COMPARISON OF METHODS FOR ESTIMATING PERSONAL BLACK CARBON EXPOSURES IN URBAN SETTINGS

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Background and Aims: Epidemiological studies have demonstrated that black carbon (BC) exposures are associated with adverse health effects. To date, studies have primarily conducted exposure assessment based on fixed-site monitoring, or a single integrated 24-48 hr personal sample. This paper uses repeat personal BC measurements to explore the difference in distribution of personal BC exposure in a cohort of 9-10 years old urban children to fixed-site BC monitoring data.
Method: Personal sampling (PS) for each subject comprised carrying a microaethalometer (Magee Sci), for 5 weekday and 1 weekend 24hr periods, spread over a 3-4 weeks. Fixed-site BC sampling (FS) employed a rack mount Aethalometer® with the inlet located outside of a 5th floor window in Washington Heights, NYC. Here we start with comparing descriptive statistics and univariate correlations for 24 hr average data for P and F.
Results: Linear regressions between PS (as y) and FS (as x) on 24hr average displayed large variability in correlation, slope and intercept for 27 subjects that had 4 or more valid data for BC_P and BC_F. 9/27 subjects show poor correlation (R^2: 0.02~0.38, N≥4) and 8/27 subjects show moderate correlation (R^2: 0.51~0.69, N≥5) with FS. However, 10 of the subjects displayed high correlation between P and F (R^2: 0.72~0.94, N≥4) but displayed variable slopes (-19 to 1.0) and intercepts (near zero to ~38,000 ng/m^3).
Preliminary Conclusion: Based on our study, ~1/3 subjects' BC personal exposure could not be predicted by central site sampling, probably due to personal activities leading to BC exposures different from that of the fixed-site; Roughly, 1/3 subjects' personal measurements highly correlate with fixed-site data, though the relationships vary as a function of the subject, consistent with spatial variability in ambient BC. Time activity recall diaries and GPS data are being investigated to see if they support these preliminary conclusions.