METHODS FOR ESTIMATING HEALTH EFFECTS OF MULTIPOLLUTANT MIXTURES IN COHORT STUDIES

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Background: Given the complexity of the pollutant mix in ambient air, it is reasonable to assume that the focus on a few regulated air pollutants in health effects research provides only a limited picture of air pollution health effects and may hamper the effectiveness of air quality management programs. Data on many features of the complex ambient mix are now becoming more readily available, both from government monitoring networks and research-related monitoring campaigns. Besides the opportunities that such data provide in furthering understanding of pollution effects, there are challenges in specifying exposure estimates based on these complex data for use in health effects analyses. Many options can be considered in attempting to tackle these challenges.
Methods: We are working on an integrated methodology to predict a multivariate exposure for members of a cohort that accounts for correlation in space and between pollutant components and for differential measurement error between pollutants. Prediction will be based on a universal kriging model that incorporates land-use and other geographic data, and a principal component analysis approach to reducing the dimension of the exposure in order to obviate the need for high-dimensional effect modification. Using this methodology, relative disease risks of contrasting pollutant mixtures will be estimated with the aim of better understanding the relative toxicity of different mixtures and more effectively focusing regulatory efforts to lessen air pollution exposure effects.