

Platform

MT06: Better Exposure Science Measurements for Epidemiology Studies - Novel Devices and Methods

MT06-01

Modeling Personal Exposure to Fine Particulates and Carbon Monoxide from Cookstove Smoke in Rural Highlands of Guatemalan Mothers using Simple Low Cost Sensors

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Abstract: Exposure to smoke from inefficient cookstoves is responsible for approximately 2 million premature deaths each year. Health effects of the smoke include pneumonia, cataracts, low birth weight, increased heart rate variability and others. Women who are the primary cooks and their children carried on their backs have the largest exposures to cookstove smoke. In Guatemala a randomized control trial to determine the effect of reducing smoke exposures by introducing a chimney stove was conducted. Exposure to fine particulate matter was determined using carbon monoxide as a proxy for fine PM. Although fine particulates are the single best indicators for health it was not feasible to measure on babies, and remains difficult and costly to measure on others. Other studies have used kitchen PM_{2.5} concentrations as estimates of personal exposures, but this practice may become less accurate as cookstove emissions are lower with new technologies. In the past 9 years since the initial study was conducted in Guatemala, our research group has developed several new simple, low cost devices that when paired with traditional air pollution monitoring instruments provide a detailed look into the exposure picture for a women over the course of the day. A small exposure assessment study was conducted to determine the feasibility of using these instruments to model personal PM_{2.5} exposures on women. The stove use monitors (SUMS), continuous monitor of time spent in the kitchen (TAMS), particle and temperature monitor (UCB-PATS) at 1 minute resolution were all used in conjunction with continuous fine PM_{2.5} and CO, integrated gravimetric PM_{2.5} measurements made in the kitchen and personally and questionnaire data on daily behaviors personal pollutant exposures are modeled. A multivariate linear regression model using data from 18 exposure samples is able to explain 70% of the error in the model. Kitchen PM_{2.5} and CO data are the best predictors of personal exposures.

Keywords: Exposure methods, Indoor environment, Sustainable development

MT06-02

Travel Patterns During Pregnancy: Comparison Between Global Positioning System (GPS)-Based Tracking and Questionnaire-Based Data

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Abstract: Background: Emerging evidences suggest that maternal exposures to traffic-related air pollution are associated with reduced fetal development, preterm birth, and term low birth weight. Exposures to traffic-related pollutants are strongly influenced by time spent near traffic emission sources, thus it is essential to understand women's travel activities during pregnancy. However, little is known about pregnant women's travel behaviors and whether questionnaire-based surveys can provide reliable information on their travel patterns during pregnancy. Objectives: Examine women's travel behavior related to traffic-related air pollution exposure during pregnancy and compare the reliability of the data from questionnaire-based interview and real-time global positioning system (GPS) tracking. Methods: We