



Case study title:	Urban air pollution
Target group:	Public health professionals, general target group
Linked to modules:	Outdoor air pollution
Source of case study:	Medical University of Vienna
Case handling:	Use powerpoint presentation and/or handouts based on the case description. Note to the presenter: this case study could be presented as a role play where two different interest groups and representatives of the “city council” discuss various options.

Introduction

Urban air pollution is mostly caused by incineration sources. Indicator pollutants directly formed in the incineration process are carbon monoxide (CO), nitrogen oxides (NO_x), and fine particulate matter (with diameter size less than 10 or 2.5 µm: PM10 or PM2.5). Each of these pollutants is by itself hazardous to health but high concentration also indicates high exposure to many other dangerous pollutants including polycyclic aromatic hydrocarbons (PAH), volatile organic compounds (VOC) and aldehydes like formaldehyde. Secondary particles and ozone are formed through chemical reactions from the primary combustion products but these pollutants are of a higher concern not in the very vicinity of the source but in the relatively cleaner air in the country side.

Reducing air pollution emission is a sensible political issue because of the severe health consequences of air pollution. It is also a prerogative because of legally binding limit values that regional and national governments are forced to meet.

On the other hand there are many different sources of these pollutants and most individual sources do not – one by one – contribute to the overall pollution significantly. So many measures are bound not to be very successful by its own and in the short run. A long lasting reduction of the pollution concentration would be more protective for the citizen's health. But the law concentrates on compliance with limit values where for PM10 daily mean values are more difficult to meet. So to fulfil the legal necessities only a reduction of the exposure on those days or periods with high pollution levels would be sufficient. But exactly these pollution episodes are usually not primarily caused by an increase in local pollutants emission but by climatic factors that cannot be changed by political will.

Considering these issues: A political need for short term solutions (that also are more likely to be accepted by the public than long term restrictions of their individual behaviour) and a health need for long term abatement strategies.

Question 1: What short term or long term health outcomes can be described?



Answer 1: AIRNET website has data with a good overview of health effects. http://airnet.iras.uu.nl/products/pdf/airnet_wg4_hia_report.pdf . See page 17 and later on health effects.

On page 55 and further there are questions and answers which could be used for discussion within the training group.

An overview with acute and chronic health outcomes are given in the table below based on information from AIRNET.

Relevant health outcomes in air pollution

Health outcomes due to acute exposure

Daily mortality

Respiratory hospital admissions

Cardiovascular hospital admissions

Emergency room visits for respiratory and cardiac problems

Primary care visits for respiratory and cardiac conditions

Use of respiratory and cardiovascular medications

Days of restricted activity

Self-medications

Avoidance behaviour

Acute symptoms

Physiologic changes, e.g. in lung function

Disease outcomes due to chronic exposure

Mortality from chronic cardio-respiratory disease

Chronic respiratory disease incidence and prevalence

Chronic change in physiologic function

Lung cancer

Chronic cardio-vascular disease

Reproductive outcomes due to chronic exposures

Pregnancy complications

Low birth weight

Pre-term delivery

Question 2: Suggest and discuss possible options for reducing PM pollution in your city

- short term measures
- long term measures



Answer 2: Various cities and regions have applied different strategies that are listed below. This is by no means an exhaustive list!

Discuss each “solution” weighting its pro’s and con’s!

Short term measures (during high pollution episodes):

Road transport restrictions / measures:

Speed limits ⁱ

Restriction for certain types of cars (only low emitting vehicles allowed to go) ⁱⁱ

Restrictions based on even/odd number-plate

Restrictions based on need to go (only necessary travels are licensed)

Closure of certain streets ⁱⁱⁱ

Pollution taxes (similar to congestion tax, but on high pollution days only)

Increase service of public transport (more buses / trams, ticket for free,...)

Other measures:

Dust abatement measures (e.g. wet cleaning of roads) ^{iv}

Forbid the use of certain fuels (light oil / gas instead heavy oil in industry / power plants where a choice is technically feasible) ^v

...

Long term (permanent) measures:

Concerning road traffic:

Permanent speed limits ^{vi}

Encourage / support financially / enforce legally the use of low emission cars / upgrading of old cars – e.g. install particle filters ^{vii}

Upgrade the car fleet of the city government authorities / public transport / ...

Close certain streets permanently (pedestrian zones,...)

Improve traffic concept (one-way streets, less congestion, more fluent traffic, ...)

Improve public transport services

Reconsider spatial planning strategies

Permanent city taxes / taxes on parking / ...

Other measures:

Encourage / support financially / enforce legally cleaner heating technology (district heating,...) ^{viii}

Encourage / support financially / enforce legally cleaner power generation / industrial production processes ⁸

Awareness raising campaigns to change the individual behaviour (no illegal burning of waste, environmentally friendly and healthy mobility, consumer choices, ...)



Note 1: these lists are not exhaustive. Speed limits on highways (if observed) significantly reduce emissions and energy consumption per kilometre. The same cannot be said for speed limits in towns (e.g. 30 km/h instead of 50 km/h). But speed limits even in towns might have a small effect. They are the easiest to implement measure. They reduce the risk of accidents and the damage done by a car accident. They can help to make traffic more fluent (but the opposite effect is also possible if not implemented wisely). They can give the public transport a head start to individual traffic.

Note 2: For many measures the overall (especially long term) effects are not evaluated and are difficult to estimate. Some measures also raise questions of (environmental and social) justice. Some are just expensive or take a long time to show results (spatial planning, permanent improvements in public transport infrastructure).

Main message / what should be learned:

There is not the one and single measure that will solve the problem or that is applicable in every setting.

Many different measures (short and long term) must be set in place and must be adapted to the local situation.

As medical doctors (when taking part in the discussions) do not only concentrate on the single goal of complying with the legal limit values but see the larger picture: Health impact, side effects (prevention of car crashes, healthier behaviour like walking or cycling on safe lanes).

Point out the need for networking and exchanging of experiences / best practices!

ⁱ In the city of Vienna for most roads a speed limit of 50 km/h (as is usual in Austria) is the rule. Only on some broad main roads usually 70 km/h are allowed. During the high-PM-season it was planned to reduce the speed limit on these main roads to 50 km/h as well. This measure could not be evaluated because due to the strong pressure of the car-driver lobby it had to be taken back within few weeks at least for the more important main roads.

ⁱⁱ Due to the Austrian law it is not possible to restrict the use of lorries in cities even if they are very old and have a bad emission profile. This is very sad because especially for short trips (transport within the city) smaller and older lorries are used than for long distance transport.

But apart from this restriction this might be a promising approach. It is planned in several regions throughout Austria.

ⁱⁱⁱ This measure is introduced in the city of Klagenfurt, Carinthia (Southern Austria). The very road where the monitoring station is located will be closed on high pollution days. It is foreseeable that the measurement values at this station will decline. It is not certain that this will help to improve the air quality of the city.

^{iv} This has been proposed and promised in many regions. It is likely to reduce the coarse particles (most of which are larger than 10 µm in diameter) but will also slightly reduce the coarse fraction of PM10.

^v As a short-term measure this is not very convincing.

^{vi} Some towns including the city of Graz have permanent speed limits (apart from the main roads where 50 km/h is allowed) of 30 km/h. This measure is rather based on noise abatement strategies and is also said to reduce accident damage. The effect on air pollution is small.

^{vii} This is considered effective and is introduced in many regions.

^{viii} As a long-term measure this is a good approach. Fast effects are not likely to be seen.

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