

## **2015 Update of vaccination coverage survey manual**

Data on vaccination coverage are used for multiple purposes at subnational, national and international levels. Ideally, vaccination coverage should be monitored continuously at local and national levels using registries or administrative reports. In many countries, however, administrative data are inadequate due to over- or under-reporting of vaccinations administered (for example, by including doses outside the recommended age range or because private practitioners do not report, respectively) and because denominators are often grossly inaccurate. Administrative data have the advantage of being available at all levels of the health system with very little delays, which should enable program managers to investigate potential problems and take remedial action in timely fashion. Improving the accuracy of administrative data is a high priority.

Surveys can be helpful to monitor coverage while efforts to improve routine reporting systems are ongoing. Three types of surveys are commonly used to estimate vaccination coverage. The large, multipurpose Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) are high-quality probability sample surveys, in which each household has a known and nonzero probability of being selected in the sample. The World Health Organization (WHO) Expanded Programme on Immunization (EPI) Cluster Survey was developed over 30 years ago as a practical tool to quickly estimate coverage to within +/- 10 percentage points of the point estimate. The original EPI survey method selects 30 clusters in each of which seven children are selected using the “random start, systematic search” method. The quota sample of 7 children per cluster is obtained via visits to an undocumented number of houses that are chosen by the field worker, potentially introducing bias, and missing data were not systematically recorded. The probability of each child in the population being selected into the sample could not be calculated, thus it was not a probability sample. With increasing emphasis at global level on accurate assessment of coverage, and increasing complexity of vaccination programmes, the 2015 update of the EPI cluster survey manual has several changes that should reduce bias, and improve the accuracy and precision of survey results.

Rigorously implemented probability samples of adequate size to measure coverage at subnational levels are resource-intensive in terms of time, expertise and funds. Household surveys may not always be the best investment to answer questions that are raised by program managers. At the most peripheral health system levels, practical field methods such as health facility-based assessments can evaluate multiple aspects of service provision, coverage and timeliness of each vaccine among clinic attendees, and can stimulate improvement of recording as well as vaccination practices. An annex to the manual aims to help policy-makers decide whether to conduct a survey, and if so, to decide which kind of survey may best meet programme goals.

Many countries obtain survey data on vaccination coverage every 3-5 years from DHS or MICS and this meets most programme needs. Additional surveys may be needed from time to time, e.g. to evaluate coverage achieved by campaigns, or after major changes have occurred in the vaccination program. When coverage surveys are necessary, WHO trusts that the 2015 working draft manual will ensure that they are conducted to high standard and that results are used to improve programme performance.

### **Main enhancements in the 2015 update**

- Increased emphasis on choosing the goals of the survey (estimation/hypothesis testing/classification) at the right level of the health system, e.g. national level

coverage stratified by province, or coverage in specific districts or areas of interest, and designing the survey and sample size to answer the key questions

- Use of probability sampling (every eligible respondent has a known and non-zero chance of selection into survey sample) - see below
- Pre-selection of households to be interviewed – eliminating any opportunity for field data collectors to affect selection (this requires excellent maps)
- Including both residents and all other persons who slept in the household the previous night rather than having a residency requirement for eligibility, because exclusion of more mobile populations can bias coverage estimates upwards
- Careful documentation of the outcome of visits to all households in the cluster so that missing data can be accounted for properly
- Conduct of weighted analyses to account for different probabilities of selection of each child in the survey
- Potential inclusion of multiple age cohorts, e.g. vaccinations scheduled between 0-11 months are measured among a cohort aged 12-23 months at the time of the survey, and those scheduled between 12-23 months among children aged 24-35 months at the time of the survey.
- More effort to get documentation of vaccination status –field workers visit health facilities to search registers for children who lack a home-based record.
- Taking photographs of vaccination cards and health facility registers. Digital cameras are inexpensive and smartphones are increasingly available, having the added advantage of GPS capability, and the manual recommends a step of photographing cards and registers so that dates can be verified during data cleaning.

#### **Probability sampling for representativeness and meaningful confidence intervals**

- Use census enumeration areas (EAs) for primary sampling units
- Obtain EA maps for selected EAs, or create sketch maps if these are not already available
- Use either a single-stage or two-stage design, depending on the survey goals, target age group(s), length of the individual questionnaires, and local demographics
- In a single-stage cluster survey, all eligible respondents in the selected EAs are interviewed (in large EAs, a segment is pre-selected and all eligible respondents in the segment are interviewed)
- In a 2-stage design, as in DHS and MICS, first households in the cluster are listed, then required number of households is selected by the survey coordinator (NOT by field teams), and then repeat visits are made to interview eligible respondents in the selected households
- Do not replace households

In addition, the manual will expand on guidance given in the previous versions:

- inclusion of multiple age cohorts – selection of sample size according to goals and selection of target number of households depending on the size of each age cohort
- improving data quality
- checks in the field (additional material on the recruitment, selection, and training of field teams and supervisors as well as supervisors' roles and responsibilities.

- checks during data management and analysis
- standard analyses to answer primary questions (coverage by given age) and secondary questions (e.g., valid doses, missed opportunities), including table shells and examples of graphing weighted results to show confidence limits and confidence bounds.
- explanation of how results can be used to estimate coverage with a given precision, or to classify coverage by comparing coverage in different areas with programmatic thresholds
- adaptation of the manual for evaluation of SIAs
- interpretation, presentation and use of results for programmatic action

### **Forthcoming supporting materials**

Other work will support the updated manual including software with standard code for analyzing immunization survey data, training materials and methods, templates of survey protocols and reports, and a step-by-step guide to survey implementation.

### **Conclusion**

The WHO EPI Immunization Coverage Cluster Survey manual has been substantially revised - the use of probability sampling and weighted analyses with high attention to quality control means that results will be more representative. Close collaboration with census offices will be needed to obtain census data and most importantly, maps of enumeration areas. Surveys conducted with the new manual will be more rigorous, more complicated, and in some cases more costly than under the earlier manual. Statistical expertise will be needed to conduct weighted analyses, and depending on survey goals, to help with sample size calculations. However, results from the new surveys should meet the increasingly high standards of RI programs, ministries of health, and results-based financiers.

### **Questions?**

Contact Marta Gacic-Dobo ([gacicdobom@who.int](mailto:gacicdobom@who.int)) and Carolina Danovaro ([danovaroc@who.int](mailto:danovaroc@who.int)) at WHO.

More information available in accompanying presentation entitled:  
'WHO EPI Vaccination Coverage Survey Using 2015 Manual – Simple Example'