

Air quality models: New health prevention tools

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As the link between air pollution and several illnesses has been established, air quality forecast will play an increasing role in mitigating health risk.

We are all exposed to polluted air. Among main air pollutants are nitrogen oxides—the so-called 'NO_x'— and ozone, which cause irritation of respiratory tract and eyes, favouring cough, lung infections in children and asthma. As for particles emitted by transports, heating or agriculture, there is a real concern for what are referred to as 'PM 2.5'—which is short for particles 2.5 millionths of a meter in diameter. Indeed, their small size allows them to penetrate deeply into the lungs. They can reach as far as the blood circulation system, thus enhancing cardiovascular risk. Furthermore, they combine with organic compound and become potentially carcinogenic.

Now, models able to forecast air pollution have been designed to prevent such [health](#) hazards. In particular, the EU-funded MACC-II project, which will be fully operational in 2014, is designed to predict the concentration of every air pollutant three to four days ahead, all over Europe. Locally, [air quality](#) managers will use such data alongside other smaller scale models to forecast air quality of a city or a district.

If predictions exceed European guidelines of [pollution levels](#), local authorities can take several preventative measures. These include encouraging drivers to lower their speed, reducing emission from main sources of pollution such as industries, coal plants or dust-emitting civil

engineering... At the same time, warning messages can be sent to the population. "At the French High council for public health (HCSP), we recommend that decision makers alert in priority all establishments whose users are the most sensitive to pollution, such as schools or nursing homes" says Francelyne Marano, a toxicologist and emeritus professor at Université Paris-Diderot in France, and a member of HCSP.

Air quality models are becoming valuable tools for epidemiologists too. "Health experts are now keen on correlating data such as hospital admission rates, or consultations of GPs for asthma, with air quality forecast on a daily or weekly basis. Such pollution exposure studies are becoming increasingly common," says Laurence Rouil, head of the environmental modelling and decision making department at INERIS, the French Institute for industrial environment and risk, and one of the project scientists. With such studies, they are hoping to provide a better understanding of health risks linked to upcoming pollution and hence a better care for patients.

In parallel, thanks to fundamental research we now have a better understanding of pollution effects on health. "The relationship between air pollution and several pathologies has been demonstrated experimentally," Francelyne Marano tells youris.com. She adds, "animals, human volunteers or cells in the lab have been exposed to various pollutants. As a result, toxicologists have discovered, for example, the mechanism by which tiny particles exhausted from diesel engines cause short term respiratory pathologies."

Further links between air pollution and health are being uncovered. After reviewing hundreds of studies, the World Health Organisation (WHO) has recently declared air pollution, whatever its composition, a potential cause of cancer in humans. "This is indeed a spectacular announcement," Marie-Ève Héroux, technical officer for air quality and noise at the WHO European Centre for Environment and Health in Bonn, Germany.

She tells youris.com, "But most preoccupying are all these small short term effects of [air pollution](#) on respiratory and cardiovascular systems. They can evolve into chronic diseases if no measures are taken. Therefore, air quality models are essential as they will help decision makers plan air quality measures and assess their efficiency on the long term."

Provided by Youris.com

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