WHO COOKBOOK:
HOW TO CONDUCT A VACCINATION COVERAGE SURVEY IN 17 STEPS

Step 1 - Assess need for a survey
Step 2 - Create a Steering Group
Step 3a, b, Step 12a, b - Define survey scope; Select survey sample
Step 4 - Define survey budget and timeline
Step 8a, b, Step 15a - Finalize the survey protocol, Survey equipment and supplies, Data management
Step 7 - Decide who will conduct the survey
Step 6 - Confirm funding
Step 5 - Develop survey proposal
Step 9 - Ethical Clearance
Step 10a, b, Step 15a, b - Design Data Collection Tools for PAPI and CAPI, Manage the Data
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Step 16a, b, c, d - Weight the data set, Describe the data, Conduct analyses, Classify coverage
Step 15a, b, c, d - Enter, clean, and, manage the data, construct variables
Step 14 - Conduct fieldwork
Step 13a, b - Train survey staff
Step 17a, b - Interpret and Share Survey Results

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Introduction

A vaccination coverage survey is a substantial endeavor. The authors of the [2018 WHO Vaccination Coverage Cluster Survey Reference Manual](https://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html) envisioned that survey practitioners would benefit from a constellation of resources to complement the manual. This document is one of those resources – a set of 1-2 page summaries describing how to conduct a vaccination coverage survey and pointing the reader to additional resources. The guidance is organized in order of the survey steps outlined in the reference manual. The summaries are compiled in this document, but also provided as standalone documents for readers who wish to focus on only a few aspects of a survey.

This succinct companion to the 2018 manual was written for WHO by Carolina Danovaro (WHO), John Wagai (independent consultant), Melissa Wardle (CDC) and Dale Rhoda (Biostat Global Consulting). The material was influenced and inspired by all the authors and contributors and reviewers of the manual, and by the participants of the [2017 WHO meeting](https://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html) to share lessons learnt from the roll-out of the updated manual.

This document was assembled and formatted by WHO intern Michelle Selim.

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(It has not been determined yet where this document and the accompanying standalone sections will be hosted in the long run, so please list the URL where you found the document. At the time of this writing, the document is accessible at [https://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html](https://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html).)

The authors welcome your feedback. Please send comments to Carolina Danovaro ([danovaroc@who.int](mailto:danovaroc@who.int)).

Note: Other survey resources that complement the 2018 manual include:


- A set of Stata programs called the Vaccination Coverage Quality Indicators (VCQI) (and supporting documentation); available at [www.biostatglobal.com/VCQI_resources.html](http://www.biostatglobal.com/VCQI_resources.html) (Accessed March 27, 2020)

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HOW-TO GET STARTED WITH STEP 1: Assess need for a survey

PURPOSE
To help decide if you need a vaccination coverage survey¹ (vs. other tools) at this time.

PEOPLE & MATERIALS

- National immunization programme (or subnational for subnational surveys)
- Interagency coordinating committee (ICC), where appropriate
- National Statistics Office, or equivalent
- Information about recent and upcoming household surveys such as:
  - Demographic and Health Survey (DHS)
  - Multiple Indicator Cluster Survey (MICS)
  - Standardized Monitoring and Assessment of Relief and Transitions (SMART)
    http://smartmethodology.org
  - EPI surveys
  - Others
- 2018 WHO Vaccination Coverage Cluster Survey Reference Manual (especially section 2.2)

- National immunization schedule and information on recent new vaccine introduction(s) and/or any recent changes to the schedule
- If you are conducting a post-campaign coverage survey, information about the campaign (campaign goals, vaccine(s) used, target population(s), dates of implementation in different geographical areas and strategies used)

STEPS

For Routine Immunization (RI):

1. Think about the role of surveys for assessing vaccination coverage for RI

   Surveys can be helpful to monitor coverage while efforts to improve routine reporting systems are ongoing. The large, multipurpose DHS and MICS, as well as specific immunization surveys, are commonly used to estimate vaccination coverage. For additional reading see Cutts et al., 2016.

2. Then, ask:
   1. What does the immunization programme need to know (not what would be nice to know)? By when? What happens if the programme does not get this information?
   2. Were there major changes in immunization (improvements/problems) that need to be monitored?

¹ When talking about vaccination coverage surveys here, we are referring to surveys following the 2018 WHO Vaccination Coverage Cluster Survey Reference Manual, available at: http://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html
3. Are there recent household surveys that estimate vaccination coverage, for example, from a DHS, MICS, SMART or other similar survey? If yes:
   a. What would another survey provide vs. the costs and time investments needed?
4. Are there any upcoming household surveys that will provide RI coverage estimates? If yes:
   a. Is the immunization programme aware of this survey?
   b. Can the immunization programme still provide input to the steering committee of the upcoming survey regarding the current immunization schedule and recent changes to it, how the immunization questions are to be asked, the availability of different home-based records (HBRs) or vaccination cards, training and monitoring of the immunization aspects of the survey, etc.?
   c. In light of the upcoming survey, is there a need for you to plan a separate vaccination coverage survey? Think critically about whether your survey would provide additional information needed vs. the costs and time investments required.
5. For Gavi-eligible countries, would the immunization programme need to do a stand-alone vaccination survey to fulfill the data requirements? Or is there a good reason to not do a survey or wait? (Gavi requirements include provisions to waive a survey if good reasons are given. See https://www.gavi.org/support/process/apply/additional-guidance/#data)
6. Can the country conduct a survey to high standards? Common issues affecting survey quality include limited respondent accessibility, limitations in obtaining a recent sampling frame and low availability of home-based records. (See Cutts et al., 2016)
7. Would a vaccination coverage survey give the programme the answer(s) needed? If yes:
   a. Is a national survey needed, or
   b. Could subnational surveys be conducted?
8. Will the results be used to improve programme performance?

If you answered NO to any of the last three questions (6, 7 or 8), re-consider the need for a survey.

For post-vaccination campaigns (also known as supplementary immunization activities (SIA)):

1. Think about the role of surveys for assessing vaccination coverage following an SIA

   In most cases, surveys following campaigns are used for accountability purposes and/or to plan for future campaigns. They are not the best tool to guide actions related to the current or ongoing campaign, as the results will come late (after the campaign is over). Additionally, it likely will not be granular to provide insight on specific areas or populations that would require vaccination mop-up activities.

2. Start discussing and deciding on a post-SIA survey early enough, ideally at the time of campaign planning.

3. Can the country conduct a survey to high standards? Common issues affecting SIA survey quality include limited respondent accessibility, limitations in obtaining a recent sampling frame, delays between campaign implementation and survey that can affect recall, etc.
4. For Gavi-eligible countries, would the programme need to conduct a post-vaccination campaign coverage survey to fulfill the SIA support requirements? See https://www.gavi.org/support/process/apply/vaccine/#mr

If you answered NO to either of the last two questions (3 or 4), re-consider the need for a survey.

CAUTIONS, TIPS & ADVICE

- Conducting a survey to estimate coverage in each district or equivalent level may not be feasible or advisable, neither for an RI coverage survey nor for post-SIA coverage survey.
  - Rigorously implemented probability samples of adequate size to measure coverage at subnational levels (many strata) are resource-intensive in terms of time, expertise and funds.
  - It is better to do a smaller, high-quality survey rather than a large survey where quality cannot be assured, as the latter may provide more precise (narrower confidence intervals), but inaccurate coverage estimates.

- For RI coverage, household surveys may not always be the best investment to answer questions raised by immunization programme 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 stimulate improvement of vaccination practices and recording. (Cutts et al., 2016)

- For SIA surveys, it is often better to focus resources on ensuring optimal supervision during the SIA itself and doing rapid campaign monitoring, than investing in a large post-SIA survey.

- In some settings, and for some campaigns, conducting a probability-based survey may not be possible, such as during vaccination campaigns in humanitarian emergencies. In such cases, rapid assessments may be more practical.

- It is sometimes tempting to add RI questions to a post-SIA survey. However, there are substantial challenges involved, so proceed with caution. See Reference Manual Section 2.11 & Cutts et al., 2016. Some considerations:
  - For the same target precision, the required sample size is higher for RI than for SIA coverage because coverage in the former is usually closer to 50% (less than SIA coverage) and more heterogeneous.
  - This is compounded by the need to visit more households to find eligible persons because routine coverage is assessed in a much narrower age group than SIA coverage.
  - The RI questionnaire takes longer to complete than in earlier decades because more doses are now included in the RI schedule and because health facilities should be visited if the child’s caregiver cannot furnish a home-based record. In contrast, SIA vaccination is not recorded in health facilities, so such visits are not recommended.
  - RI surveys may also include interviewing of mothers who gave birth in the previous 12 months to assess tetanus toxoid (TT), which further increases the duration spent by the data collection team in a single household. Thus, evaluating all routine vaccinations among 12–23 month olds (with the possible addition of mothers for TT) during a post-SIA survey increases resource needs and may delay results of SIA coverage.
One or two questions can be included about prior receipt of the relevant vaccine (e.g. measles-containing vaccine if a measles or measles-rubella SIA is being evaluated) through routine services to evaluate whether the SIA reached persons missed by the RI programme.

**ADDITIONAL RESOURCES**
- MICS Survey design tools
HOW TO GET STARTED WITH STEP 2: Assess need for a survey

PURPOSE
To establish a multi-disciplinary committee or steering group to oversee the survey, from design to analysis and dissemination

PEOPLE & MATERIALS
- National immunization programme (or sub-national, for sub-national surveys)
- Interagency coordinating committee (ICC), where appropriate
- Reference Manual, section 2.1

STEPS
9. Define the role and terms of reference (TOR) of the Steering Group.
   Primarily this group coordinates the complex tasks of designing and conducting the survey. See Multiple Indicator Cluster Survey TOR Template English.

10. Define the participants of the Steering Group.
    Representatives may be solicited from the host country’s national ministry of health, national census agency or statistical office, WHO, UNICEF, the funding agency, and other partners.
    Ideally, some members should have experience with past vaccination surveys in the area so that the survey can be adapted to the local context, the budget can be realistic and any potential problems or issues can be anticipated and addressed

11. Determine if a technical committee will also be created, and whether the technical committee will be a sub-group of the steering group, or if it will be a different group. If the latter, define how the technical committee will liaise with the survey steering group.
    Technical committees usually include statistical expertise and individuals familiar with using census data, geographic information systems (GIS) and maps.

12. Ensure that the survey coordinator sets up a calendar of meetings and keeps the team engaged.

13. Ensure that the steering group signs off on the survey report.

CAUTIONS, TIPS & ADVICE
- Determine how the steering group will liaise with EPI and with ICC (where applicable).
- Ensure that each member of the steering group knows what is expected of him/her and signs off on minutes from meetings where key elements of the survey are decided.
- Ensure that the steering committee follows the survey implementation and is fully aware of changes to the survey chronogram and budget.
ADDITIONAL RESOURCES
- *Multiple Indicator Cluster Survey (MICS)*
  - Terms of Reference for Steering Committee Template (14 October 2016) [English](#)
HOW-TO GET STARTED WITH STEP 3a: Define survey scope and budget – Set primary questions and target population

PURPOSE
To establish primary programmatic questions and set appropriate target population. This is typically initial information used for the survey proposal.

PEOPLE & MATERIALS
- Steering committee
- National immunization programme (or subnational for subnational surveys)
- Interagency coordinating committee (ICC), where appropriate
- National Statistics Office, or equivalent
- Technical committee
- Information about recent and upcoming household surveys such as:
  - Demographic and Health Survey (DHS)
  - Multiple Indicator Cluster Survey (MICS)
  - Standardized Monitoring and Assessment of Relief and Transitions (SMART) (smartmethodology.org)
  - EPI surveys
  - Others
- National immunization schedule and information on recent new vaccine introduction(s) and/or any recent changes to the schedule
- If you are conducting a post-campaign coverage survey, information about the campaign (campaign goals, vaccine(s) used, target population(s), dates of implementation in different geographical areas and strategies used)

STEPS

1. Set primary question and goals; see Reference Manual Section 2.3 Identify primary questions that affect survey design and sample size for more examples.
   a. Is the primary question an estimation question (Reference Manual Section 2.3.1)? This is most common.
      Example: What proportion of the target population is fully vaccinated according to the national schedule?

   b. Is the primary question a comparative or hypothesis testing question (Reference Manual Section 2.3.2)? This is quite rare.
      Example: Has coverage for a vaccine improved since the last survey measurement?
c. Is the primary question a classification question (Reference Manual Section 2.3.3)?

Example: Which health districts have coverage that is below an important programmatic threshold (for example, DTPCV3 coverage below 80%)?

2. Define the target population (Reference Manual Section 2.4):

a. For routine immunization coverage surveys

<table>
<thead>
<tr>
<th>If the National Routine Immunization Schedule recommends...</th>
<th>Target population</th>
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<tr>
<td>Vaccines given until 9 months of age</td>
<td>Children 12-23 months</td>
</tr>
<tr>
<td>Vaccines given between 12-23 months of age</td>
<td>Children 24-35 months</td>
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<tr>
<td>HPV given to girls 9-14 years of age</td>
<td>Girls 15 years old</td>
</tr>
<tr>
<td>Tetanus coverage among pregnant women</td>
<td>Women who gave birth in last 12 months</td>
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</table>

b. For post-campaign coverage survey the target population varies based on the ages included during the campaign. For example, a measles-rubella supplementary immunization activity (SIA) that targets children aged 9 months to 14 years will include this target population in the survey design.

CAUTIONS, TIPS & ADVICE

- If you are planning a survey that requires multiple outcomes, populations, administrative regions, or geographic levels (national, province, district), it is strongly recommended that you consult with a sampling statistician. See Reference Manual Sections 2.12. Designing for multiple outcomes; 2.13. Designing for multiple geographic areas; 2.14. Designing for multiple levels of administrative or geographic hierarchy.
- It will be helpful for the survey steering group to review the latest vaccination schedule and discuss which vaccines to assess and whether recent changes or vaccine introductions will make the survey especially complicated. For example, if new home-based records or cards are issued that list new vaccines, then survey staff will need to be trained to read both the old and the new cards.
- The definition of ‘fully vaccinated’ may vary from country to country, may vary over time, and it may include only a subset of all vaccines; make the definition clear from the very start of the project.
HOWTO GET STARTED WITH STEP 3b: Define survey scope and budget – Agree on sample size to answer survey question

PURPOSE
To calculate feasible sample size given primary survey question and conditions. This is typically initial information used for the survey proposal.

PEOPLE & MATERIALS
- National immunization programme (or subnational for subnational surveys)
- Interagency coordinating committee (ICC) for countries, where appropriate
- National Statistics Office, or equivalent
- Steering committee
- Technical committee
- Statistician
- Survey parameter estimates based on previous surveys completed

STEPS
1. Set inferential goals or determine how much uncertainty is acceptable for the survey. The inferential goals will depend on the type of question and goals set for the survey. See Reference Manual Section 2.5 for additional information.
   a. If asking an estimation question then express the uncertainty as confidence intervals (CI) such as 95% CI.
   b. If asking a hypothesis testing question then express the uncertainty as statistical power. This is typically characterized by three parameters: 1) Minimum detectable difference between the two groups, 2) The probability of making a Type I error, 3) The power of the test.
   c. If asking a classification question then express the uncertainty as the probability of classification error, also known as misclassification.

2. Calculate the required sample size. At this time consult with the survey statistician about sampling design.
   a. Collect or estimate the following parameters:
      i. Target population size
      ii. Anticipated vaccination coverage (p)
      iii. Intracluster correlation coefficient (ICC)
      iv. Confidence level (a)
      v. Confidence interval (CI) half width
      vi. Target number of respondents per cluster (m)
      vii. Target number of clusters per stratum
      viii. Parameters relating to statistical power of the test and probability of errors
   b. Review the following resources for background information and tools on calculating the required sample size.
i. *Reference Manual* Section 2.7. Calculate the required sample size

ii. Annex B1: Steps to calculate a cluster survey sample size for estimation or classification

iii. Annex B2: Sample size equations for estimation or classification

iv. Annex B3: Sample size equations for comparisons between places or subgroups, or over time

3. Once the sample size required to answer the primary question is calculated, determine feasibility.
   a. From the sample size estimated determine the costs and time required to implement.
      i. See Multiple Indicator Cluster Survey: Listing and Fieldwork Duration, Staff and Supply Estimates Template [English](#) to help estimate time and staff required.
      ii. Estimate the budget required (See Step 4).
   b. If the sample size is not feasible, consider revising survey design to ensure affordability and timeliness. See Figure 1. Early steps in survey design in the *Reference Manual* to help revise sample size and costs.

4. See Step 12a and Step 12b for complementary steps.


**CAUTIONS, TIPS & ADVICE**
- When agreeing on your sample size and survey design determine if the following need to be taken into consideration:
  o adding RI to a post-SIA survey
  o multiple outcomes
  o multiple geographic areas
  o multiple levels of administrative or geographic hierarchy

**ADDITIONAL RESOURCES**
- Multiple Indicator Cluster Survey:
  o Listing and Fieldwork Duration, Staff and Supply Estimates Template [English](#)


HOW TO GET STARTED WITH STEP 4: Define survey budget and timeline

PURPOSE
To estimate budget and develop a tentative timeline based on sample size and survey scope. This is typically initial information used for the survey proposal.

PEOPLE & MATERIALS
- Survey coordinator
- Steering committee
- Technical committee
- Statistician
- Reference Manual Table 2: Timeframe for a national coverage survey
- Budgets and timelines used for previous surveys
- Potential deadlines, holidays, dates of significance, seasons for the year
- National immunization program work plan
- Reference Manual Section 3.1 and Table 2
- Survey budget template (examples)
- Timeline template (examples)

STEPS
1. Create a budget (See excel template and examples: coverage survey, DHS, and MICS)
   a. See budget template for common line items. Add or fill in fields that pertain to your survey.
   b. Update budget periodically throughout the survey. Ultimately, you should have both expected and actual costs documented.
2. Create a project timeline
   a. Example timetable template based on Table 2. Timeframe for a national coverage survey in the Reference Manual.
   b. Identify major deadlines and work backwards from those dates.
   c. Certain steps require more time and often experience unexpected delays. To address this plan for additional time up front. Common steps where there are delays include obtaining ethical clearance, identifying accurate and up-to-date sampling frames, setting up contracts, and ensuring funding is in place.
3. Determine if budget and timelines are reasonable. See Figure 1. Early steps in survey design for process.
   o If not, consult Figure 1. Early steps in survey design for process in the Reference Manual and discuss compromise strategies to identify a lower-cost design.
   o If low-cost design cannot answer the primary programmatic questions then do not do the survey at this time.
CAUTIONS, TIPS & ADVICE
- When estimating your budget take the following into consideration: fixed costs, cost proportional to number of strata, number of clusters per stratum, and total number of respondents, number of teams, etc.
- Consider and plan for steps that tend to be delayed.
- Consider the size and complexity of the survey. Larger surveys will likely require more time to plan and implement.
- Consider times people will be at home.
- Try to avoid:
  - Rainy seasons, the winter, hottest months
  - Religious, political, and cultural events
  - Agricultural seasonal cycles

ADDITIONAL RESOURCES

Budget
- For more comprehensive and detailed budget templates see examples from:
  - DHS: https://www.k4health.org/toolkits/dhs
    - See Appendix B of Survey Organization Manual for DHS
  - Multiple Indicator Cluster Survey (MICS) Plan
    - Survey Plan Template - Appendix A Budget Calculations Template (6 March 2017)
      English
    - Listing and Fieldwork Duration, Staff and Supply Estimates Template (26 May 2017) English

Timeline
- Example timelines:
  - Coverage Survey Timeline based on Reference Manual Table 2.
  - Haiti Serosurvey example 1
  - Haiti Serosurvey example 2
  - Kenya SIA Coverage Survey Gantt Chart
- Multiple Indicator Cluster Survey (MICS) Plan. See Chapter 14 for the timetable.
HOW-TO GET STARTED WITH STEP 5: Develop survey proposal\textsuperscript{2}

PURPOSE
To develop a concise document with the most relevant information on survey design, scope, budget and timeline often used to advocate for funding

PEOPLE & MATERIALS
- Immunization programme
- Interagency coordinating committee (ICC) for countries, where appropriate
- Statistician
- Steering group members
- Use How-to Steps 1-4 of the survey process to inform the proposal

STEPS
1. Gather relevant background materials used to inform How-to Steps 1-4 and start organizing information into a proposal.
2. Use the proposal template and checklist provided below as a starting point
3. Adapt proposal to reflect any additional requirements needed for your context

Proposal Template and Checklist

Proposal Title

Background and context
- Reflects knowledge of the country’s immunization programme including the routine immunization schedule, recent immunization campaigns and other programmatic features of relevance.
- If this is a post-SIA survey, include relevant information about the campaign.
- References previous and planned surveys that captures immunization coverage data (e.g. DHS, SMART, MICS, EPI, etc.)

Problem statement and rational
- Introduce questions the survey expects to answer and why they are important to address
- Answer why this survey is needed now
- Address what information will be new
- Describe if information fulfils a requirement
- Answer how the survey findings will be used to improve the immunization programme

\textsuperscript{2}Also known as concept note or protocol summary.
Objectives

Primary

- Indicate primary purpose for conducting the survey. This will drive the survey design (sample size, target population, procedures and analysis).

Secondary

- List additional analyses planned with the data. Some examples include: timeliness, drop-out rates (e.g. DTP1-DTP3, MCV1-MCV2), factors associated with vaccination outcomes, missed opportunities for vaccination, card availability and urban vs. rural estimates). See Reference Manual 6.4 and WHO White Paper on Harmonizing Vaccination Coverage Measures in Household Surveys available at https://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html.

Design summary

- Describe the overall design of the survey to be used and the rational about why it was selected.
  - Vaccines to be assessed
  - Target population(s) included

Stratification to be used

- Confirm that stratification refers to the reporting units (e.g. province/region, state/district, urban vs. rural); See Annex A: Glossary of terms to align definitions with proposal.
- Describe rational about the proposed stratification
- As appropriate see Reference Manual sections:
  - 2.12. Designing for multiple outcomes
  - 2.13. Designing for multiple geographic areas
  - 2.14. Designing for multiple levels of administrative or geographic hierarchy

Sample size

- Indicate sample size calculated (see Reference Manual Annex B1, B2, and B3 and How-to Step 12: Select Sample)
- Describe assumptions used and rational for sample size calculations
  - Percent coverage of primary antigen and precision
  - Design effect
  - Number of eligible children per cluster
  - Intra-cluster correlation coefficient
  - Non-response

Sampling strategy

- Describe the following:
  - type of sampling used (e.g. probability sampling)
  - selection and source of sampling units (sampling frame)
source of household line listing and maps to be used or household line listing activity, as needed

**Survey implementation**
- Indicate stakeholders involved in the survey (e.g. EPI staff, survey coordinator, statistics office)
- Indicate primary implementing party
- Specify terms of references and expected deliverables for any consultants hired and organizations involved in enumeration, household line listing, map development, data collection and supervision
- Briefly describe the process and person(s) responsible for data collection, data management, quality assurance (e.g. supervision, external monitors), analyses and dissemination
- List expected limitations

**Ethical review**
- Indicate that ethical clearance to be obtained for country and partner organizations (see Step 9: Verify Ethical Clearance)
- Briefly describe provisions for informed consent and confidentiality

**Expected survey outcomes and “products”**
- List expected deliverables include: clean dataset and data dictionary, survey report, materials developed/used and documentation
- List any other deliverables (e.g. peer-review publications, policy documents, etc.)

**Preliminary budget and timeline**
- Provide initial estimated amount (see Reference Manual Annex C)
- Present tentative timeline (e.g. chronogram, Gantt chart)

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**CAUTIONS, TIPS & ADVICE**
- Survey proposals should provide sufficient context for stakeholders and funders to understand the need and scope of the survey has been thoughtfully developed.
- Survey proposals are not the same as the survey protocol. The survey protocol will contain in-depth details on standard operating procedures, terms of reference for involved parties and methods.

**ADDITIONAL RESOURCES**
- Survey proposal template and checklist
- Example Concept Notes: Example 1, Example 2, Example 3
HOW-TO GET STARTED WITH STEP 6. Confirm funding is in place

PURPOSE
To raise awareness that not having the funds in place is common and a major setback for survey implementation.

PEOPLE & MATERIALS
- National immunization programme (or sub-national, for sub-national surveys)
- Interagency coordinating committee (ICC), where appropriate
- Organization or institution actually contracting implementing partner(s)
- Implementing partner

STEPS
1. Make budget as realistic as possible.
2. If doing a request for proposals (RFP), ensure that the terms of reference and payment scheme are clear.
3. Learn from the administration team about the requirements to issue (usually large) contracts. This is will proactively put the measures in place to ensure that all requirements are met and payment is timely.
4. Revise the survey chronogram, timetable, or Gantt chart to reflect each of the steps needed to ensure that the funds are available and can be transferred appropriately. Note: there are often many steps required to confirm funding is in place. Plan accordingly.

CAUTIONS, TIPS & ADVICE
- Not having funding in place is a common reason for survey delays, or worse, for surveys to stop in the middle of implementation.
- Allocate additional time for this step as there are typically delays.
- Delays in funding availability often result in lower morale among survey team members, having to do re-training activities, longer consultancy periods than anticipated and unnecessary frustration and stress.
- Delays in starting a survey often result in shortening the time allocated for data management and analysis, potentially compromising the quality of these steps.
- Talk with administration and financial officers as the survey planning starts to ensure that the steps required for issuing the RFP and contracts are clear.
- Incorporate steps required to confirm funding is in place in the survey timelines.
- It is always a good idea to think of potential contingencies and allocate funding for them in the detailed budget (see Step 4), as not to run out of money before the end of the survey.

ADDITIONAL RESOURCES
- Sample RFP
  - Confidentiality page
  - RFP Example
HOW-TO GET STARTED WITH STEP 7: Decide who will conduct the survey

PURPOSE
To provide guidance on choosing the agency to implement the survey.

PEOPLE & MATERIALS
- Survey steering committee
- List of potential data collection organizations
- Survey protocol
- Hiring policies, procedures and timelines from agency who will manage the contract(s)
- Request for proposal (RFP) template
- Budget
- *Reference Manual* Section 3.2

STEPS
The *Reference Manual* recommends that survey fieldwork be conducted by an organization independent from the national immunization programme. The following steps will help select and engage a qualified organization:

1. Draft detailed terms of reference and RFP.
2. Determine which organization will fit the needs of the survey. Options include:
   a. Government institutions (e.g. national statistical offices)
   b. Contractors
   c. Academic institutions
3. Determine payment structure (i.e. how and when)
4. Create a project plan that details roles and responsibilities for the following:
   a. Obtaining ethical clearance
   b. Gathering the necessary preliminary documentation, such as census data, maps, etc.
   c. Designing data collection tools and methods
   d. Choosing data analysis tools
   e. Obtaining a sampling frame and selecting a sample
   f. Obtaining vaccination registers (where applicable)
   g. Hiring and training staff
   h. Conducting fieldwork and ensuring quality data collection
   i. Designing a database
   j. Entering and cleaning data
   k. Analyzing data
   l. Writing a report and sharing results
   m. Archiving all the survey information resources (forms, databases, code used to generate results, etc.)
CAUTIONS, TIPS & ADVICE
- Make sure to clearly define the roles and relationships between the survey coordinator, steering committee and implementing agency.
- Put in writing which organization will own the data after the survey is finished.
- Discuss plans for publishing survey protocol, methods and results in peer-reviewed literature; consider establishing order-of-authors from the very start.
- Discuss external monitoring. Which organizations will be involved? Will they provide feedback directly to field supervisors and data collectors or will they provide it to the survey coordinator? Some contractors may be reluctant to receive oversight after they have signed the contract, so put your expectations in writing early.
- If household listing activity takes place, provide sufficient time for funding and logistics to be put in place. Additionally, allow for enough time and resources to validate sampling frame.

ADDITIONAL RESOURCES
- RFP examples
- TOR examples
  - Household Listing Exercise TORs
  - Example TORs
HOW-TO GET STARTED WITH STEP 8a: Finalize the survey protocol

PURPOSE
To develop a comprehensive protocol that serves as a roadmap for the entire survey.

PEOPLE & MATERIALS
- Survey coordinator
- Steering committee
- Technical committee
- Protocol template and checklist

STEPS
5. Refer to the survey proposal previously completed (How to Step 5: Develop survey proposal) and pull relevant information.
6. Use a protocol template or outline to start developing the survey protocol. Please see protocol template and checklist word document based on the Reference Manual and other survey protocol documents.
7. Adapt protocol to reflect additional requirements for the survey.
8. See Step 15a as well for complementary step

CAUTIONS, TIPS & ADVICE
- Guidance and resources for several components of the protocol are outlined in other How-to Steps of the survey process.
- It will be helpful to develop detailed standard operating procedure (SOP) documents for many of the sections listed within the protocol.
- It may be helpful to have important organizations sign a document saying that they approve the protocol, in case there is confusion or disagreement at a later date.

ADDITIONAL RESOURCES
- Protocol template and checklist
- Protocol Review Criteria
- MICS survey plan template English
- Survey Organization Manual for Demographic and Health Surveys
- Examples of specific SOPs: Taking photos
HOW-TO GET STARTED WITH STEP 8b: Finalize survey protocol—Survey equipment and supplies

PURPOSE
To guide on equipment and supplies needed to implement a vaccination coverage survey.

PEOPLE & MATERIALS
- Survey coordinator
- Technical committee
- Survey protocol
- Country information on suppliers and supply costs

STEPS
Supplies and equipment required in any survey depend on whether data are collected using paper questionnaires or tablet computers. Once a decision has been made on the mode of data collection, choice of equipment to be purchased will depend on affordability and availability of the equipment.

**General Equipment**

1. Stationery — pens, pencils, plastic bags to keep forms, folders, weather proof envelopes for forms, weather proof bags for form transportation
2. Printer and photocopier for reproduction of maps

**Computer Assisted Personal Interviewing (CAPI) Equipment**

1. CAPI equipment — server computer, mobile phones/tablets for data collection, backup storage, power banks, charging cords
2. Internet access — SIM cards, mobile data dongles

**Paper Assisted Personal Interviewing (PAPI) Equipment**

1. Numbering stamp or pre-printed water proof labels for questionnaires
2. Global Positioning System (GPS) devices
3. Cameras (if taking photos of immunization cards)
4. Computers and software for data entry

CAUTIONS, TIPS & ADVICE

- Ensure you have identical model of equipment for all the survey members for ease set up and support. Enumerators using their own devices for survey data collection is unacceptable.
- Many modern tablets or mobile phones/tablets have inbuilt camera and GPS. Ensure phones/tablets have sufficient capacity to record quality GPS estimates.
- Ensure adequate supplies and appropriate field distribution plans. Always have extra supplies.
- Before CAPI or computers are purchased, ensure a written agreement about which organizations will own the devices once survey is completed.
HOW-TO GET STARTED WITH STEP 9: Verify ethical clearance

PURPOSE
To identify and comply with ethical review and approval needed in this country prior to starting survey data collection.3

PEOPLE & MATERIALS
- Survey coordinator
- National research ethics committee or institutional review board (IRB)
- National policies on ethics for surveys involving human subjects
- Survey proposal and protocol

STEPS
1. Review and discuss national policies on ethics for survey involving human subjects
2. Identify all required paperwork that needs to be submitted
3. Request approximate timelines for IRB decisions
4. Survey coordinator meets with review board to review the study design and obtain clearance
5. Topics to include in the documentation:
   a. Verbal informed consent (scenario about barriers to written consent)
   b. Description of how data confidentiality will be preserved
   c. Description of how personally identifying information will be removed from datasets that are released for public access
   d. Description of who will have access to what types of records

CAUTIONS, TIPS & ADVICE
- Ethical clearance can be delayed for many reasons. It is best to start this process early.

ADDITIONAL RESOURCES
- Example of verbal consent scripts
- Multiple Indicator Cluster Survey (MICS) Tools
- Examples to be added: confidentiality, identifying markers, access to records

3 This document does not address the likely extra requirements associated with collection of biological samples (e.g. serosurveys).
HOW TO GET STARTED WITH STEP 10a: Design Data Collection Tools for Paper Assisted Personal Interviewing (PAPI)

PURPOSE
To design appropriate paper-based data collection tools to support quality data collection.

PEOPLE & MATERIALS
- Survey protocol
- National routine immunization schedule including any new vaccine introductions in the last 3 years
- If performing a post-campaign coverage survey, information about the campaign such as campaign goals, vaccine(s) used, target population(s), dates of implementation in different geographical areas, strategies used
- Copies of home-based records (HBRs) for public/private providers and border areas for the past 3 years
- Questionnaire templates from previous vaccination coverage survey
- Reference Manual Section 3.4 vaccination coverage manual
- Reference Manual Section 4.1 vaccination coverage manual
- Reference Manual Section 5.3.3. Skip patterns
- The following data collection tools are essential for survey data quality:
  - list of households
  - household member listing form
  - individual questionnaires (routine immunization, tetanus toxoid vaccination or supplementary immunization activity survey)
  - health facility register and cluster forms
  - survey checklists

STEPS
Data collection can be done using paper assisted personal interviewing (PAPI) or computer assisted personal interviewing (CAPI). The first part of Step 10 is on designing tools for paper data collection. See Step 15a and Step 15b on database design and data management.

3. Design, pretest and translate the questionnaires.
   a. Ensure that the questionnaires are appropriate to the survey type i.e. routine immunization survey, tetanus protection-at-birth survey, or post-vaccination campaign survey.
   b. Preferably, customize questionnaire templates from previous surveys rather than designing fresh set of questions.
   c. During customization or questionnaire design, ensure that the questionnaires are aligned with the updated immunization schedule for your country and also meets the survey objectives.
   d. Check that vaccination cards allow for easy transcription of data from cards. Ensure the order of vaccines listed in both the questionnaire and card match.
e. If pictures of vaccination cards are to be taken, ensure the paper form includes prompt for taking the picture. See SOPs for taking pictures.
f. Check skip patterns to ensure that respondents are only asked questions that are applicable to them. This helps reduce interviewing time.
g. Develop a system for uniquely identifying individuals interviewed that should appear in every form such as stratum ID, cluster ID, household ID and respondent ID (See Step 15c).
h. Translate and back translate the questionnaire to languages spoken locally in the survey area.
i. The technical committee should plan to review and adopt finalized questionnaire.
j. Pretest questionnaire before conducting data collection.
k. Finalize the questionnaires after incorporating feedback from the pretest. Retest, finalize, and print.

4. Design health facility register forms for collecting data on routine immunization or tetanus toxoid administration at the health facility to collect data from health registers.
   a. Ensure that information collected at the health facility registers can be linked to individual questionnaires filled in the household.

5. Plan for collection of photographic evidence of vaccination cards
   a. Secure cameras, or phones with cameras for photography
   b. Train the enumerators on photographic techniques
   c. Label photos with unique identifiers to ensure that they can be linked to individual questionnaires.
   d. Prepare for transmission and storage of photographs collected in the field.
   e. Have provisions for privacy and security of the images.

CAUTIONS, TIPS & ADVICE
- Use questionnaire templates as opposed to designing fresh questionnaires
- Ensure that all survey objectives are fully addressed in the questionnaire
- After pre-testing and finalizing the questionnaires field test once more before survey implementation.
- Take provisions to prevent data loss: protect forms against weather conditions (e.g., water resistant bags to store forms and archiving in dry places), all pages include the unique ID, SOPs for management and storage of forms.

ADDITIONAL RESOURCES
- DHS programme questionnaires and templates
- UNICEF MICS: Questionnaires and indicator list
HOW TO GET STARTED WITH STEP 10b: Design Data Collection Tools for Computer Assisted Personal Interviewing (CAPI)

PURPOSE
To select and design electronic data collection application and tool.

PEOPLE & MATERIALS
- Survey coordinator
- Computer Assisted Personal Interviewing (CAPI) form developers and support staff
- Survey protocol
- If performing a post-campaign coverage survey, information about the campaign (campaign goals, vaccine(s) used, target population(s), dates of implementation in different geographical areas, strategies used)
- National routine immunization schedule including any new vaccine introductions in the last 3 years
- Copies of home-based records (HBRs) for public/private providers and border areas for the past 3 years
- Finalized paper questionnaires
- Requisite skills to develop data entry application
- Resources to secure adequate equipment (tablets or phones) to collect data
- Additional Training on CAPI
- Instructions for interviewers
- Reference Manual Section 3.4.3
- Reference Manual Section 4.1 vaccination coverage manual
- Reference Manual Section 5.3.3. Skip patterns
- Reference Manual Annex I: Using information and communication technology (ICT) for digital data capture

STEPS
The second part of Step 10 is on designing tools for Computer Assisted Personal Interviewing (CAPI) on tablet computers or mobile phones. Questions are read from the electronic device and answers keyed into the device – eliminating the need for printing paper questionnaires and data entry. See Step 15a and Step 15b on database design and data management.

6. Decide on the application to use for data collection
   a. Does the application have features that will safeguard data integrity and quality?
   b. What hardware does the data collection application run on? How much will the hardware cost? How durable or rugged is the hardware? Can the hardware be reused for future surveys? Is the proposed hardware available in the country of survey in sufficient quantities?
   c. Do you have personnel who have necessary skills to design and support the application before, during and after the survey?
   d. How long does it take to develop or troubleshoot the application?
e. Does application support multiple languages?

f. Ease of use by the survey team

g. Will the use of a stylus be required?

h. How much does the application cost?

7. Finalize development of questionnaires
   a. Ensure that paper questionnaire has been developed or is at an advanced stage of development.
   b. Based on questions from the paper questionnaire develop a data dictionary to link questions to variables.

8. Develop the CAPI application of choice – CSPro, ODK, survey solution, others
   a. Program necessary range checks and skip patterns
   b. If possible, program the device to automatically collection GPS location
   c. Pay attention to language and selection options
   d. Develop a manager’s module for tracking survey implementation and quality

9. Implement measures to ensure data security in tablets
   a. Each tablet should have a unique login and password
   b. Data are stored in password encrypted folders
   c. There is a secure transmission channel from the tablet to central repository

10. Check for consistency between paper questionnaire and application.
11. Pre-test the CAPI making sure the skip patterns and range checks are consistent with the questionnaire
12. Test data transmission and review the quality of data collected.
13. Rectify any data issues due to programming errors
14. Install application into all the tablets / phones and test that the applications are working.
15. Before data collection:
   a. Ensure that all enumerators and the supervisors have been adequately trained on the use of devices and the data collection application (See *Reference Manual* Chapter 5)
   b. Have contingency plan for power supply to charge the tablets or phones while in the field e.g. swappable batteries, mobile chargers etc.
   c. Prepare user guide and troubleshooting manual

**CAUTIONS, TIPS & ADVICE**

- Ensure sufficient budget to cover all CAPI needs.
- Reflect on the length of your questionnaire and determine the best tools and application for your setting. Consider pros and cons of application types.
- Availability to troubleshoot.
- Have a finalized questionnaire or an advance draft of questionnaire before commencing design of data collection application.
- Allow sufficient time to pretest and correct errors and bugs in the data collection application before going to the field.
- Go through checklist for deciding data collection application and data collection equipment.
- Data security, integrity and security should not be compromised.
- Develop the data entry interface with appropriate logical skips, and test it over and over again.
- Do not put too many logic restrictions, as the original data may have the flaw (e.g., The card itself may have a vaccination with a date prior to the date of birth) and if the tool does not allow continuing with data entry, interviewers may have to invent data to move on. It is better to use flags and notes to double check the value than to not allow entering it.
- Hire interviewers with experience in using tablets or smartphones for data collection.
- Ensure proper training and test accuracy of data entry before starting data collection.
- Assure proper supervision and monitoring.
- Systematically, and in as real time as possible, do data controls or checks to quickly identify unexpected patterns or anomalies with the data. For example, a team taking an unusually short time in the interviews, a team with usually short time between interviews, a team that frequently skips over large and time intensive sections of the survey (e.g. vaccine card data extraction), etc.
- Ensure that data transmission is feasible, and there are other options when bandwidth is limited.
- Consider insuring the devices, or some other mechanism to deal with breakages or theft.
- Save the data at a set frequency using memory sticks, or something else, as to avoid losing data in case of malfunctions.
- Have a person(s) designated for troubleshooting and support that are readily available for the entire duration of the survey.
- Avoid devices that are too small that may lead to errors due to a finger pressing the wrong option.
- Be careful when programming parameters and restricting data entry. Try and use flags to ensure data can be entered as correctly and efficiently as possible.
- All data collectors should have uniform equipment.
- Equipment requirements: GPS coordinates, space, screen size, backup plan (extra devices or when to use paper-based form as backup)
  - Have extra devices.
  - Have extra batteries or some other way to charge the devices to avoid running out of power in the middle of field work.

**ADDITIONAL RESOURCES**

**QUESTIONNAIRE TEMPLATES**

- [DHS programme questionnaires and templates](#)
- [UNICEF MICS: Questionnaires and indicator list](#)
- Vaccination Coverage Quality Indicators, Users Guide.
- Vaccination coverage surveys – forms and variable list (FVL), Draft version 1.2
- [Data inspection and cleaning facilitating tool](#) presentation
- Computer-facilitated near-time data quality inspection for vaccine coverage surveys: lessons from Pakistan

Abstract

About CSPro

The Census and Survey Processing System (CSPro) is a free and open source software developed and supported by the United States Census Bureau. CSPro is a robust software which has been used in data collection in over 160 household surveys and population census by leading statistical agencies and non-governmental organizations. CSPro can handle census – sized applications and supports data export to major statistical software formats. Guidance to CSPro can be found in the links below.

https://www.census.gov/population/international/files/cspro/cspro70.pdf
http://www.csprousers.org/help/CSPro/create_a_new_data_entry_application.html
https://www.census.gov/population/international/files/cspro/csent41.pdf

About ODK

Open Data Kit (ODK) is an open source software that is used for data collection using Android mobile phones or tablets. More information on ODK can be found in the links below.

https://opendatakit.org/use/2_0_tools/older-versions/june-2016-rev-204/application-designer-rev-204/

About Survey solution

Survey Solution is a free computer-assisted personal interviewing software developed by the Development Research Group of the World Bank in collaboration with the Food and Agriculture Organization (FAO).

HOW-TO GET STARTED WITH STEP 11. Hire staff and coordinate logistics

PURPOSE

To describe main steps for recruiting and training field survey staff and coordinating survey logistics.

PEOPLE & MATERIALS

- Survey coordinator
- Training facilitators
- Fieldwork supervisors and enumerators
- Enumerators
- Survey protocol
- Terms of reference
- Clear documentation and agreed upon working conditions
- Reference Manual Section 3.8

STEPS

1. INTRODUCTION

The quality of the data collected in the field depends to a large extent on the skills of the field workers. The training is a way of imparting necessary knowledge and skills. It also provides an opportunity to further select desired survey personnel.

2. RECRUITMENT

The following factors should be considered during recruitment:

- Level of education (minimum high school diploma).
- Physical stamina to walk long distances.
- Knowledge of local languages. Recruitment should therefore be conducted on a regional basis as individuals from a region are more likely to understand the language, culture and terrain of a region.
- Social and cultural context to the sex of the investigators.
- Previous survey experience (this will influence content that is covered as a ‘refresher’ or ‘new material’).
- Recruit and train more persons than are required for the survey.
- Consider administering a standardized test at the end of the training.

3. DECIDING NUMBER OF PERSONNEL TO HIRE

The survey plan should have estimated the number of personnel to be hired for the fieldwork. However, if this has not been done, this is a good opportunity to calculate the number of enumerators and supervisors to be hired for the survey. Remember to train more than will be required for the survey. The Multiple Indicator Cluster Survey, Listing and Fieldwork Duration, Staff and Supply Estimates Template (26 May 2017) English can be used to help with estimates.

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4 Data manager, statistician, and other coordinating roles are described elsewhere (Step 2 and 15)
CAUTIONS, TIPS & ADVICE
- Set recruitment criteria so as to get appropriate survey staff. Prior survey experience is not mandatory for selection as survey staff. Experienced enumerators may not pay attention to the training thereby not following protocol, they may however have roles as supervisors.
- Plan your training by preparing standardized training material and including role play and practice session in the training.
- Preferably conduct training in one site using the same set of trainers.
- Training should be conducted for a minimum of 5 days

ADDITIONAL RESOURCES
- Terms of Reference Examples:
  o Enumerators/Interviewers
  o Supervisors
- Demographic and Health Survey Preparing for data collection
HOW-TO GET STARTED WITH STEP 12a: Select Survey Sample - Overview to Vaccination Coverage Sample Selection

PURPOSE
To guide the household selection process.

PEOPLE & MATERIALS
- Survey steering committee
- Survey technical committee
- Survey coordinator
- Sampling statistician
- National statistics office or equivalent
- Survey protocol
- Reference Manual Section 2
- Reference Manual Annexes B1, B2, and B3

STEPS
Two key recommendations of the Reference Manual are on the customization of sample size based on the survey design and on the use of probability based sampling techniques for the selection of primary and secondary sampling units resulting in an appropriate sample design that meets survey objectives. This first section on steps to sampling are on the considerations for appropriate sample for your vaccination survey; the other sections are on how to select households, sample size considerations to make when faced with budget constraints and on implicit stratification. Below are steps for sample selection:

16. Identify primary questions for the coverage survey and translate these questions to inferential goals. (Reference Manual Section 2.5)
17. Decide on the primary goal of the coverage survey guided by the sampling statistician and the technical committee. The main goals of a vaccination coverage survey can be to detect differences in coverage between administrative areas, detect changes over time in the same administrative area, or estimating coverage levels. (See Step 3a and Reference Manual Section 2.3)
18. Decide on the number of reporting strata (whether the survey will report precise coverage at the national level or at lower administrative units) (See Step 3b and Reference Manual Sections 2.6 and 2.7)
19. Decide on the desired confidence level (precision).
20. Obtain information on other parameters required for sample size estimation including the anticipated vaccination coverage, inter cluster correlation (design effect - DEFF) and target number of respondents per cluster. DEFF can be sourced from previous vaccination coverage surveys, however these may not be available resulting to use of conservative estimates. (Reference Manual Annex B1)
21. Compute appropriate sample size (Reference Manual – Annex B2 and B3) and determine the number of primary and secondary sampling units per strata.
22. Select primary and secondary sampling units.

CAUTIONS, TIPS & ADVICE
- Make sure you have competent personnel to guide on the sampling process.
- When selecting the sample for a coverage survey one should balance the desired sample size and the cost and time of survey implementation.
- Excessively large sample size as a result of increased number of reporting strata can compromise survey quality as a result of the inability to recruit, train and supervise large survey team.
- Work with the national statistics office to obtain a recent household listing with enumeration area maps.
- Proper documentation of the household selection process is important for weights calculation later on during analysis.

ADDITIONAL RESOURCES
- Sample size calculator template
HOW-TO GET STARTED WITH STEP 12b: Select Survey Sample - Household selection

PURPOSE
To guide the household selection process.

PEOPLE & MATERIALS
- Survey coordinator
- Sampling statistician
- National statistics office or equivalent
- Survey protocol
- Sampling frame of enumeration areas
- Recently conducted household listing in the selected enumeration areas
- Reference Manual Section 2. Design the sample structure of the survey
- Reference Manual Annexes B1, B2, and B3
- Reference Manual Annex E How to map and segment a primary sampling unit
- Reference Manual Annex F How to enumerate and select households in a two-stage cluster sample

STEPS
23. Compute sample size - refer to How-To See Step 12a on deciding on sample and for computing sample size
   o Estimate the number of clusters needed in your strata
   o Estimate the number of households needed per enumeration area to achieve required sample size
24. Select the primary sampling units (PSUs) – enumeration areas (Reference Manual Sections 3.6 and Annex D).
25. Obtain a recent line list and maps of households of selected enumeration areas. Ideally, the household list should not be more than 6 months old.
26. If no recent line list or maps exit, conduct a household listing activity in all selected enumeration areas. (Reference Manual Annex E)
27. In each enumeration area, use simple or systematic sampling technique to identify households to be interviewed. (Reference Manual Annex F)

CAUTIONS, TIPS & ADVICE
- Make sure you have competent personnel to guide on the sampling process.
- Work with the national statistics office to obtain a recent household listing with EA maps.
- Proper documentation of the household selection process is important for weights calculation later on during analysis.

ADDITIONAL RESOURCES
- Sample size calculator template
HOW-TO GET STARTED WITH STEP 13a. Train Survey Staff – Preparation

PURPOSE
To prepare for the training of field survey staff.

PEOPLE & MATERIALS
- Survey coordinator
- Training facilitators
- Field staff: supervisors, enumerators (also known as data collectors or interviewers)
- Computer Assisted Personal Interviewing (CAPI) form developers and support staff
- Survey protocol
- Reference Manual Annex G. Tips for high-quality training of survey staff
- Training materials: presentations, manuals, list of definitions, terms of reference/roles and responsibilities, questionnaires, instructions for interviewers, case studies and scenarios to practice identifying households and data collection, CAPI exercises and tailored training, etc.

STEPS
1. Recruit fieldwork staff. See How-to Step 7 and Step 11 for additional information on selecting and hiring staff.
2. Determine training needs and tailor training materials to address those needs. For example, a professional research institution that is well trained and experienced in reading and using maps may only need a refresher training for the purposes of the survey, while an academic institution where students have limited training may require more class time to ensure they understand how to use the maps once they are out in the field.
3. Determine timing and length of training required.
   a. A minimum of five days is required for basic training including at least one day training in the community.
   b. Classroom size should be between 20-50 people.
4. Invite and coordinate training sessions with selected facilitators.
5. Develop methodology and content for the training. Some topics to address during the training include:
   Training for Enumerators
   a. General topics: Objectives of the survey; Use of survey results; Structure of the survey (roles and responsibilities); Consent; Data security and confidentiality; Supervisory structure.
   b. Topics for enumerators: Household identification; Identification of the boundaries of clusters (reading maps); Identification of households; Use of unique identifiers.

5 This page does not include training of data management team
6 Where CAPI is incorporated in data collection activities
c. **Conducting a survey in households:** Presentation and interacting with household members; Communicating the purpose of the investigation; Time of interview; Obtaining consent from participate; Returning to the households.

d. **Screening for eligibility:** Establishment of the list of the eligible in the household; Using calendar of events in absence of documents specifying the dates of birth.

e. **Interview and filling out forms:** Administering questionnaires; Filling out the forms; Using CAPI, entering data, editing entries, sending completed data.

f. **Collecting information on evidence of vaccination:** Routine immunization schedule; Eliciting immunization history from children’s caregivers; Sources of vaccination information; Reasons why some children have not been vaccinated; Collecting photographs of vaccination cards.

g. **Data quality:** Summary form of clusters; Quality control and correction; Daily meeting

**Additional Training for Supervisors**

In addition to training on methods and tools for the survey, supervisors need training in technical supervision and verification of the quality of the data in the field. This includes the following topics:

- Safety and wellbeing of the team
- Assignment of interviews, sharing workload, sharing survey tasks among enumerators
- Checking for eligible households
- Identifying health facility to check health registers for vaccination records
- Completeness of the household census and survey of eligible households
- Household revisit procedure
- Survey quality control including spot check, interview monitoring, and reporting
- Field check tables
- Filling out synthesis forms to track progress
- Microplanning of supervision
- Resolution of common problems
- Relationship with the coordination team
- Checking completion and data quality on PAPI and/or CAPI devices
- Transmission of data from field to central office
- Care and troubleshooting of CAPI devices

6. Organize the trainings based on size and location of the survey. Below are a few options to consider:

a. **Using one team of facilitators:** In this option, training is delivered by the same team of facilitators to ensure quality and consistency. This option is preferred especially if all staff is recruited and trained at the national level. When training a large number of enumerators,
several training sessions can be arranged in different parts of the country to accommodate a more manageable number of enumerators.

b. **Using several teams of facilitators:** Due to the size of the survey and the time requirements for one team of facilitators to conduct trainings for all enumerators, the steering committee may choose to have several teams of facilitators to deliver training in different parts of the country. This assumes a training of trainers with the risk of having courses that do not have the same level of quality. This option should be **avoided** wherever possible. Ultimately, if this is the best option, conduct a centralized training of trainers and designing standardized and scripted training material to be used by each training team.

c. **Training supervisors:** The preferred option is to train supervisors before enumerators and then use them as coaches during the training of enumerators. A common practice is to train supervisors and enumerators in a joint session by adding some specific modules for supervisors, but this option has the disadvantage of not putting enough emphasis on the own activities of supervisors.

7. Confirm funding is in place for training facilities and field survey staff.

**CAUTIONS, TIPS & ADVICE**
- Design the trainings to reflect the participant’s prior experiences and knowledge, while making sure they understand the specific standard operating procedures for the survey.
- Training should ideally be conducted in the local language that investigators will use. This may however not be possible in many setting, here ensure that key concepts are translated to the local language and back-translated to the language of instruction. Encourage the use of interviewing language in the role play sessions.
- The manual of standard operating procedures should be studied during the training. Participants must refer to them during the exercises, practical sessions and role-play.
- Less time should be spent on didactic training and more on role-play and practice sessions.

**ADDITIONAL RESOURCES**
- [Interviewer Recruitment, Selection, and Training](https://www.umich.edu/) University of Michigan Cross-Cultural Survey Guidelines
- [Preparing for Data Collection](https://www.mics.org/) Multiple Indicator Cluster Survey (MICS)
- [Training Field Staff](https://dhsprogram.com/) Demographic and Health Surveys (DHS)
- [Example training agenda](https://www.dhsprogram.com/) from *Reference Manuel Annex G-1*
- Terms of Reference
  - Enumerators
  - Supervisors
HOW-TO GET STARTED WITH STEP 13b. Train Survey Staff

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**PURPOSE**

To prepare for the training of field survey staff.

**PEOPLE & MATERIALS**

- Survey coordinator
- Training facilitators
- Field staff: supervisors, enumerators (also known as data collectors or interviewers)
- Computer Assisted Personal Interviewing (CAPI) form developers and support staff
- Survey protocol
- Training materials: presentations, manuals, list of definitions, terms of reference/roles and responsibilities, questionnaires, instructions for interviewers, case studies and scenarios to practice identifying households and data collection, CAPI exercises and tailored training, etc.

**STEPS**

1. Meet with facilitators prior to the training to review the agenda and materials.
2. Ensure all materials for the week are prepared and printed prior to the participants’ arrival.
3. Prepare various classroom activities and materials to reinforce learning. These could include:
   a. **Presentations**: keep presentations to a minimum and integrate questions within the presentations to check for understanding of important material.
   b. **Handouts**: this could include list of definitions, best practices, common questions, contact information, data collection teams, field trajectories, etc.
   c. **Filling out the questionnaire exercises**: the purpose of this activity is to familiarize participants with the forms and with entering data. This is an opportunity for them to ask questions about appropriate procedures. Here it is best to have standardized answers within their training manual to reference. Ensure that there are options for “Refused to answer, or do not know.” Interviewers should not impute data on the fly.
   d. **Establish, train and assess the data collection team** on the following interviewing practices and procedures:
      i. Assessing child eligibility
      ii. Assessing age of birth
      iii. Obtaining consent
      iv. Checking for vaccine card availability and data extraction
      v. If vaccine date(s) missing from the card, asking about vaccination history by recall
      vi. Asking for the name of the location where each vaccination was received to facilitate health facility register review
      vii. Referring child for missing doses of vaccine to the nearest health facility

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7 This page does not include training of data management team
8 Where CAPI is incorporated in data collection activities
e. **Case studies**: facilitators should develop several scenarios for participants to work through in small groups. Developing as many types of possible situations will help prepare the enumerators. Case studies are an opportunity for participants to practice entering data, troubleshoot common challenges in the field, and for supervisors and facilitators to assess enumerator understanding prior to going to the field. After completion, participants should receive an answer key to keep responses and practices standardized.

f. **Role-Playing**: role-playing is another opportunity for enumerators to practice collecting data and for supervisors to assess the performance of their teams prior to working in the field. Some common role-playing topics include household eligibility, vaccination card availability, and taking verbal vaccination history. Additionally, this is an opportunity to demonstrate good versus poor data collection practices.

4. Conduct field practice activity to allow enumerators to collect and record the information from households in real situation.
   a. Preparation  
      - Transportation and logistics  
      - Community should not be in a cluster for the investigation  
      - Locality does not have special mass events (e.g. weekly market)  
      - Community near training facility (less than 15 minutes)  
      - Inform the community of the exercise  
      - Households have been selected  
      - Arrival in the locality should be based on the agreed appointment times  
   b. Visits to households  
      - Greet participants at selected households  
      - Investigators should work individually  
      - Supervisors avoid making comments in households and instead write feedback to give enumerators at a later time  
   c. Returning from the field  
      - Write a quick summary after the return  
      - Discuss and address any challenges  

5. Conduct a final selection test at the end of the training. This is one of the requirements of the new guidelines. It must be clearly announced at the beginning of the training and be as transparent as possible. It may take the form of a written and oral test. It is desirable to take into account the behavior and performance of the participants throughout the training (exercises, role-play, field practical).

6. At the end of the training, each supervisor should develop a micro-plan that indicates expected progression. This must be discussed and validated by the coordination team. The micro-plan is the responsibility of the supervisor and requires a good knowledge of the field.

**CAUTIONS, TIPS & ADVICE**

- Some considerations for developing micro-plans by supervisory team:
  o Account for both travel and field work time.
  o Travel and fieldwork are not the same for all clusters. On average supervisors and the coordinating team should expect a cluster to take 1 to 2 days to complete. Factors such as availability of the households and location of households will influence the time required to complete work within a cluster.
- Think through the logistics required to complete each cluster including transportation, data collection instruments, maps, accommodations, food, etc.

- Design the trainings to reflect the participant’s prior experiences and knowledge, while making sure they understand the specific standard operating procedures for the survey.

- Training should ideally be conducted in the local language that investigators will use. This may however not be possible in many setting, here ensure that key concepts are translated to the local language and back-translated to the language of instruction. Encourage the use of interviewing language in the role play sessions.

- The manual of standard operating procedures should be studied during the training. participants must refer to them during the exercises, practical sessions and role-play.

- Less time should be spent on didactic training and more on role-play and practice sessions.

- Ensure that copies of the questionnaires or CAPI devices are available for use during the training period. Provide exercises for completion of the questionnaires and review the entries made. This is an opportunity for familiarizing with the questionnaire.

- Prepare role-play exercises beforehand and use these to complete the questionnaires. The exercises should also include transcription of data from immunization cards. Allow for some time for the participants to conduct field practice in an enumeration area near the training venue. Data collected during this session allows for testing the data entry process or data transmission using CAPI devices giving an opportunity for final adjustments before commencing data collection.

ADDITIONAL RESOURCES

- [Interviewer Recruitment, Selection, and Training](#) University of Michigan Cross-Cultural Survey Guidelines
- [Preparing for Data Collection](#) Multiple Indicator Cluster Survey (MICS)
- [Training Field Staff](#) Demographic and Health Surveys (DHS)
- [Example training agenda](#) from Reference Manuel Annex G-1
HOW-TO GET STARTED WITH STEP 14. Conduct Field Work

PURPOSE
To ensure cohort of dedicated interviewers are prepared for survey data collection.

PEOPLE & MATERIALS
- Survey Coordinator
- Monitors
- Supervisors
- Enumerators (also referred to as data collectors or interviewers)
- Standard operating procedures (SOP) for the field
- Reference Manual Sections 4.1-4.5

STEPS

Identifying households
1. Arrange logistics to ensure enumerators can start early enough to find caretakers at home.
2. Factor in safety, accessibility, and cultural norms for clusters and plan accordingly.
3. Provide standard operating procedures (SOPs) to enable data collectors and supervisors to successfully conduct the following:
   a. Household revisits
   b. Documenting and reporting households visited and eligible children in each cluster
   c. Supervisory structure to ensure quality data collection

Conducting the interview
1. Establish, train and assess the data collection team on the following interviewing practices and procedures:
   a. Assessing child eligibility
   b. Assessing age of birth
   c. Obtaining consent
   d. Checking for vaccine card availability and data extraction
   e. If vaccine date(s) missing from the card, asking about vaccination history by recall
   f. Asking for the name of the location where each vaccination was received to facilitate health facility register review
   g. Referring child for missing doses of vaccine to the nearest health facility
2. Establish supervisory structure to ensure data collectors understand and adhere to the questionnaires.

Checking the completed questionnaire
1. Once interview is completed, data collectors should review the completed questionnaire to ensure all fields were completed accurately.
2. After interviewer has checked then the supervisor should check the completed questionnaire.
3. Some checks to include, were the questions answered clearly and legibly? Were the card dates entered correctly and legibly? Were the correct IDs entered?

CAUTIONS, TIPS & ADVICE
Considerations for data collection:

- Plan for data collection teams to spend more than 1 day per cluster to complete data collection activities.
- Plan home visits during times people are at home; this often requires early, late, or weekend visits to households.
  - Priority to find/wait/extract data from card
- Using vaccine card data is a priority. If the card was misplaced or if the caregiver needs time to locate the card encourage data collection team to wait for the caregiver to find it.
- Dates from the vaccination card should match dates from the cards, regardless if invalid dates.
- To maintain high quality data collection be on the lookout for red flags. Some examples include, time to complete interview, time between interviews, GPS coordinates that are unusually close together, missing data, operation errors, etc.

ADDITIONAL RESOURCES
- Multiple Indicator Cluster Survey (MICS) Tools.
  - MICS Plan English Chapter 7 for fieldwork.
  - See Listing and Fieldwork Duration, Staff and Supply Estimates Template English to estimate time requirements based on available staff and resources.
HOW-TO GET STARTED WITH STEP 15a: Manage the Data – Introduction

PURPOSE
Highlight the importance and breadth of data management and the role of data manager.

PEOPLE & MATERIALS
- Data manager
- Survey coordinator
- Field supervisors
- Data entry staff
- Statistician
- When we think of survey data, we often think first of the responses to survey questions, but there can be many kinds of supporting data to manage in a coverage survey; these might include:
  - Rows-and-columns databases
    - Stratum list & info
    - Cluster list & info
    - Household (HH) listing
    - HH RI survey form data
    - Independent monitoring data
    - HC RI survey form data
    - Forms from piggy-backed surveys
  - Digital document archive & index
    - Photos of vaccination cards
    - Photos of health center records
    - Photos to help identify selected HH
    - PDFs of completed survey forms
  - Other information resources
    - Vaccination schedule
    - Sampling & census info
    - Maps
      - Driving maps
      - Census maps
      - Google Earth maps
      - Sketch maps
      - Digital map coordinates
    - Database of health centers that serve the clusters in the survey
      - Location & contact info
      - Record of liaising communication
    - Survey progress forms
- One or more computers that are equipped with software that is appropriate for data management and with which the data manager is experienced
- For data collection with paper forms:
  - One or more rooms with plenty of table and shelf space and filing cabinets in which to manage and organize thousands of forms
  - A high-quality copy machine that can scan all the paper forms and convert to PDF for archival purposes or for sharing with data entry subcontractors

STEPS
Give the data manager appropriate resources to plan early and well.

Once the data collection technology is identified there are a great many pieces that may be planned about what sorts of data will be generated or collected, by whom the data will be collected and who will later need to access and use that data.
The data manager may not be part of the formal survey steering committee, but it will be helpful to keep them apprised of any important changes in plan or schedule or resources and to ask them how those changes might affect their ability to meet their commitments.

STEPS

1. Link the data manager with the team that is developing survey questionnaires to understand survey structure and the skip patterns
2. Devise a system for identifying each questionnaire (interview) uniquely: such as stratum ID, cluster ID, household ID and respondent ID
3. Ensure range checks and allowable data format are inbuilt within the data collection device. Data collection protocol should also use required fields to ensure that there are no empty fields
4. Once data are collected, edit for missing and inconsistent responses before transmission
5. Ensure that data collected on paper or electronically are transmitted securely and in a timely manner
6. Clean data
7. Merge datasets and create analysis ready datasets
8. Analyze the data
9. Archive data and metadata and make them available for secondary analysis

CAUTIONS, TIPS & ADVICE

- Because it is important that the data manager be skilled in using various tools, it may be appropriate for them to help select the tools and processes that will be used to: collect the data, check it, store it, query it, back it up and make it accessible
- The data manager should assist with survey development for skip patterns and response types. Refer to Step 8a, Step 10a, Step 10b and Step 13b.
- In addition to strong technical skills, the data manager should have excellent people skills; when the project experiences substantial delays or mishaps, the data manager will likely be a central figure in some high-stress conversations about how to recover as much time (or data) as possible; there may be periods in the project where it seems that the very success of the survey depends on the data manager doing a good job, so you will benefit from having a calm, healthy, experienced, articulate team player in this role

ADDITIONAL RESOURCES

- Terms of Reference Examples
  - Data Entry Clerk
  - Data Management Coordinator
HOW-TO GET STARTED WITH STEP 15b: Manage the Data – Enter the data

PURPOSE
Accurately record respondents’ answers to survey questions

PEOPLE & MATERIALS
- Data manager
- Field supervisors
- Data entry operators
- Reference Manual Sections 5.1 & 5.2
- VCQI Forms and Variable List Document
- If collecting data via Paper Assisted Personal Interviewing (PAPI)
  o Pre-printed paper forms
  o Pre-printed labels with Stratum & Cluster IDs
  o Computer program for keyboard double-entry with data checking
  o Process for verifying & clarifying IDs on paper forms as they are unpacked
  o Process for storing paper forms in a safe & organized fashion
- If collecting data via Computer Assisted Personal Interviewing (CAPI)
  o Pre-printed forms with Stratum & Cluster ID QR codes

STEPS
1. Data manager to design the databases to hold data with input from field supervisors.
2. If using CAPI:
   a. Program and test the electronic implementation of the questionnaire; test skip patterns; test for invalid values; test that records are uploaded to the server promptly and without duplicates.
   b. Write & test programs to check values when records arrive on the server and a process to communicate questions/concerns to field and a process for field workers to correct errant entries
3. If using PAPI, write and test the data entry screens and the program to identify discordant entries

CAUTIONS, TIPS & ADVICE
- If using CAPI and if your survey analysis plan includes indicators that rely on knowing vaccination dates precisely (e.g., valid coverage, timeliness indicators, missed opportunity indicators) then your survey protocol should require data collectors to take photographs of home-based vaccination records; train data collectors to take excellent photos and budget funds to pay to review every photo and correct data entry errors for vaccination dates.

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9 This STEP is not necessary if data are entered during the respondent interviews using Computer Assisted Personal Interviewing (CAPI).
- If using PAPI
  o Consider hiring a commercial vendor to do double-data entry; many services guarantee an error rate below 1 error in every 100 data elements.
  o If your organization is doing the double-data entry, be sure to save backup copies of single-entry datasets and then fix discordant entries in a new copy of the database.
  o Contractors often say they will do single data entry and “check a subset of entries for errors”. This may sound almost as good as doing double data entry, but in practice it is sometimes not done at all or not clear that they did any checking. You should probably either require double data entry of all forms with a guaranteed low error rate in their contract (which you can verify by cross-checking with paper forms) or require a very detailed explanation of how they will select which subset of records to check and how many errors in those checks will trigger automatic double-checking of ALL entries. (i.e., if they check 10% of the entries and find more than 1 error in every 100 data elements, require them to check ALL entries because the error rate for their single-entry data is unacceptably high). Require that they check a certain number of records from each and every data collector. Also require them to describe their plan to correct the errors that they find. If the contractor is responsible for data entry, make them responsible for doing a high-quality job, and tie their pay to their performance, where possible.

ADDITIONAL RESOURCES
- Example Terms of Reference for Data Entry Clerk
- Instructions for double data entry with concordance checking using Excel: https://faculty.unlv.edu/barchard/doubleentry/
- Dr. Wenfeng Gong (wenfeng.gong@gatesfoundation.org) has developed customized Stata programs for near-real time identification of values that need to be reviewed and some infrastructure for updating the values if they are indeed wrong. < links here to available assets to be added>
- Data Inspection & Cleaning Facilitating Tool presentation
- Stata includes a command to compare two datasets. The name is ‘cf’ and it stands for ‘compare files’. (Type ‘help cf’ at the Stata command prompt to learn more.) Furthermore, Stata users have written programs with additional comparison capabilities. Those programs are named ‘cf2’ and ‘cf3’. (Type ‘findit cf2’ or ‘findit cf3’ at the Stata command prompt to learn more.)
- Biostat Global Consulting has written a new Stata command named ‘assertlist’ which could be used to identify discordant entries in doubly-entered data. Assertlist also provides appropriate Stata syntax for replacing errant values with corrected values. (Type ‘findit assertlist’ at the Stata command prompt, or check the Biostat Global website (www.biostatglobal.com) or e-mail Dale Rhoda (dale.rhoda@biostatglobal.com) to learn more.)
HOW-TO GET STARTED WITH STEP 15c: Manage the Data – Clean the data

PURPOSE
To identify dataset values that are clearly or likely wrong, and address them consistently.

PEOPLE & MATERIALS
- Data manager
- Statistician
- Field supervisors are sometimes involved
- Digital dataset(s)
- List of expectations for the values of each variable
- Computer program to list records with incorrect values or discordant values

STEPS
1. Cross-reference with survey records and check that you have data from all expected strata and clusters and that the number of records corresponds roughly to your expectations, based on the sampling plan. Investigate and explain deviations from your expectations.
2. Identify and delete duplicate records
3. If data were collected using paper assisted personal interviewing (PAPI)
   a. First, clean the variables that serve as unique record identifiers, such as stratum ID, cluster ID, household ID and respondent ID. These variables, or some like them, should uniquely identify the rows in the dataset.
   b. Write down your expectations for each variable in the dataset regarding sensical dates, plausibility and similar data entry concerns. Check the data against the expectation and make a list of observations that do not meet the expectation. Ask the data manager to check the paper forms for those respondents (provide the ID variables for problematic records) and ask them to provide back a list of correct values.
4. If data were collected using computer assisted personal interviewing (CAPI), there will not be a paper form that you can use to check the value stated by the respondent, so data cleaning is simpler than with paper forms:
   a. Check the ID variables for internal consistency and plausibility; if some values are wrong, use other variables such as interview date and interviewer ID to infer where the data come from and correct the values
   b. Use GPS coordinates and make some maps to confirm whether the data collectors were in the right location when they entered the data
   c. Confirm or correct vaccination dates using photos of home-based records
   d. Check the dataset for impossible values for any variable and replace them according to your data cleaning policy
5. Whether you use paper or electronic data capture:
   a. If the dataset contains values that are not possible, make a decision about how to code those. Document the decision and implement it consistently across all records. (i.e., 1=male and 2=female; what do we do when sex is recorded as 0? Probably make it missing.)
b. If values will be corrected by using other fields (i.e., if you will use the child’s name and your judgment to assign a value for sex) then document that, too.

C. In the case of dates that are nonsensical (February 31) or not possible (vaccine date before the date or birth, or after the date of survey), consider clearing out the values of the date field and indicating that the child received that dose using a field for a tick mark. (A tick is a variable that says we believe the child received the dose, but we do not know when. A child with a tick mark will receive credit for having received a crude dose, but not for having received a valid dose.) See PAHO Tools for Monitoring the Coverage of Integrated Public Health Interventions Module 6.

CAUTIONS, TIPS & ADVICE

- Data corrections should be made using a program - and therefore documented - rather than simply typing a corrected value directly into a database.
- It is common for data collectors to be sloppy when writing down stratum ID or cluster ID and it can take many hours or even several weeks of work to figure out precisely which responses came from which clusters, so give good attention to the ID variables from the very start of planning data collection.
- Consider using waterproof pre-printed labels with IDs written on them, with paper forms.
- Consider using QR codes for ID variables, with electronic forms.

ADDITIONAL RESOURCES

- To be added: Link to zip file of ‘Resources to Accurately Record Survey IDs’
- Biostat Global Consulting has written a new Stata command named ‘assertlist’ which is designed to identify data values that violate assumptions and to provide a spreadsheet with which data managers can feed back corrected value. Assertlist also provides appropriate Stata syntax for replacing errant values with corrected values. (Type ‘findit assertlist’ at the Stata command prompt, or check the Biostat Global website (www.biostatglobal.com) or e-mail Dale Rhoda (dale.rhoda@biostatglobal.com) to learn more.)
HOW-TO GET STARTED WITH STEP 15d: Manage the Data – Construct derived variables

PURPOSE
To calculate derived variables and coverage indicators using clear definitions and specifications

PEOPLE & MATERIALS
- Statistician
- List of instructions, or specification for calculating indicators from survey variables
- A statistical software package like Stata, SPSS, Epi Info or R

STEPS
1. Identify which coverage indicators will be calculated and how they will be defined. The components of a coverage indicator definition include:
   a) Which respondents are included in the calculation? Excluded?
   b) How is the denominator calculated? The numerator?
   c) What is the role of weights, if any?
   d) How are missing data and Do Not Know responses handled?
   e) How do we interpret results?
      • Are we making a statement about the population from which the sample was drawn or only about the survey sample itself?
      • How do we use the outcome in a sentence?
      • Should we report uncertainty due to sampling variability? If yes, how?
2. Write (or use) a program to code indicator variables according to the definitions
3. Write comments in the programs and provide them as one of the deliverables of the project

CAUTIONS, TIPS & ADVICE

ADDITIONAL RESOURCES
- The WHO Vaccination Coverage Quality Indicators (VCQI) software can accomplish this task for coverage indicators that are included in that software
- The VCQI Indicator List with Specifications (https://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index2.html) document lists steps for calculating derived variables and outcome variables for the VCQI indicators
- See WHO White Paper on harmonizing vaccination coverage measures in household surveys for additional tips on calculating coverage indicators
HOW-TO GET STARTED WITH STEP 16a: Weight the dataset

PURPOSE
To calculate survey weights that indicate what portion of the eligible population is represented by each survey respondent.

PEOPLE & MATERIALS
- Statistician
- Team that performs sample selection
- Data collectors (survey interviewers)
- Data manager
- Reference Manual Section 6.2
- Spreadsheet program (e.g., Excel) or a statistical software package

STEPS
It is possible to weight the dataset before constructing derived variables (Step 15d).

1. Sample selection often has up to four stages: Select primary sampling units (PSUs); segment large PSUs and select a segment; select households; select respondents within the household. Provide forms or a tool for selectors to record the probability of selection at each stage and submit them to the data manager (Refer back to See Step 12a and Step 12b on selecting survey sample.)
2. Calculate design weights based on probability of selection.
3. Nonresponse adjustment requires knowing the eligibility status and interview outcome at every selected household. These are recorded using disposition codes.
   a. Was anyone home?
   b. Was anyone eligible?
   c. If no-one was home, can a neighbor tell us whether anyone eligible lives there?
   d. Did eligible respondents refuse to be interviewed?
   e. Was the interview completed?
   Provide a way of recording this information and of updating it when data collectors revisit the household.
4. Evaluate the response rate and the data concerning disposition codes to decide whether adjustment for nonresponse is possible and appropriate. If yes, calculate adjustment, based on likely number of non-respondents in each cluster; shift the weight that would have been captured by those people who did NOT respond to the survey onto those who DID respond to the survey. (See Reference Manual Section 6.2.2)
5. Evaluate the need for post stratification. Obtain a list of total eligible population in each survey stratum from the census office and ask what the estimates are based on. How many years back was the last census? Talk with the survey coordinator to evaluate the quality of the household listing work. Did the listing teams have excellent maps? Did they travel to the periphery of each cluster, or stay near the center? The statistician sums the design weights, or nonresponse-adjusted weights in every stratum and compares the ratio of those sums to the ratio of the...
counts from the census office. If the ratios differ substantially then the statistician must decide whether to post-stratify the weights using the census numbers (because s/he feels that the census numbers are likely better than the quality of the household listing), or to let the dataset determine the relative stratum weights (because s/he feels that the survey listing data are likely to be of higher quality than the list obtained from the census office). Different statisticians take different approaches to this question. Document the decision and the reason for it.

6. Post-stratify the weights, if appropriate, using instructions from Reference Manual Annex J.

CAUTIONS, TIPS & ADVICE
- Coverage estimates should be weighted; coverage estimate weighting represents a recent improvement to WHO coverage survey methodology.
- Calculating the weights requires the survey staff to keep track of probability of respondent selection at each stage of selection which will require early planning to capture required data during sample selection. Provide forms or tools to record probability of selection at each stage.

ADDITIONAL RESOURCES
- UNICEF MICS
HOW TO GET STARTED WITH STEP 16b: Describe the data

PURPOSE
To ensure the dataset's overall size and allocation across strata and clusters are as expected; if not, understand and document why.

(Optionally) To identify clusters with surprisingly low percentage of respondents vaccinated, so EPI can follow up

PEOPLE & MATERIALS
- Data manager
- Statistician
- Survey coordinator
- Database
- Statistical program, e.g., Stata, SPSS, R, Epi Info
- Reference Manual Section 6.1

STEPS
1. When the sample size calculation was performed, the statistician identified a target number of clusters per stratum and a target number of completed responses per cluster. Check that the dataset is complete and includes roughly the number of respondents that was expected. Tabulate the results and comment on any substantial differences between the observed and expected sample size.
2. Create tables summarizing the demographics of respondents.
3. If the sample size per cluster is sufficient (see below, under Caution), make organ pipe plots and their accompanying tables for to identify clusters with surprisingly few vaccinated respondents; work with the EPI to decide what should be considered “surprisingly low” (Which doses do they expect to see at least medium or high proportion vaccinated in EVERY cluster? How low would be surprisingly low?); make a list of clusters that meet the definition of surprisingly low coverage and provide supporting information to the EPI so they can decide whether and how to follow up on these results. Identifying clusters with surprisingly low coverage is almost always applicable in post-vaccination campaign surveys. Whether it is relevant in a routine immunization survey or not will depend on sample size per cluster and on EPI priorities.

CAUTIONS, TIPS & ADVICE
Identifying clusters with surprisingly low coverage is only likely to be useful in clusters with an appreciable number of respondents, at least 5 or 7 or more. When the number of respondents in a cluster is quite small, then sample coverage might be very low due to chance or sampling variability; low proportion vaccinated might not be a signal of a problem. (Even in a region with very high coverage, there is some chance that you could select two or three respondents at random and find that none of them was vaccinated, thus, it might be a waste of time and resources to follow up on those results).
ADDITIONAL RESOURCES
The WHO Stata Vaccination Coverage Quality Indicators (VCQI) software includes programs to make organ pipe plots and to list clusters with surprisingly low coverage.
HOW-TO GET STARTED WITH STEP 16c: Conduct standard and additional analyses

PURPOSE
- To populate table shells and make the figures for selected indicators
- To review results with the survey steering committee and note interesting questions that are raised for follow-up analysis
- To provide write-up of methods and strengths and limitations
- To help steering committee interpret results

PEOPLE & MATERIALS
- Statistician
- Steering committee (or report-writing subcommittee)
- Reference Manual Sections 6.3 and 6.4

STEPS
1. Summarize each indicator in a table and, where appropriate, with a figure
2. Provide adequate labels, titles, and footnotes for the table or figure to stand alone
3. For weighted coverage indicators, provide estimates of uncertainty due to sampling variability, usually with a 95% confidence interval
4. Review the appropriate interpretation of each indicator with the steering committee
5. Note follow-up questions and conduct additional analyses to address them

CAUTIONS, TIPS & ADVICE
- Once the dataset is clean and weighted and the derived and outcome variables have been calculated, it is straightforward to calculate coverage results for the survey strata and for demographic sub-groups of interest.

- Indicators that draw conclusions about coverage among the population of eligible children should be accompanied by some indication of uncertainty due to sampling variability. This is usually expressed with a 2-sided 95% confidence interval. The analyst should calculate confidence intervals with a tool that accounts properly for the sampling design. Modern statistical programs have the capability to do this: Stata, SPSS, Epi Info and R have this ability, as do some other, less common tools.

- In the best case, the statistician and steering committee will have developed and agreed upon table shells (dummy tables) early in the survey planning process. It is quite common for the steering committee to ask for some re-arrangement or for additional tables once the shells are filled.

- Some indicators are weighted, some are not. Some indicators are accompanied by estimates of uncertainty due to sampling variability, and some are not. Many of these choices are influenced by traditions in coverage survey reporting. It is not recommended to skip weighting for those
indicators where WHO recommends it or to drop the confidence intervals from result tables when the result is a conclusion about coverage among the eligible population.

- The steering committee will likely appreciate some support in how to use coverage estimates in clear sentences and in knowing what caveats should accompany the results.

- The report may include only a subset of tables and figures that you produce. It may be possible to provide additional tables and figures as an electronic annex, which is not printed as part of the report.

- The statistician should provide an archive copy of all datasets and all code used to generate the tables and figures for the report. The full data, complete with personal identifiers, should be archived by the survey team, and made available to those with authorized access. In some cases it will be appropriate to also make a public-release dataset where personal identifiers have been removed (i.e., names) or had some random noise added to them (i.e., GPS coordinates of respondent households).

- If you are using the WHO Stata VCQI software, then much of the work of populating tables and figures will be handled by VCQI. If you are using other tools, it is recommended to have an independent analyst audit your programs to help find mistakes. It may be helpful to feed in a dataset where the results are known to see if your programs produce the right answers. You could analyze one of the VCQI test datasets and compare your results with those from VCQI.

- Share the tables and figures with several audiences and listen carefully to how they interpret them to catch any misleading aspects of your labels or representation. If there are common misunderstandings or confusion, try to address them thru alternative representation or explanatory text.

ADDITIONAL RESOURCES
The WHO Stata VCQI software generates tables and figures for many indicators and is extensible if you wish to add new indicators to it. The VCQI documentation includes guidance on how to interpret results. VCQI resources are available on the TechNet-21 website.
HOW-TO GET STARTED WITH STEP 16d: Classify Coverage

PURPOSE
- In some cases the steering committee may wish to classify coverage in Routine Immunization (RI) or tetanus surveys
- Different classification approaches are possible, as described in Reference Manual Annex N
- The approach that uses 1-sided bounds is probably least confusing and misclassifies coverage in the fewest strata

PEOPLE & MATERIALS
- Statistician
- Steering committee (or report-writing committee)
- Reference Manual Section 6.4, Annex M, Annex N

STEPS
Many post-campaign coverage surveys include a goal to classify whether coverage is
- Likely to be higher than the coverage goal
- Likely to be lower than the goal
- Unclear whether it is higher or lower than the goal

1. Identify the target coverage level
2. Identify the level of statistical confidence associated with the classification (e.g., 95%)
3. Calculate 1-sided confidence bounds at that level
4. If the both bounds fall below the target coverage, the reader can be confident that coverage is below the target.
5. If the both bounds fall above the target coverage, the reader can be confident that coverage is above the target.
6. If the bounds fall on both sides of the target coverage, then the reader cannot be confident whether coverage is above or below the target.

CAUTIONS, TIPS & ADVICE
Most readers understand the ideas of being confident that coverage is very likely above or below a target value, but they sometimes have difficulty understanding how we can NOT be confident whether it is above or below the value. It may be helpful to say that the estimated coverage is so close to the target that we would need a larger sample to be (for example, 95%) confident that it is above or below. The closer true coverage is to the target, the larger the sample size we would need to confidently classify coverage.

ADDITIONAL RESOURCES
The WHO Stata Vaccination Coverage Quality Indicators (VCQI) software portrays 1-sided 95% confidence bounds in its tables and on its inchworm plots to facilitate coverage classification.
HOW-TO GET STARTED WITH STEP 17a. Interpret Survey Results

PURPOSE
To draft the survey report and key messages before sharing survey results with stakeholders.

PEOPLE & MATERIALS
- Survey coordinator
- Statistician
- National immunization programme (or subnational for subnational surveys)
- Survey protocol
- Reference Manual Sections 7.1-7.7

STEPS
1. Prepare the report. Several sections of the report can be pulled from the background, methods, and table shells developed for the survey protocol. Update and explain any changes made.

   Report Outline
   a. Background section
   b. Survey methods and limitations
      i. Sampling frame
      ii. Sampling procedures
      iii. Selection bias
      iv. Information bias
      v. Data transcription and data entry errors
   c. Results
      i. Estimates of coverage
      ii. Classifying coverage
      iii. Reporting aggregated results
   d. Discussion
   e. Implications and recommendations
      i. Report key coverage indicators of each vaccine (See WHO White Paper on Harmonizing Vaccination Coverage Measures in Household Surveys)
      ii. Reaching a birth cohort
      iii. Quality of recording and reporting vaccinations
      iv. Invalid doses and timely encounters
      v. Evaluating supplementary immunization activities

2. Make data and documentation of methods freely available
   a. Include: methods, data, and analysis code

CAUTIONS, TIPS & ADVICE
- The reliability of the data collection and of the data processing have been checked and documented thoroughly.
  o The interpretation of the data has been peer reviewed at least by the following: the steering group, the survey coordinator, the statistician, the EPI director, and senior

ADDITIONAL RESOURCES
- Multiple Indicator Cluster Surveys (MICS) Tools
  - Report Writing
- Demographic and Health Surveys
  - Dissemination and Data Use
- Example Terms of Reference for Data Analysis and Report Writing
HOW-TO GET STARTED WITH STEP 17b. Disseminate Survey Results

PURPOSE
To draft survey key messages, and communication materials to share survey results with stakeholders.

PEOPLE & MATERIALS
- Survey coordinator
- Statistician
- National immunization programme (or subnational for subnational surveys)
- Reference Manual Sections 7.1-7.7

STEPS
3. Develop key messages for key audiences focused on the following:
   a. What were the major themes that emerged from the data
   b. What were the survey goals
   c. What is the political context
4. Present the primary report of findings to the ministry of health for review and approval.
5. Once approved, the national immunization program and survey coordinator prepare simpler and shorter reports to share with health service workers and other stakeholders. Consider:
   a. Who needs to learn about the survey?
      i. Policymakers
      ii. EPI managers
      iii. Mid-level managers
      iv. Service delivery staff
      v. Relevant partners – interagency coordinating committee
      vi. Communities covered by the survey
   b. What information do they need to know?
      i. Actionable information to take corrective action
   c. How do they get this information?
      i. Presentation of results
      ii. Meetings
      iii. Newsletters
   d. When should they get this information?
      i. Ideally within 1 month of the survey
   e. Next steps
      i. Targeted workshops to identify reasons for issues and identify improvement objectives
      ii. Operational research: missed opportunities, focus groups to assess community attitudes and knowledge
      iii. Identify strategies to improve vaccination coverage
6. Create communication materials and presentations
   a. Slide presentations for feedback workshops
   b. Brief summary of national survey results
c. Brief summary of sub-national survey results and recommendations (province or district)
d. Print 4-5 key charts and tables
   i. Coverage by strata
   ii. Histogram of age at DTPCV1 and MCV1
   iii. Tables summarizing crude and valid coverage and missed opportunities
e. Bullet points showing their implications for actions

7. Make data and documentation of methods freely available
   a. Include: methods, data, and analysis code

CAUTIONS, TIPS & ADVICE
- Ideally, the following will be true when it is time to share the results:
  o The organization of the survey (including the selection of a contractor) has been requested and approved by the Ministry of Health at the beginning of the process.
  o The interpretation of the data has been peer reviewed at least by the following: the steering group, the survey coordinator, the statistician, the EPI director, and senior members of the ministry of health. Public Opinion Research Transparency Initiative for more information on this issue (www.aapor.org/AAPORKentico/Transparency-Initiative.aspx).

- Remember to include dissemination workshops in your budget. This is an important step after the survey for identifying reasons for issues, improvement objectives and actions.

- When sharing the results, it is important to remember the following:
  o Timely (as soon as possible after the survey)
  o Present to national and to health authorities in each stratum of the survey
  o Document discussion and update report accordingly
  o Obtain clearance on the final report from the ministry of health

- When developing key messages, they should be constructive. Use the following Dos and Don’ts to guide message development:
  o Do emphasize progress
  o Do identify possible reasons for slow progress
  o Do highlight opportunities for improvement
  o Don’t assign blame
  o Don’t use critical tones

ADDITIONAL RESOURCES
- Multiple Indicator Cluster Surveys (MICS) Tools
  o Dissemination
- Demographic and Health Surveys
  o Dissemination and Data Use
- Example Terms of Reference for Data Analysis and Report Writing