



Applications of Small Area Estimation (SAE)

in the Social Protection Sector

Introduction

Decision-makers in the social protection sector require up-to-date spatially disaggregated data to understand the distribution of poverty at small geographical areas – and to identify gaps in service delivery.

However, quality poverty data is rarely available at lower levels of geography (i.e. district-level or smaller), as household surveys typically do not represent all small areas in the country.

Small Area Estimation (SAE) is a statistical modelling technique that supplements household survey data with external data sources (e.g. geo-spatial data coming from satellites) to produce estimates of poverty, or other development indicators, at granular levels of geography.

The <u>Data Innovation Team</u> at Oxford Policy Management, in collaboration with the University of Southampton, has developed a <u>Practical Guide to Small Area Estimation of</u> <u>Poverty</u> under the <u>Data & Evidence to End</u> <u>Extreme Poverty (DEEP)</u> research programme.



This publicly available tool leverages open-source geo-spatial and household survey data to produce poverty statistics for small areas, i.e. upazilas (administrative level 3) in Bangladesh, shown in Figure 1 below – even for areas that household survey did not reach (grey areas in the left-hand side map). An upazila has a population of around 350,000 people on average. Estimates at a smaller level (e.g. grid cells) may be possible, but depend on the size of the household survey.



Figure 1: Small Area Estimates of poverty at upazila (administrative level 3) in Bangladesh

Notes: Grey areas in the left-hand side of the figure represent upazilas (administrative level 3) in Bangladesh where there are no DHS clusters, i.e. no households were interviewed in these locations - which means we do not have information on poverty from the survey.

Table 1: Use cases and limitations of Small Area Estimation

What SAE can be used for

- Geographical prioritisation of social protection programmes and public service delivery.
- Regularly updated, low-cost granular poverty estimates, even in the absence of a census.
- Anticipatory action and shock-responsive social protection – through integration of granular poverty maps with early warning systems and climate data.
- Identification of areas in need of humanitarian assistance – through overlays of poverty maps with geo-located data on conflict, food security, nutrition etc.
- Guiding the quotas for **expansion** of Social Registries.

What SAE cannot be used for

- Calculating the Proxy Means Test (PMT) score.
- Estimating individual or household-level poverty.
- Replacing household-level surveys.

To reduce the computational requirements needed for SAE, we are building an SAE App that automates the processing of geo-spatial data using cloud computing. The app automatically fetches, processes and visualises data within minutes. This enables users with all hardware specifications to use geo-spatial data for poverty modelling.

Dashboard and other contextual data

Poverty maps produced by SAE can be overlaid with other contextual datasets relevant to the social protection sector in an interactive dashboard.

Practical guide to Small Area Estimation of poverty

Our practical guide to SAE of poverty combines Demographic and Health Surveys (DHS) and geo-spatial data in a statistical model to produce poverty statistics at the upazila level (administrative level 3) in Bangladesh.

Figure 2: Small Area Estimation using household survey and geo-spatial data.



Notes: In portion 1 of the figure, the blue dots represent the locations of DHS clusters, while the boundaries represent administrative level 3 (upazila) in Bangladesh. In portion 4 of the figure, the poverty map shows the proportion of households in poverty in each upazila, where poor households are defined as being in the bottom quintile of the Relative Wealth Index (RWI) according to the DHS. Darker colours indicate a higher proportion of households in poverty.

Costings and level of effort

Replication of estimates of poverty using the same data sources and methodology in another country would require 30 days (or 16-20 days when using the SAE App). Poverty estimates can also be produced using other datasets (e.g. different household survey or replacing geo-spatial data with a census).

Sustainability

To encourage the take up of the SAE tool and build capacity of national statistical offices and poverty researchers, OPM offers trainings in R programming, geo-spatial analytics, and SAE (typically through a 1-2 week training course).

To find out more about SAE, including using other data sources, our training offer, or the SAE App - send us an email at **contact@povertyevidence.org**