

Empirical Bias Corrections for Fitting Multilevel Models under Informative Sampling

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Survey data are generally obtained via a complex sampling design involving clustering, stratification and unequal sample inclusion probabilities. When the inclusion probabilities are correlated with the model outcomes after conditioning on the auxiliary variables, the sampling process is informative, and the model holding for the sample data is different from the model holding in the population from which the sample is taken. Standard estimation methods for multilevel models may provide severely biased estimates of the model parameters under informative sampling, especially when the cluster sample sizes are small, yielding to erroneous interpretation of the phenomenon studied. In this article, we propose a new approach based on resampling procedures to correct for the bias of multilevel model parameter estimates under informative sampling of the first and second levels of the model hierarchy. The performance of the proposed method and alternative bias correction approaches proposed in the literature are assessed via an extensive simulation study and an application to a real data set.

Key Words: Bootstrap, probability weighting, complex survey data