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Examining Determinants of Pesticide Exposures in Public Housing Using Classification and Regression Tree (CART) Analysis

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Background and Objectives: The use of chemical pesticides to control cockroach and rodent infestation in inner-city households is a growing public health concern as pest management practices often include the use of banned and restricted-use products to control pests. This practice can result in elevated levels of pesticide residues in the home, but due to prohibitive costs to measure these levels, it is often challenging to detect highly exposed households. The aim of this study was to devise a low-cost approach to identify homes in public housing with high levels of pesticide residues, using a screening approach based on housing characteristics.

Methods: As part of the Healthy Public Housing Initiative, we collected environmental samples from 42 public housing apartments in Boston, Massachusetts, in 2002 and 2003 and obtained information on household demographics, questionnaire information (e.g., self-reported pesticide use), and home visits. Focusing on five organophosphate and pyrethroid pesticides, we used classification and regression tree analysis (CART) to disaggregate the pesticide concentration data into homogenous subsamples according to housing characteristics, which allowed us to identify households impacted by the mismanagement of pesticides.

Results: The CART analysis demonstrated reasonable sensitivity and specificity given more extensive household information, but generally poor performance using only information available without a home visit.

Conclusion: This method has the potential to detect highly exposed households with reasonable sensitivity and specificity given appropriate information that can subsequently lead to the design of effective interventions.