

Bayesian Estimation in Small Areas when the Sampling Design Strata Differ from the Study Sub-Domains

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The purpose of this work is to obtain reliable estimates in study sub-domains when there are potentially very small sample sizes and the sampling design stratum differs from the study sub-domain. The population sizes are unknown as well for both the study sub-domain and the sampling design stratum. In calculating parameter estimates in the study sub-domains, a random sample size is often necessary. We propose a new family of generalized linear mixed models with correlated random effects when there is more than one unknown parameter. The proposed model will estimate both the population size and the parameter of interest. General formulae for full conditional distributions required for Markov Chain Monte Carlo (MCMC) simulations are given for this framework. Equations for Bayesian estimation and prediction at the study sub-domains are also given. We apply the 1998 Missouri Turkey Hunting Survey, which stratified samples based on the hunter's place of residence and we require estimates at the sub-domain level, defined as the county in which the turkey hunter actually hunted.

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