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Symposium 2008:
Data Collection: Challenges, Achievements and New Directions

Selection Models for Evaluating Assumptions of Methods that Compensate for Missing Values in Sample Surveys

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2009



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Abstract

Missing values caused by item nonresponse represent one type of non-sampling error that occurs in surveys. When cases with missing values are discarded in statistical analyses estimates may be biased because of differences between responders with missing values and responders that do not have missing values. Also, when variables in the data have different patterns of missingness among sampled cases, and cases with missing values are discarded in statistical analyses, those analyses may yield inconsistent results because they are based on different subsets of sampled cases that may not be comparable. However, analyses that discard cases with missing values may be valid provided those values are missing completely at random (MCAR). Are those missing values MCAR?

To compensate, missing values are often imputed or survey weights are adjusted using weighting class methods. Subsequent analyses based on those compensations may be valid provided that missing values are missing at random (MAR) within each of the categorizations of the data implied by the independent variables of the models that underlie those adjustment approaches. Are those missing values MAR?

Because missing values are not observed, MCAR and MAR assumptions made by statistical analyses are infrequently examined. This paper describes a selection model from which statistical significance tests for the MCAR and MAR assumptions can be examined although the missing values are not observed. Data from the National Immunization Survey conducted by the U.S. Department of Health and Human Services are used to illustrate the methods.

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