

A composite likelihood approach to analysis of survey data with sampling weights incorporated under two-level models

Grace Y. Yi*

University of Waterloo, Waterloo, Canada yyi@uwaterloo.ca

JNK Rao

Carlton University, Ottawa, Canada

Haocheng Li

University of Waterloo, Waterloo, Canada

Multi-level models provide a convenient framework for analyzing data from survey samples with hierarchical structures. Inferential procedures that take account of survey design features are well established for single-level (or marginal) models. On the other hand, available methods that are valid for general multi-level models are somewhat limited. This paper presents a unified method for two-level models, based on a weighted composite likelihood approach, that takes account of design features and provides valid inferences even for small sample sizes within level 2 units. The proposed method has broad applicability and is straightforward to implement. Empirical studies reported have demonstrated that the method performs well in estimating the model parameters. Moreover, this research has important implication: It provides a particular scenario to showcase the unique merit of the composite likelihood method for which the likelihood method would not work.

Key Words: Complex sampling design, multi-level model, variance estimation