NERAM Colloquium IV

WHO Air Quality Guidelines for Europe

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http://www.euro.who.int/air
Policies related to AQ in European Region of WHO

European Union Clean Air Policy

Objective: to reduce air pollution to a level where it does not impose a significant risk to human health and the environment as a whole.

Environmental Strategy for countries of Eastern Europe, Caucasus and Central Asia (EECCA)

Objective: The reduction of risk to health through reduction of urban air pollution
Key action: The optimisation of standards, accounting for health impacts (based on WHO criteria)
WHO Role

- To provide science-based advice to achieve the objective of clean air policy;
- Act as science - policy interface

WHO AQ programme 2002-5

- "Systematic review of health aspects of air quality in Europe"
- Global update of WHO Air Quality Guidelines
WHO Systematic Review of Health Aspects of Air Quality in Europe, 2001-2004

Scientific Advisory Committee
Ross Anderson, Tom Bellander, Joseph Brain, Bert Brunekreef, Erik Dybing, Stephen Holgate, Klea Katsouyanni, Robert Maynard, Jon Samet and Bernd Seifert

WHO Experts / Reviewers

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WHO European Centre for Environment and Health
Systematic Review: selected results

PM

Which of the physical and chemical characteristics of particulate air pollution are responsible for health effects?

- Fine PM is more hazardous than larger particles
- Metal content
- Organic components such as PAH
- Endotoxins
- Extremely small particles (< 100 nm)
Systematic Review: selected results

Ozone

Is there a threshold below which no effects on health are expected to occur?

- Epidemiology: no evidence for threshold from short-term studies; confidence in the existence of associations of O3 with health decreases as concentrations decrease

- Chamber studies: may show thresholds in the studied group but this is not sufficient to indicate a threshold of effects for ALL people
Systematic Review: selected results

**NO2**

**What is the basis for maintaining the WHO NO$_2$ annual specific guideline value of 40 µg/m$^3$?**

- **Toxicology:** adverse effects of long-term exposure to NO$_2$ at higher concentrations.
- **Epidemiology:** adverse health effects associated with NO$_2$ at the annual average concentration ca. 40 µg/m$^3$ ... WHO annual specific guideline value of 40 µg/m$^3$ should be retained or lowered.
The effects of air pollution on children's health and development

Conclusions on causal associations:

- PM and respiratory deaths in post-neonatal period
- Ambient air poll & lung function development (pre & post natal)
- PM and O3 exposure and asthma aggravation
- Pb and neurobehavioural development

Several suggestions for causal associations in available data
Systematic Review

Is there a threshold below which no effects on health are expected to occur in all people?

For PM, O3 and NO2: **No**

⇒ Replace the threshold concept with exposure-risk functions
Long term exposure to PM and risk of mortality in ACS cohort

<table>
<thead>
<tr>
<th>Cause of mortality</th>
<th>RR per 10 ug/m3 PM2.5*)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes</td>
<td>1.06</td>
<td>1.02 - 1.11</td>
</tr>
<tr>
<td>Cardiopulmonary</td>
<td>1.09</td>
<td>1.03 - 1.16</td>
</tr>
<tr>
<td><em>All CVD &amp; diabetes</em></td>
<td>1.12</td>
<td>1.08 - 1.15</td>
</tr>
<tr>
<td><em>Dis. of respir.syst.</em></td>
<td>0.92</td>
<td>0.86 - 0.92</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>1.14</td>
<td>1.04 - 1.23</td>
</tr>
<tr>
<td><strong>All other causes</strong></td>
<td>1.01</td>
<td>0.95 - 1.06</td>
</tr>
</tbody>
</table>

*)Average PM2.5 estimate

Sources: Pope et al, JAMA 2002; Circulation 2004

TFH 2003: “..apply the relative risk for all cause mortality... in the extended American Cancer Society (ACS) cohort study Pope et al. (2002).”
Loss in average statistical life expectancy due to identified anthropogenic PM2.5 (months)


Source: IIASA
Premature mortality attributable to daily max. 8 hour means ozone > 35 ppb (SOMO35)

Applied relative risk factor: 1.003 / 10 µg/m³ increase in daily max 8 h mean
Premature mortality attributable to daily max. 8 hour means ozone > 35 ppb (SOMO35) (cases/year)

Source: IIASA
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WHO AQG - Global Update

Steering Group:

- Ross H Anderson, UK
- Bert Brunekreef, Netherlands
- Binheng Chen, China
- Aaron Cohen, USA
- Robert L Maynard, UK
- Isabelle Romieu, Mexico
- Supat Wangwongwatana, Thailand
- Kirk Smith, USA
Pollutants to be considered in 2005: PM, O3, NO2, SO2

Structure:
- Policy oriented Executive Summary
- Part 1: Application of Guidelines in AQ policy and management
- Part 2: Hazard assessment of PM, O3, NO2, SO2
- Part 3: Derivation of Guidelines

Draft ready for external review: Summer 2005
WHO WG Meeting: week 17-21 October 2005
Thank you

http://www.euro.who.int/air

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Products of the «Systematic Review of health aspects of air quality in Europe», 2002/4

- Health aspects of air pollution with particulate matter, ozone and nitrogen dioxide [http://www.euro.who.int/document/e79097.pdf](http://www.euro.who.int/document/e79097.pdf)
- Meta-analysis of time-series studies and panel studies of particulate matter (PM) and ozone (O3) [http://www.euro.who.int/document/e82792.pdf](http://www.euro.who.int/document/e82792.pdf)