



## DHS Survey Design: Sample Size



Most DHS surveys are representative\* at the national level, for urban and rural areas, and for the first administrative level subdivisions, which are usually called regions, zones, provinces, governorates, or states. There is growing interest in providing DHS data for even lower administrative levels, such as counties and districts.

\*In this document, by “representative at a specific domain level” we mean that most of the survey results/indicators can be produced on the level of that domain with good precision.

### What factors determine sample size?

Sample sizes for DHS surveys are based on the number of survey domains (usually subnational units such as regions), the precision requirements for priority indicators, and the budget. Generally, The DHS Program samplers design surveys with fertility and childhood mortality estimates in mind.

To calculate fertility with an adequate level of precision, for example, samplers include between 800 women for every subnational region in countries with a high total fertility rate (TFR) to 1,000 women in countries with a low TFR. The typical subnational region is usually administrative level I. In other words, a high TFR country with 10 regions needs to interview at least 8,000 women in order to have estimates of fertility and child mortality with reasonably small standard errors for each of the 10 regions. In countries with more than 10 regions, one option to keep the sample size down and reduce costs is to group some regions to form study domains. A total sample size of about 10,000 women is ideal to maintain cost efficiency and high data quality.

### How precise are these estimates?

All survey sampling strategies are subject to sampling error. The DHS Program designs samples to provide national and subnational estimates with a reasonable relative standard error. The larger the sample size, the smaller the relative standard error on any given indicator will be. The standard errors at the admin I level are

### Considerations

#### Validity:

Increasing sample size is a valid practice if funding and human resources are sufficient for a larger survey. All sampling strategies are subject to sampling error; the larger the sample, the smaller the relative standard error will be.

#### Impact on cost:

Sample size is the single largest driver of survey cost, as it impacts all elements of the survey process from hiring and training of staff to processing of data, report writing and dissemination.

#### Impact on quality:

Large sample sizes can overburden the implementing agency and survey management staff and lead to poorer data quality because of the challenges in data collection and overall survey management. A large survey requires additional coordination and leadership and should be undertaken by an experienced implementing agency with robust data quality checks in place.

wider than those at the national level; standard errors at the admin 2 level are larger than those at the admin 1 level. For this reason, interpretation of subnational trends and comparison of subnational units should be undertaken with caution unless the total sample is very large. Appropriate significance testing is necessary to confirm changes over time or true differences between subnational areas.

### What options exist to provide data at lower administrative levels?

- **Full and shortened questionnaires:** Depending on the priority indicators for the survey, a compromise can sometimes be reached wherein many indicators are available at the second administrative level, while others are available only for admin 1. For example, in the 2014 Kenya DHS the total sample size was 40,000, which is very large for a DHS. Many indicators were available for all 47 counties, while those indicators that require larger sample sizes (TFR, childhood mortality rates) were only available for each of the 8 regions. Though the total sample size was very large, only half of the households received a full questionnaire, while the other half received a shortened questionnaire.
- **Over-sampling in focus areas:** Sometimes stakeholders have data needs that are specific to a few districts; perhaps they want to monitor progress in key intervention areas. In this case, those districts can be over-sampled without expanding the entire sample to the second administrative level. This helps to maintain a manageable and cost-effective sample size while still meeting specific data needs.
- **Larger sample sizes:** It is also possible to implement a standard DHS that is representative at the second administrative level, which, in some countries, requires a sample size of over 50,000 women. This can be undertaken only when financial and human resources are sufficient to properly manage the survey without threatening the overall data quality. Very large sample sizes present unique logistical challenges for training, staff management, data and lab processing, and provision of supplies. Management of this type of survey requires a highly skilled and organized implementing agency coordinated with external technical assistance.
- **Small area estimation:** Another alternative for producing estimates at lower subnational levels relies on small area estimation (SAE) techniques and statistical modeling using ancillary geographic information. If these techniques are acceptable, the DHS survey scope can be limited to data collection for admin 1 estimates only and these data along with covariate data from external sources can be used to estimate indicators at lower administrative levels.

Currently, The DHS Program uses statistical modeling using ancillary geographic information to create interpolated surfaces for lower-level estimates. The DHS Program standardly produces modeled surfaces for 12 key indicators. These maps are presented at a 5x5km grid scale, which can be aggregated to represent the needed subnational units along with confidence intervals for the aggregated indicators. This approach does not provide estimates that are as accurate as high quality survey data and is currently limited to a small set of indicators. However, if appropriate for the specific data need, interpolated surfaces may offer an alternative to very large sample sizes. (References: <https://dhsprogram.com/pubs/pdf/SAR15/SAR15.pdf>, <https://dhsprogram.com/pubs/pdf/SAR14/SAR14.pdf>).