Regression Models Of Residential Exposure To Chlorpyrifos And Diazinon

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This study examines the ability of regression models to predict residential exposures to chlorpyrifos and diazinon, based on the information from the NHEXAS-AZ database. The robust method was used to generate "fill-in" values for samples that are below the detection limit. Such values were assigned once and were used for all analyses in the study. The dependent variables were route-specific pesticide exposures estimated via the scenario evaluation approach. Twenty-nine potential determinants of exposure, the independent variables, were identified from six questionnaires used in the study. Twelve formulation schemes that are different in terms of selection techniques and sets of independent variables used were employed. Model formulations in these schemes were done using all available subjects and then repeated using only subjects with above detection limit concentration values. Model performance was evaluated by the square of the multiple correlation coefficient, R2, and the root mean square error (RMSE). Four schemes employed the minimum-effort approach, which uses only independent variables from the questionnaires in the formulation. This approach yields models that predict up to 65 percent of the variation of the estimated exposure. The rest of the schemes employ the second approach, which added pesticide concentrations in media not included in route-specific exposure estimations to the model-formulation process. The addition improved model performance considerably. Residual analyses were performed. All selected models satisfy or nearly satisfy criteria regarding the mean, variance, and normal distribution of residuals. Logistic regression models did not have better performance when formulated based on the selected multiple regression models. Sample size was a constraining factor in the model formulation. This study shows that multiple regression models can be used to predict exposures to pesticides in residences with information obtaining from questionnaires only. The study identified several potential determinants of exposure to pesticides. No clear pattern was obtained regarding route or pesticide has better prediction models.

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