UNDERSTANDING INTRA-NEIGHBORHOOD PATTERNS IN FINE PARTICULATE AIR POLLUTION USING MOBILE MONITORING IN BRADDOCK, PA

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Background and Aims: Braddock, Pennsylvania, in the eastern suburbs of Pittsburgh, lies in a valley adjacent to the Monongahela River. An economically distressed area, Braddock is home to the Edgar Thomson Steel Works, one of the few remaining active steel mills in Pittsburgh. Braddock exceeds both the average annual (>15 µg/m3) and daily (>35 µg/m^3) National Ambient Air Quality Standards (NAAQS) for particulate matter ($PM_{2.5}$), and is situated in a federal $PM_{2.5}$ non-attainment area.

Methods: A mobile monitoring design was used to explore the within-neighborhood spatial and temporal (within-day and between-day) variability in $PM_{2.5}$ and PM_{10}. Our sampling route consisting of 25 designated stops, of 3- to 5-minute intervals, sampled in summer and winter months, during morning and afternoon hours, in 2010-2011. Ambient weather data was obtained from Pittsburgh International Airport, and examined to identify inversion events.

Results: The $PM_{2.5}$ and PM_{10} mobile monitoring data display some spatial variation between stops, and substantial temporal variations across days. Concentrations also differed substantiailly between morning and afternoon runs. The $PM_{2.5}$/ PM_{10} ratio was generally high (0.8 to 1), suggesting a predominance of fresh combustion particles in our sampling area. For morning sampling runs, mean $PM_{2.5}$ concentrations ranged from 31 to 55 µg/m^3 (SD = 1.53 and 4.92 µg/m^3, respectively), and mean PM_{10} concentrations ranged from 30 to 70 µg/m^3 (SD = 1.64 and 7.68 µg/m^3, respectively). During summer months, afternoon concentrations were significantly lower than in the morning for both $PM_{2.5}$ and PM_{10}, owing to morning inversions in the river valley. During the winter, concentrations were generally lower than during summer, but showed lesser diurnal variability, with no inversion events.

Conclusions: These pilot data reveal significant diurnal and spatial variability in both $PM_{2.5}$ and PM_{10} concentrations within Braddock. Results will inform the design of a stationary monitoring network, to be implemented and maintained as part of a longitudinal study on childhood asthma exacerbation in Braddock.