Department Colloquium

Speaker: Hwashin Shin, Health Canada
Date: Friday, March 20
Time: 2:30 p.m.
Place: Jeffery 234
Title: Air Health Indicator (AHI) (Environmental Health Risk Attributable to Short-terms Air Pollution Exposure)

Abstract: The association between daily variations in urban air quality and mortality has been extensively studied using time-series methods. These statistical approaches typically assume that the association is stable over time. We developed a health indicator, Air Health Indicator (AHI), as a space-time dynamic tool which relaxes this assumption.

The AHI is part of a larger set of environmental indicators, CESI (Canadian Environmental Sustainability Indicators), designed to provide annual risk estimates of air pollution. The AHI has been developed to monitor the trend in the percentages of daily mortalities resulting from short-term exposure to major air pollutants. Current development of the AHI has focused on the contribution of ground-level ozone and fine particulate matter (PM2.5) exposure to mortality due to heart, circulatory and respiratory causes during the warm season (April to September) for 24 Canadian cities over 26 years (1984-2009) for ozone and 22 cities over 9 years (2001-2009) for PM2.5.

The AHI has the potential to help identify which air pollutants are associated with health risks, and to track the effectiveness of air quality management actions aimed at reducing adverse health effects in the Canadian population. This AHI finding implies that policies to reduce air pollutants should translate into health benefits. Nonetheless, there are factors which could influence air pollution-related mortality risk over time, such as increased underlying health risk due to aging of the population or changes in the pollutant mixture. The AHI is under development to detect these changes.

A generalized additive model with link to Poisson and a hierarchical random effect model were employed and a dynamic unequally weighted multi-year estimator was proposed. After conceptual and Mathematical model construction processes are introduced, the AHI ozone results will be presented. Current and future collaborations between Queen’s and Health Canada will be discussed.

Notes:
1) The Air Health Indicator (AHI) provides a view of the public health impacts attributable to outdoor air pollution in Canada.
(http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=CB7B92BA-1)

2) Ozone (O3) in the upper atmosphere (10 to 50 km above the earth’s surface) protects the earth from the sun’s harmful ultraviolet radiation. In the lower part of the atmosphere, at ground level, O3 is harmful to human health.

3) Particulate matter (PM) is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components and biological constituents,
including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of particles is directly linked to their potential for causing health problems. USA EPA groups particle pollution into two categories:

- "Inhalable coarse particles," such as those found near roadways and dusty industries, are larger than 2.5 micrometers and smaller than 10 micrometers in diameter.
- "Fine particles," such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller (PM$_{2.5}$).

(http://www.epa.gov/pm/)