Introduction
National statistical bureaus often provide estimates of different small area indicators (e.g., unemployment, average income) at different geographical levels which have been computed using different methods. Spatio-temporal models, for example, take into account different geographic and temporal structures of the data in order to improve estimation. The purpose is to borrow strength from contiguous regions and observations close in time, because they will share similar patterns. By using different spatial and temporal structures it is possible to investigate the pattern of the data and to choose the best among different sets of models.

Bayesian spatio-temporal models
Using a direct estimator of the area mean ($Y_i$) and its sampling variance ($\sigma_i^2$), both obtained from survey data. In addition, other auxiliary information can be available as area means ($\bar{Y}_u$) from additional sources. We propose the following Bayesian model to improve Small Area Estimation of the area mean values in area $i$ at time $t$:

$$\bar{Y}_u[\alpha, \beta, \sigma_i^2] \sim N(\alpha + \bar{Y}_u, \beta + \bar{w}_i + u_i, \sigma_i^2)$$

where $v_i[w_i, \sigma_i^2] \sim CAR(\sigma_i^2)$ and $w_i[\sigma_i^2] \sim N(0, \sigma_i^2)$, $\sigma_i^2 \sim Ga(0.5, 0.0005)$.

Combining individual and aggregated data
In order to provide more accurate estimates of the coefficients of the covariates in the model, we propose the use of the following model using individual data ($y_{it}$).

$$\bar{Y}_u[\alpha, \beta, \sigma_i^2] \sim N(\alpha + \bar{Y}_u, \beta + \bar{w}_i + u_i, \sigma_i^2)$$

Survey design
We have used the same sample as in the area level analysis. This assures that results are comparable (in terms of AEMSE and AREMSE) and this sample size is computationally feasible when estimating the models using individual information.

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References