Health impact assessment of short and long-term exposure to ozone and PM in 25 European cities

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Introduction

Stakeholders drafting policies to reduce air pollution must take into account economic and social constraints, political orientations and urban planning, as well as health. Health impact assessments (HIAs) provide objective estimates of the impacts of improvements in air quality on a given population’s health.

The Aphekom project presents an updated estimate of the health impacts of urban air pollution in Europe. It involves 25 European cities (figure 1).

Results

The cities totalled 38,919,190 inhabitants, 21% being older than 65 years old. Only Dublin, Malaga and Stockholm complied with the WHO-AQG for the annual level of PM10 and only Stockholm for PM2.5.

No city complied with the WHO-AQG for the daily 8th-maximum values of O3. The proportion of days with values over the WHO-AQG varied from nearly 0 in Dublin to 32.2% in Athens (median: 9.6%).

Data and Methods

A classical HIA process was applied (figure 2) to assess the current burden of air pollution on health, considering:

- the short-term impact of PM2.5 and O3 on total non-external mortality and on cardiac and respiratory hospitalisations;
- the long-term impact of PM2.5 on total and cardiovascular mortality.

Routine mortality, hospital admissions and pollutant concentrations data were collected in each city.

Concentration response functions were chosen favouring meta-analyses of multicentre studies in European cities when available [1-4].

Concentration-response function = % change in health outcome per unit change in pollutant levels

Impact = change in health outcome associated with the change in pollutant levels

All computations were performed using guidelines and Excel spreadsheets developed by the Aphekom project.

Discussion

Our results provide an at least estimate of the burden of health of air pollution in the 25 Aphekom cities. The largest health burden is attributable to the long-term impact of chronic exposure to PM2.5. Aphekom estimated the associated monetary gain to be around €30 billion annually, including savings on health expenditures, absenteeism and intangible costs such as well-being, life expectancy and quality of life.

Aphekom’s work is particularly relevant, as:

- various European Union member states have exceeded mandated limit values on particles since 2005;
- EU and national agendas are being prepared for implementing existing regulations on air pollution and for revising current EU legislation in 2013.

Results call for a more stringent regulation, and an improved monitoring of air pollution in Europe, especially for fine and ultrafine particles.

References


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