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Near Real time modeling of weather, air pollution, and health outcome indicators in New York City

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Background:

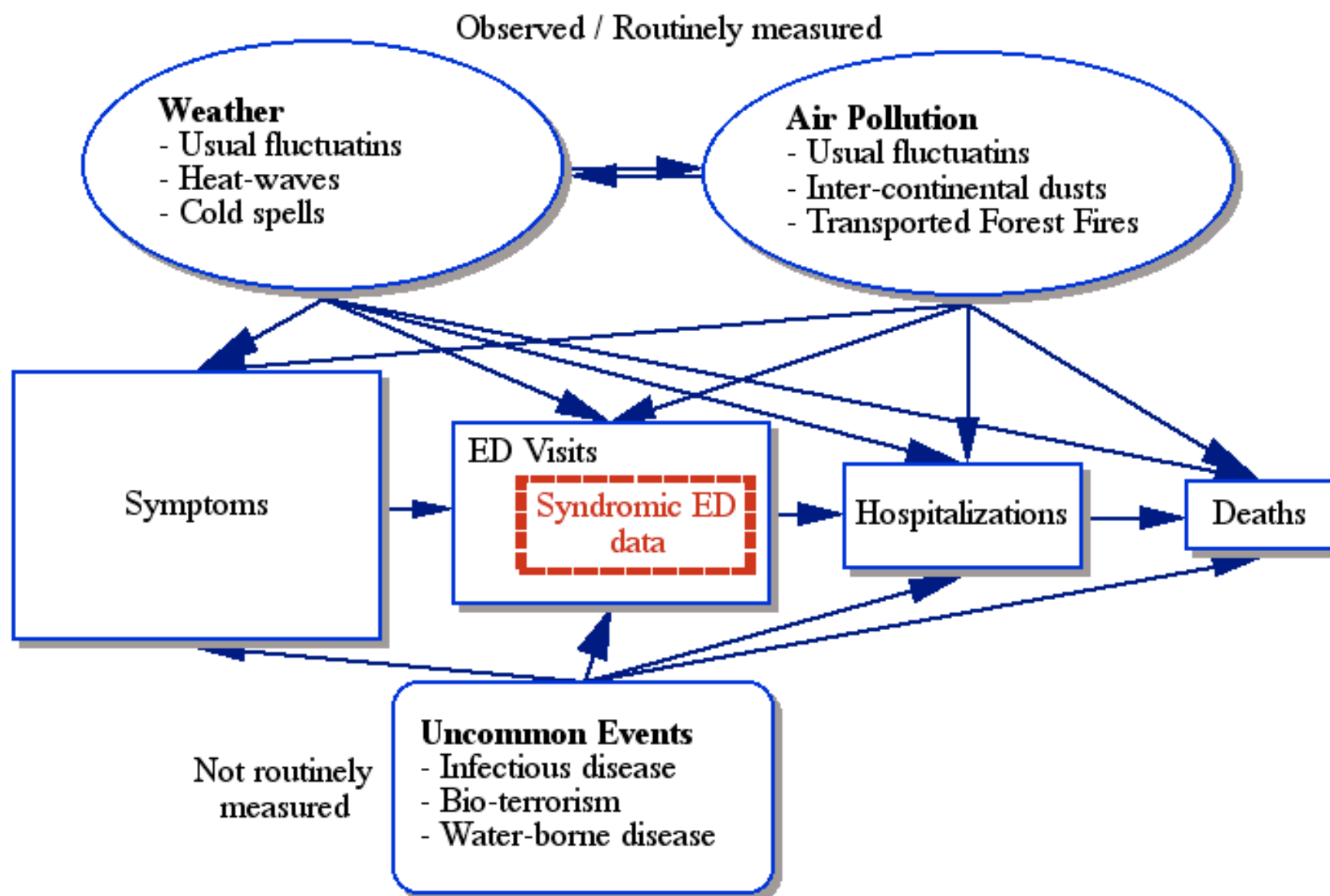
- Many of environmental indicators (weather variables, air pollution variables) are available near real time.
- New York City Department of Health has been collecting the citywide daily *syndromic* data (e.g., emergency department visits) that are available next day.

NYCDHMH Syndromic Surveillance Systems:

- Established in 1995 to detect outbreaks of waterborne illness. In 1998, monitoring of ambulance dispatch calls for indicators of unusual space time clustering of acute illness began.
- The main outcome was the percentage of calls categorized as influenza-like illness, including: respiratory, difficulty breathing, sick, and sick pediatric.
- Syndromic surveillance of emergency department (ED) visits was established after the 2001 World Trade Center attacks to track the acute health effects of the attacks and to detect possible biologic terrorism.
- An electronic collection of the ED visits data via direct file transfer protocol (FTP) or as email attachments started in November 2001. The NYCDHMH receives data from 46 hospitals encompassing approximately 89% of annual ED visits in NYC.

Objectives:

- Develop models to describe relationships between weather variables, air pollution variables, syndromic data, hospital admissions, and mortality data.
- Test the performance of the alternative prediction models developed



Framework of relationships between weather, air pollution, and health outcomes

Methods

Time-series modeling:

- Characterization of the sequence of events among weather, air pollution, and health outcome.
- Development of alternative health effects models and testing the model performance.

Spatial modeling:

- Land use regression to characterize the gradient of air pollution.
- Spatial modeling of heterogeneity of health effects response to weather and air pollution within NYC.

Expected results and benefits:

The prediction models will be useful tools to:

- measure health impacts of weather and air pollution;
- help detection of unusual events (e.g., bio-terrorism); and,
- provide near real-time means to predict and reduce health risks in response to developing meteorological and air pollution exposures.