



JOHNS HOPKINS
BLOOMBERG
SCHOOL of PUBLIC HEALTH

Department of Biostatistics

BIOSTATISTICS SEMINAR

Structural Equation Models for Exposure Assessment and Health Effects Analysis of Airborne Particulate Matter

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ABSTRACT

Structural equation modeling has proven to be useful both for exposure assessment and health effects analysis in the study of airborne particulate matter (PM). Structural equation models (SEMs) are latent variable models that specify a structure on the relationship between observable and unobservable variables, thus allowing investigators to study the behavior of constructs they are not able to measure directly based on related quantities that are measurable. In the study of PM, SEMs may be used to assess exposure to source-specific particles based on complex mixtures of particles from different sources. Even though the sources of the particles are not directly observed, this modeling approach allows investigators to explore the influence of meteorological factors on source-specific PM in ambient air. When multivariate health outcomes are recorded during exposure, investigators can employ SEMs to allow multiple measured outcomes to collectively represent underlying physiological states. Putting the exposure and health response pieces together, we demonstrate how a single SEM can be used to estimate the health effects of unobserved pollution sources on clinically relevant breathing patterns in canines.

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