Chapter 25

Early Warning System and Adaptation Advice to Reduce Human Health Consequences of Extreme Weather Conditions and Air Pollution

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ABSTRACT

The authors developed a multi-site Internet service to provide the public with real time information about local weather and air quality, how they may affect health, and how general population and different sensitive population groups can protect their health during periods of extreme weather conditions or increased air pollution levels. The information service is based on data obtained from the Republic Hydrometeorological Service of Serbia and Serbian Environment Protection Agency. Health warnings and recommendations are given separately for each AIQ and heat index or wind chill index value, for each sensitive population group, as well as for the general population. The project is currently implemented on the website of the Institute of Occupational Health Niš and will be offered to other healthcare institutions in Serbia. Evaluation of the system should enable redefinition of heat and wind chill indices and air pollution threshold values if necessary. This chapter explores the service.

INTRODUCTION

Exposure to adverse weather conditions or high concentrations of air pollutants is associated with a wide range of acute and chronic health effects, especially in children, the elderly, and in patients with chronic diseases. Pyramid of the health effects of adverse weather conditions and air pollution starts from subclinical effects, continued with deterioration of organ functions, the appearance of new or worsening of
existing symptoms, increased use of drugs, activity reduction, an increased number of physician visits, increased use of emergency medical services, increased number of admissions to hospital treatment, and ends with the increased number of deaths.

The growing problems of climate change and air pollution have caused the development of a system for monitoring health risks and issuing warnings in many countries. In the U.S., the National Weather Service was developed, using the National Weather Hazards application to monitor, alert, and provide advice on risk due to the effects of many meteorological factors: snow, wind, floods, extreme heat and cold over the Internet (http://www.nws.noaa.gov). United States Environmental Protection Agency - EPA calculates and displays the Air Quality Index (http://www.airnow.gov) and issues warnings for increased concentration of pollutants in the air. In the UK, the website of the National Weather Service (http://www.metoffice.gov.uk) gives an overview of the current meteorological conditions and air quality index. Warnings are issued when the values of these factors are sufficient to pose a threat to human health and the presentation contains a number of recommendations regarding appropriate behavior and preparations for risk mitigation due to the effects of extreme weather conditions. Similar systems exist in other countries: Canada (http://www.ec.gc.ca), Australia (http://www.bom.gov.au), France (http://france.meteofrance.com), Germany (http://www.umweltbundesamt.de), as well as other countries.

Internet applications for weather and air pollution monitoring, as well as for providing health advice and issuing warnings have been developed, not only on national level, but also for regions of large countries (USA, Canada, China, Australia), as well as in many cities in the world.

Within the “New information technologies for analytical decision-making based on the organization of experiments and observations, and their application in biological, economic and social systems” project, funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia, the first system for early warning and providing recommendations for reducing the adverse health consequences of air pollution and meteorological conditions is under development in Serbia. The system is interfaced with using a web application and is intended for use by the general population and vulnerable population groups in the cities of Serbia. At this stage, the system has been implemented on the website of the Institute of Occupational Medicine in Nis, and will be offered in other towns in Serbia.

BACKGROUND

Air Pollution

The earliest recorded problems with outdoor air pollution occurred due to burning fossil fuels in large cities (Brimblecombe, 1987). Industrialization and transport have led to an increase in the concentration of pollutants in the air. By the mid- twentieth century, there have been a few short-lived episodes in which exceptionally high levels of air pollution have influenced the occurrence of excessive mortality and morbidity. The most dramatic three episodes took place in the Meuse Valley in Belgium in 1930. (Nemery et al., 2001), Donora, Pennsylvania in 1948. (Davis, 2002) and in London in 1952 (Bell & Davis, 2001; UK Ministry of Health, 1954) These episodes prompted the authorities in many countries to start the research on the impact of air pollution on human health and to enact legislation that would improve air quality. These measures and activities have greatly contributed to alleviating the problem in the developed countries, but air pollution remains a serious, now global, worldwide problem, with
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