Research findings in Health Impact Assessment

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WHO Reviews

- WHO Regional Office for Europe implemented two projects:
- REVIHAAP – reviewed the evidence on health aspects of air pollution, and
- HRAPIE - health risks of air pollution in Europe
- Financial support from the European Commission (EC).
- Provided scientific evidence-based advice to support the comprehensive review of the EU's air quality policies scheduled for 2013. The review focussed on pollutants regulated by EU directives 2008/50/EC and 2004/107/EC.

Main Message from REVIHAAP

- The evidence has ***strengthened*** on all four main pollutants, $PM_{2.5}$, PM_{10}, Ozone and NO_2
- Talk will concentrate on these
- There are ***new*** messages for policy

Particulate Matter

- Additional support for the effects of short-term exposure to $PM_{2.5}$ on both mortality and morbidity, based on several multicity epidemiological studies;
- Additional support for the effects of long-term exposures to $PM_{2.5}$ on mortality and morbidity, based on several studies of long-term exposure conducted on large cohorts in Europe and North America;
- An authoritative review of the evidence for cardiovascular effects, conducted by cardiologists, epidemiologists, toxicologists and other public health experts, concluded that long-term exposure to $PM_{2.5}$ is a cause of both cardiovascular mortality and morbidity

Particulate Matter

- Significantly more insight has been gained into physiological effects and plausible biological mechanisms that link short- and long-term $PM_{2.5}$ exposure with mortality and morbidity, as observed in epidemiological, clinical and toxicological studies;
- Additional studies linking long-term exposure to $PM_{2.5}$ to several new health outcomes, including atherosclerosis, adverse birth outcomes and childhood respiratory disease; and
- Emerging evidence that also suggests possible links between long-term $PM_{2.5}$ exposure and neurodevelopment and cognitive function, as well as other chronic disease conditions, such as diabetes.

Policy Messages - PM

•There is a need to **revise** the existing **WHO AQGs** for $PM_{2.5}$ and PM_{10}

• There is a need to re-evaluate and lower the **Stage 2 indicative limit value for $PM_{2.5}$** (currently 20µg/m^3 annual mean)-cf WHO AQG and US NAAQS

•Support for the **exposure-reduction** approach has strengthened

• The **National Exposure Reduction Target** in Directive 2008/50/EC should be made **mandatory** by 2020 to ensure improved public health

Policy Messages - PM

- A move away from ‘all PM components are equally harmful’
- WHO should consider developing an **AQG for road vehicle PM emissions**, building on work already carried out on BC/EC by WHO
- The NECD revision should add a **ceiling for $PM_{2.5}$**
- In achieving NECD ceilings and the ambient LVs for $PM_{2.5}$, MSs should give **priority to reducing emissions from vehicles and from combustion of solid and liquid fuels** including NRMM and biomass
- Note that there is **no regulatory pressure** on **vehicle** (or any other) primary combustion in the **ambient** air quality Directive
- EU should consider actions to reduce **non-tailpipe** emissions from vehicles

Ozone (1)

- Effects from **long-term exposures** now recognised
- **WHO** should consider an **AQG for long-term exposures**
- Long term exposures determined by **global emissions** (mainly of **methane**)
- Methane now included in proposed revisions to the NECD

Ozone (2)

- EC should then consider wider **outreach** – via HTAP?
- Contingent on this, **EU** should consider a **TV for long-term exposures**
- Can't quantify threshold but if exists, it is <45ppb max hourly mean
- Recommend carrying out HIA with SOMO35 and **SOMO10**

Nitrogen Dioxide

- Much **more epidemiology** reporting associations of effects with short- and long-term outdoor exposures
- Many associations **robust to inclusion of PM** in 2-pollutant models
- With the epi and toxicological findings especially on respiratory effects, these results are **suggestive of a causal relationship**
- Many studies in areas where NO_2 < annual LV, so case for **revising WHO AQGs** on basis of **outdoor** epidemiology: could result in **lower** AQGs
- There is **no *health-based* case** to relax or remove the existing annual EU LV

HRAPIE – Health Risks of Air Pollution in Europe

- As part of the HRAPIE project, experts were asked :
- “What concentration–response functions (CRFs) for key pollutants should be included in cost–benefit analysis supporting the revision of EU air quality policy?”

Some recommended CRFs

- $PM_{2.5}$ all cause mortality, long-term exposure
- $PM_{2.5}$ all cause mortality, short-term exposure
- Ozone all cause mortality, long-term exposure **(new)**
- Ozone all cause mortality, short-term exposure **>10ppb** daily max 8hr mean **(new)**
- NO_2 all cause mortality, long-term exposure **(new)**

Comparison of long-term CRFs for all-cause mortality

Pollutant	CRF Per 10 ug/m^3 uos	Qualifier	Typical urban conc. C (ug/m3)	Mortality index (CRF-1)*100*C
$PM_{2.5}$	1.062	Age 30+ years **A***	10-20	62-124
Ozone	1.014	April-September mean of daily max 8hour, >70 ug/m^3 resp.mort Age 30+ years **B**	~50 ?	-
NO_2	1.055 1.039(to allow for 30% overlap with $PM_{2.5}$	>20ug/m^3 **B***	20-40 20-40	0-110 0-78