>Spain-MONICA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>± 5 x 1000</td>
<td>✓</td>
<td>-</td>
<td>last 1996</td>
<td>± 1986</td>
<td>± 25-64</td>
<td>± 72</td>
</tr>
<tr>
<td>Catalunia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>± 5 x 1000</td>
<td>✓</td>
<td>-</td>
<td>last 1996</td>
<td>± 1986</td>
<td>± 25-64</td>
<td>± 72</td>
</tr>
<tr>
<td>Sweden</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>1.5 x 1000</td>
<td>✓</td>
<td>-</td>
<td>5-years</td>
<td>± 1985</td>
<td>± 25-64</td>
<td>± 70-73</td>
</tr>
<tr>
<td>Gothenburg</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>1.5 x 1000</td>
<td>✓</td>
<td>-</td>
<td>5-years</td>
<td>± 1985</td>
<td>± 25-64</td>
<td>± 70-73</td>
</tr>
<tr>
<td>Northern</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>2/2.5 x 1000</td>
<td>✓</td>
<td>-</td>
<td>4/5-years</td>
<td>± 1986</td>
<td>± 25-74</td>
<td>± 73-83</td>
</tr>
<tr>
<td>Sweden</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>2/2.5 x 1000</td>
<td>✓</td>
<td>-</td>
<td>4/5-years</td>
<td>± 1986</td>
<td>± 25-74</td>
<td>± 73-83</td>
</tr>
</tbody>
</table>

(A), (B), (C), (D) distinguish different Surveys in the same country

(***) surveys like those in Nord-Trondelag are conducted in several regions, with 5-10 year’s intervals (e.g. FINNMARK)

# Computer Assisted Personal Interview (CAPI)

## National Institute of Public Health, Denmark
### TABLE 5 2006 SOURCE: HES

**DISEASE: ISCHAEMIC HEART DISEASE**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Years of data collection</th>
<th>Periodicity</th>
<th>Gender</th>
<th>Age range</th>
<th>Population</th>
<th>Methods of data collection</th>
<th>Age-Std values</th>
<th>Comp./last year avail.</th>
<th>Access data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>W</td>
<td>Men x1000</td>
<td>Women x1000</td>
<td>Total x 1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LSHTM quest</td>
<td>Other quest</td>
<td>Exam</td>
</tr>
<tr>
<td>Denmark 1</td>
<td>1976-2001</td>
<td>1976-78; 81-83; 91-93, 2001-03</td>
<td>√</td>
<td>√</td>
<td>20+</td>
<td>9.3</td>
<td>10.3</td>
<td>19.6</td>
<td>√</td>
</tr>
<tr>
<td>Denmark 2</td>
<td>1964-2005</td>
<td>2 or more times</td>
<td>√</td>
<td>√</td>
<td>35-85+</td>
<td>17</td>
<td>24</td>
<td>41</td>
<td>√</td>
</tr>
<tr>
<td>Finland</td>
<td>1972-2002</td>
<td>*</td>
<td>√</td>
<td>√</td>
<td>35-85+</td>
<td>2,600</td>
<td>2,600</td>
<td>5,200</td>
<td>√</td>
</tr>
<tr>
<td>Germany (BGS)</td>
<td>1997-1999</td>
<td>5-6 years</td>
<td>√</td>
<td>√</td>
<td>18-79</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>Greece</td>
<td>1994-2004</td>
<td>3-4yrs</td>
<td>√</td>
<td>√</td>
<td>all</td>
<td>12</td>
<td>17</td>
<td>29</td>
<td>-</td>
</tr>
<tr>
<td>Hungary</td>
<td>2001-2001</td>
<td></td>
<td>√</td>
<td>√</td>
<td>55-64</td>
<td>3.7</td>
<td>4.7</td>
<td>8.4</td>
<td>-</td>
</tr>
<tr>
<td>Iceland</td>
<td>1967-2005</td>
<td>continually</td>
<td>√</td>
<td>√</td>
<td>all tog.</td>
<td>15</td>
<td>15</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>Italy</td>
<td>1998-2002</td>
<td></td>
<td>√</td>
<td>√</td>
<td>35-74</td>
<td>3.2</td>
<td>3.2</td>
<td>6.4</td>
<td>√</td>
</tr>
<tr>
<td>Norway I</td>
<td>1974-2001</td>
<td>discontinued</td>
<td>√</td>
<td>√</td>
<td>30-75</td>
<td>a)</td>
<td>√</td>
<td>√</td>
<td>b)</td>
</tr>
<tr>
<td>Norway II</td>
<td>1985-1995</td>
<td>next:2006-8</td>
<td>√</td>
<td>√</td>
<td>20+</td>
<td>55</td>
<td>55</td>
<td>110</td>
<td>-</td>
</tr>
<tr>
<td>UK</td>
<td>1994-2004</td>
<td>every year</td>
<td>√</td>
<td>√</td>
<td>16-85+</td>
<td>2-15 (child.)</td>
<td>14</td>
<td>-</td>
<td>√</td>
</tr>
</tbody>
</table>

* 5 years (FINRISK); 15 years (Health 2000)  ** only for Health 2000

1 Copenhagen City Heart Study  2 Surveys at the Research Centre for Prevention and Health in Copenhagen

II North Trondelag

a) County surveys of adults within the range 30-75yrs, 5000 to 100 000 invited.  b) risk factors

**Blank spaces: missing or unclear information**
**TABLE 5d 2006**

**DISEASE: ISCHAEMIC HEART DISEASE**

**SOURCE: HIS**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Years of data collection</th>
<th>Periodicity</th>
<th>Gender</th>
<th>Age range</th>
<th>Population</th>
<th>Questions included</th>
<th>Age-Std values</th>
<th>Comput./lat year avail.</th>
<th>Access data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Men x1000</td>
<td>Women x1000</td>
<td>Total x 1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>1997 - 2004</td>
<td>every 4 yrs</td>
<td>√ √</td>
<td>35-85+/all together</td>
<td>6</td>
<td>6</td>
<td>12</td>
<td>on AMI, PCI</td>
<td>-</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1993 - 2002</td>
<td>every 3 yrs</td>
<td>√ √</td>
<td>15+ 5yrs ranges</td>
<td></td>
<td></td>
<td></td>
<td>on stroke, IHD</td>
<td>-</td>
</tr>
<tr>
<td>Finland</td>
<td>1978 - 2004</td>
<td>every year</td>
<td>√ √</td>
<td>all</td>
<td>2,600</td>
<td>2,600</td>
<td>5,200</td>
<td>on AMI, AP, HF</td>
<td>-</td>
</tr>
<tr>
<td>Germany (BGS)</td>
<td>1997 - 1999</td>
<td>5-6 years</td>
<td>√ √</td>
<td>18-79</td>
<td></td>
<td></td>
<td></td>
<td>on AMI, HF, AP, IC, Stroke</td>
<td>√</td>
</tr>
<tr>
<td>Hungary</td>
<td>2000 - 2003</td>
<td>every 3 yrs</td>
<td>√ √</td>
<td>*</td>
<td>7</td>
<td></td>
<td></td>
<td>on AMI, stroke</td>
<td>-</td>
</tr>
<tr>
<td>Italy</td>
<td>1999 - 2000</td>
<td></td>
<td>√ √</td>
<td>20-79</td>
<td></td>
<td></td>
<td></td>
<td>on AMI, stroke</td>
<td>-</td>
</tr>
<tr>
<td>Norway</td>
<td>1975 - 2002</td>
<td>every year</td>
<td>√ √</td>
<td>16+</td>
<td>4.5</td>
<td></td>
<td></td>
<td>on all CVD</td>
<td>√</td>
</tr>
<tr>
<td>Poland</td>
<td>1996</td>
<td>only once</td>
<td>√ √</td>
<td>35-85+/all together</td>
<td></td>
<td></td>
<td></td>
<td>on isch. heart dis</td>
<td>-</td>
</tr>
<tr>
<td>Spain</td>
<td>1987 - 2003</td>
<td>1987, 95, 97, 2003</td>
<td>√ √</td>
<td>0-4, 5-74, (10-year grp), 75+</td>
<td>20,000</td>
<td>20,000</td>
<td>40.000</td>
<td>on heart dis and arter. hypert.</td>
<td>-</td>
</tr>
</tbody>
</table>

* non-institutionalized adult population aged 18 years or older

**Blank spaces: missing or unclear information**
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Disease</th>
<th>Area</th>
<th>Source</th>
<th>1st year</th>
<th>Age range</th>
<th>Population</th>
<th>Resp. rate</th>
<th>Indicators</th>
<th>Access data</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HHD</td>
<td>AMI</td>
<td>CVA</td>
<td>Nat Reg</td>
<td>Sample x1000</td>
<td>Quest Exam</td>
<td>Re-exam</td>
<td>Men x1000</td>
<td>Women x1000</td>
<td>Total x1000</td>
</tr>
<tr>
<td>Austria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Belgium</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓ -</td>
<td>4</td>
<td>✓ -</td>
<td>-</td>
<td>1980</td>
<td>55-74</td>
<td>2</td>
</tr>
<tr>
<td>Copenhagen City Heart Study</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>14</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>1976</td>
<td>20</td>
</tr>
<tr>
<td>Denmark (B)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ -</td>
<td>25</td>
<td>✓ ✓</td>
<td>✓</td>
<td>1964</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>Finland FINRISK</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>- ✓</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>1972</td>
<td>25-74</td>
<td>18</td>
</tr>
<tr>
<td>Finland HEALTH 2000</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>- -</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>2000</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>France - PRIME</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>- -</td>
<td>7.8</td>
<td>✓ ✓</td>
<td>-</td>
<td>1991</td>
<td>50-59</td>
<td>7.8</td>
</tr>
<tr>
<td>Germany KORA</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>- ✓</td>
<td>18</td>
<td>✓ ✓</td>
<td>-</td>
<td>1984</td>
<td>25-74</td>
<td>7</td>
</tr>
<tr>
<td>Germany (B) (*)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>- ✓</td>
<td>6.5</td>
<td>✓ ✓</td>
<td>-</td>
<td>2001</td>
<td>45-75</td>
<td>-</td>
</tr>
<tr>
<td>Italy</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>- -</td>
<td>47</td>
<td>✓ ✓</td>
<td>-</td>
<td>1984</td>
<td>20-69</td>
<td>13</td>
</tr>
<tr>
<td>Netherlands</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>- ✓</td>
<td>10.3</td>
<td>✓ ✓</td>
<td>-</td>
<td>1990</td>
<td>55</td>
<td>3</td>
</tr>
<tr>
<td>Rotterdam ERGO</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>- ✓</td>
<td>1.3</td>
<td>✓</td>
<td>-</td>
<td>1985</td>
<td>65-84</td>
<td>1</td>
</tr>
<tr>
<td>Zutphen</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>- ✓</td>
<td>6</td>
<td>✓</td>
<td>-</td>
<td>1987</td>
<td>20-59</td>
<td>3</td>
</tr>
<tr>
<td>Norway</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- ✓</td>
<td>6</td>
<td>✓</td>
<td>-</td>
<td>1987</td>
<td>20-59</td>
<td>3</td>
</tr>
<tr>
<td>Portugal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1987</td>
<td>20-59</td>
<td>3</td>
</tr>
<tr>
<td>Spain</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1987</td>
<td>20-59</td>
<td>3</td>
</tr>
<tr>
<td>Sweden Stockholm</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>- ✓</td>
<td>4.178</td>
<td>✓ ✓</td>
<td>-</td>
<td>1997</td>
<td>60</td>
<td>1.67</td>
</tr>
<tr>
<td>United Kingdom BRHS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ ✓</td>
<td>7.7</td>
<td>✓ ✓</td>
<td>✓</td>
<td>1978</td>
<td>40-60</td>
<td>7.7</td>
</tr>
</tbody>
</table>

(A), (B), (C) distinguish different Longitudinal Studies in the same country

(*) Germany (B) is ongoing (RECALL Study);

# National Institute of Public Health, Denmark
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Disease</th>
<th>Area</th>
<th>GPs proportion</th>
<th>1st year</th>
<th>Duration</th>
<th>Age range</th>
<th>Population</th>
<th>Indicators</th>
<th>Access data</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IHD</td>
<td>AMI</td>
<td>CVA</td>
<td>HF</td>
<td>Nat. Reg.</td>
<td>Sample</td>
<td>Other</td>
<td>%</td>
<td>years</td>
<td>Men x1000</td>
</tr>
<tr>
<td>Austria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Belgium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Denmark</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Finland</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>France</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Germany</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Italy</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Netherlands</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ -</td>
<td>228 -</td>
<td>3 1993 onward</td>
<td>0-✓</td>
<td>- -</td>
<td>424</td>
<td>- - - - contacts x patient</td>
<td>NIVE L</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>✓ ✓ ✓ ✓ ✓ - ✓</td>
<td>56 -</td>
<td>20 1985 onward</td>
<td>0-✓</td>
<td>39 41</td>
<td>80</td>
<td>✓ ✓ - - -</td>
<td>Maas Univ.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Portugal</td>
<td>- ✓ ✓ ✓ - ✓</td>
<td>200 -</td>
<td>0.5 1990</td>
<td>10 0-75+</td>
<td>77 85</td>
<td>162</td>
<td>✓ - ✓ - -</td>
<td>Inst. Nac. de Saude</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sweden</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UK – England</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ -</td>
<td>137 -</td>
<td>3 1987 onward</td>
<td>all 2000 2000 4000</td>
<td>✓ ✓ - - -</td>
<td>ONS</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK – Scotland</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>80 -</td>
<td>8 1992 onward</td>
<td>all - - 400</td>
<td>✓ ✓ - - -</td>
<td>IDS</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(A), (B) distinguish different General Practitioners Registers in the same country
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Area</th>
<th>Year</th>
<th>Age range</th>
<th>Population</th>
<th>Sources</th>
<th>Indicators</th>
<th>Access data</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Men x1000</td>
<td>Women x1000</td>
<td>Total x1000</td>
<td>Mortal</td>
<td>HDR</td>
</tr>
<tr>
<td>Austria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Belgium</td>
<td>Ghent</td>
<td>-</td>
<td>1983-1997</td>
<td>25-69</td>
<td>50</td>
<td>51</td>
<td>101</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Ghent</td>
<td>-</td>
<td>1998</td>
<td>25-74</td>
<td>70</td>
<td>72</td>
<td>142</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Bruges</td>
<td>-</td>
<td>1999</td>
<td>25-74</td>
<td>75</td>
<td>76</td>
<td>151</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Charleroi</td>
<td>-</td>
<td>1983</td>
<td>25-69</td>
<td>58</td>
<td>59</td>
<td>117</td>
<td>✓</td>
</tr>
<tr>
<td>Denmark</td>
<td>-</td>
<td>1977</td>
<td>0</td>
<td>493</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Finland</td>
<td>FINAMI</td>
<td>-</td>
<td>1993-2002</td>
<td>35-100</td>
<td>104</td>
<td>128</td>
<td>232</td>
<td>✓</td>
</tr>
<tr>
<td>France</td>
<td>-</td>
<td>1985</td>
<td>35-74</td>
<td>✓ ✓ 1,800</td>
<td>✓ ✓ GP</td>
<td>✓ -  ✓</td>
<td>✓</td>
<td>In/out hospital Ministry of Health MONICA</td>
</tr>
<tr>
<td>Germany</td>
<td>-</td>
<td>1985</td>
<td>25-74</td>
<td>✓ ✓ 400</td>
<td>✓ ✓ -</td>
<td>✓ -  ✓</td>
<td>✓</td>
<td>In/out hospital GSF KORA MONICA</td>
</tr>
<tr>
<td>Italy</td>
<td>8 areas</td>
<td>1996-1999</td>
<td>35-74</td>
<td>✓ ✓ 3,360</td>
<td>✓ ✓ -</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>In/out hospital ISS MONICA</td>
</tr>
<tr>
<td>Netherlands</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Norway</td>
<td>Regional MI</td>
<td>-</td>
<td>2001</td>
<td>18</td>
<td>150 150 300</td>
<td>- - Information by physicians in hospital</td>
<td>- - -</td>
<td>In hospital Trondheim University by HDR</td>
</tr>
<tr>
<td>Norway</td>
<td>(Finmark)</td>
<td>-</td>
<td>2000</td>
<td>15</td>
<td>29 29 58</td>
<td>✓ ✓ In-hosp inform</td>
<td>✓ ✓ ✓</td>
<td>In/out hospital Kirkenes hospital MONICA and online</td>
</tr>
<tr>
<td>Portugal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Spain</td>
<td>-</td>
<td>1985-1998</td>
<td>25-74</td>
<td>380 386 766</td>
<td>✓ ✓ necropsy</td>
<td>✓ -</td>
<td>✓</td>
<td>In/out hospital MONICA MONICA</td>
</tr>
<tr>
<td>Sweden</td>
<td>Northern Swed.</td>
<td>-</td>
<td>1985</td>
<td>25-74</td>
<td>250 260 510</td>
<td>✓ ✓ -</td>
<td>✓ -</td>
<td>✓</td>
</tr>
<tr>
<td>UK</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
## TABLE 8 2003

**DISEASE:** ACUTE MYOCARDIAL INFARCTION  
**SOURCE:** POPULATION BASED REGISTER

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Area</th>
<th>Year</th>
<th>Age range</th>
<th>Population</th>
<th>Sources</th>
<th>Indicators</th>
<th>Access data</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Registers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>-</td>
<td>1978</td>
<td>0–</td>
<td>5,368</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>1991</td>
<td>0–</td>
<td>5,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>-</td>
<td>1995</td>
<td>20–</td>
<td>4.5</td>
<td></td>
<td>Information by heart surgeon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway-cardiac surgery register</td>
<td>-</td>
<td>1987</td>
<td>0–</td>
<td>8,880</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sweden</td>
<td>-</td>
<td>1987</td>
<td>0–</td>
<td>8,880</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

# National Institute of Public Health, Denmark
<table>
<thead>
<tr>
<th>Country</th>
<th>Area coverage</th>
<th>Year</th>
<th>Age range</th>
<th>Population</th>
<th>Access data</th>
<th>Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>Charleroi</td>
<td>1983-2003</td>
<td>25-69</td>
<td>50 50</td>
<td>missing ECG; enzymes; symptoms, MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Belgium</td>
<td>Ghent</td>
<td>1983-2003</td>
<td>25-74</td>
<td>71 71</td>
<td>missing ECG; enzymes; symptoms, MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Belgium</td>
<td>Bruges</td>
<td>1999-2003</td>
<td>25-74</td>
<td>75 75</td>
<td>missing ECG; enzymes; symptoms, MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Denmark</td>
<td>Northern Jutland</td>
<td>1978-2001</td>
<td>35-85+</td>
<td>247 247</td>
<td>Århus Univ. Hospital</td>
<td>√</td>
</tr>
<tr>
<td>Finland</td>
<td>FINAMI</td>
<td>1993-2002</td>
<td>all</td>
<td>90 103</td>
<td>Nat. Inst of Publ. H. MONICA, troponine, enzymes, ECG, symptoms, autopsy</td>
<td>√</td>
</tr>
<tr>
<td>France</td>
<td>Lille,Strasbourg,Toulouse</td>
<td>1985-2004</td>
<td>35-74</td>
<td>752 767</td>
<td>INSERM U258 MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Germany</td>
<td>Ausburg</td>
<td>1985-2002</td>
<td>25-74</td>
<td>203 204</td>
<td>Nat. Institute of Stat. GSF and official German health report via inernet</td>
<td>√</td>
</tr>
<tr>
<td>Italy</td>
<td>7 areas</td>
<td>1996-1999</td>
<td>35-74</td>
<td>tot: 3,600</td>
<td>Nat Inst. Public Health MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td>1972-2002</td>
<td>35-85+/all tog</td>
<td>tot: 1000</td>
<td>Health Reg. West ECG; enzymes; symptoms, autopsy</td>
<td>√</td>
</tr>
<tr>
<td>Poland</td>
<td>1 urban/1 rural popul.</td>
<td>1983-93</td>
<td>35-64</td>
<td>180 200</td>
<td>missing ECG; enzymes; symptoms, autopsy ; MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td>1985-98</td>
<td>25-74</td>
<td>234 246</td>
<td>Catalan Dep. of Health Inst. of Health Studies ECG; enzymes; symptoms, autopsy ; MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td>1987-2001</td>
<td>35-74</td>
<td>160 162</td>
<td>NBHW MONICA</td>
<td>√</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>Year</td>
<td>Age range</td>
<td>Population</td>
<td>Access data</td>
<td>Validation</td>
<td>Age-Std. values</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------------------------------</td>
<td>------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Men x1000</td>
<td>Women x1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>1978-2001</td>
<td>35-85+</td>
<td>2,677</td>
<td>2,734  Nat. Institute of Public Health</td>
<td>MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Finland</td>
<td>1991-2003</td>
<td>all</td>
<td>2,600</td>
<td>2,600  Nat. Inst. of P. Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iceland</td>
<td>1981-2002</td>
<td>25-74</td>
<td>2,600</td>
<td>2,600  Nat. Inst P.H.; Icelandic Heart Association</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>1987-2001</td>
<td>all ages</td>
<td>4545</td>
<td>4466  Nat. Board of H. and Welfare</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Blank spaces: missing or unclear information
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Area</th>
<th>Year</th>
<th>Age range</th>
<th>Population x1000</th>
<th>Sources</th>
<th>Indicators</th>
<th>Access data</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Registers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td></td>
<td>1978</td>
<td>0–25</td>
<td>2,654</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td></td>
<td></td>
<td>1985–1997</td>
<td>24-95+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td></td>
<td>1991–1997</td>
<td>25-75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td></td>
<td>1991–1997</td>
<td>25-75</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td></td>
<td>1985–1997</td>
<td>25-75</td>
<td>114</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>1991–1997</td>
<td>25-75</td>
<td>162</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td>1996–1999</td>
<td>35–74</td>
<td>3,360</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td></td>
<td>1978–1997</td>
<td>2,654</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*HDR = Hospital Discharge Records*
### TABLE 9a 2006

**DISEASE:** CEREBROVASCULAR ACCIDENTS  
**SOURCE:** REGIONAL POPULATION BASED REGISTER

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Area coverage</th>
<th>Year</th>
<th>Age range</th>
<th>Population</th>
<th>Access data</th>
<th>Validation</th>
<th>Age-Std. values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark*</td>
<td>Glostrup (Copenhagen city)</td>
<td>1982-1991</td>
<td>25-74</td>
<td>326</td>
<td>Danish Institute of Public Health</td>
<td>MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Finland</td>
<td></td>
<td>1993-97</td>
<td>all</td>
<td>93</td>
<td>103</td>
<td>Nat. Inst. of P. Health</td>
<td>MONICA</td>
</tr>
<tr>
<td>France</td>
<td>Dijon (town)</td>
<td>1985-2004</td>
<td>6 months →</td>
<td>69</td>
<td>81</td>
<td>Ministry of Health</td>
<td>MONICA, autopsy, examinations, surg./pharm. treatment, signs &amp; symptoms</td>
</tr>
<tr>
<td>Germany</td>
<td>Erlangen Stroke R.</td>
<td>1994-....</td>
<td>18+</td>
<td>49</td>
<td>51</td>
<td>University of Erlangen</td>
<td>signs and sympt; surg. or pharmac. treatment; exam.: neurologist, TAC, MRI</td>
</tr>
<tr>
<td>Greece</td>
<td>Arcadia</td>
<td>1993-95</td>
<td>all</td>
<td>42</td>
<td>39</td>
<td>Alexandra Hospital, Univ. of Athens</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>8 areas</td>
<td>1998-1999</td>
<td>35-74</td>
<td>4,500</td>
<td>National Institute Public Health</td>
<td>MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td>1972-2002</td>
<td>all</td>
<td>tot: 1,000</td>
<td>Nat.Inst.Stat./HDR</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Poland</td>
<td>Pol-MONICA</td>
<td>1984-93</td>
<td>35-64</td>
<td></td>
<td>Nat. Inst. of Cardiology</td>
<td>Examin: neurologist, TAC; autopsy; MONICA</td>
<td>√</td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td>1985-2004</td>
<td>35-74</td>
<td>160</td>
<td>162</td>
<td>MONICA Northern Sweden</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 9b 2006

**DISEASE:** CEREBROVASCULAR ACCIDENTS  
**SOURCE:** NATIONAL POPULATION BASED REGISTER

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Year</th>
<th>Age range</th>
<th>Population</th>
<th>Access data</th>
<th>Validation</th>
<th>Age-Std. values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>1978-2001</td>
<td>35-85+</td>
<td>2,677</td>
<td>2,734</td>
<td>Nat. Inst. of P. Health</td>
<td>-</td>
</tr>
<tr>
<td>Finland</td>
<td>1991-2003</td>
<td>35-85+</td>
<td>2,600</td>
<td>2,600</td>
<td>Nat. Inst. of P. Health</td>
<td>MONICA</td>
</tr>
</tbody>
</table>

*Blank spaces: missing or unclear information*
<table>
<thead>
<tr>
<th>Country</th>
<th>ICD version</th>
<th>Mortality ICD codes (*)</th>
<th>HDR ICD codes (*)</th>
<th>Linkage mortality / HDR</th>
<th>Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium Charleroi, Ghent, Bruges</td>
<td>IX, X</td>
<td>410-414, 428, 798, 799</td>
<td>410-414, 428, PTCA, CAGB</td>
<td>name, date of birth</td>
<td>MONICA</td>
</tr>
<tr>
<td>Northern Denmark</td>
<td>VIII, X</td>
<td>410</td>
<td>410</td>
<td>ID</td>
<td>----</td>
</tr>
<tr>
<td>Finland</td>
<td>X</td>
<td>410, 411, 428, 798, 799</td>
<td>410, 411, PTCA, CABG</td>
<td>ID</td>
<td>MONICA, troponine</td>
</tr>
<tr>
<td>France</td>
<td>IX, X</td>
<td>410-414, 428, 798, 799</td>
<td>410-414, 428</td>
<td>name, date of birth</td>
<td>MONICA</td>
</tr>
<tr>
<td>Germany</td>
<td>X</td>
<td>410-414, 798, 799</td>
<td>410, 411, PTCA, CAGB</td>
<td>name, date of birth</td>
<td>MONICA, troponine</td>
</tr>
<tr>
<td>Italy</td>
<td>IX</td>
<td>410-414, 798, 799, others</td>
<td>410-414</td>
<td>name, date of birth</td>
<td>MONICA</td>
</tr>
<tr>
<td>Norway</td>
<td>X</td>
<td>410</td>
<td>410, PTCA, CABG</td>
<td>ID</td>
<td>MONICA, troponine</td>
</tr>
<tr>
<td>Poland</td>
<td>X</td>
<td>410-414, 428, 798, 799</td>
<td>410-413</td>
<td>-</td>
<td>MONICA</td>
</tr>
<tr>
<td>Spain</td>
<td>IX</td>
<td>410-414, 428, 798, 799</td>
<td>410-414</td>
<td>name, date of birth</td>
<td>MONICA</td>
</tr>
<tr>
<td>Northern Sweden MONICA</td>
<td>X</td>
<td>410, 411</td>
<td>410, 411</td>
<td>ID</td>
<td>MONICA</td>
</tr>
<tr>
<td>Denmark</td>
<td>VIII, X</td>
<td>410-414, 798, 799</td>
<td>410, PTCA, CABG</td>
<td>ID</td>
<td>Recommended national diagnostic criteria and MONICA</td>
</tr>
<tr>
<td>Finland</td>
<td>X</td>
<td>410-414, 428, 798, 799</td>
<td>410-414, 428, PTCA, CABG</td>
<td>ID</td>
<td>MONICA, troponine</td>
</tr>
<tr>
<td>Iceland</td>
<td>IX, X</td>
<td>410-414, 428, 798, 799</td>
<td>410-412, 414, PTCA, CABG</td>
<td>ID</td>
<td>MONICA</td>
</tr>
<tr>
<td>Sweden</td>
<td>IX, X</td>
<td>410</td>
<td>410</td>
<td>ID</td>
<td>Recommended national diagnostic criteria, troponine</td>
</tr>
</tbody>
</table>

(*) all codes are presented in the ICD-9 revision to facilitate the comparison
Table 11  Registers of Stroke: case definition in each country

<table>
<thead>
<tr>
<th>Regional Registers</th>
<th>Sources of information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ICD version</td>
</tr>
<tr>
<td>Finland</td>
<td>X</td>
</tr>
<tr>
<td>France</td>
<td>X</td>
</tr>
<tr>
<td>Germany</td>
<td>X</td>
</tr>
<tr>
<td>Greece</td>
<td>IX</td>
</tr>
<tr>
<td>Italy</td>
<td>IX</td>
</tr>
<tr>
<td>Norway</td>
<td>X</td>
</tr>
<tr>
<td>Sweden MONICA</td>
<td>IX, X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>National Registers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
</tr>
<tr>
<td>Finland</td>
</tr>
</tbody>
</table>

(*) all codes are presented in the ICD-9 revision to facilitate the comparison
Table 12: Conversion table between ICD-VIII, IX and X revisions

<table>
<thead>
<tr>
<th>ICD-VIII</th>
<th>ICD-VIII label</th>
<th>ICD-IX</th>
<th>ICD-IX label</th>
<th>ICD-X</th>
<th>ICD-X label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatic heart disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>393-398</td>
<td>Chronic rheumatic heart disease</td>
<td>I05-I09</td>
<td>Rheumatic heart disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>410 - 414</td>
<td>Ischaemic heart disease</td>
<td>410 - 414</td>
<td>Ischaemic heart disease</td>
<td>I20 - I25</td>
<td>Ischaemic heart disease</td>
</tr>
<tr>
<td>410</td>
<td>Acute myocardial infarction</td>
<td>410</td>
<td>Acute myocardial infarction</td>
<td>I21, I22</td>
<td>Acute myocardial infarction</td>
</tr>
<tr>
<td>411</td>
<td>Other acute and subacute forms of ischaemic heart disease</td>
<td>411</td>
<td>Other acute and subacute forms of ischaemic heart disease</td>
<td>I20.0</td>
<td>Other acute ischaemic heart disease</td>
</tr>
<tr>
<td>412</td>
<td>Old myocardial infarction</td>
<td>412</td>
<td>Old myocardial infarction</td>
<td>I25.2</td>
<td>Old myocardial infarction</td>
</tr>
<tr>
<td>413</td>
<td>Angina pectoris</td>
<td>413</td>
<td>Angina pectoris</td>
<td>I20</td>
<td>Angina pectoris</td>
</tr>
<tr>
<td>412, 414</td>
<td>Chronic ischaemic heart disease, asymptomatic ischaemic heart disease</td>
<td>414</td>
<td>Other forms of chronic ischaemic heart disease</td>
<td>I25 (excluding I25.2)</td>
<td>Chronic ischaemic heart disease</td>
</tr>
<tr>
<td>Heart failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>428</td>
<td>Heart failure</td>
<td>428</td>
<td>Congestive heart failure</td>
<td>I50.0</td>
<td>Congestive heart failure</td>
</tr>
<tr>
<td>427.0</td>
<td>Congestive heart failure</td>
<td>427.0</td>
<td>Left heart failure, acute oedema of lung</td>
<td>I50.1</td>
<td>Left heart failure, acute oedema of lung</td>
</tr>
<tr>
<td>Other cardiovascular diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-404</td>
<td>Hypertensive disease</td>
<td>401-405</td>
<td>Hypertensive disease</td>
<td>I11-I13</td>
<td>Hypertensive disease</td>
</tr>
<tr>
<td>415</td>
<td>Acute pulmonary heart disease</td>
<td>415</td>
<td>Acute pulmonary heart disease</td>
<td>I26</td>
<td>Acute pulmonary heart disease</td>
</tr>
<tr>
<td>420-429</td>
<td>Other forms of heart disease</td>
<td>420-429</td>
<td>Other forms of heart disease</td>
<td>I30-I49, I51</td>
<td>Other forms of heart disease</td>
</tr>
<tr>
<td>426-427</td>
<td>Conduction disorders and cardiac dysrhythmias</td>
<td>426-427</td>
<td>Conduction disorders and cardiac dysrhythmias</td>
<td>I44-I49</td>
<td>Conduction disorders and cardiac dysrhythmias</td>
</tr>
<tr>
<td>440</td>
<td>Atherosclerosis</td>
<td>440</td>
<td>Atherosclerosis</td>
<td>I70</td>
<td>Atherosclerosis</td>
</tr>
<tr>
<td>441-442</td>
<td>Aortic aneurysm</td>
<td>441-442</td>
<td>Aortic aneurysm</td>
<td>I71-I72</td>
<td>Aortic aneurysm</td>
</tr>
<tr>
<td>444</td>
<td>Arterial embolism and thrombosis</td>
<td>444</td>
<td>Arterial embolism and thrombosis</td>
<td>I74</td>
<td>Arterial embolism and thrombosis</td>
</tr>
<tr>
<td>451-456</td>
<td>Venous thromboembolic disease</td>
<td>451-456</td>
<td>Venous thromboembolic disease</td>
<td>I80-I87</td>
<td>Venous thromboembolic disease</td>
</tr>
</tbody>
</table>
### Table 12: Conversion table between ICD-VIII, IX and X revisions

<table>
<thead>
<tr>
<th>ICD-VIII</th>
<th>ICD-VIII label</th>
<th>ICD-IX</th>
<th>ICD-IX label</th>
<th>ICD-X</th>
<th>ICD-X label</th>
</tr>
</thead>
<tbody>
<tr>
<td>430 - 438</td>
<td>Cerebrovascular diseases</td>
<td>430-438</td>
<td>Cerebrovascular diseases</td>
<td>I60 - I69, G45</td>
<td>Cerebrovascular diseases</td>
</tr>
<tr>
<td>430</td>
<td>Subarachnoid haemorrhage</td>
<td>430</td>
<td>Subarachnoid haemorrhage</td>
<td>I60</td>
<td>Subarachnoid haemorrhage</td>
</tr>
<tr>
<td>431</td>
<td>Cerebral haemorrhage</td>
<td>431</td>
<td>Intracerebral haemorrhage</td>
<td>I61</td>
<td>Intracerebral haemorrhage</td>
</tr>
<tr>
<td>431</td>
<td>Cerebral haemorrhage</td>
<td>432</td>
<td>Other and unspecified intracranial haemorrhage</td>
<td>I62</td>
<td>Other non-traumatic intracranial haemorrhage</td>
</tr>
<tr>
<td>432</td>
<td>Occlusion of precerebral arteries</td>
<td>433</td>
<td>Occlusion and stenosis of precerebral arteries</td>
<td>I65</td>
<td>Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction</td>
</tr>
<tr>
<td>433, 434</td>
<td>Cerebral thrombosis, cerebral embolism</td>
<td>434</td>
<td>Occlusion and stenosis of cerebral arteries</td>
<td>I66</td>
<td>Occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction</td>
</tr>
<tr>
<td>433</td>
<td>Cerebral thrombosis</td>
<td>434.9</td>
<td>Cerebral infarction</td>
<td>I63</td>
<td>Cerebral infarction</td>
</tr>
<tr>
<td>435</td>
<td>Transient cerebral ischaemia</td>
<td>435</td>
<td>Transient cerebral ischaemia</td>
<td>G45</td>
<td>Transient cerebral ischaemic attacks and related syndromes</td>
</tr>
<tr>
<td>436</td>
<td>Acute but ill-defined cerebrovascular disease</td>
<td>436</td>
<td>Acute, but ill-defined, cerebrovascular disease</td>
<td>I64</td>
<td>Stroke, not specified as haemorrhage or infarction</td>
</tr>
<tr>
<td>437, 438</td>
<td>Generalised ischaemic cerebrovascular disease, other and ill-defined cerebrovascular disease</td>
<td>437</td>
<td>Other and ill-defined cerebrovascular disease</td>
<td>I67, I68</td>
<td>Other cerebrovascular disease, Cerebrovascular disorders in diseases classified elsewhere</td>
</tr>
<tr>
<td>438</td>
<td>Late effects of cerebrovascular disease</td>
<td>438</td>
<td>Late effects of cerebrovascular disease</td>
<td>I69</td>
<td>Sequelae of cerebrovascular diseases</td>
</tr>
</tbody>
</table>

### Sudden death

<table>
<thead>
<tr>
<th>ICD 9 CM</th>
<th>NOMESCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.1</td>
<td>CABG</td>
</tr>
<tr>
<td>36.01-36.06</td>
<td>FNA-FNE</td>
</tr>
<tr>
<td>36.06</td>
<td>PTCA</td>
</tr>
<tr>
<td>36.06</td>
<td>FNG0</td>
</tr>
<tr>
<td>88.55-88.57</td>
<td>Coronary angiography</td>
</tr>
<tr>
<td>35.0-35.99</td>
<td>Valvular operations</td>
</tr>
<tr>
<td>35.95</td>
<td>FG, FJ, FK, FM</td>
</tr>
<tr>
<td>35.96</td>
<td>FG, FJ, FK, FM</td>
</tr>
<tr>
<td>35.99</td>
<td>FG, FJ, FK, FM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ICD 9 CM</th>
<th>NOMESCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.1</td>
<td>CABG</td>
</tr>
<tr>
<td>36.01-36.06</td>
<td>FNA-FNE</td>
</tr>
<tr>
<td>36.06</td>
<td>PTCA</td>
</tr>
<tr>
<td>36.06</td>
<td>FNG0</td>
</tr>
<tr>
<td>88.55-88.57</td>
<td>Coronary angiography</td>
</tr>
<tr>
<td>35.0-35.99</td>
<td>Valvular operations</td>
</tr>
<tr>
<td>35.95</td>
<td>FG, FJ, FK, FM</td>
</tr>
<tr>
<td>35.96</td>
<td>FG, FJ, FK, FM</td>
</tr>
<tr>
<td>35.99</td>
<td>FG, FJ, FK, FM</td>
</tr>
</tbody>
</table>
Table 13
INDICATORS FOR ACUTE MYOCARDIAL INFARCTION
(ICD-9 410, ICD-10 I21-I22)

<table>
<thead>
<tr>
<th>AMI</th>
<th>AVAILABLE</th>
<th>SHORT-TERM IMPLEMENTATION</th>
<th>LONG-TERM IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH STATUS:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MORTALITY</td>
<td>Mortality rate</td>
<td>Mortality rate</td>
<td>Validated mortality rate</td>
</tr>
<tr>
<td>ICD-9</td>
<td>410-414</td>
<td>ICD-9 410</td>
<td></td>
</tr>
<tr>
<td>ICD-10</td>
<td>120-125</td>
<td>ICD-10 121-122</td>
<td></td>
</tr>
<tr>
<td>MORBIDITY</td>
<td>Hospital Discharge Rate</td>
<td>Attack rate/incidence rate</td>
<td>Validated attack/incidence rate</td>
</tr>
<tr>
<td>ICD-9</td>
<td>410</td>
<td>1-day, 28-day case-fatality</td>
<td>Re-admission after 1 year</td>
</tr>
<tr>
<td>ICD-10</td>
<td>121, 122</td>
<td></td>
<td>1 year survival</td>
</tr>
<tr>
<td>In-hospital case-fatality</td>
<td></td>
<td></td>
<td>28-day case-fatality among first day survivors</td>
</tr>
<tr>
<td>HEALTH SYSTEM: HEALTH CARE UTILISATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine use</td>
<td></td>
<td>Thrombolytic therapy</td>
<td></td>
</tr>
<tr>
<td>Surgical operations and invasive procedures</td>
<td></td>
<td></td>
<td>CABG per AMI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PTCA per AMI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emergency CABG (within 24 hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emergency PTCA (within 24 hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30-day case-fatality rate for CABG</td>
</tr>
<tr>
<td>In-patient care utilisation</td>
<td>Aggregate bed-day rate</td>
<td>Median length of stay</td>
<td></td>
</tr>
<tr>
<td>Mean length of stay</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 14

INDICATORS FOR ACUTE CORONARY SYNDROMES  
(ICD-9 410-411, 413 ICD-10 I20.0, I21, I22, I24)

<table>
<thead>
<tr>
<th>ACS</th>
<th>SHORT-TERM IMPLEMENTATION</th>
<th>LONG-TERM IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH STATUS:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| MORTALITY | Mortality rate  
ICD-9 410-411  
ICD-10 I20.0, I21, I22 | Validated mortality rate |
| MORBIDITY | Hospital discharge rate  
ICD-9 410-411  
ICD-10 I20.0, I21, I22 | Validated attack rate/incidence |
| HEALTH SYSTEM:  
HEALTH CARE UTILISATION | | |
| Surgical operations and invasive procedures | CABG per ACS  
PTCA per ACS  
Emergency CABG (within 24 hrs)  
Emergency PTCA (within 24 hrs) | |
| In-patient care utilisation | Aggregate bed-day rate  
Mean length of stay | ACS patients in ICU  
Median length of stay |
Table 15

HEALTH STATUS INDICATOR FOR ALL ISCHAEMIC HEART DISEASES
(ICD-9 410-414, ICD-10 I20-I25)

<table>
<thead>
<tr>
<th>ALL ISCHAEMIC HEART DISEASES</th>
<th>AVAILABLE</th>
<th>SHORT-TERM IMPLEMENTATION</th>
<th>LONG-TERM IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH STATUS:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| MORTALITY                    | Mortality rate  
 IC-D-9 410-414  
 IC-D-10 I20-I25 | Mortality rate  
 IC-D-9 410-414+ 798  
 IC-D-10 I20-I25, R96, R98 |                          |
| MORBIDITY                    | Hospital Discharge rate  
 IC-D-9 410–414,  
 IC-D-10 I20-I25 | Prevalence of effort angina  
 Prevalence of IHD  
 MI, CABG, PTCA, angina |                          |
| DISABILITY                   | Functional disability and quality of life indicators |                          |                          |
| HEALTH SYSTEM:               |           |                           |                          |
| HEALTH CARE UTILISATION      |           |                           |                          |
| Surgical operations and invasive procedures | CABG rate  
 PTCA rate  
 Coronary angiography rate |                          |
### Table 16

**HEALTH STATUS INDICATOR FOR HEART FAILURE**  
(ICD-9 428, ICD-10 I50)

<table>
<thead>
<tr>
<th>HEART FAILURE</th>
<th>AVAILABLE</th>
<th>SHORT-TERM IMPLEMENTATION</th>
<th>LONG-TERM IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH STATUS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MORTALITY</strong></td>
<td></td>
<td>Mortality rate</td>
<td>Validated mortality rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>ICD-9 428</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>ICD-10 150</em></td>
<td></td>
</tr>
<tr>
<td><strong>MORBIDITY</strong></td>
<td></td>
<td>Hospital Discharge Rate</td>
<td>Prevalence</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>ICD-9 428 rate</em></td>
<td>Validated hospital discharge rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>ICD-10 150 rate</em></td>
<td></td>
</tr>
<tr>
<td><strong>DISABILITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEALTH SYSTEM:</td>
<td></td>
<td>Functional disability and quality of life indicators</td>
<td></td>
</tr>
<tr>
<td>HEALTH CARE UTILISATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical operations</td>
<td>Heart transplant rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-patient care utilisation</td>
<td>Aggregate bed-day rate</td>
<td>Median length of stay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean length of stay</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Table 17

### HEALTH STATUS INDICATOR FOR OTHER FORMS OF HEART DISEASE

<table>
<thead>
<tr>
<th>OTHER FORMS OF HEART DISEASE</th>
<th>AVAILABLE</th>
<th>SHORT-TERM IMPLEMENTATION</th>
<th>LONG-TERM IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEALTH STATUS:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MORTALITY</strong></td>
<td>Mortality rate</td>
<td>Mortality rate</td>
<td>Validated mortality rate</td>
</tr>
<tr>
<td>ICD-9 393-398, 401-405, 420-429</td>
<td>ICD-9 440, 441, 444, 415, 426-427, 428, 429</td>
<td>ICD-10 170, 171, 182, 144-149, 150, 151</td>
<td></td>
</tr>
<tr>
<td>ICD-10 105-109, 111-113, 130-149, 151</td>
<td>ICD-10 170, 171, 182, 144-149, 150, 151</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MORBIDITY</strong></td>
<td>Hospital Discharge Rate</td>
<td>Hospital Discharge Rate</td>
<td>Validated hospital discharge rate</td>
</tr>
<tr>
<td>ICD-9 393-398, 401-405, 420-429</td>
<td>ICD-9 440, 441, 444, 415, 426-427, 428, 429</td>
<td>ICD-10 170, 171, 182, 144-149, 150, 151</td>
<td></td>
</tr>
<tr>
<td>ICD-10 105-109, 111-113, 130-149, 151</td>
<td>ICD-10 170, 171, 182, 144-149, 150, 151</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HEALTH SYSTEM:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HEALTH CARE UTILISATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In patient care utilisation</td>
<td>Mean length of stay</td>
<td>Mean length of stay</td>
<td>Median length of stay</td>
</tr>
<tr>
<td>Aggregate bed-day rate</td>
<td>Aggregate bed-day rate</td>
<td>Aggregate bed-day rate</td>
<td>Aggregate bed-day rate</td>
</tr>
<tr>
<td>Surgical operations and invasive procedures</td>
<td>HDR rates and mean length of stay for: Valvular operations, Aortic and other aneurism, Pace maker, Catheter ablation, Implantable cardioverter defibrillators</td>
<td>HDR rates and mean length of stay for: Valvular operations, Aortic and other aneurism, Pace maker, Catheter ablation, Implantable cardioverter defibrillators</td>
<td>HDR rates and mean length of stay for: Valvular operations, Aortic and other aneurism, Pace maker, Catheter ablation, Implantable cardioverter defibrillators</td>
</tr>
<tr>
<td>HEALTH STATUS:</td>
<td>AVAILABLE</td>
<td>SHORT-TERM IMPLEMENTATION</td>
<td>LONG-TERM IMPLEMENTATION</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
</tbody>
</table>
| MORTALITY     | Mortality rate  
*ICD-9 430-438,*  
dementia (290.4)  
*ICD-10 I60-I69,* G45, F01 | Mortality rate  
*ICD-9 430, 431+432, 434, 436+437*  
*ICD-10 I60, I61+I62, I66, I64+I67, I68* | Validated mortality rate |
| MORBIDITY     | Hospital Discharge Rate  
*ICD-9 430–438,*  
dementia (290.4)  
*ICD-10 I60-I69,* G45, F01 | Hospital Discharge Rate  
*ICD-9 430, 431+432, 434, 436+437*  
*ICD-10 I60, I61+I62, I66, I64+I67* | Attack rate / incidence by subtype of stroke  
(ischaemic subarachnoid, intracerebral haemorrhagic)  
7-day case-fatality rate  
Prevalence of stroke |
| DISABILITY    | Functional disability and quality of life indicators |
| HEALTH SYSTEM: HEALTH CARE UTILISATION | |
| In-patient care utilisation | Aggregate bed-day rate  
Mean length of stay | CT, MRI per population  
Median length of stay | Stroke units per population |
| Surgical operations and invasive procedures | Carotid angioplasty rate | | |
REFERENCES


50. [http://www.euro.who.int/HFADB](http://www.euro.who.int/HFADB).


54. http://www.oecd.org/document/30/0,2340,en_2825_495642_12968734_1_1_1_1,00.html


60. http://www.ktl.fi/publications/monica


64. International Classification of Diseases, VIII Revision; WHO 1970.


67. NOMESCO Classification of Surgical Procedures Version 1.7. NOMESCO Uppsala and Copenhagen 2002 (www.nordclass.uu.se/verksam/ncspe.htm)


70. The Joint European Society of Cardiology/American College of Cardiology Committee. Myocardial infarction redefined - A consensus document of The Joint European Society of

71. Tunstall-Pedoe H: Comment on the ESC/ACC redefinition of Myocardial infarction by consensus dissenter. *Eur Heart J* 2001; **22**, 7, 613-615


73. The Task Force on Heart Failure of the ESC. *Eur Heart J* 1995; **16**:741-51.


