

Bayesian Small Area Prophecy of Literacy Under a Two Part Random Effects Model

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A B S T R A C T

The UNESCO Institute for Statistics has initiated a programme to collect data on the level of adult literacy in developing countries, using small scale surveys. One of the main objectives of this programme is to obtain summary measures of literacy levels in small geographical areas for which only small samples would be available, thus requiring the use of models.

Small area models in common use are not suitable for this kind of data due to the mixed distribution of the literacy scores in developing countries. This distribution has a large peak at zero, i.e., a large proportion of adults that are illiterate, and juxtaposed to this peak is an approximately bell-shaped distribution of the non-zero scores measured for the rest of the sample.

In this presentation we develop a two part two-level model that is suitable for this kind of data and show how to obtain the small area measures and their variances, or compute credibility intervals by use of the full Bayesian paradigm with the aid of MCMC simulations. The proposed method is illustrated using data from a literacy survey conducted in Cambodia.