APHEIS Air Pollution and Health : A European Information System

Health Impact Assessment on the Benefits of Reducing $PM_{2.5}$ in 26 European Cities

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Created in 1999 from the APHEA-2 project, the Apheis programme (www.apheis.net) was co-funded by the EC's Directorate General of Health and Consumer Protection and by Apheis' partners. Nowadays, the Apheis programme is coordinated by Institut de Veille Sanitaire (InVS) in Saint-Maurice, France.

To fulfill its mission, Apheis has assembled a European network of environment and health professionals and created an epidemiological surveillance system that generates health impact assessment (HIA) of outdoor air pollution on an ongoing basis and produces reports at periodic intervals.

The Apheis programme uses standardised guidelines for data collection and HIA analysis to foster ongoing cross-fertilization between multiple disciplines and regions to: create skilled, local teams; enrich know-how and the quality of its findings; and explore important health impact assessment methodological issues. Using this approach, Apheis has established a good basis for comparing HIA methods and findings between cities. This combination provides both local officials with standardized local data, analysis and knowledge for local decision making, and European officials with standardized local data analyzed to provide a global view for European policy making.

The Apheis network made a first estimate of the health impact of different concentrations of $PM_{2.5}$ in European cities. The study used well-established methods and published results of research on the effects of current air pollution on public health. According to this project, all other things being equal, public policies that would reduce the $PM_{2.5}$ annual mean concentrations from 20 $\mu g/m^3$ to 15 $\mu g/m^3$ would reduce the annual deaths all ages by more than 5,500 including more than 3,500 deaths due to cardio-respiratory diseases and more than 600 deaths due to lung cancer, among 23 Apheis cities in 11 European countries, amounting to about 36 millions inhabitants. Compared to the current situation, a sustained reduction of the annual mean values to 15 $\mu g/m^3$ $PM_{2.5}$ would translate into non-negligible gains in life expectancy. Depending on the city, life expectancy would be between 1 month and more than 2 years longer[2].

Very recently, the Apheis network has updated this assessment for the Paris 2006 ISEE-ISEA conference, including the health impact of the new limit values currently under discussion at the European level. Twenty-six cities, located in 15 European countries participated in this study: Athens, Barcelona, Bilbao, Bordeaux, Budapest, Cracow, Dublin, Gothenburg, Hamburg, Le Havre, Lille, Lisbon, Ljubljana, London, Lyon, Madrid, Marseille, Paris, Prague, Rome, Rotterdam, Rouen, Seville, Stockholm, Toulouse and Vienna.

As far as we know, the draft of the new European Directive on ambient air quality (CAFE Directive) proposes an annual average $PM_{2.5}$ concentration of 25 $\mu g/m^3$ by 2015, while the European Parliament proposes an annual limit value of 20 $\mu g/m^3$. In addition, the equivalent Environmental Protection Agency (EPA) standard for the U.S. is 15 $\mu g/m^3$, and the World Health Organization (WHO) guideline is 10 $\mu g/m^3$.

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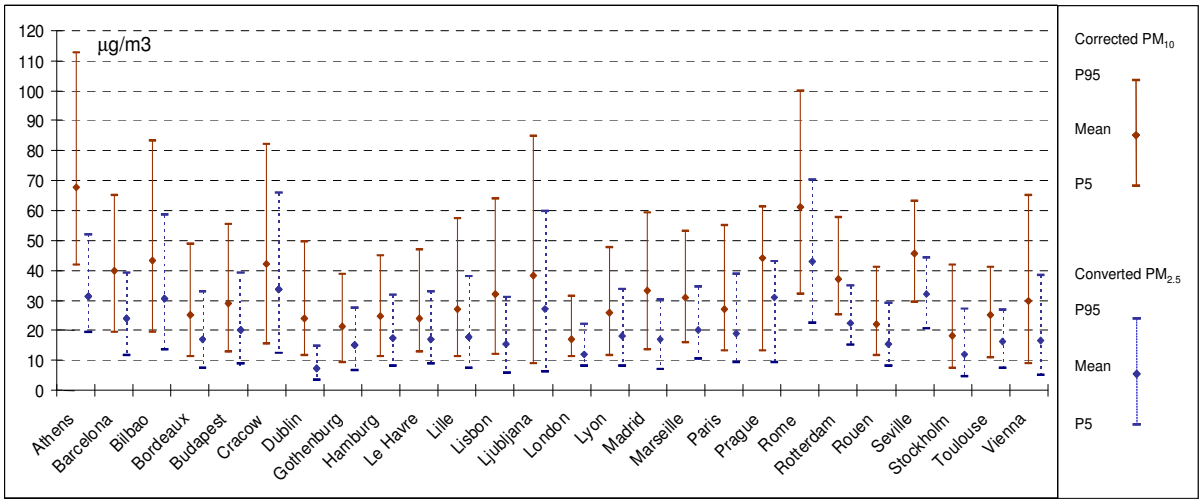
[2] Boldo E, Medina S, LeTertre A, Hurley F, Mücke HG, Ballester F, Aguilera I & Eilstein D on behalf of the Apheis group. Apheis: Health impact assessment of long-term exposure to PM2.5 in 23 European cities. European Journal of Epidemiology (2006)

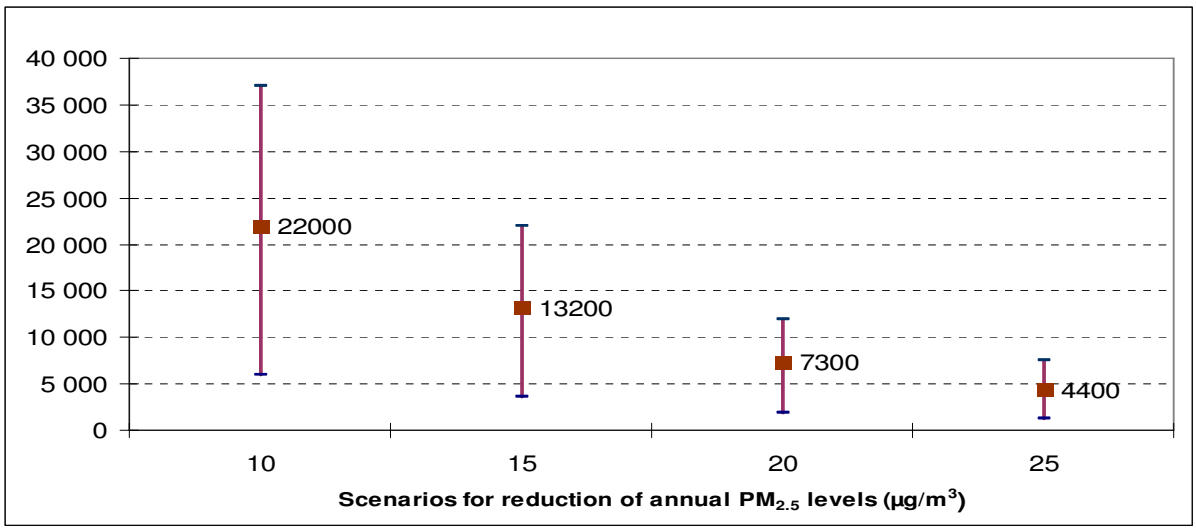
In our study, mean annual levels of corrected PM_{10} in the Apheis cities ranged from 17 to 61 µg/m^3. The derived $PM_{2.5}$ values ranged from 7 to 43 µg/m^3.

Annual levels for corrected PM_{10} and converted $PM_{2.5}$ for each Apheis city



The Apheis study has estimated the potential benefits in terms of deaths that could be prevented in 26 European cities by reducing these $PM_{2.5}$ annual levels to 25, 20, 15 and 10 µg/m^3 respectively. In specific, reducing annual mean levels of $PM_{2.5}$ to 15 µg/m^3 could prevent three times more premature deaths in the Apheis cities than a reduction to 25 µg/m^3 (13,200 vs. 4,400 deaths). This number could grow by up to five times if $PM_{2.5}$ levels were reduced to 10 µg/m^3 (22,200 vs. 4,400 deaths).

Potential reductions in total annual deaths (central estimate and 95% CI) among people 30 years and over in 26 Apheis cities for different decreases in annual $PM_{2.5}$ levels.



These 26 Apheis cities total 41.5 million inhabitants in 15 European countries. Such reductions in air-pollution levels could have a much greater impact on the health of the 450 million inhabitants of the European Union. Although several limitations in HIA methodology have been described, its use has proven helpful in estimating the potential health impact of new environmental policies. This study illustrates the large reduction in premature deaths that could be achieved by lowering annual $PM_{2.5}$ levels in European cities.