Scientists have created a new, easy-to-use tool that allows health professionals to monitor the day-to-day risks posed by short-term exposure to main urban air pollutants. The tool could enable vulnerable groups, such as asthmatics, to take precautionary measures and to increase public awareness of the health impacts of air pollution, say the researchers.

Scientists estimate that in a typical urban environment, citizens are exposed to around 200 types of air pollutant. Concentrations of sulphur dioxide, fine particulate matter, nitrogen dioxide and ground-level ozone have been linked to respiratory and cardiovascular diseases. As a result, regional authorities are increasingly interested in monitoring air quality in line with the EU Air Quality Framework Directive.

According to the research conducted under the EU PASODOBLE project, although various indicators of air pollution already exist, many are not accompanied by adequate health advices nor related to specific pathologies. The scientists devised a rating system to predict whether the risk of an increase in a particular health defect, such as asthma, Chronic Obstructive Pulmonary Disease or ischemic heart disease, is low, moderate, high or very high for a given location at a given time.

The scientists tested the forecasting tool in Greece (Thessaloniki and Athens), the Netherlands and France (Provence Alpes Côte d’Azur). The sites chosen are known to be among the cities most affected by air pollution in Europe.

The tool “Aggregate Risk Index” (ARI) is calculated from reference values (relative risk) for a given health endpoint, associated with an increase of each pollutant concentration, and are derived from health data collected during epidemiological studies. Relative risks are ideally computed for a specific region, and known as exposure-response functions, i.e. mortality rates and daily hospital admissions related to air pollution.

For each measured pollutant, the result is expressed as the risk of increasing the incidence of a given health defect. An estimate of the total risk for a given health defect, is then calculated from the sum of the individual risks for a mixture of pollutants. This not only accounts for possible additive effects but also allows users to compare the relative contributions of each pollutant. This risk is then converted into a simple numerical rating generally from 1 to 10 (1 = low risk, 10 = very high risk), and specific to the study area. The ARI rating can extend past a value of 10 in very highly polluted areas, which indicates that even healthy people may suffer negative health effects from short-term exposure. The ARI rating is accompanied by appropriate health advices for vulnerable people with heart or lung problems, such as reducing strenuous outdoor activity.

Using up-to-date data on emissions and background pollution levels, the PASODOBLE researchers intend to make daily, colour-coded ARI forecasts available online for given health defects. Health care professionals and regional authorities can then identify risk areas and disseminate health advices accordingly via radio, television, newspapers or the internet, say the researchers.

The ARI tool is intended to manage the health response to pollution events on regional scale and the scientists point out that specific response may vary between individuals. However, on-going feedback from physicians will help fine-tune and improve the performance of the model for regional crisis management.

1. See: http://ec.europa.eu/environment/air-quality/legislation/existing_leg.htm
2. Promote air quality services integrating observations development of basic localised information for Europe (PASODOBLE) is supported by the European Commission under the Seventh Framework Programme. See: www.myair-eu.org


Contact: pierre.sicard@acri-st.fr
Theme(s): Air pollution, Environment and health, Risk assessment