Spatial Correlations Among Air Pollution and Social Stressors Across NYC Communities

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Introduction: Chronic psychological stress has been linked to respiratory health, both independently and in combination with air pollution exposures. There is growing interest in methods to explore synergistic effects among these exposures as well as the extent to which they disproportionately impact lower income communities and other susceptible populations. Understanding this interplay could help elucidate the relationships among psychosocial stressors, air pollution, and health in urban communities.

Methods: Building on the New York City Community Air Survey (NYCCAS), a year-round study of intra-urban variation in multiple air pollutants across NYC neighborhoods, we are using Geographic Information System (GIS)-based methods to identify and map relevant, community-level social stressors for comparison with intra-urban patterns in air pollution exposures.

Results: Under NYCCAS, we recently completed spatial models describing significant intra-urban variation in fine particles ($PM_{2.5}$), elemental carbon (EC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and pollution sources (e.g., traffic, building density). Through mapping neighborhood-level indicators of social stressors, including mental health data, violent crime statistics, noise complaints, neighborhood percent poverty, and quality of life variables (e.g., park/playground conditions), we are providing information on clustering and inter-neighborhood variability. Additional variables related to childhood stress experiences (e.g., abuse/neglect, percent students in schools exceeding capacity), a subpopulation of concern for asthma, will be explored.

Conclusions: Comparison of spatial distributions of community stressors and air pollutants will allow disentangling of these separate patterns of exposure. Future epidemiological investigations using these data will enable assessment of the independent and synergistic effects of different but potentially spatially correlated exposures in predicting the onset and exacerbation of respiratory and cardiovascular illness.