

# **Small Area estimation with varying area boundaries by low level hierarchical modelling using the synthetic estimator**

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## **Abstract**

This paper investigates the use of hierarchical models for small area estimation with varying area boundaries employing the synthetic estimator. The strategy is to model at the lowest possible area level. The paper shows how the area estimates and corresponding MSE estimates can be obtained at a variety of nested and intersecting boundary systems which build from the low level. The estimates are computed by aggregating from the lowest level and are hence internally consistent. The paper extends the theory of Stukel and Rao (1999) who considered the use of such models together with the EBLUP estimator. The methodology is illustrated by presenting results of a simulation study that uses hierarchical models built at the lowest area level defined by the UK 1991 census, enumeration districts, and producing estimates and MSE estimates for a variety of UK boundaries.

## **Reference**

Stukel D.M., Rao J.N.K., 1999, On small-area estimation under two-fold nested error regression models. *Journal of Statistical Planning and Inference* 78 131-147.