Abstract

Background/Aims: The dissemination of high efficiency cooking and heating systems is among the most cost-effective interventions to abate the burden of disease caused by indoor air pollution (IAP). Measuring the population-dynamics of time-location and personal activity behavior that affect IAP exposure is critical to quantifying the effectiveness of such interventions. We obtained estimates by stove type (improved/open) of the time that Guatemalan adult women in the CRECER study spent in the kitchen. Methods: We used a novel sensor technology developed at UC Berkeley: the Time-Activity Monitoring System (TAMS) to collect minute-by-minute accounts of the kitchen time budgets. The devices were worn by the women for 48-hour periods quarterly over two years. Twenty-four samples of 55 women were analyzed to obtain marginal estimates using a linear GEE model with time changing covariates. The variance components were estimated using a random effects model, and the inferences from both approaches were compared. Results and Conclusions: There were not significant differences in the kitchen time budgets of the open fire and improved stove groups. The partitioning of variances (p=0.14) and the inference obtained with both models indicate that the correlation between repeated measures of time activity collected quarterly in the population is not high.

Introduction

Objectives

Study Design

Analytical Models

Covariates

Estimating Mother’s Personal Kitchen PM2.5 Exposure Pattern By Combining Time-Activity Data (TAMS) with Continuous PM2.5 Kitchen Air Measurements (PATHS)

Results

Conclusions

References

Typical home for 2 persons-meals through day

Electricity: Average Time: extra person meal

3.22 hrs 5.90 hrs 3.92 hrs 5.31 hrs

The presence of a chimney stove in the kitchen was not an important predictor of time spent in the kitchen for adult women in the population.

The strongest predictors of kitchen time are the number of people in the household and interaction with electricity in the kitchen.

Robust standard errors are slightly smaller than naïve estimates, reinforcing that the independent correlation structure is adequate.

The partitioning of variances in mixed models for each stove type are similar. When pooling the data, the intraclass correlation r=0.14, indicating that most of the variability is found within subjects.

The lack of a significant difference in total kitchen time-budgets across stove types suggests that there are differences in personal IAP exposure associated with changes in kitchen time-activity, these differences arise from the re-distribution of the exposure times through the day, not from modifications in the total time-budget.

A similar conclusion can be drawn with respect to the partitioning of variance by stove type.

Our models indicate that the number of person meals cooked per day and the interaction between electricity and stove type are important predictors of time spent in the kitchen by exposure models, when direct measurements are not available.

The correlation between repeated measures of time activity collected quarterly in this population is not high.


We thank NEstSS for financial support through grant #R01ES10178, the Guatemalan Ministry of Health, the study participants and their families. Visit the Chronic Respiratory Effects of Early Childhood Exposure to Respirable Particulate Matter Study (CRECER) website: http://ehs.sph.berkeley.edu/guat.