Exploratory analysis of the potential health impacts of climatic variability and air pollution

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We present results of a study examining how climatic variations and corresponding air quality conditions may aggravate heat-and cold-related morbidity among adults and vulnerable populations—in particular, the poor, elderly, and children in North Carolina. North Carolina displays substantial variability in weather as one goes from the coast to the western mountains. In this phase of our study, we examine the relationship between air pollution data for Charlotte, NC, and air mass types given by a synoptic weather type classification scheme developed by Sheridan (2002). In this scheme, each day at a given location containing a long time series of weather data is classified into one of six major air mass types and a transitional stage. Data for determining the daily synoptic patterns for Charlotte were obtained at Charlotte Douglas International Airport. Apart from reducing the number of variables needed to characterize the weather pattern on a given day, there are other advantages to using such a system in studies of this sort. Previous modeling studies (e.g., Hanna et al., 2001) have shown that synoptic classification patterns are also associated with characteristic transport patterns of pollutants.

We have examined data for ozone (O3), carbon monoxide (CO), and nitrogen dioxide (NO2) from January 1996 through December 2004 at several monitoring sites within the greater Charlotte urban area. Results show that NO2 levels correlated strongly with CO. Increase in Asthma hospital admissions could be linked to O3 exposure for the moist tropical air mass during summer. NO2 and CO were linked with increased asthma hospitalization with more types of air masses.

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