APHEIS: Influence of traffic-related PM_{10} emissions on public health in 1999

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AIRNET
A Thematic Network on Air Pollution and Health

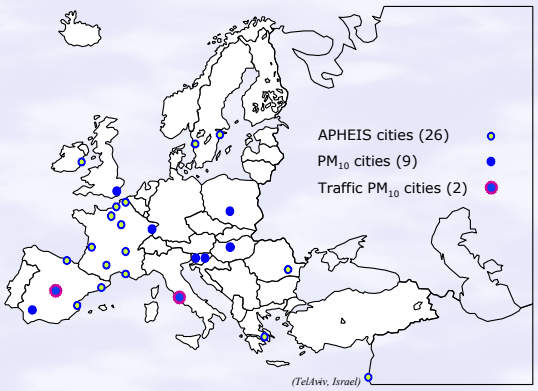
NERAM
Network for Environmental Risk Assessment and Management

Background and objective

Apheis (Air Pollution and Health: A European Information System) has been designed to provide decision makers, environmental professionals and the public of Europe with a comprehensive, up-to-date and easy-to-use information source on air pollution and health.

For health impact assessment air quality measurements of urban background monitoring sites should be considered (defined by the Apheis guideline on exposure assessment).

Because the location of PM_{10} monitoring sites of Madrid and Rome were characterised as traffic-related the opportunity is given to analyse the influence of PM_{10} emissions of vehicular traffic, and consequently their impact on public health, in comparison to urban background PM_{10} measurements of seven other Apheis cities.



PM_{10} concentration findings

In 1999, the PM_{10} mean concentration ranged from 20 to 45 µg/m³. The specific traffic-related analyses show first, that PM_{10} of traffic related-sites of Madrid and Rome is in the upper concentration level (37 and 43 µg/m³) such as the PM_{10} urban background data of cities in eastern Europe (Celje, Cracow and Ljubljana), and they have approximately the same number of days per year with exceeded 24-hour limit values. Second, a comparison within western European cities show that PM_{10} urban background levels of e.g. London and Strasbourg (~22 µg/m³) are about two times lower than those of Madrid and Rome.

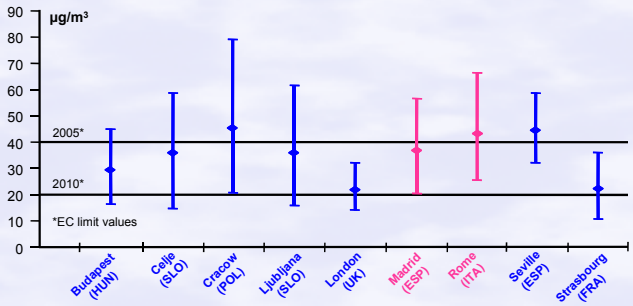


Fig. 1: Annual mean, 10th and 90th percentiles of PM_{10} concentration

Furthermore, the PM_{10} concentration in Seville is 44 µg/m³, as high as in Rome. Although PM_{10} was measured at urban background monitoring sites, the city of Seville identified vehicular transport as the main cause for PM_{10} air pollution.

Health impact assessment findings

In terms of health impact assessment, the result with the biggest potential health benefit was found for a reduction of the annual PM_{10} mean value to a level of 20 µg/m³ (PM_{10} EC limit value for 2010). It shows that in Madrid and Rome, the corresponding reductions in the number of deaths per 100,000 inhabitants per year attributable to chronic effects of PM_{10} would range between 50 and 70, comparable to Budapest and Ljubljana, and are more than ten times higher than in other western European cities (e.g., London and Strasbourg: 5 deaths/100,000 inhabitants).

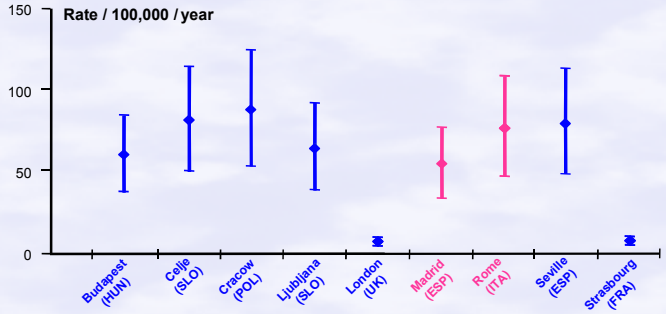


Fig. 2: Potential benefits of reducing annual mean values of PM_{10} to a level of 20 µg/m³ (2010 limit values for PM_{10}) - Number of deaths per 100,000 inhabitants (95 % confidence limits) attributable to the chronic effects of PM_{10}

Conclusions

In 1999, western European cities with a significant influence of vehicular traffic show higher PM_{10} concentrations and an increased mortality rate due to acute and chronic effects of particles compared to people in eastern Europe who are exposed to urban background level.

By chance, a discrepancy within the characterization of air monitoring stations was identified, which could result in data misinterpretations. Within Apheis data compilation air monitoring meta data of Madrid and Rome was reported as traffic-related. The PM_{10} concentration in Seville was comparable to Rome, but PM_{10} monitoring sites were characterised as urban background. The city of Seville identified vehicular traffic as the main cause of PM_{10} air pollution.

As this study shows, to avoid misinterpretations in the comparison of air quality data and in the assessment of their health impact a harmonised and standardised air monitoring siting criteria should be used within Europe, as fixed at the EC Council Decision (97/101/EC of 27 January 1997) to establish a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within Member States (revised by Commission Decision 2001/752/EC of 17 October 2001).

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