PREVENTIVE CHEMOTHERAPY:

Tools for improving the quality of reported data and information

A field manual for implementation

World Health Organization

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Preface

Preventive chemotherapy is one of the main interventions used by national programmes to control and eliminate five neglected tropical diseases (NTDs): lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiases and trachoma. The intervention is distributed through mass drug administration (MDA) and school-based treatments, with the goal of treating populations at risk of infection at appropriate, regular intervals. Incorrect tallying or reporting of the numbers of individuals treated can bias routinely reported results, as can poorly documented shifts in population, reliance on outdated census data and treatment of individuals outside the targeted age group or geographical area.

A fundamental step in monitoring the success of programmes is knowing the coverage of preventive chemotherapy; that is, how many people who needed treatment swallowed the medicines. Without reliable information on treatment coverage, programme managers and their staff cannot monitor programmatic performance effectively. Routine monitoring is essential to track progress towards programmatic goals, identify communities in which coverage is low or insufficient and implement corrective actions to improve coverage. Coverage evaluation surveys are straightforward, population-based surveys designed to provide precise estimates of preventive chemotherapy coverage against targeted NTDs and provide a valuable tool for evaluating programmatic performance.

The quality of data on preventive chemotherapy for NTDs received by national programmes is at times incomplete, untimely and of questionable accuracy. As the goals for control and elimination of NTDs, as endorsed by the World Health Assembly and published in the WHO roadmap for implementation, approach, programmes must ensure that high-quality data are available and used effectively for decision-making. Data quality assessments are resources for national programmes to assess the quality of reported data on preventive chemotherapy and the quality of the data management system.

A recurring request from national programmes is the need for a rapid, inexpensive and simple tool to assess coverage of preventive chemotherapy as part of supervision activities. The objective of the Supervisors' coverage tool is to improve coverage within a given supervision area within the current round of MDA. The advantage of this tool over other monitoring approaches, including independent monitoring and rapid coverage monitoring, is that it provides a classification of the coverage that was likely achieved during the current MDA round.

This field manual presents the three tools and their methodologies, with stepwise explanations on planning, implementation, and interpretation and action, to guide improvements in the quality of reported data and information on preventive chemotherapy for NTDs. Additional resources are available to accompany the guides.

Below is a tabulated summary description of the three tools.

Tools for improving the quality of reported data and information on preventive chemotherapy of neglected tropical diseases

	Coverage Evaluation Survey	Data Quality Assessment	Supervisors' Coverage Tool
Purpose	To **validate** reported coverage (obtain a statistical point estimate)	To **verify** reported data and **assess capacity** of data management and reporting systems	To **classify** coverage as above/below a threshold
Administrative level	Implementation unit (district)	National and/or district	Supervision area (sub-district)
Sample size	> 500 people	N/A	20 people
Sites visited	30 villages	12 service delivery points	20 villages
Survey team	External to programme	Internal and external to programme	Internal, self-assessment
Timing	Within 6 months of MDA (longest within 12 months)	Every 3 years nationally Rotate every year in some districts	Within 2 weeks of MDA
Cost (US$)	~ US$ 2000–5000 per district	US$ 12 000–15 000 nationally US$ 1000–2500 per district	~ US$ 250–1000 per supervison area
Duration	2–3 weeks	~ 2 weeks	<1 week

MDA, mass drug administration; N/A, not applicable.

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Abbreviations and acronyms

CDD	community drug distributor
CES	coverage evaluation survey
CSAT	coverage survey analysis tool
CSB	coverage survey builder
DQA	data quality assessment
DEFF	design effect
EA	census enumeration area
HH	household
IAL	intermediate data aggregation level
IU	implementation unit
KAP	knowledge, attitudes and practices
MDA	mass drug administration
NTD	neglected tropical disease
PPES	probability proportionate to estimated size
PSS	probability sampling with segmentation
PSU	primary sampling unit
SA	supervision area
SAC	school-age children
SCT	supervisors' coverage tool
SDP	service delivery point
SOP	standard operating procedure
SSU	secondary sampling unit
TSU	tertiary sampling unit
USAID	United States Agency for International Development
VF	verification factor
WHO	World Health Organization

Glossary

The definitions given below apply to the terms as used in this field manual. They may have different meanings in other contexts.

assessment period
The period of time in which the round of preventive chemotherapy under assessment was conducted; ideally, the assessment period should be determined by the ministry of health that commissions the data quality assessment (DQA).

census enumeration area (EA)
The smallest geographical area for which census population results are available.

community drug distributor (CDD)
A volunteer who is frequently utilized by neglected tropical disease programmes to deliver preventive chemotherapy to individuals in their community as a part of mass drug administration.

coverage evaluation survey (CES)
A population-based probability survey designed to provide an estimate of preventive chemotherapy coverage, which meets precision needs and avoids the biases and some of the errors that can affect reported coverage. A CES differs from other tools used to monitor coverage (e.g. coverage supervision tool, rapid coverage monitoring, or independent monitoring).

coverage survey analysis tool (CSAT)
A Microsoft CSV-based tool designed to analyse survey results and auto-generate a standardized report. It is downloadable at: https://coverage.securedatakit.com

coverage survey builder (CSB)
A Microsoft Excel-based tool designed to aid survey coordinators with the planning and implementation of a coverage evaluation survey. It is downloadable at: http://www.ntdsupport.org/resources/coverage-survey-builder-coverage-evaluations

data verification
A quantitative comparison of recounted to reported data that assesses whether data are being collected and reported accurately at every level in the data reporting system.

drug package
A combination of preventive chemotherapy medicines (drugs), which are given out together to treat neglected tropical diseases.

eligible population
The population targeted for treatment with mass drug administration, based on drug-specific eligibility criteria.

epidemiological coverage
The proportion of individuals in the survey area who swallowed the medicine, or combination of medicines, out of the total population in the survey area, regardless of eligibility for treatment.

household (HH)
A group of people who eat and live together.

implementation unit (IU)
The administrative unit in a country that is used as the basis for making decisions about implementing mass drug administration; the IU is usually a district.

intermediate data aggregation level (IAL)
Administrative levels that are lower than the national level but higher than the community drug distribution point, at which data on preventive chemotherapy are aggregated; the number of intermediate aggregation levels may vary between countries. The DQA tool provides for up to four intermediate levels: intermediate level 1 represents the next level after the community, followed by level 2, etc. For example, data may be sent from villages (service delivery points) to a health facility where the data are first aggregated (intermediate aggregation level [IAL 1)], then to a district (IAL 2), followed by a region (IAL 3); then data are sent to the national level.

interviewer
The person in charge of questioning the respondents and filling out the questionnaire.

mass drug administration (MDA)
A method of distributing preventive chemotherapy in which medicines are administered to the entire population of an area (e.g. state, region, province, district, sub-district, village) at regular intervals, regardless of individual infection status.

mop-up
Localized mass administration of medicines that is repeated immediately after the original mass administration in areas where the coverage of preventive chemotherapy is found to be inadequate.

national level
The highest administrative level at which data on treatment and stocks of medicine are aggregated for the entire country; at this level, programme managers, the national secretariat and other partners review the data and make decisions.

preventive chemotherapy
The use of essential anthelminthic medicines (or, for trachoma, an antibiotic), alone or in combination, as a public health tool to control or eliminate neglected tropical diseases. In preventive chemotherapy, all individuals in endemic communities or areas are treated regardless of infection status. It is commonly delivered through mass community- and school-based distributions.

preventive chemotherapy coverage
A general term encompassing the various types of coverage (geographical, national, epidemiological, reported) that programmes may calculate and report.

programme reach
The proportion of people in the survey area who were offered the opportunity to receive preventive chemotherapy, regardless of whether the medicine was ingested.

reported (or administrative) coverage
The coverage calculated from the data reported by all community drug distributors; census figures or previous reports from drug distributors are used to estimate the population denominator.

report availability
The percentage of source documents or reports that can be retrieved.

report completeness
The percentage of source documents or reports that contain all the required data for indicators.

report timeliness
The percentage of source documents or reports that were compiled or submitted by the due date.

sampling unit
Administrative geographical areas in which service delivery points are located and where data are tabulated and aggregated. During the DQA, some of these areas are selected as part of a sample where the assessment will take place. Depending on the number of administrative levels in a country, sampling units may be divided into primary sampling units (PSU), secondary sampling units (SSU), and tertiary sampling units (TSU).

segment
A grouping of households from within the initially sampled subunit; used for sampling efficiency.

service delivery point (SDP)
The delivery of services to prevent neglected tropical diseases may include the following interventions, among others: preventive chemotherapy (the SAFE strategy for trachoma), morbidity management and disability prevention, and/or treatment of cases. The service delivery point is the lowest administrative level, school or fixed point where an intervention benefiting a population (i.e. service delivery) occurs. For diseases amenable to preventive chemotherapy, these points are typically communities, villages, or schools where the intervention has taken place and where treatment data are compiled from the treatment registers or tally sheets by community drug distributors, teachers or health workers.For the DQA, this is equivalent to "peripheral treatment" sites.

source documents
Data collection tools where service delivery is first recorded. For neglected tropical diseases amenable to preventive chemotherapy, these tools may include treatment registers, tally sheets on preventive chemotherapy and inventory records at the distribution level. For other diseases, they may include patient records.

sub-district data aggregation level

The administrative level directly below the district level for which data on preventive chemotherapy are aggregated. The number of sub-district aggregation levels may vary among countries; in very small districts there may be no aggregation of sub-district data.

subunit

The smallest administrative unit for which population estimates are available; may correspond to a census enumeration area, village, hamlet or locality.

supervision area (SA)

The geographical area in which the supervisors' coverage tool is conducted. Typically, the supervision area corresponds to the smallest administrative or geographical unit for which a first-level supervisor is responsible.

supervisors' coverage tool (SCT) implementer

The individual in charge of conducting the supervisors' coverage tool within a given supervision area; usually a supervisor of mass drug administration at sub-district level.

survey area

The administrative geographical area in which mass drug administration is conducted and for which data on preventive chemotherapy coverage are tabulated and reported. For many neglected tropical diseases, this is the district or implementation unit.

survey coordinator

The person, often from the central level, who plans and oversees a coverage evaluation survey.

surveyed coverage

Coverage measured through the use of population-based survey sampling methods. It is calculated as a fraction. The denominator is the total number of individuals surveyed and the numerator is the total number of individuals surveyed who were identified as having ingested the medicine.

survey population

The population for which a statistical estimate of preventive chemotherapy coverage is desired.

systems assessment

A qualitative assessment of the strengths and weaknesses of the data management and reporting system, assessed through key informant interviews conducted at every level in the data reporting system.

target coverage threshold

Disease-specific thresholds above which treatment levels are considered to be effective for achieving programme goals/public health goals.

target segment size

The average number of households per segment.

verification factor (VF)

The ratio of recounted value of the indicator to the reported value; the VF is used to measure the degree of accuracy of reported data.

COVERAGE EVALUATION SURVEYS (CES)

Introduction

Typically, monitoring of coverage relies on routinely reported data which are aggregated from the records of community drug distributors. While reported coverage is an essential tool for monitoring programmes' performance, it is prone to errors resulting from incorrect estimates of the target population, weak health information systems, underreporting and intentional inflation of the numbers of people treated[2].

Uses of preventive chemotherapy coverage surveys

Coverage evaluation surveys are a valuable tool for evaluating programme performance. Such population-based surveys are designed to provide precise estimates of coverage while overcoming many of the biases and errors that can undermine reported coverage.

While typically regarded as a tool for **estimating preventive chemotherapy coverage**, the benefits of and uses for coverage evaluation surveys extend beyond the estimation of treatment levels attained. Other potential uses include:

- To validate reported coverage rates: The results of coverage surveys can be used to check the accuracy of the system for recording and reporting data and take corrective actions where necessary.
- To identify reasons for non-compliance: The common reasons for not swallowing the medicines can be identified, allowing country programmes to improve social mobilization before the next round of MDA.
- To detect problems with the supply chain and distribution systems: Coverage surveys can identify groups of individuals for whom the medicines were never offered and where corrective action can be taken.
- To measure coverage in specific populations: Survey tools can be used to measure coverage levels in sub-populations (e.g. by age, sex, and rural vs urban areas).
- To provide an opportunity to measure other population attributes: An investigation of additional issues (e.g. knowledge, attitudes and practices towards the intervention; the prevalence of morbidity and the performance of community drug distributors) can generate valuable information for improving programme performance.

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1. Accelerating work to overcome the global impact of neglected tropical diseases: a roadmap for implementation. Geneva: World Health Organization; 2012 (http://www.who.int/neglected_diseases/NTD_RoadMap_2012_Fullversion.pdf, accessed february 2019).

2. Murray CJ, Shengelia B, Gupta N, Moussavi S, Tandon A, Thieren M. Validity of reported vaccination coverage in 45 countries. Lancet. 2003;362:1022–7.

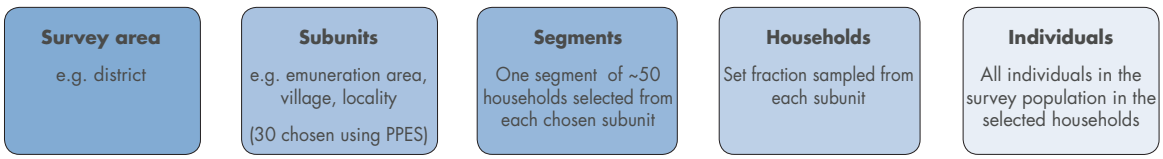
Throughout this guide an important distinction is made between two populations: the eligible population and the survey population.

- **The eligible population** is the population targeted for MDA treatment, based on drug-specific eligibility criteria.
- **The survey population** is the population for which an estimate of preventive chemotherapy coverage is desired. This may differ from the eligible population; for some NTDs the survey population will be larger than the eligible population.

For example, for lymphatic filariasis the eligible population to receive albendazole and diethylcarbamazine is all individuals aged ≥ 2 years, excluding women who are pregnant or in the first week of breastfeeding and the extremely ill. When evaluating coverage, the survey population for lymphatic filariasis is everyone who was living in the survey area at the time of the MDA, regardless of their eligibility for treatment.

Sampling overview

In this survey design, subunits (e.g. enumeration areas, villages) are chosen with probability proportionate to estimated size (PPES) in segments, where a segment represents a group of approximately 50 households. In the field, the subunits selected for the survey sample are divided into this predetermined number of segments, such that the segments are of approximately the same size in households. Then, one segment is selected at random and a fixed proportion of households is selected systematically from among the households in segments selected for the survey sample. This coverage evaluation survey design produces an equal probability of samples of the survey population (**Annex 2** describes how to calculate selection probabilities using the coverage evaluation survey design). It is derived from the "modified segment design" option described in the manuals for UNICEF's Multiple-Indicator Cluster Surveys 2–4[1] and by Turner et al. in 1996.[2]



PPES, probability proportionate to estimated size sampling

The sampling methodology described in this guide was endorsed by WHO's Strategic and Technical Advisory Group for Neglected Tropical Diseases in 2016.[3]

Implementing the survey methodology will result in an equal-probability sample of the survey population.

1. Multiple indicator cluster survey. New York (NY): United Nations Children's Fund (http://mics.unicef.org/tools, accessed February 2019).

2. Turner AG, Magnani RJ, Shuaib M. A not quite as quick but much cleaner alternative to the Expanded Programme on Immunization (EPI) Cluster Survey design. Int J Epidemiol. 1996;25:198–203. doi.org/10.1093/ije/25.1.198.

3. Report of the WHO Strategic and Technical Advisory Group for Neglected Tropical Diseases. Geneva, 12–13 April 2016. Geneva: World Health Organization; 2016 (http://www.who.int/neglected_diseases/NTD_STAG_report_2016.pdf, accessed February 2019).

1. Planning

1.1 Preparation and logistics

Where and when should coverage evaluation surveys be conducted?

Coverage surveys are an integral part of evaluating the performance of NTD programmes. National programmes should be encouraged to conduct coverage surveys throughout the implementation of a programme, as part of routine monitoring of programmes' performance, and to ensure that the target coverage thresholds are being reached and that the reporting system is functioning well. When coverage surveys are used as a part of routine programme performance monitoring, it is recommended that the survey areas (e.g. districts) be selected randomly, for example by drawing names from a hat. The number of coverage surveys conducted will be dictated by the resources available. Coverage surveys will be most informative to national programmes if they are conducted at various timepoints in the programme's lifecycle and across different geographical areas.

In addition to routine integration of coverage surveys, there are certain circumstances in which coverage surveys may be indicated. For example, coverage surveys can be a useful tool to understand the reasons for low coverage or compliance with treatment, to estimate coverage when population figures (i.e. the denominator) are uncertain and to investigate any reasons for greater than expected levels of infection or morbidity. In such instances, the survey area (an implementation unit, such as a district) from which to sample should be selected purposefully, based on the areas experiencing the particular challenge. These issues are summarized in Table 1.1.

When should surveys be timed relative to the MDA?

It is recommended that coverage surveys be implemented as soon after the MDA as possible to minimize recall bias, ideally after the reported coverage from the last MDA has been calculated and before planning for the next MDA has begun; typically no later than 3–6 months after the MDA.

The following are suggested timelines that can be used to help with planning and budgeting, depending on the size of the country.

- Planning for a coverage survey: **4–6 weeks**
- Implementing a coverage survey: **2–3 weeks**
- Analysis, interpreting and reporting: **1 week**
- Acting upon the coverage survey results to improve the next MDA: **4–6 weeks**

Table 1.1 Key considerations for determining when and where to conduct coverage surveys

Main purpose of the coverage survey	Method used to select the survey area (e.g. district)	Preferable timing in the programme
1. To check if the data reporting system is working well	Random	Early (first and second years of the programme), repeated in later years if early results show a large discrepancy
2. To better estimate coverage where there is reason to believe that routine reporting is incorrect: • in areas where the denominator (total population figure) is suspected to be grossly incorrect or out of date • where reported coverage is highly suspect • where incidence of morbidity is ongoing • where a transmission assessment survey or impact assessment survey is failing	Purposeful or random, depending on the number of areas in which the problem is suspected	As need arises
3. To evaluate programmatic progress	Random	Mid-term evaluation of national action plan (third and fourth years of programme)
4. To integrate a KAP survey with a coverage survey in order to:		
• identify the reasons for low coverage	Purposeful, if testing specific areas of low coverage	Following MDA with reported low coverage
• test the effectiveness of social mobilization and communication strategies	Random, if testing across the programme	Following a new or change in social mobilization strategy

KAP, knowledge, attitudes and practices; MDA, mass drug administration

Who should conduct the survey?

A survey team should conduct the coverage evaluation survey. The teams may be comprised of staff at national, regional/provincial or district levels *who are not directly engaged in the MDA*. For the sake of transparency, it is often preferable to have multiple organizations or levels within the health system represented on the survey teams. Some countries choose to commission a local university or institute to implement the survey. Typically, each survey team has two members: at least one **interviewer** who speaks the local language and is in charge of questioning the respondents and filling out the questionnaire; one **sampler**, who ensures that the sampling plan is adhered to and determines which households are selected; and a driver who transports the team to each survey site. Sometimes the same driver may transport multiple teams. It is helpful if one or more of the team members is familiar with the local area. It is advisable to request the local community/village leader to provide a local guide to accompany the team while working in the area. **A survey coordinator**, typically from the central level, is needed to lead the survey planning and to supervise the teams in the field.

What materials are required?

The materials required for planning, implementing and actioning a CES are listed in **Annex 1**. National programmes should ensure that these materials are available in appropriate quantities before the planning phase.

What training is needed?

The survey teams should be trained immediately before the coverage survey is implemented to ensure that the information learnt is retained. A suggested outline for training is as follows:

- Day 1 – Conduct in-class training on the segmentation approach, selection of households and practise with completing the questionnaire. Interviewing techniques (**Annex 3**) should be practised repeatedly in order to minimize errors and maximize efficiency of time spent in each household. Additional training should be provided for other optional questionnaires that may be included in the survey. **Annex 1 (Appendix 4)** provides an example of such a questionnaire for a knowledge, attitudes and practices (KAP) survey.
- Day 2 – Practise the approach in one or two field sites (sites selected for field practice should not include any of the 30 sites selected for the actual survey).
- Day 3 (full or half day) – Discuss experiences from Day 2, review the survey methods, and plan for the field work.

How much does a survey cost?

The cost of a typical coverage survey, including the cost of training, can vary substantially by country as well as within countries according to the size and density of the survey area. Previous surveys using other methods were reported to cost US$ 2000–10 000 per survey area or district to implement. Comparative operational research studies that compared three survey methods in four countries reported costs ranging from US$ 1867 to US$ 4816 (**Table 1.2**). Following consultations and review of several cost data sources during a technical meeting with monitoring and evaluation officers from NTD implementing agencies, it is suggested that coverage evaluation surveys using the recommended probability sampling with segmentation (PSS) method be budgeted at a cost of US$ 2500–3500 per district as part of planned programme activities.

How should the coverage survey builder be used?

To help survey planners design a coverage evaluation survey, an Excel-based tool called the Coverage Survey Builder (CSB) was developed. This tool can help survey planners to determine a sample size appropriate for the survey, select subunits, segment and systematically select households within the selected subunits and compile results. The CSB is available for download[1] and is discussed further in sections 1.4, 1.5 and 2.1.

Table 1.2. Comparative cost estimates of three most common survey methods

WHO region	Survey method					
	Expanded Programme on Immunization (EPI)		Lot quality assurance sampling (LQAS)		Probability sampling with segmentation (PSS)	
	No. of days to complete	Cost (US$)	No. of days to complete	Cost (US$)	No. of days to complete	Cost (US$)
Country A (Africa)	18	4385	19	4816	17	4525
Country B[1] (Americas)	22	1867	9	1167	18	1520
Country C (Africa)	14	4113	10	3247	16	4546
Country D (Africa)	23	4040	21	3835	26	4535
Average	19.25	3601	14.75	3266	19.25	3782

1 Surveys implemented using established ministry of health structures, which contributed to significantly reducing costs in this country.

1.2 Selection of the survey area

Coverage evaluation surveys should be conducted at the administrative geographical area in which the MDA is conducted and for which data on the coverage of preventive chemotherapy are collated and reported. It is referred to in this manual as the **survey area**. For many NTDs, this is typically a district or implementation unit.

School-based distribution. School-age children (5–14 years) are frequently treated through school because the use of existing school infrastructure makes treatment more efficient and reduces distribution costs; however, **it is important to recognize that the population of school-age children requiring treatment is not limited to children who attend schoo**l. Coverage evaluation surveys should include all school-age children – both in and out of school. To achieve this aim, coverage surveys evaluating school-based distributions should be conducted at the community level so that all children can be reached. The survey area for school-based distributions should correspond to the administrative level at which school-based treatments are aggregated and reported. This will enable programme managers to assess whether the target coverage threshold has been met and to validate the reported coverage. Note that there may be instances in which a school-based coverage survey is desirable. This guide does not apply in such instances.

1.3 Selection of the survey population

Before beginning a coverage survey the survey population that will be suitable for inclusion in the coverage survey must be specified.

Lymphatic filariasis, onchocerciasis and trachoma

For lymphatic filariasis, onchocerciasis and trachoma the survey population will be the same as the total population in the survey area. This corresponds to WHO's definition of **epidemiological coverage**[1], which reflects the proportion of the at-risk population that is covered by MDA. This means that everybody living in the survey area, regardless of their eligibility for treatment, is suitable for inclusion in the survey. For example, coverage surveys for onchocerciasis should include children aged < 5 years, even though they are ineligible to receive ivermectin.

Schistosomiasis and soil-transmitted helminthiases

For schistosomiasis and soil-transmitted helminthiases the survey population may vary, based on the treatment priorities and goals of the national programme. The population most commonly targeted for treatment with preventive chemotherapy is school-age children (aged 5–14 years); however, in some countries preschool-age children, women of childbearing age, or everyone living in high-risk areas may also be targeted. In areas where lymphatic filariasis is coendemic, the entire population is automatically treated for soil-transmitted helminthiases. Consequently, the decision about which survey population to use should be based on the population for which an estimate of coverage is desired. For example, if the national programme wishes to evaluate the coverage of a new deworming programme targeting preschool-age children, then the survey population would be preschool-age children (i.e. children aged 1–4 years).

Integrated coverage assessments

When a combination of drug packages is delivered to the population (either co-administered or independently administered during the same year) then an integrated coverage evaluation survey may be the most efficient way to assess the coverage of all relevant drug packages for treatment of NTDs amenable to preventive chemotherapy. For integrated assessments, it is important to clearly define the survey population for each drug package evaluated in the survey in advance of it. To avoid complications, it is recommended that no more than two survey populations be assessed through a single survey (although multiple drug packages may be assessed within the same survey population).

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1. Monitoring and epidemiological assessment of mass drug administration in the global programme to eliminate lymphatic filariasis: a manual for national elimination programmes. Geneva: World Health Organization; 2011 (WHO/HTM/NTD/PCT/2013.9; http://www.who.int/lymphatic_filariasis/resources/9789241501484/en/, accessed February 2019).

Target coverage thresholds

To achieve WHO's 2020 goals for control and elimination of NTDs treated through preventive chemotherapy, high levels of coverage must be sustained in the population where the diseases are endemic. For each of these five diseases, WHO has defined minimum target coverage thresholds to indicate sufficiently high coverage with preventive chemotherapy of the population at risk (Table 1.3).

Determining the expected survey population per household

Once the survey population has been defined, the average number of individuals in the survey population who are expected to be living in each household must be determined. If the survey population is equivalent to the entire population (e.g. for lymphatic filariasis, onchocerciasis and trachoma), this is the same as establishing the average household size. If the survey population is a subset of the total population (e.g. preschool-age children), information on the population structure by age group will be required, and is typically available from the most recent census or Demographic and Health Survey.

Table 1.3 Drug packages for preventive chemotherapy of neglected tropical diseases and WHO-defined target coverage thresholds for the survey population

Disease	Drug package	Survey population[a]	Target coverage threshold[b]
Lymphatic filariasis	Albendazole + ivermectin Albendazole + DEC	Everybody living in the survey area (e.g. district)	≥ 65%
Onchocerciasis	Ivermectin	Everybody living in the survey area (e.g. endemic focus, district)	≥ 80%[c]
Schistosomiasis	Praziquantel	The survey population may vary, based on national treatment priorities and could include one or more of the following groups:[e] • school-age children (5–14 years) • high-risk adults	75%[d]
Soil-transmitted helminthiases	Albendazole or mebendazole	School-age children (5–14 years) The survey population may vary, based on national treatment priorities and could include one or more of the following groups: • preschool-age children (1–4 years) • school-age children (5–14 years) • women of childbearing age • everybody living in the survey area at the time of MDA	75%
Trachoma	Tetracycline ointment (< 6 months)	Everybody living in the survey area (e.g. district)	80%

DEC, diethylcarbamazine; MDA, mass drug administration

a Corresponds to the population of interest for the coverage survey and that should be eligible for inclusion; the population for which an estimate of preventive chemotherapy coverage is desired.
b Corresponds to the target "epidemiological coverage" threshold of the population.
c Threshold applies when the goal is elimination of ocular morbidity caused by onchocerciasis.
d WHO specifies a target coverage threshold of 75% for school-age children.
e Preschool-age children are currently ineligible to receive praziquantel through MDA.

Additional calculations may be necessary if the age group reported in the census does not correspond to the coverage survey population. In general, the calculations for doing this are as follows:

Expected no. of people in the coverage population per household = (% population in age group) x (fraction age group in coverage population) x (average household size)

Example

Suppose the survey population for your survey is preschool-age children (defined as 1–4 years old). The census reports that 13.75% of the population is aged 0–4 years and that the average household size is 5.4 people. In this case, the survey population represents 80% of the census age group (that is, the survey population aged 1–4 spans 4 years, while the 0–4 census age group spans 5 years). The expected number of people in the survey population per household can be calculated as:

(13.75%) x (80%) x (5.4) = 0.6 people aged 1–4 years per household = Expected no. of people in the coverage population per household

If you are conducting an integrated assessment with two survey populations you will need to calculate the expected number of people per household for each of the survey populations. When entering this information into the CSB tool, the population with the smaller expected number of people per household will be considered **survey population 1**. The population with the larger expected number of people per household will be **survey population 2**.

1.4 Calculation of the sample size

Box 1.1 outlines the factors to consider when determining the sample size for the survey. These calculations can be performed automatically using the CSB.

Box 1.1 Sample size calculations

Step 1: Expected coverage (p). The proportion of the population that you expect will have swallowed the drug (expected coverage sample size will increase as the reported coverage approaches 50%). To help ensure that the sample size is sufficient to meet study objectives, it is recommended that at least 15 percentage points be subtracted from the reported programme coverage. For example, if reported coverage is 85%, it would be more conservative and ensure a greater sample size to subtract 15 percentage points and assume that the expected coverage figure is 70%. If after subtracting 15 percentage points the reported coverage is < 50%, then 50% should be used as the expected value. If you are conducting an integrated coverage assessment, the lowest of expected drug package coverage rates should be used. *Suggested default: 50%*

Step 2: Desired precision (δ). The desired precision measure considered here is half the width of a 95% confidence interval around the coverage estimate. For example, a measure of precision of 5 percentage points around a coverage estimate corresponds to a confidence interval of +/–5%. *Suggested default: 5%*

Step 3: Design effect (DEFF). The design effect is a measure that reflects the degree to which respondents in the same subunit are likely to be similar in terms of the information provided in response to a survey question. A design effect of 1.0 indicates that the use of cluster sampling (sampling people from select subunits) makes no contribution to the variability of the estimate. If possible, assumptions about the size of the design effect should be based on the experience of previous surveys. Otherwise, values between 2 and 4 are recommended. *Suggested default: 4*

Step 4: Alpha (α). An alpha value corresponds to the significance level associated with a confidence interval. When considering a single hypothesis test, choosing an alpha value of 0.05 means that, even if there is only random variation in the data, one is willing to mistakenly draw the conclusion that there is information in the data 5% of the time. Selecting alpha=0.05 corresponds to a 95% confidence interval ($Z\alpha/2=1.96$). If the coverage survey were repeated multiple times and 95% confidence intervals calculated each time, then 95% of these intervals would be expected to contain the true coverage. *Suggested default: 0.05*

Step 5: Non-response rate (r). The percentage of members of the survey population sampled for the survey but for whom data were not obtained due to absenteeism, refusal, or other reason. Values of 10–20% are recommended. *Suggested default: 10%*

These responses can be used to generate the sample size to be targeted for your survey using the equation below (calculated automatically in the CSB):

$$n = \frac{(DEFF)(Z^2_{(\alpha/2)})(p)(1-p)}{\delta^2\,(1-r)}$$

Example

Using the default values the sample size would be:

$$1707 = \frac{(4)(1.96^2_{(\alpha/2)})(0.5)\,(0.5)}{0.05^2\,(1-0.1)}$$

1.5 Systematic selection of subunits

For this protocol, 30 subunits should be randomly selected from among all those within the survey area. Subunits should be administrative areas for which population figures are available. **The ideal subunits are census enumeration areas (EAs), although villages, wards, localities or any other small administrative unit may also be used**. Although EAs may require greater effort initially than other choices of subunit, the use of EAs for survey sampling is advantageous because:

- they account for all households in a country in a jointly exhaustive and mutually exclusive fashion (i.e. each household in the country will fall into one and only one EA);
- they are among the smaller geographical units available, sometimes much smaller than villages and large towns, so they are easier to work in than larger units;
- they can be used in urban areas as well as rural and semi-urban areas; and
- outline maps for each EA are often available,[1] which can help to create segments (see section 2.1).

The term "subunits" is used when referring to the first units of sample selection, be they EAs/villages/localities/etc. See the box below for a summary of this information.

Enumeration area	Village/ward/locality/hamlet/etc.
Designed to be comprehensive: jointly exhaustive and mutually exclusive	A household can belong to multiple villages or no village
Relatively consistent, small population size	Population size can vary widely
Can be used in rural, semi-urban and urban areas	Challenging to use in urban centres
Maps are available, typically from the same governmental office that conducts the census	Maps may not be available

To improve the efficiency of household sampling, a segment of households will be randomly selected within each selected subunit. Sampling of households will take place only within that segment. The probability that any one subunit is selected is proportionate to the estimated number of segments it contains. The **default segment size is 50 households**; however, sometimes larger segments may be necessary if the expected number of households required to meet the sample size exceeds 50 (segmentation is discussed in detail in section 2.1). **Box 1.2** gives stepwise directions for selecting the subunits.

1. Maps (also referred to as "sketch maps") are typically available from the same governmental office that conducts the national census. Both the Demographic and Health Survey and UNICEF's Multiple Indicator Cluster Survey routinely use EAs as the primary sampling unit.

Box 1.2 Systematic selection of subunits using PPES sampling

The following steps should be completed during the planning phase using the Coverage Survey Builder (CSB) tool (http://www.ntdsupport.org/resources/coverage-survey-builder-coverage-evaluations) to select the subunits from which the 30 segments will be chosen.

Step 1: Obtain a list of all subunits in the survey area and their estimated size. This list should be exhaustive for the study area. A visit to the government office in charge of the census may be necessary to request a list of all subunits and their population (ideally in terms of the number of households [HH]). If projected growth rates are available, they should be taken into account when determining the projected population of each subunit. Make sure the subunits are listed according to geographical order, and not alphabetical order.

Step 2: Combine small subunits. Any subunit with < 25 households should be merged with an adjoining subunit on the list – which should also correspond to a subunit in close geographical proximity – to form one single subunit for sampling purposes. List these two combined subunits together on a single line in your spreadsheet (note: this is most easily performed using Microsoft Excel). For example, if Subunit A has 22 households, it should be combined with Subunit B, the next subunit on the list that is geographically contiguous. Supposing Subunit B has 128 households. The combined subunit should be listed in a single row as "Subunits A and B" with 150 households (128+22).

Step 3: Divide large subunits. Additionally, it is recommended, although not required, that any subunit with > 400 households be subdivided if possible and listed on separate lines, in order to make segmentation more manageable in the field. It is not necessary to have sub-subunit level population information at this stage. Approximate populations (e.g. "Subunit C part 1 of 2" (50% of the population in Subunit C) and "Subunit C part 2 of 2" (50% of the population in Subunit C) can be used and the exact boundaries of these sub-subunits can be determined upon arrival, based on well-defined neighbourhoods or other existing administrative units, if they are selected in Step 6 below. It is important to keep track of the number of parts into which a large subunit was divided (e.g. "part 1 of 3") so that the team in the field knows the number of initial groups in which to split the large subunit.

Step 4: Enter the names of the subunits and the estimated number of households in the CSB. To ensure maximum geographical representation of the survey area, subunits should be listed in geographical order. This list of subunits and number of households may be copied and pasted directly from the census spreadsheet(s) used in Steps 1–3 to save time and reduce the potential for errors. If information on the number of households does not exist, it can be approximated by dividing the total population for each subunit by the average household size and rounding to the nearest whole number.

Step 5: Determine the target segment size and the number of segments per subunit. The CSB will automatically determine the target segment size, which is set at 50 households by default but may be larger if the sample size per segment is not expected to be met after visiting 50 households. For a more detailed explanation of how the target segment size is calculated, see **Annex 2**. The number of segments per subunit is equal to the projected subunit size divided by the target segment size and rounded to the nearest whole number (e.g. 131 HH / 50 HH per segment ≈ 3 segments).

Step 6: Select 30 subunits using PPES. The CSB will systematically select 30 subunits from the survey area with probability proportional to the estimated number of segments they contain. It is possible for larger subunits to be selected more than once. In such cases, the number of segments to be selected from the subunit is equal to the number of times it was selected. For example, if the sixth and seventh selected segments fall within subunit #28, then it will be necessary to randomly select two segments from subunit #28.

Sensitization of subunits

The survey coordinator is in charge of making sure that the leaders of each subunit selected for the coverage survey are made aware of the survey in advance of the team's visit. During this sensitization visit (or phone call) with the local leaders, the representative from the survey team should share the purpose of the coverage survey and also discuss the optimal day of the week and time of day for the survey team to visit in order to find members of the survey population at home.

2. Implementation

2.1 Creating segments

A segment is the area to be surveyed within each selected subunit. Segments refer to groups of households and are used to reduce the time and work required for sampling in the field. Only households within the selected segment need to be enumerated. On average, the number of households in each segment is expected to be roughly the **target segment size** (Box 1.3 shows the method used to calculate this figure). For most surveys the **target segment size** will be **50 households**. A total of 30 segments will be chosen from the subunits selected (at least one segment in each selected subunit) via PPES (see section 1.5).

Maps (or "sketch maps")

- Once the subunits have been selected it is worthwhile investigating whether maps of the selected subunits are available. If EAs were used as the subunits, the office of the census should have maps for each EA available upon request.
- Because these maps outlining the boundaries of each EA may require a fee, it is advisable to solicit maps only for those EAs that are selected. Sometimes sketch maps are available in the field at the local health post or from a village leader. For this reason it is important that planning for a coverage survey takes place well in advance of the desired implementation.
- While obtaining maps may require additional work during the planning phase, they often result in substantial time saving during survey implementation.
- This survey method is still feasible to conduct in villages if maps are not available.

Box 1.3. Dividing a subunit into segments

The following steps should be followed by survey teams in the field to divide a subunit into segments and randomly select one segment in which to sample.

Step 1: Locate the outer boundaries of the subunit. If the subunit is a village or locality it may be easy for village leaders to describe where the boundaries lie; however, if the subunit is an EA, it will be necessary to use the maps to determine the boundaries of the EA because the EA may not necessarily coincide with a village or locality.

Step 2: Divide the subunit into segments with roughly the same number of households. Survey teams should carry with them a list of the selected subunits and the number of segments required in each (available from the CSB). Survey teams should work with local leaders to help divide the subunit into the predetermined number of segments such that each segment has approximately the same number of households. This means that the geographical size of the segments may vary considerably – densely populated areas will have geographically small segments and low-density segments will be large. It is recommended to use natural lines of division, such as roads, footpaths, streams or other distinguishable landmarks to form the boundaries of the segments so that it is clear into which segment each household falls. Maps and the assistance of community leaders will be essential in this process. Assign each segment a number.

> Note: It is important that each subunit be divided into exactly the predetermined number of segments, based on the estimated number of households. The number of segments **should not** be revised in the field if the original estimate is found to be incorrect.
>
> Example
> If a selected subunit is expected to have 131 households, then according to the CSB it will require 3 segments (131 HH / 50 HH per segment ≈ 3 segments). But suppose that upon reaching this subunit in the field the survey team discovers that there are only 106 households. It is very important that the survey team still divide this subunit into exactly 3 segments, as was originally planned, even though the correct number of households is quite different. Any deviation in the number of segments from that planned using the CSB will result in *a non-equal probability sample*.

Step 3: Randomly select one segment. Randomly select one segment by assigning a number to each segment and then drawing one number from a hat (or flipping a coin if there are only two segments from which to choose). When the entire village or EA is a single (1) segment there is no need for random selection.

> Example
> If the subunit has been divided into four segments, assign each segment a number from 1 to 4. Write the numbers 1 through 4 on pieces of paper and put these pieces into a bowl or hat. Draw one paper. The number drawn corresponds to the number of segments that has been selected.

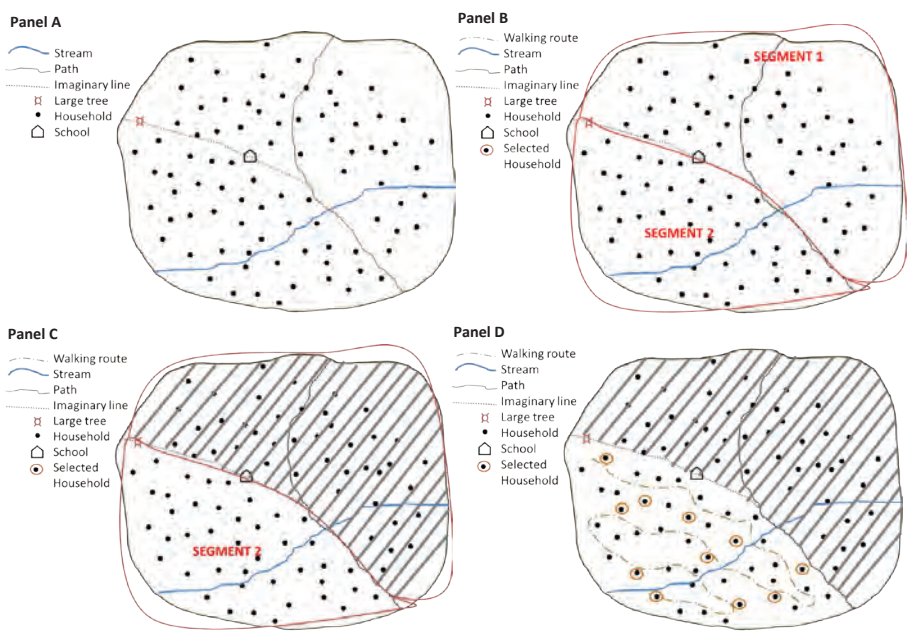
Upon arrival in a selected subunit, members of the survey team should first familiarize themselves with the boundaries of the subunit, according to the map or local leadership. The team should then work with local leaders to divide the subunit into the predetermined number of segments. Follow the steps in Box 3 to create segments within each selected subunit.

Figure 1.1 provides a step-wise depiction of how to create segments and select households within each segment of an EA.

Large subunits

If a selected subunit corresponds to a larger subunit that was subdivided in section 1.5 (e.g. "Subunit C part 1 of 2") then the subunit should first be subdivided into the number of parts using any existing administrative structure (e.g. neighbourhoods, blocks, zones) and then one of these subdivisions selected at random. It is within this selected subdivision that the segmentation should occur. Note that larger towns are often more likely to have maps at the local level, which can help tremendously with the segmentation.

Figure 1.1. Depiction of the steps required to create segments and select households within each segment of the EA Panel A: Example of a rural EA with approximately 85 households. Panel B: The EA is segmented into two segments of approximately equal size using natural lines of division. Panel C: One segment is randomly selected (by tossing a coin or drawing pieces of paper from a hat or bowl). Panel D: A walking route through the selected segment is identified that passes by all households in the segment; households are selected for the survey according to the selected sampling list (either List A or List B).



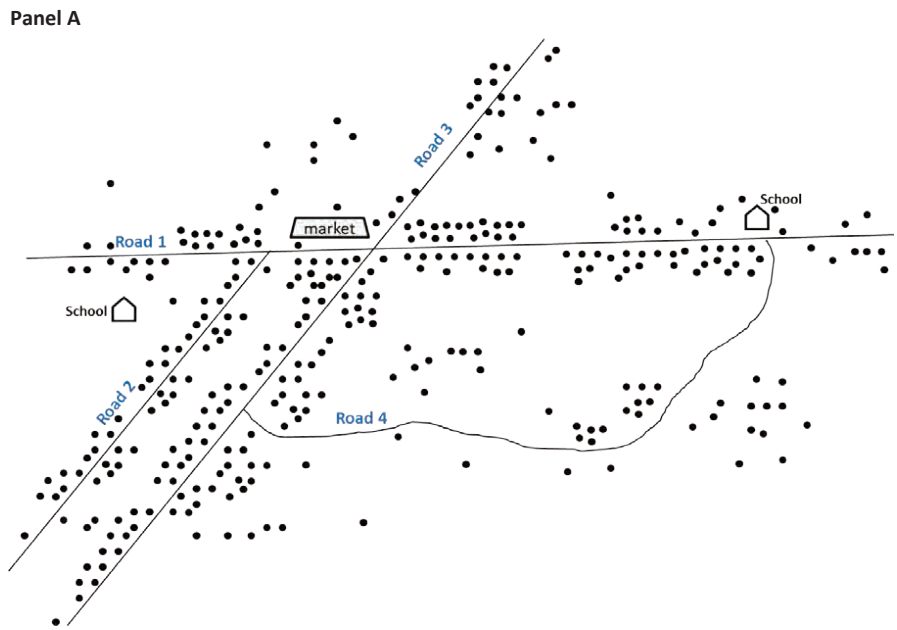
Example

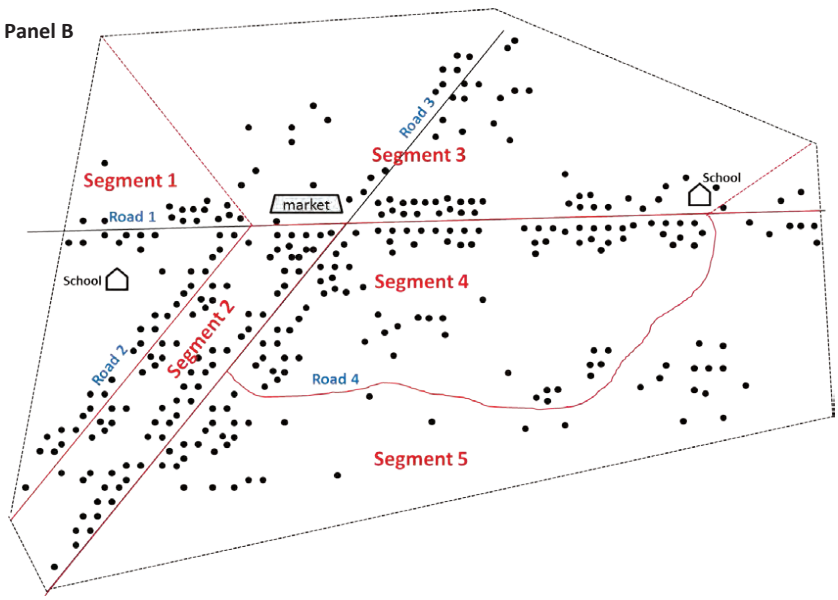
The town of Lenbe is expected to have 1336 households and for that reason it was subdivided into four parts in section 5, with each part listed on a separate line in the CSB tool (see example below); "Lenbe part 3 of 4" was selected as a subunit by the CSB. Upon arrival in Lenbe the team learns that it contains five well-defined neighbourhoods (A, B, C, D and E). Because Lenbe was originally subdivided into four parts during the coverage survey planning phase, the team considers each of these neighbourhoods to be a part, pairing the two smallest neighborhoods (D and E), and then randomly selects one of these neighbourhoods to serve as "Lenbe part 3 of 4" – that is, the selected subunit. The team writes the neighbourhood names A, B, C and D+E onto slips of paper and places them into a hat. Neighbourhood A is randomly selected, which means that the part of Lenbe that corresponds with neighbourhood A will serve as the selected subunit. The team then visits neighbourhood A and divides it into the predetermined number of segments (seven in this example) of approximately equal size, from which one is randomly selected.

#	Subunit names	Estimated no. of households (from census)	No. of segments per subunit	Cumulative segments	Selected subunits
1	Lenbe part 1 of 4	334	7	7	
2	Lenbe part 2 of 4	334	7	14	
3	Lenbe part 3 of 4	334	7	21	1
4	Lenbe part 4 of 4	334	7	28	

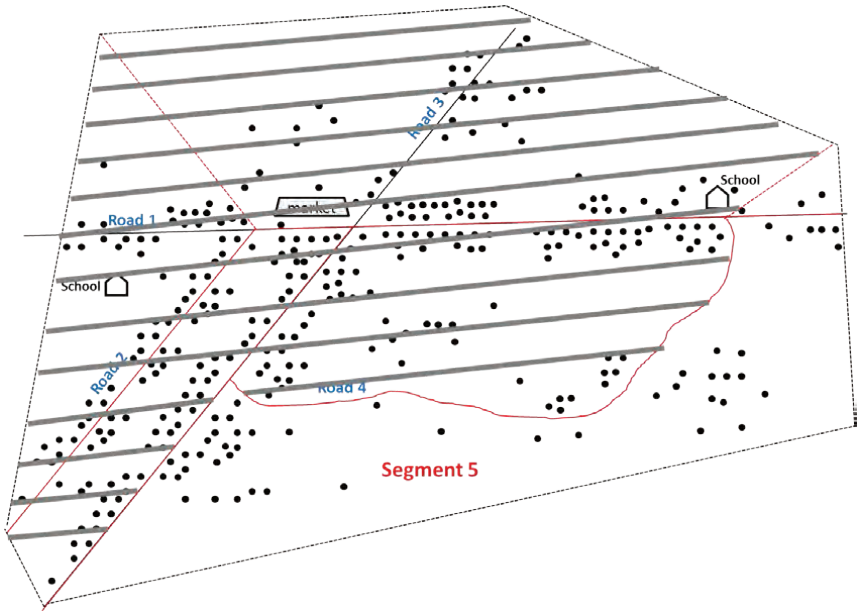
Figure 1.2 depicts an example of segmentation in a larger semi-urban EA.

Figure 1.2. Example of segmentation in a larger semi-urban EA Panel A: A sketch map of a semi-urban EA with ~270 households. Panel B: The EA is divided into five segments with approximately equal numbers of households using roads as the primary line of division between segments. Panel C: Segment 5 is randomly selected. Panel D: A walking route through segment 5 is identified that bypasses all households in the segment and households are selected for the survey according to the selected sampling list.

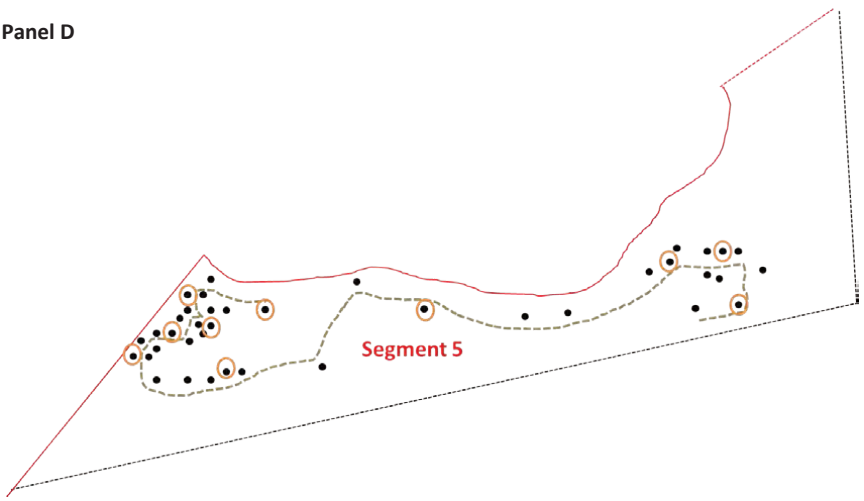




Panel C



Panel D



COMMON QUESTIONS

Does each segment need to have exactly the defined number of households?

No, it is **more important** that each segment have **approximately equal numbers of households** than it is for a segment to contain exactly the target segment size. In fact, because of rounding and errors with the population estimation, it is unlikely for any one segment to have exactly the defined number of households. For example, if the target segment size is set at 50 households, in practice in some subunits the segments may end up having closer to 40 households, while in other subunits they may have 60.

What if the same subunit is selected more than once by the CSB?

If a subunit is very large it may be selected more than once (see **Box 1.2**, **step 5**). In this case, the number of segments selected from the subunit should correspond to the number of times it was selected. Put a piece of paper into a hat or bowl for each segment in the subunit and then draw pieces of paper from the hat corresponding to the number of times the subunit was selected. The same segment may not be selected more than once.

Example

Suppose that **both** the 21st and 22nd selected segments come from the same subunit, which has 390 households. As with the previous example, the first step is to divide the subunit into equal subgroups. The subunit requires 390/50 = 8 segments. Because 8 is a lot of segments, it may take some time, and even require the aid of rough maps, to divide the subunit into roughly 8 equal parts. The next task is to randomly select the two segments from the eight segments, which will be the 21st and 22nd selected segments; this can be done by drawing numbers from a hat or bowl. The same segment may not be selected more than once.

How can segmentation be used in urban areas?

Segmenting urban areas can be easier than segmenting rural areas, as cities and towns are usually organized into blocks or some similar units. When using EAs, maps are usually available showing streets and blocks; if unavailable, these maps can be drawn by hand.

It is preferred to use EA rather than subunits in urban areas, because subunits may vary considerably in size. However, where reliable EA maps are not available for urban areas, hand drawn maps of subunits may be used.

2.2 Selecting households within selected segments

Once segments have been chosen among the sampled subunits, households will be selected within each sampled segment for inclusion in the coverage survey. A previously established sampling interval, automatically applied by the CSB, is used to determine which households in the segment are to be sampled in order to reach the expected sample size. The CSB will generate two lists (A and B) to facilitate the selection of households within the segment, according to the sampling interval. It is recommended that the Survey Coordinator generate these lists in advance using the CSB and give each survey team a laminated copy of lists A and B to carry with them in the field.

The survey teams should follow the steps outlined in **Box 1.4** to identify the households from which individuals will be surveyed.

Box 1.4. Selecting households within each segment

Step 1: Identify a route through the segment. The survey team should work with a local guide to identify a walking route that will pass by every house in the segment and determine which household will serve as the initial household.

Step 2: Select list A or B. Flip a coin to determine if List A or List B will be used.

List A	List B
0	4
5	9
10	14
15	19
20	24
25	29
30	34
35	39
40	44
45	50
50	55
56	60
61	65
66	70
71	75
76	80

Step 3: Follow the route through the segment and survey households according to the selected list. Starting with the initial household, enumerate households as you follow the predetermined route through the segment (ignoring any structures that are not households). If culturally acceptable, it is often helpful to number the door of each household with chalk. For each enumerated household that corresponds to a number on the selected list, stop and survey all members of the survey population who were living in the household at the time of the MDA (see section 8). Continue until the next number on the selected list is greater than the total number of households in the segment.

> Note: Lists A and B are intentionally made to be much longer than will be necessary for most segments. Since most segments are expected to have about 50 households, most survey teams will complete sampling in a given segment before they reach the end of the list. Once a segment is complete the teams should not attempt to enrol additional households in order to reach the end of List A or list B. Lists A and B are longer than necessary to account for the rare instances where the actual size of a selected segment is significantly greater than planned (e.g. has 80 households), which may be due to faulty census projections or a segmentation imbalance. In such instances it is important to have enough households in lists A and B so that the team can still apply the set sampling interval to all households in the segment even if it results in an unusually large sample size from that one segment.

Step 4: Sample two survey populations (only applies to integrated coverage evaluations). If your survey has two survey populations, lists A and B will have additional asterisks (*) by some of the numbers. These numbers correspond to the households in which survey population 1 (which should correspond to the smaller of the two survey populations (e.g. children aged 5–14 years) are sampled. Numbers with an asterisk correspond to those households in which individuals from both survey populations should be sampled (e.g. children aged 5–14 and everyone living in the household)

.../...

.../...

What if people live in compounds instead of households?

In some settings, such as sub-Saharan Africa, households may be grouped into compounds, which are more visible and easier to enumerate than households.

Example 1

Instead of sampling 1 in 4 households according to List A, the survey team could use the same List A to sample 1 in 4 compounds throughout the segment (assuming that the segment size is still based on the number of households – such as 50 households). Within each selected compound all members of the survey population who were living there during MDA would be surveyed.

Example 2

Suppose the CSB generates lists A and B (shown on the previous page) for this coverage survey (right). In addition, suppose that the survey team has already randomly selected a single segment within the subunit (see section 6) and identified a route through the selected segment that will pass by each house (Step 1). At this point a team member flips a coin and selects List A. The survey team then walks the predetermined route through the selected segment, counting each household they pass. The team does nothing except to count (or label with chalk) the 1st, 2nd, 3rd and 4th households they pass. When they arrive at the 5th household, the team stops to interview **all members** of the survey population living in the household because this is the first household number on the selected List A (the starting "0" on List A can be ignored, as there is no "0th" house). Having finished all interviews in the 5th household, the team then continues counting each house along the predetermined route (e.g. 6th, 7th, 8th) until they arrive at the 10th household, the next on List A. Once again the team stops and interviews all members of the survey population living in the household. This process continues until the team reaches the last household in the segment; for the sake of example, suppose this corresponds with the 47th household. **At this point the team stops because they have visited each house in the segment, even though List A has additional numbers**. The sampling is considered complete for that segment and the team may travel on to the next selected subunit.

2.3 Interviewing selected individuals

All household members living in the selected house or compound who are part of the survey population (the predetermined age group that is the focus of the coverage evaluation survey) should be interviewed. Information for young children (aged < 10 years) may be collected from their primary caregivers or from the children themselves. In surveys where children were treated through schools, it may be appropriate to ask only the children directly.

Questionnaire

A sample questionnaire is attached as **Annex 1 (Appendix 1)**. This questionnaire contains the minimum information required to assess MDA coverage. It is important to ask whether people were offered the medicines (this provides a measure of the programme's ability to reach the population) and whether they swallowed the medicines (this provides an estimate of the coverage of preventive chemotherapy). The survey coordinator may choose to add additional questions including: incidence of side-effects; knowledge, attitudes and practices of the population; socioeconomic status, NTD-related morbidity; household status of water, sanitation and hygiene; or other indicators for which a population-based statistically valid answer is desired. The questionnaire should be tested locally before use and back-translated from any local language to ensure consistency.

Electronic data collection

Collection of electronic data via handheld mobile devices is a viable alternative to the paper-based questionnaire. Electronic data collection often incorporates built-in error-checking, which can help to minimize errors in data entry and tabulation. It is also helpful for instituting skip patterns and saving paper. A disadvantage is that it may be harder for supervisors to review questionnaires completed electronically, particularly if the data are sent to the cloud as soon as the interview is completed. Use of an electronic data capture device does not change the recommended survey sampling methodology described above.

Households with no members of the survey population

If there is no member of the survey population in the selected household, or if the entire household is absent and not expected to return later in the day, proceed to the next selected household. A replacement household is not needed; the sample size was inflated to account for non-response (**Box 1.1, step 5**).

Absent individuals

If an adult (aged ≥ 10 years) survey respondent is absent but expected to return later in that day, the survey team should try to revisit the household. If the survey respondent is not expected to return, or is absent upon the revisit, then the survey team should try to reach the individual via mobile phone. If this is not possible, another adult in the household may serve as a proxy respondent and answer on behalf of the absent individual. If a child aged > 10 years is absent but expected to return later that day, the survey team should make an attempt to revisit the household, or to visit the school that the child attends; however, a primary caregiver can answer on the child's behalf.

Integrated assessment

For integrated coverage surveys with multiple survey populations, it is recommended that a separate form be used for each survey population. The sampler (person in charge of sampling) on the team should use the selected list (either List A or List B) to know in which households survey population 1 is interviewed (e.g. households with no asterisk) and in which households both survey populations 1 and 2 are interviewed (e.g. households with an asterisk). In households where both survey populations are to be interviewed, some individuals may fall into both populations; these individuals will be interviewed twice, once for each drug package.

3. Interpretation and action

3.1 Analyse and interpret the results

Once data collection is complete, the results should be compiled to assess surveyed coverage. While there are many reasons for conducting a coverage evaluation, the two main objectives are (i) t**o estimate the preventive chemotherapy survey coverage** and determine whether it exceeds the target coverage threshold, and (ii) **to validate the reported programme (or administrative) coverage**.

Given the use of cluster sampling, as opposed to a simple random sample of population members (which is not operationally feasible), it is not possible to calculate the confidence intervals around each estimate by hand. Instead, a data entry form and simple website have been developed to facilitate the confidence interval calculations.

The CSB provides the user with a "Results Entry Form" (also shown in **Annex 1 (Appendix 2)**). Enter the summary information for each selected segment; that is, the total number of people interviewed from that segment, the number of people who reported being offered the medicines and the number of people who reported swallowing them. The information for each segment should be entered in the order in which it was selected from the CSB (that is, in geographical order). Complete a separate Results Entry Form for each medicine assessed. **Do not** modify this form by adding rows or columns. Once your information has been entered, save each Results Entry Form as a csv file (separate files should be created for each medicine). This information can then be uploaded directly into the online coverage survey analysis tool (CSAT).[1] Headings should not deleted from the CSB files. Verify that the information has uploaded correctly into the web tool (alternatively, enter the information directly into the web tool by hand) and click, "calculate". The programme will then return the estimate for the **surveyed coverage** and the **programme reach** along with the corresponding 95% confidence intervals and design effects.

1. http://coverage.securedatakit.com

Estimating preventive chemotherapy survey coverage

The data gathered in the survey can be used to estimate the true coverage of preventive chemotherapy. Because the survey methodology employed produces an equal probability sample, sample estimates can be calculated without the use of sample weights. The estimated coverage can be calculated as follows:

$$\text{Surveyed coverage} = \frac{\text{[No. of "yes" responses to having swallowed the medicine]}}{\text{[Total no. of people surveyed]}}$$

Interpretation: If the surveyed coverage falls below the target coverage threshold (**Table 1.2**), it is evidence that the MDA needs improvement. If the surveyed coverage exceeds the target coverage threshold (e.g. at least 10 percentage points greater than the threshold), then it is evidence that the MDA was successful and the programme is functioning well. When the surveyed coverage is near the target coverage threshold (e.g. < 10 percentage points above the threshold), visual inspection alone is not sufficient to conclude that the margin of error around the surveyed coverage is greater than the target coverage threshold. In such instances, the lower **95% confidence interval** of the surveyed coverage should be compared with the target coverage threshold (**Table 1.3**) to determine whether the true coverage of preventive chemotherapy is likely to have exceeded the target coverage threshold. This lower 95% confidence interval will automatically be calculated by the CSAT.[1] The surveyed coverage is a measure of both the reach of the programme and the compliance of individuals with MDA. If the lower 95% confidence interval of the surveyed coverage is below the target coverage threshold (see section 3.2 for next steps).

Example

Suppose the surveyed coverage for azithromycin is 82%, while the target coverage threshold for trachoma is 80%. Because the surveyed coverage is only slightly greater than the target coverage threshold (< 10 percentage points), the data are entered into the online Coverage Analysis Tool to determine the lower confidence interval. Suppose the online tool returns a lower confidence interval (77%). This means it is likely that the true coverage could be as low as 77%. Because 77% is less than the target coverage threshold (80%), the MDA is not considered to have achieved effective coverage and improvements to the MDA are needed.

Programme reach

By collecting information on whether or not an individual was offered the drug package(s), it is possible to determine how well the programme was able to reach the population. The coverage of programme reach can be calculated as follows:

$$\text{Programme reach} = \frac{\text{[Number of "yes" responses to having been offered the medicine]}}{\text{[Total number of people surveyed]}}$$

1. http://coverage.securedatakit.com

Interpretation: Programme reach is an indicator of the proportion of the population in the survey area that has the opportunity to participate in MDA. Low programme reach could be an indicator of supply chain difficulties, community drug distributor challenges or inadequate social mobilization. By comparing the surveyed coverage with the programme reach, it is possible to isolate the rate of individual compliance with MDA.

Validation of reported coverage

The surveyed coverage is expected to be an unbiased estimate of the true coverage of preventive chemotherapy in the survey population.[1] As a result, the surveyed coverage can be compared with the reported coverage: if the two figures are *similar* then the reported coverage can be considered validated; if the two figures are *different* then the reported coverage is not validated. However, what constitutes "similar" vs "different" can be subjective. A more objective way of validating the reported coverage is to calculate the 95% confidence interval around the surveyed coverage, based on the survey data, and determine whether the reported coverage falls within this confidence interval around the surveyed coverage.

Example

The reported coverage is 85% and the estimated coverage based on the survey data is 71%, with a 95% confidence interval (66%, 76%). Because the reported coverage falls outside this confidence interval, the reported coverage has not been validated by the survey results.

Interpretation: Is the reported coverage similar to the surveyed coverage? Or is the reported coverage contained within the 95% confidence interval around the surveyed coverage? If it is, then the reported coverage is said to be "validated" – meaning that the reporting system is working as desired and the reported coverage estimates can be relied on to determine whether the programme is meeting the target coverage threshold. If the reported coverage is very different from the surveyed coverage or, alternatively, if it falls outside the 95% confidence interval around the surveyed coverage, then the reported coverage is not validated. Further investigation into the reporting system, with tools such as the Data Quality Self-Assessment, may be required to understand where the inaccuracies are occurring.

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1. Assuming that any errors in respondents' ability to correctly recall whether or not they swallowed the medicine are independent of true coverage.

3.2 Convert the results into programmatic action

An integral part of a coverage survey is the development of an action plan (**Annex 1 (Appendix 3)**). The action plan helps programmes to convert the results of a coverage evaluation survey into concrete steps to improve coverage and reporting. It should be developed collaboratively with the national NTD programme and the health ministry. The national programme may then collaborate with its partners to operationalize the action plan.

It is strongly recommended that a **stakeholders meeting** be convened to share the coverage survey results and discuss the programmatic actions that will be taken in response. The action plan should be implemented before or during the next round of MDA, as applicable.

Table 1.4 is intended to help users in developing their own action plan. It lists the possible findings that can occur when the surveyed coverage is compared with both the target coverage threshold and the reported coverage. The table provides potential causes to investigate and corrective actions that can be taken.

Table 1.4. Interpreting and following up reported and surveyed coverage results

Finding or observation	Potential causes to investigate	Corrective action
1. Comparison of surveyed coverage with target coverage threshold: To better estimate coverage where there is reason to believe routine reporting is incorrect		
Surveyed coverage is below the target coverage threshold[a]	Check the coverage in the different sub-populations to determine whether any particular group is being left out or has lower than average coverage (e.g. males vs females, SAC, particular sub-districts, ethnic minorities)	Develop and implement targeted social mobilization as required Investigate the reasons why the sub-populations are not adequately covered and make the appropriate change in MDA strategy or platform to reach the sub-populations Consider using Independent Monitoring or the SCT (see **module 3**) with MDA mop-up during the next round to improve coverage
	Check the reasons for why the eligible population was **not offered** the medicine Check the reasons for why the eligible population did not **swallow** the medicine	Tailor corrective action according to reasons given which include strengthening: • drug supply chain; • social mobilization and information and education campaigns (look at reasons given by those who did swallow the medicine) • drug delivery platform used • training, supervision and motivation of drug distributors • communication on adverse events • capacity of national and/or district level staff
Surveyed coverage is **above** the target coverage threshold[b]	Communities and drug distributors are motivated and the programme is functioning well	Congratulate your teams. Sustain programme momentum for the next year to maintain coverage levels
2. Comparison of surveyed coverage with reported coverage: To check if the data reporting system is working well		
Reported coverage is much higher than surveyed coverage[c] (i.e. routine reporting is likely overestimating true coverage)	Drug distributors are incorrectly reporting on ingestion of the medicines	Conduct a data quality self-assessment or DQA (see **module 2**) to diagnose where the data reporting system is breaking down Improve the skills and motivation of drug distributors through better training and supervision; consider use of mHealth technologies Make improvements to the tally sheets and/or registers used
	The total population figure (e.g. the denominator) is incorrect or outdated, or people from outside the survey area are also taking the medicines and are being included in the total treatment tallies	Determine if more accurate population estimates or projections are available and apply a correction factor to routine coverage estimates as appropriate Ask the drug distributors to record and report non-resident individuals ingesting the medicines separately and do not include them in the numerator for calculating PC coverage
Reported coverage is much lower than surveyed coverage[d] (i.e. routine reporting is likely underestimating true coverage)	Data are not being correctly aggregated or reported	Conduct a Data Quality Self-Assessment or Data Quality Assessment[f] to diagnose where the data reporting system is breaking down
Reported coverage and surveyed coverage are similar[e]	A good reporting system is in place	Congratulate your teams. Continue using the current reporting system, with increased confidence that it provides a good estimate of PC coverage. Less expenditure in future surveys (at least for the current survey area) is required.

Finding or observation	Potential causes to investigate	Corrective action
3. Comparison of surveyed coverage with programme reach: To assess compliance with and success of the programme's social mobilization and communication strategy		
Surveyed coverage is **less** than programme reach	Check the reasons given for why individuals who were offered the medicine did not swallow it	Improved information and education campaigns may be needed before the next round to increase compliance
Surveyed coverage is **greater** than programme reach	There may be a problem with the coverage survey data. Check whether the survey team implemented the questionnaire correctly; recount results and check for arithmetical errors	Greater training may be needed to make sure the survey team correctly understands the difference between being *offered* the medicine(s) and *swallowing* the medicines and that this difference is conveyed correctly to the respondents
Surveyed coverage is close to or **equal** to programme reach	Compliance is high	Congratulate the teams. Continue with the current information and education campaigns, as they appear to be working

CI, confidence interval; MDA, mass drug administration; PC, preventive chemotherapy; SAC, school-age children

a Applies to situations in which either the surveyed coverage is below the target coverage threshold or the lower 95% CI around the surveyed coverage is below the threshold.
b Applies when the surveyed coverage, and the lower 95% CI around the surveyed coverage, both exceed the target coverage threshold.
c A more objective approach is to see if reported coverage is *greater than* the 95% CI around the surveyed coverage.
d A more objective approach is to see if reported coverage is *less than* the 95% CI around the surveyed coverage.
e A more objective approach is to see if reported coverage is *contained within* the 95% CI around the surveyed coverage.
f The DQA tool is available at: http://pdf.usaid.gov/pdf_docs/PA00JZS3.pdf

DATA QUALITY ASSESSMENTS (DQA)

Introduction

As the goals for control and elimination of NTDs endorsed by the World Health Assembly and published in the WHO roadmap[1] are fast approaching, national programmes must ensure that high-quality data are available and used effectively to make decisions. For example, data on preventive chemotherapy should be used to:

- identify and prioritize areas of low performance and design strategies to improve coverage;
- determine when it is appropriate to conduct an impact assessment such as a Transmission Assessment Survey or a Trachoma Impact Survey; and
- account for effective use of resources, such as medicines, funding and human resources.

Uses of data quality assessments

A data quality assessment (DQA) is a resource available to national programmes and their partners to assess the quality of reported data on preventive chemotherapy as well as the underlying reporting system that generates that data, and facilitate evidence-based actions to improve their quality where necessary.

Data quality assessments assess the quality of reported data and the reporting system, and facilitate action to improve their quality.

The quality of data is measured to incorporate seven dimensions, as outlined in Table 2.1.

WHO recommends that the data flow in a pathway similar to that shown in Figure 2.1, while recognizing that the specific path and administrative levels will vary by country. Because challenges to maintaining a high quality of data arise at every point along the pathway, the DQA allows national programmes to assess the data at each level, and thereby to identify any bottlenecks or challenges at any specific level.

1. Accelerating work to overcome the global impact of neglected tropical diseases: a roadmap for implementation. Geneva: World Health Organization; 2012 (http://www.who.int/neglected_diseases/NTD_RoadMap_2012_Fullversion.pdf, accessed February 2019).

The methods used in the DQA include:

1) Review of national programme data management system design
2) Data collection and review at multiple levels of reporting system/pathway
    a. Review of available historical data
    b. Review of availability, completeness and timeliness of reporting
    c. Data verification
    d. Systems assessment through key informant interviews
3) Development and operationalization of action plan

Table 2.1. Dimensions of data quality[1]

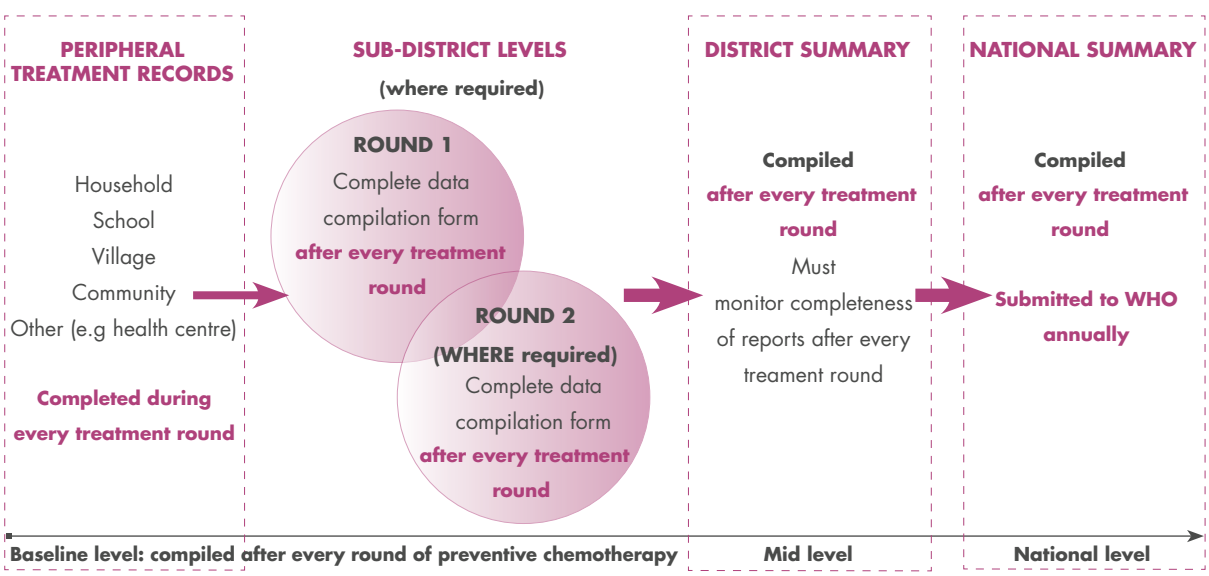
Dimension	Definition
Accuracy	Valid, correct, minimal errors; measures what it is intended to measure
Reliability	Collected through consistent procedures and protocols
Precision	Has sufficient and appropriate detail
Completeness	Inclusive without omissions, or a proportion of expected reports that are actually received
Timeliness	Reported by an established deadline
Integrity	Free from deliberate bias or manipulation throughout the system
Confidentiality	Managed according to protection, country ownership and standards of use

1. Adapted from: Improving data quality: a guide for developing countries. Geneva: World Health Organization; 2003 (http://apps.who.int/iris/bitstream/10665/206974/1/9290610506_eng.pdf, accessed February 2019); Routine data quality assessment (RDQA) curriculum materials. USAID and Measure Evaluation; [undated] (http://www.cpc.unc.edu/measure/resources/tools/monitoring-evaluation-systems/data-quality-assurance-tools/data-quality-assurance-workshop/session-1-what-is-data-quality, accessed February 2019); and Data quality audit tool: guidelines for implementation. Washington (DC): United States Agency for International Development; 2008 (http://www.cpc.unc.edu/measure/resources/tools/monitoring-evaluation-systems/data-quality-assurance-tools/dqa-auditing-tool-implentation-guidelines.pdf, accessed February 2019).

The primary outputs of the DQA include:

1) **A flow diagram** of the national system for reporting data on preventive chemotherapy, including the data collection and information management tools used, across all levels.
2) **Graphs and tables** indicating aspects of data quality at all levels, including:
   a. Trends in historical reported data
   b. Availability, completeness and timeliness of reporting
   c. Verification factor: a ratio that measures the accuracy of data reported through the system, as defined as the recounted value of assessed indicators compared with the reported value, in order to highlight discrepancies between the verified and reported data
   d. Strengths and weaknesses of data reporting system.
3) **A report** summarizing DQA activities, and strengths, weaknesses and observations around data quality and the reporting system.
4) **An action plan** with defined actions, individuals responsible, timelines and steps for monitoring.

Figure 2.1. Recommended pathway for preventive chemotherapy data flow[1]



1. Monitoring drug coverage for preventive chemotherapy. Geneva: World Health Organization; 2010 (http://apps.who.int/iris/bitstream/10665/44400/1/9789241599993_eng.pdf, accessed February 2019).

Overview of DQA steps

A DQA can be a valuable resource for national NTD programmes and their partners to better understand the quality of data on preventive chemotherapy and the system that generates that data. This guide describes in detail the steps that should be taken to implement a DQA. These steps are summarized below, with references to the later sections where more detail is provided.

1. Plan for the DQA (see section 1)
   a) Decide where and when to conduct a DQA.
   b) Obtain authorization from the relevant national authorities.
   c) Determine who will be part of the DQA team.
   d) Decide which indicators to assess.
   e) Obtain sufficient materials.
2. Conduct review of national programme data management system design (see section 1.2)
3. Tailor DQA tool to country context. This would include tailoring the names of the specific levels (e.g. SDP = village), indicating the data sources (e.g. tally sheet or register) and changing any questions to be more applicable to the country.
4. Train DQA team members. This training should include a theoretical component, implemented in a classroom, and a practical component, implemented in a nearby community to ensure hands-on activity before deploying teams to the field.
5. Collect and review data at national level (see section 2). This includes review of available historical data, review of availability, completeness and timeliness of reporting, data verification, and a systems assessment through key informant interviews. In addition, collect inputs for action plan.
6. Travel to selected sub-national DQA sites.
7. Collect and review data at intermediate aggregation levels (see section 2). This includes review of available historical data, review of availability, completeness and timeliness of reporting, data verification, and a systems assessment through key informant interviews. In addition, collect inputs for action plan.

8. **Collect and review data at service delivery points** (see section 2). This includes review of available historical data, review of availability, completeness and timeliness of reporting, data verification, and a systems assessment through key informant interviews. In addition, collect inputs for action plan.
9. **Debrief DQA team at national level**.
10. **Prepare draft report and action plan; DQA team** (see section 3).
11. **Present draft report and Action Plan to stakeholders, then finalize the report to include inputs and feedback from all stakeholders. Disseminate DQA findings, particularly functionaries of the NTD management information system at sub-national levels** (see section 3).
12. **Action DQA findings for next MDA, and monitor outcomes of actions** (see section 3).

A sample data collection and review process is shown in **Figure 2.2**; the DQA steps are summarized in **Figure 2.3**.

Figure 2.2. Summary example of process for DQA data collection and review

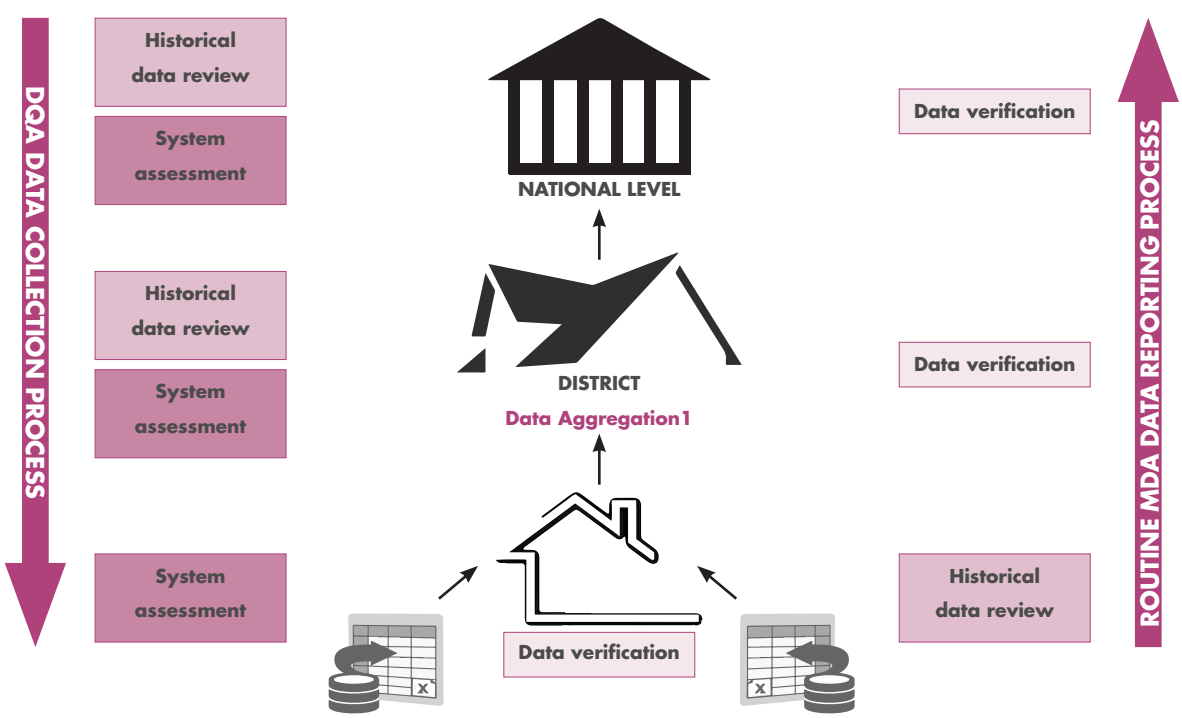


Figure 2.3. Summary of key steps for DQA for preventive chemotherapy

Planning (see section 1)	1. Plan for DQA 2. Conduct review of national programme preventive chemotherapy data management system design 3. Tailor DQA tool to country context 4. Train DQA team members
Implementation (see section 2)	1. Data collection and review at national level: Review historical data, review availability, completeness and timeliness of reporting, data verification, and systems assessment 2. Data collection and review at intermediate aggregation levels: Review historical data, review availability, completeness and timeliness of reporting, data verification, and systems assessment 3. Data collection and review at service delivery points: Review historical data, review availability, completeness and timeless of reporting, data verification, and systems assessment
Interpretation and action (see section 3)	1. Debrief DQA team 2. Develop draft report and action plan 3. Present report and action plan to stakeholders and finalize 4. Action DQA findings

1. Planning

1.1 Preparation and logistics

Where should a DQA be conducted?

Determine how many sites the DQA should assess

After determining the district(s) where the DQA will be conducted, you will need to determine how many sites to select within each district. A key objective of this DQA is to gain an understanding of the quality of the data that the NTD programme collects and reports. This most likely does not require a statistically reliable estimate of accuracy. Approximately 12 service delivery points (SDPs) are sufficient for a DQA. However, a larger number of SDPs can be selected depending on available resources and purpose of the DQA. A multi-stage cluster sampling approach will be employed to select the required sites. The number of stages will depend on the number of data aggregation levels within a country, as described by the various scenarios below.

Scenario 1: No intermediate data aggregation level. In cases where data from SDPs are sent directly to the national level without any intermediate aggregation level, districts will serve as the primary sampling units. In this case four districts will be selected with three SDPs per district, giving a total of 12 SDPs.

Scenario 2: One intermediate data aggregation level. For example, data are first collected in communities (SDPs), then sent to the district for aggregation (IAL 1), then to the national level.

Where there is only one intermediate data aggregation level, the selection should follow the same procedure as explained under scenario 1.

Scenario 3: Two intermediate data aggregation levels. For example, data are first collected in communities (SDPs), then sent to a health facility for aggregation (IAL 1), then to the district for additional aggregation (IAL 2), then to the national level.

Where there are two intermediate data aggregation levels, two primary sampling units (PSUs) then two secondary sampling units (SSUs) will be selected from each of the PSU. Three SDPs should then be selected from each SSU.

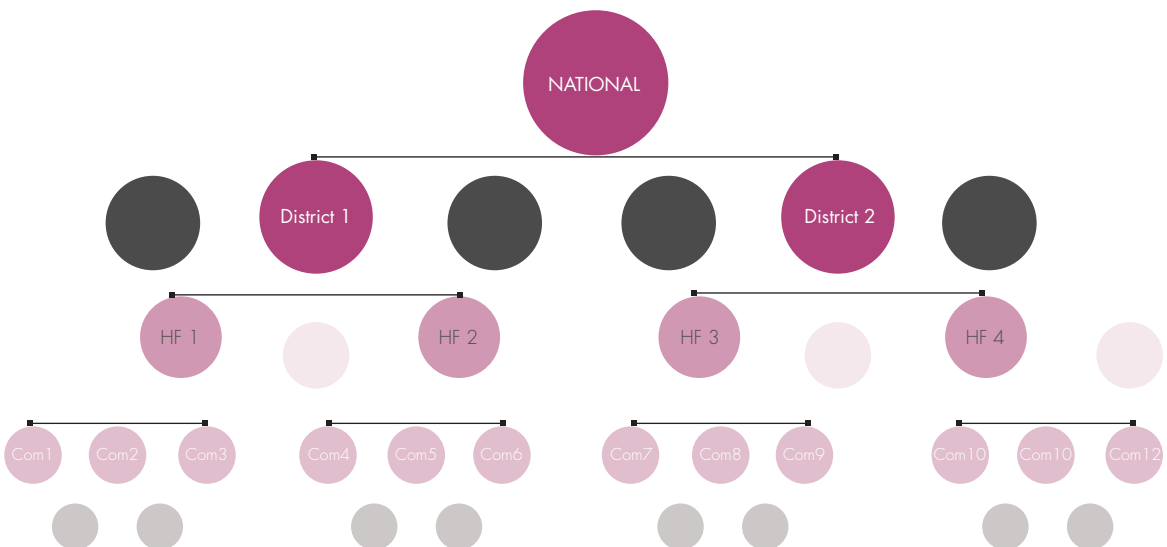
Scenario 4: Three intermediate data aggregation levels. For example, data are first collected in communities (SDPs), then sent to a health facility for aggregation (IAL 1), then to the district for additional aggregation (IAL 2), then to the region for additional aggregation (IAL 3), then to the national level.

Where there are three intermediate data aggregation levels, the selection will include two PSUs, one SSU from each PSU, two tertiary sampling units (TSUs) from each SSU and three SDPs from each TSU.

Scenario 5: Four intermediate data aggregation levels. Where there are four intermediate data aggregation levels, select two PSUs, one SSU from each PSU, one TSU from each SSU, and two units from the lowest level of data aggregation. Three SDPs should then be selected from each of the lowest data aggregation level units.

Figure 2.4 shows a typical case of DQA site selection for a country with two intermediate data aggregation levels.

Figure 2.4. Site selection example for two intermediate aggregation levels. In this example, data flow from communities to health facilities to districts to the national level. The community is the Service Delivery Point (SDP), the health facility is Intermediate Aggregation Level 1, and the district is Intermediate Aggregation Level 2.
This example has six districts, two of which have been selected as the primary sampling unit (PSU) through probability proportionate to estimate size (PPES). Four health facilities (two in each district) have been selected as secondary sampling units (SSUs), and 12 communities (three in each health facility catchment area) have been selected as service delivery points (SDPs). The lighter-shaded areas show aggregation levels and service delivery points that were not selected for this DQA.



HF, health facility; Com, community service delivery point

Table 2.2 summarizes the possible scenarios for selecting DQA sites.

Select the districts where the DQA should be conducted

The first step to determining the districts in which a DQA should be conducted is to determine the aim of that DQA, as outlined in Table 2.3.

You might decide to select just one district, in which case all the sub-district aggregation sites and 12 SDPs would be selected from that district. Alternatively, you could select multiple districts, if you want to understand the data quality in multiple districts. If you select two or three districts, the 12 SDPs could be spread across those districts. Or you could sample to get 12 SDPs in each district; this will take longer and have larger budgetary implications, and so resources should be taken into consideration when making this decision. Separate DQA Excel files will also be required for each district.

Select the sub-district sites where the DQA should be conducted

These sites should be randomly selected using probability proportionate to estimated size (PPES), as described in Annex 4.

Table 2.2. Possible scenarios for selecting DQA sites

Intermediate data aggregation levels	SDPs	PSU	SSU	TSU1	TSU2
None	12	4	–	–	–
One	12	4	–	–	–
Two	12	2	2 x 2 = 4	–	–
Three	12	2	1 x 2 = 2	2 x 2 = 4	–
Four	12	1	1 x 2 = 2	1 x 2 = 2	2 x 2 = 4

PSU, primary sampling unit; SDP, service delivery point; SSU, secondary sampling unit; TSU, tertiary sampling unit

Inform relevant authorities and obtain authorization

Authorization must be obtained from relevant authorities, such as national, regional, district and village, for the sites selected for the DQA. Authorization from national authorities is essential. It is advised to do this ahead of implementation. It may be necessary to conduct courtesy visits or discussions with sub-national level authorities during field implementation. Field experience has shown that obtaining authorization ahead of the DQA, introducing the team while in the field before data are collected at the appropriate sites and debriefing each administrative level after data collection adds value in terms of buy-in for the activity and operationalization of the DQA recommendations.

During the pre-implementation authorization calls and visits, it is also helpful to inform the relevant authorities of what will be asked from them during the implemention period. For example, they should be advised that the individuals responsible for data management and reporting will need to be available to answer the systems assesment questions and that reports received from the lower level will need to be available for recounting.

Ethical considerations

The DQA should be conducted with, and fully adhere to, the ethical standards of the country. While the DQA team will require access to treatment records in order to recount and cross-check reported results, the assessment team should neither photocopy nor

Table 2.3. Guidance on selecting districts in which to conduct DQA

Aim	District selection	Key remarks
Identify and address causes of poor data quality in known or suspected poorly performing districts	Purposive selection based on districts concerned about data quality issues (e.g. coverage evaluation survey after MDA showed large disrepancy between reported and surveyed coverage)	Results will only be representative of sampled districts, although lessons learnt may apply to other districts.
Understand quality of data in area(s) supported by a specific partner	Random selection of districts in partner-supported area using PPES	Results will only be representative of partner-supported area, although lessons learnt may apply to other districts.
Acquire representative understanding of data quality strengths and weaknesses across the country	Random selection using PPES	May be difficult to get a true representative sample for the entire country, as data quality may vary substantially both across and within districts.
Gain basic understanding of data quality strengths and weaknesses across the country	Implement part or all of DQA steps in routine supportive supervision across all districts	Results will only be representative of the districts visited through supportive supervision, although lessons learnt may apply to other districts.

DQA, data quality assessment; MDA, mass drug administration; PPES, probability proportionate to estimated size

remove documents from any of the sites. In addition, the team shall not accept or solicit directly or indirectly anything of economic value as a gift, gratuity, favour, entertainment or loan that is or may appear to be designed in any manner to influence official conduct, particularly from one who has interests that might be substantially affected by the performance or nonperformance of the assessment team's duty. This provision does not prohibit the acceptance of food and refreshments of insignificant value on infrequent occasions in the ordinary course of a meeting.

When should a DQA be conducted?

A DQA should be conducted as soon as possible after all of the data on preventive chemotherapy have been reported through the routine national reporting channels. It is important to avoid, to the extent possible, conducting a DQA on anything other than the most recently completed MDA. For example, if a DQA is planned in June to assess the MDA of lymphatic filariasis conducted in March, but an MDA of trachoma occurred in the same areas in May, respondents may confuse their responses from both MDAs. The DQA should also be conducted well in advance of any planning for the next MDA, so that the results from the DQA can be used to inform the strategy and activities in the next MDA cycle.

A full DQA may be conducted every 2–3 years. Field experience has also shown the value of conducting components of the DQA as part of supportive supervision more frequently. In addition, some national programmes have found it valuable to conduct a DQA every 2 years, resources permitting.

Who should conduct a DQA?

Experience from field testing has shown that it is beneficial to have representatives from multiple organizations on the DQA teams, including the Ministry of Health in a leading role, NTD partners, and technical officers of the WHO country office. This ensures both ownership of the findings as well as accountability across the stakeholders. Staff from the health ministry may include programme officers from the national, regional and/or district level.

Each team should have at least two individuals, one of whom speaks the local language and can conduct the systems assessment interview. Ideally, two people would be involved in the systems assessment, since the interpretation of the interview can be subjective and it is valuable to discuss. It is important also that someone other than the key informant's supervisor conducts the interview, so as not to bias the results. Two people should be involved in reviewing and verifying the data, in order to ensure that the data are verified accurately. Field experience has shown that individuals with strong eyesight and basic skills with mathematics (e.g. counting, addition, subtraction) should be involved in reviewing and verifying the data.

At least two individuals should be part of each DQA team, although more may be valuable. The optimal size for each team is four: two for systems assessment and two for data verification.

Select indicators to be assessed in DQA data verification

The organization or country commissioning the DQA should decide which indicators should be reviewed for data verification. These indicators will be recounted for comparison with what was reported.

The indicators selected must therefore be captured in the national programme tools used at every level.

The same indicators should be assessed at all sites. Some areas, however, may not be endemic for NTDs or have received treatment for the disease under review; in this case, the assessment will be done only for those indicators applicable to the selected sites. Different indicators may be selected for the next DQA.

Determine which indicators should be assessed for data verification

The specific indicators to assess in the DQA should be determined based on the data concerns of that organization or country. Table 2.4 lists some potential concerns and the relevant indicators that could be assessed.

The decision to assess reported treatments by disease or drug package will be determined based on the national reporting forms. For example, if data are recorded and aggregated according to drug package (e.g. ivermectin plus albendazole), the DQA can focus on the medicines or the drug package; if by disease (e.g. lymphatic filariasis), then focus is on each disease in formation.

Table 2.4. Potential concerns and relevant indicators to assess through DQA

Potential concern	Indicator to assess
Reported treatment values for a particular disease or drug package	No. of people treated for that disease or drug package
Quality of gender-disaggregated data	No. of females treated, or no. of males treated, for a specific disease or drug package
Quality of age-disaggregated data	No. of preschool-age children treated, or no. of school-age children treated, for a specific disease or drug package
Misreporting of medicines administered	No. of tablets administered, for a specific medicine
Lack of reporting of SAEs	No. of SAEs reported
Discrepancies between population estimates used as coverage denominator	Total population

SAE, severe adverse event

Identify how many indicators should be assessed for data verification

Typically, three to five indicators are assessed during the data verification step of DQAs. The number of indicators assessed will increase the complexity of the DQA, and therefore the time and resources that are required; thus, it is generally recommended that not more than five indicators are assessed.

It has been suggested, however, that provision could be made for many more indicators to be evaluated.[1]

Typically, 3–4 indicators are assessed during a DQA, with a maximum of 5.

Note: Each data collection sheet of the DQA tool has the capacity to assess five indicators. If the DQA will encompass more than five indicators, multiple Excel files will be required, and indicators should be organized by category (such as number of people treated for each disease in one tool, number of people targeted in another, and medicines wasted in a third).

What materials are required?

The materials required for planning, training, implementing, reporting and actioning a DQA are listed in Annex 1. National programmes should ensure that these materials are available in appropriate quantities before the planning phase.

Finalize field implementation plans

Before embarking on field travel, it will be necessary to ensure that you have made all the necessary arrangements for transportation, lodging and communication, and that you have sufficient materials. The following points should be noted.

Order of the sites to be visited

Reports prepared at lower levels are sometimes sent to the higher data aggregation level site with no copies remaining at the lower levels. To avoid situations where the team visits a site and has no reports for comparing the recounted figures, it is recommended to start by visiting the higher data aggregation levels (e.g. district) and then move systematically and sequentially to the lower levels until you reach the community. While at a higher data aggregation level, the team should record reported indicator values for the lower level sites to be assessed, so as to facilitate comparison between recounted and reported figures while at the lower level.

1. de Souza DK, Yirenkyi E, Otchere J, Biritwum N-K, Ameme DK, Sackey S et al. Assessing lymphatic filariasis data quality in endemic communities in Ghana, using the neglected tropical diseases data quality assessment tool for preventive chemotherapy. PLoS Negl Trop Dis. 2016;10: e0004590. doi:10.1371/journal.pntd.0004590.

Prior appointment with site contact persons

As much as possible, appointments should be made with the intended respondents or people who store data at the different levels before the visit is made. This will reduce non-response and minimize time that could arise from failure to meet the respondent at the expected locations. It is helpful to have the intended respondents assemble at a centralized point, such as a health facility, with their completed data capture and reporting tools, to review questions on data verification and systems assessment. This may have a budget implication as the respondents may require refunds for transportation.

Duration of DQA data collection

Field experience has shown that it typically takes a half to a full day to conduct the DQA activities at each site. Field data collection has typically taken 5–10 days per DQA; however, this can vary substantially depending on the number of teams, the number of sites visited, the distance between sites, the transportation required to get to sites, whether the DQA respondents are available when you arrive, and whether the records are available for data verification.

A sample schedule of DQA activities to be conducted at each site is presented in **Annex 1 (Appendix 8).**

A sample schedule and timeline for an entire DQA process is presented in **Annex 1 (Appendix 10)**.

1.2 Review of national programme preventive chemotherapy data management system design

An initial step of the DQA should be to **review the design of the national programme's data management system on preventive chemotherapy**. Team members can use this information to design the DQA; for example, to determine the reporting levels that are equivalent to SDPs and IALs, and which indicators may be appropriate for data verification. This review will also enable the team to understand better the strengths and weaknesses of the current system, which can inform the questions included in the systems assessment step of the DQA. The review may be conducted by one or two team members who would then share the results with the rest of the team. It should take place at the central level and in advance of the DQA to facilitate planning of the field visits.

Methods

- Desk review
- Key informant interviews

Possible data sources

- Templates for data collection/analysis/reporting tools for every level of the reporting system (paper and/or electronic)
- National programme documentation or standard operating procedures (SOPs) for data collection, data analysis, data storage, reporting, and use of data on preventive chemotherapy, including submission deadlines for treatment reports and any procedures to address late, incomplete, inaccurate, and/or missing reports

- Documentation of national programme definitions for indicators selected to be assessed for data verification during DQA
- Documentation or SOPs of staff roles for data collection/analysis/reporting at all levels; e.g. at each level:
  - position responsible for compiling data
  - position responsible for submitting data to the next level
  - position responsible for receiving reported data
  - position responsible for reviewing data (quality, programme performance, etc.) and providing feedback
  - position responsible for ensuring that data are used.
- Training curriculum that includes data collection/analysis/reporting/use; may be part of overall training curriculum on preventive chemotherapy
- Organazation chart (organigram) of national NTD programme staff, including monitoring and evaluation specialist and/or data manager
- Reports from any previous assessments related to data quality, including DQAs, post-MDA coverage evaluation surveys, supportive supervision, etc.
- Annual workplans and reports, focusing on any references to data quality and the reporting system
- Key informants, including
  - national programme:
    - NTD coordinator
    - Disease programme managers
    - Monitoring and evaluation specialist
    - Data manager
    - Ministry of Health Statistics bureau
  - in-country stakeholders, including:
    - WHO
    - Ministry of Education, if implementing preventive chemotherapy in schools
    - Nongovernmental organization partners
    - Donors

Steps

1. **Read through the data sources** that are available and identify which contain information related to data quality and the data reporting system.
2. **Pay special attention to any strengths and weaknesses** related to the quality of the data and the reporting system. Also note any previous recommendations, any follow-up taken on those recommendations, and whether those actions had any impact on strengthening quality.
3. **Answer the questions in Annex 1 (Appendix 6)** (also available in the DQA tool).
4. For any questions for which you do not have an answer, follow up with **key informant interview**(s) with at least one person from the Ministry of Health, and additional stakeholders as needed. Note their responses in the DQA tool.
5. **Create a data flow diagram of the national preventive chemotherapy data reporting system**, including the tools used, across all levels. See **Annex 5** for an example.
6. **List the strengths and weaknesses of the design of the system** that you have observed.

Outputs

- Data flow diagram
- List of observed strengths and weaknesses of design of national programme preventive chemotherapy data management system

2. Implementation

2.1 Review of available historical data

It is important to take advantage of the opportunity to review historical data. This allows the DQA team to observe trends in key data, such as how the number of persons treated, the total population and the reported coverage have changed over time. This is particularly valuable when interpreting coverage rates over time – have major changes resulted from fluctuations in the numerator? In the denominator? Many national programmes have indicated challenges in accurately estimating the population values used as the denominator when calculating coverage, so this is one step to help determine whether it is indeed a problem. The review also allows the team to examine the quality of data over time. In addition, this serves as an opportunity to strengthen the capacity of the DQA respondents to better understand and use the data.

This data review should be conducted at every site selected for the DQA.

The indicators selected for the review of historical data are not always the same as the indicators selected for the DQA. It is recommended to review MDA numerators (persons treated), denominators (persons at risk or targeted) and coverage for up to three diseases that can be assessed from the data accessible at the sites visited. For example, if a DQA is being done to assess a school-based MDA and the selected DQA indicators are persons treated with praziquantel, school-age children treated with albendazole and number of tablets used, the DQA team could choose to analyse the historical coverage data for MDA of schistosomiasis and soil-transmitted helminthiases during the preceding 3 years.

Methods

- Desk review at all selected DQA sites
- Key informant interviews at all selected DQA sites

Possible data sources

- Integrated NTD database or other national database (national level)
- Treatment reports for the past 3 years or more
- PC medicines inventory reports for the past 3 years or more
- Community drug distributor (CDD) registers/summary forms (SDP level)
- Population estimates from other programmes or sources (e.g. immunization, Ministry of Education, United Nations Population Division, CDD pre-MDA registration, etc.)
- Post-MDA coverage evaluation survey results
- Key informants, including the individual(s) responsible for compiling, reviewing and submitting data. For example, these may include:
  - national programme:
    - Monitoring and evaluation specialist
    - Data manager
    - National NTD coordinator
  - regional level (e.g. IAL 3):
    - Data manager
    - Regional focal person
  - district level (e.g. IAL 2):
    - Data manager
    - District focal person
  - health facility level (or other sub-district unit; e.g. IAL 1)
    - Nurse in-charge
    - CDD supervisor
  - village/community level/school (e.g. SDP):
    - CDD
    - CDD team leader
    - Teachers

Steps

1. Define which treatment indicators (numerators) you want to examine over time.

Suggestions include:

- number of persons treated for lymphatic filariasis
- number of persons treated for onchocerciasis
- number of school-age children treated for schistosomiasis
- number of school-age children treated for soil-transmitted helminthiases
- number of persons treated for trachoma

2. Review the consistency of the reported values of the treatment values (numerators) over the past 3 years or more.

   - Enter the values in the DQA worksheet. Comment in the worksheet on the following:
     - Do the numbers make sense? Are any increases consistent with population growth, or a change in implementation strategy?
     - Review the data for outliers. Is the value in one of the years substantially higher or lower than that in the others? If so, is there a reasonable explanation?
     - Review the data for inappropriate patterns. For example, is the same value reported two years in a row, suggesting duplicate data? Are there often numbers reported that end in 0 or 5, suggesting estimates rather than actual values?
     - If the data are stored electronically, do the values end in a decimal, indicating that an average percentage was applied rather than an actual value?
     - Compare the treatment values with the medicines inventory report. Do the treatment values align with the number of tablets used?
     - Compare reported treatment values across diseases. Do major differences make sense (e.g. known problems with one disease, or different eligible populations targeted)?

3. Review the consistency of the population values (denominators) over the past 3 or more years.

   - Enter the values in the DQA worksheet. Comment in the worksheet on the following:
     - What is the source of the denominator at each level?
     - Do the numbers make sense? Are any increases consistent with population growth?
     - Review the data for outliers. Is the value in one of the years substantially higher or lower than that in the others? If so, is there a reasonable explanation?
     - Review the data for inappropriate patterns. For example, is the same value reported two years in a row, suggesting duplicate data? Are there often numbers reported that end in 0 or 5?

- Compare these values with population estimates from other sources/programmes. Are there very large differences?
- Compare the denominator values used across diseases. Do any differences make sense (e.g. using total population versus school-age population as the denominator)?

4. Review the reported coverage over time in the past 3 or more years.
   - Enter the values in the DQA worksheet. Comment in the worksheet on the following:
     - Do the numbers make sense?
     - Review the data for outliers. Is the value in one of the years substantially higher or lower than that in the others? If so, is there a reasonable explanation?
     - Recalculate the reported coverage with population estimates from other sources/programmes, and compare. Does it make a very large difference in the interpretation of the coverage?
     - Are any coverage values greater than 100%?
     - Are any values less than the disease-specific threshold?
     - How do the reported values compare with any surveyed coverage values?
     - Compare reported coverage values across diseases. Do major differences make sense (e.g. known problems with one disease, or different eligible population targeted)?
5. Conduct key informant interview(s) with individual(s) responsible for compiling, reviewing and submitting data.
   - Ask the respondents the questions below and note their responses in the DQA tool.
     - Do the population estimates seem accurate to you?
     - How well has this area performed with regards to meeting the targets?

Outputs

- Graphs and tables showing trends over time.

2.2 Review of availability, completeness and timeliness of reporting

This section examines the availability, completeness and timeliness of the data reported. These are three important dimensions of data quality. In order to be used effectively for decision-making, all of the data should be available for analysis, complete to understand, and submitted on time so that corrective actions can be taken promptly.

It will be important for the DQA team to define these three indicators; additional details are given below.

This data review should be conducted at every site selected for the DQA.

Methods

- Desk review

Possible data sources

- Treatment reports for the last MDA under assessment
- CDD registers or tally sheets (SDP level)

Steps

1. As a DQA team, define "available", "complete" and "timely" for the purposes of the DQA. Record these definitions in the DQA tool. For example, you might consider:
   a) If a report is submitted in a format different to that of the template used by the national NTD programme, will this be considered "available"?

b) If data were reported over the phone or through SMS, and there is no written record of the data, how will this be considered with regards to "available", "complete" or "timely"?

c) Does a report need to have all of the data points filled in to count as "complete"? If a report has all of the indicators included in the DQA but is missing other data, will it be counted as "complete"?

d) What are the submission deadlines for each level? Are they the same at each level across the country? If not, the DQA team should be aware of the submission deadlines for each site in order to measure "timeliness".

e) Does each report template have a space to indicate the date on which it was submitted? If not, how will you determine "timeliness"?

2. Review all the reports that were submitted to the site that you are assessing. Answer the questions in the DQA tool, and record the answers.

Note: If data are entered into an electronic format at a certain level, ensure that you have identified the proper protocols to assess availability, completeness and timeliness during the review of the system design component of DQA planning.

3. Discuss the results with the individual responsible for compiling/reviewing/submitting data. For example, you might discuss:

a) Is he/she surprised by the findings?

b) What challenges does the respondent face in getting all of the reports? Making sure the reports are complete? Ensuring that the reports are submitted on time?

c) How does the respondent deal with reports that are not submitted, or that are incomplete and/or late?

d) How do these findings affect the interpretation of the number of people treated? Population estimates? Medicines used?

Outputs

- Charts and tables showing availability, completeness and timeliness of reporting.

2.3 Data verification

This section helps to identify discrepancies in the reported values with the number that can be verified through recounting. As noted above, the DQA may identify some reports that are unavailable or incomplete. The DQA team should take this into consideration when interpreting the results of data verification.

This data verification should be conducted at every site selected included in the DQA pathway.

Methods

- Quantitative recounting of available reports

Possible data sources

- Treatment reports submitted to the site that is being assessed
- Supply chain reports submitted to the site that is being assessed

Steps

1. Tailor the questionnaire template to the country context. This would include tailoring the names of the specific levels (e.g. SDP = village, etc.), indicating the data sources (e.g. tally sheet, or register), and adapting any questions to the local context. This should also take into account the established protocols for archiving paper reports that are subsequently digitized and any electronic reports that should be maintained for auditing purposes. For example, if paper reports received from sub-districts are entered into an electronic database at the district level, the DQA team would want to use the actual source documents (paper forms) rather than the electronic database when verifying the data at the district level.

2. One person on the DQA team should **start recounting** the indicators from all the available documents (not just those for the sampled areas from the lower level), using the results verification form (**Annex 1 (Appendix 5)**) as needed. For example, at the district level, you should review the summary reports from all the health centres in the district, not just those that were sampled for the DQA.
3. Once finished, **a second person should also recount the indicators.**
4. **Compare the two recounted values of the DQA team members. If they are not the same, recount until both individuals arrive at the same value**. While counting handwritten data, it may be useful to take notes of any values that are difficult to read, as this is often the source of variation between the two team member's final totals. For example, a 4 is often mistaken for a 9.
5. **Also record the value that was reported for that level in the DQA tool.** For example, if you are at the district level, you should indicate the value that the district reported to the national level, for the selected indicators.
6. **Calculate the ratio of recounted to reported in the DQA tool, for each indicator.** This is considered the verification factor (VF). A VF less than 1.0 indicates overreporting; a VF greater than 1.0 indicates underreporting. For NTDs, it has generally been accepted that a VF between 0.90 and 1.10 is considered "accurate enough" for the purposes of reporting (i.e. a 10% difference from the value that was reported).
7. **Interpret the data verification results.** For any indicators where the VF is less than 0.90 or greater than 1.10, discuss with the individual(s) responsible for compiling/reviewing/submitting the data. For example, you might discuss:
   a) Is he/she surprised by the findings?
   b) What does he/she think caused the discrepancies? Also provide the respondent feedback about what you, as the evaluator, believe might have contributed to the discrepancies.
   a) What challenges does the respondent face in compiling/reviewing the data?
8. **If there are sites below this site that will be visited, be sure to take note of the reported values for the DQA indicators to take with you to the next site.**
   a) For example, if District A has Health Centre 5's report, and you have sampled Health Centre 5 to be assessed through the DQA, write down the values of the DQA indicators for Health Centre 5.

Outputs

- Charts and tables that show discrepancies in reported versus verified data through recounting.

2.4 Systems assessment through key informant interviews

In addition to reviewing the data, it is also valuable to assess the performance of the reporting system that generates those data. This will enable qualitative assessment of the relative strengths and weaknesses of a data management and reporting system at all levels. The purpose of assessing the data management and reporting system is to identify potential threats to data quality posed by the design and implementation of data management and reporting systems.

This systems assessment should be conducted at every site selected for the DQA. The systems assessment questions are asked to those responsible for managing data and preparing reports at the different levels.

Using the Excel DQA tool, scores are generated for each functional area. The scores are an average for all responses to the qualitative questions in each functional area, with each question coded 3 for "yes, completely," 2 for "partly", and 1 for "no, not at all". The scores are intended to be compared across functional areas to guide programme implementers on which systems' strengthening activities to prioritize. It would be reasonable to consider investing more resources in an area in which the score is low than in areas in which the scores are relatively high.

Methods

- Qualitative questionnaire with semi-structured questions
- Key informant interviews

Possible data sources

- Key informants, including the individual(s) responsible for compiling, reviewing and submitting data. For example, these may include:
  - National level:
    - Monitoring and evaluation specialist
    - Data manager
    - National NTD coordinator
  - Regional level (e.g. IAL 3):
    - Data manager
    - Regional focal person
  - District level (e.g. IAL 2):
    - Data manager
    - District focal person
  - Health facility level (or other sub-district unit; e.g. IAL 1):
    - Nurse in-charge
    - CDD supervisor
  - Village/community level (e.g. SDP):
    - CDD
    - CDD team leader

Steps

1. **Tailor the questionnaire template to the country context.** This would include tailoring the names of the specific levels (e.g. SDP = village, etc.), indicating the data sources (e.g. tally sheet, or register), and adapting any questions to the local context.
2. **Field test the questionnaire and make appropriate changes.** Field testing should take place in a site that was not selected to be part of the DQA. It may be conducted by one or two DQA team members as part of the preparatory activities, and the remaining team members can be briefed afterwards. The field testing should not take more than 1–2 days.
3. **Conduct key informant interviews with individual(s) responsible for compiling, reviewing and submitting data. Complete the DQA tool, noting in particular the reasons why any questions were answered "no" or "partly".**

4. **Interpret the systems assessment results.** If many questions were answered "no" or "partly", discuss with the individual(s) responsible for compiling/reviewing/submitting the data. For example, you might discuss:

   a) Is he/she surprised by the findings?

   b) What suggestions does he/she have to improve the design and operationalization of the system?

Outputs

- Charts and tables indicating the strengths and weaknesses of the data reporting system
- Specific remarks and suggestions by health workers at each level on how to correct weakness

3. Interpretation and action

3.1 Develop and operationalize an action plan

Acting on the DQA findings is one of the most important steps in conducting a DQA. It is not worth spending time and resources to conduct a DQA if no action is going to be taken as a result. The DQA is an excellent opportunity to elicit suggestions and feedback from the DQA respondents, who have experience with the data and data management across all levels of the reporting system. Thus, inputs to the action plan should be compiled at every site that is assessed during the DQA. The DQA team should then synthesize the actions and finalize an action plan. This should include components of monitoring the operationalization of the action plan, to ensure that the recommendations are acted upon.

Methods

- Synthesis of DQA findings and from each dashboard summary.

Possible data sources

- Results from review of data reporting design
- Observations about historical data
- Availability, completeness and timeliness of data, as identified through the DQA
- Results from key informant interviews
- Action plan inputs from all sites assessed

Steps

1. **Compile inputs to the action plan at every site assessed through the DQA**; see **Annex 1 (Appendix 7)** for a template. This includes gathering input from the DQA respondents, as well as the DQA team's observations.

2. **At a central-level debriefing meeting, the DQA team should review the inputs to the action plan that were compiled at every site, and identify cross-cutting, high-priority issues**. Things to consider include:
    a) Did similar issues arise at multiple sites?
    b) Did similar issues arise at the same level? For example, did all of the health facility in-charges note that they do not receive feedback from the district?
    c) Which issues may have quick-win solutions?
    d) Which issues may require intensive solutions but achieve lasting impact?
    e) Are any issues outside the national NTD programme's control? It would be valuable to note these issues in the report, but limit the responsibility of the national programme to address those issues.
3. **The DQA team should draft an action plan.** The plan should include the key issue(s) to be addressed; the solution(s) to address them (e.g. change in strategy, specific activities); the timeline for implementing the solution(s); the person responsible for overseeing the implementation of the solution(s); and the person responsible for monitoring the implementation and outcome of the solution(s).
4. **The DQA team should present the draft action plan at a national NTD programme.** Stakeholders should include the National NTD Coordinator, National NTD Programme Managers, WHO Country Office, NGO partners and donors, as appropriate. Any input of stakeholders from the health ministry and partners should be incorporated into and final action plan.
5. **Finalize DQA documentation**. This includes ensuring the DQA data are entered into one master Excel file tool, including all the comments from the key informant interviews and observations; names, titles and organizational affiliation of DQA team members; names of sites visited; list of indicators assessed; final DQA report; and final action plan.
6. **The DQA team should collaborate with the national NTD programme to send feedback of the DQA results to the appropriate individuals, and other functionaries of the NTD management information system in other districts**. This should include, at a minimum, the NTD programme staff and the DQA respondents in the selected sites as well as staff in other districts who may benefit from the findings.
7. **At the next work planning session, a member of the DQA team should remind participants of the DQA findings in order to ensure that appropriate actions are taken from the DQA. The following year a member of the national NTD programme should report on the actions taken in response to the DQA, and the outcomes.**

Outputs

- Detailed action plan
- Actions are taken for the next MDA as a result of the DQA findings
- An update on the actions taken in response to the DQA, and the outcomes (following year)
- Final DQA documentation forms and single Excel file with all findings
- Final DQA reports, using template in **Annex 1 (Appendix 9)**

SUPERVISORS' COVERAGE TOOL (SCT)

Introduction

A recurring request from national NTD programme teams is the need for a quick, inexpensive and simple tool that can be used to assess coverage of preventive chemotherapy.

Uses of the supervisors' coverage tool

The SCT can be used to improve the coverage of preventive chemotherapy delivered through MDA. The SCT gives supervisors a supportive supervision tool with which to strengthen the performance of community drug distributors and their first-level supervisors, providing an opportunity to identify and solve problems related to low MDA coverage. The advantage of the SCT over other monitoring approaches, including independent monitoring and rapid coverage monitoring, is that it provides a classification of the coverage that was likely achieved during the current MDA. The results of the SCT should be used to develop action plans to improve the MDA, which may include conducting mop-up treatments, distributing additional treatment registers, updating village registers, better delineating service delivery areas for community drug distributors, and increasing social mobilization and training for new and existing community drug distributors.

The main objective of the SCT is to improve the coverage of preventive chemotherapy within a given supervision area during the current round of MDA. Although the tool is conducted at the lowest level of supervision over the MDA, some of the findings may be generalized to improve coverage at higher levels. A secondary objective is to offer district, sub-district and first-level supervisors an objective supervision tool with some basic predictive value.

The SCT does not provide an equal probability sample of the supervision area and thus will not produce statistically valid estimates of coverage. Accordingly, it is recommended for use only as a programmatic tool for supervisors at sub-district level and those supervising teams of community drug distributors, to identify poorly performing areas for immediate action. While recognizing the benefits of this tool, its use should be restricted to sub-district monitoring and supervision of MDA and routine supervision of services. Regional and national managers should regularly promote the use of the SCT as a supervisory tool; it should not be referred to as a "survey," since it is meant to provide a rapid, approximate classification of coverage and information for improving coverage, rather than an estimate of coverage with specified precision.

Other public health programmes and Ministry of Health Departments may similarly adopt the use of this SCT in their contexts.

The SCT is presented in Box 3.1 for quick reference.

1. Planning

1.1 Preparation and logistics

Where and when should the SCT be conducted?

The SCT should be conducted locally by district or sub-district supervisors. The person in charge of using the SCT is called a **SCT implementer**. Because the SCT is meant to be an internal, self-monitoring tool for programmes to improve coverage at the local level, the SCT implementer must be a district or sub-district supervisor who is directly involved in the MDA and who uses the tool within his or her area of supervision.

When it is time to conduct the SCT, the SCT implementer can be joined by one or more enumerators, who may be individuals from the local health post, the supervisor of a neighbouring sub-district or first-level supervisors (individuals who supervise community drug distributors).

When should the SCT be conducted relative to the MDA?

In order to improve coverage during the current round of MDA, the SCT should be conducted towards the end of, or immediately after, the MDA has been completed (but no later than 2 weeks after the MDA), to ensure that there is time for the SCT to be completed and mop-up activities to be conducted before the data from the distribution registers are aggregated and reported. The national programme will decide whether to conduct the SCT during the latter half of the MDA or immediately after the MDA. Table 3.1 outlines some of the advantages and disadvantages to consider when determining when to conduct the SCT.

Where should the SCT be conducted?

The SCT is conducted at the sub-district level in what is referred to as a supervision area. A supervision area is the smallest administrative or geographical unit for which a first-level supervisor is responsible, or the catchment area of someone who supervises the community drug distributors. Its size will vary by country and may range from a partial community to several communities. Within a given district, the SCT may be conducted in all supervision areas, if budget permits, or in areas selected strategically, prioritizing those areas where coverage is expected to be low. Step 2 of the Methods section describes how supervision areas should be selected in greater detail.

Table 3.1. Considerations for timing when to use the CST

Timing	Advantages	Disadvantages
During latter half of MDA	✓ Mop-up can be conducted as part of the MDA, not as a separate activity ✓ SCT implementers can use the tool as part of their routine supervisory activities (which should not require additional per diem)	✗ Need to determine how to handle areas that have not yet been treated when selecting households for the SCT ✗ Classification of coverage may be biased low (as the MDA has not been completed)
Immediately after MDA	✓ The resultant classification of coverage is more likely to reflect the status of drug coverage because the MDA has been completed	✗ Additional funds may be required if mop-up is indicated ✗ Difficult to remobilize CDDs and allocate supply of drugs once MDA is considered to have finished

CDD, community drug distributor; MDA, mass drug administration; SCT, supervisors' coverage tool

What materials and supplies are needed?

A checklist of materials and supplies which supervisors should have before proceeding to the field to conduct supervision activities using the SCT is listed in Annex 1. National programmes should ensure that these materials are available in appropriate quantities.

How much does an SCT typically cost to conduct?

The cost of conducting a SCT will vary, based on the size of the supervision area, the local rate and how well the SCT is integrated within the existing supervisory activities of the national NTD programme. There are two main costs to the SCT: training and implementation.

- Training. Typically, a half-day of training will suffice to teach SCT implementers how to use the tool, although a one-day training, including half a day of field practice, is preferable. The main costs of training are transportation to the training site, per diems and venue rental. Typical range: US$ 500–5000
- Implementation. Typically, the SCT takes 0.5–2 days to implement, depending on the size of the supervision area and the method by which households are randomly selected (see Step 3 of the Methods section). The main costs of implementation are transportation and per diem. If the SCT is integrated as part of the routine supervisory activities during the MDA then there should be no additional implementation costs. Typical range: US$ 0–1000

1.2 Methods

The SCT is a quick, simple and inexpensive tool that can be used by first-level supervisors to monitor and supervise MDAs. It is based on lot quality assurance sampling, whereby a small random sample is used to classify an area as exceeding or failing to reach a predetermined threshold of coverage. The tool allows NTD programmes to classify an area as being at, above or below the target coverage threshold, and, subsequently, to identify areas in need of mop-up activities. It can also be used to supervise the community drug distributors. Box 3.1 summarizes the nine steps of the SCT. Section 2 describes the steps in detail.

Box 3.1. SCT Implemention steps

Step 1: Identify the survey population.

Step 2: Identify the supervision area in which to conduct the SCT.

Step 3: Obtain a list of all households using registers or household enumeration.

Step 4: Randomly select 20 households.

Step 5: Visit each selected household and randomly select one person from the survey population.

Step 6: Interview the selected person to determine whether they received the appropriate medicine.

Step 7: Determine how many of the 20 individuals received and swallowed the medicine; use the decision rule table to classify coverage as "good", "cannot conclude good" or "inadequate" relative to the target threshold.

Step 8: Develop an action plan.

Step 9: Implement the action plan.

2. Implementation

2.1 Step 1: Identify the survey population

The survey population corresponds to the population of interest for the SCT and, consequently, the population for which a coverage classification can be made. Members of the survey population are suitable for inclusion in the SCT. Table 3.2 lists the survey populations according to each NTD amenable to preventive chemotherapy. For preventive chemotherapy of lymphatic filariasis, onchocerciasis and trachoma, the entire population is considered to be the survey population, regardless of their eligibility for treatment. For preventive chemotherapy of schistosomiasis and soil-transmitted helminthiases, the survey population refers to the specific group of people for whom the intervention is targeted and may vary by country. The SCT can be used to classify coverage for more than one NTD (e.g. after an integrated MDA), which may result in multiple survey populations. Special instructions exist (see step 4) for situations in which there are multiple survey populations; however, steps 2–3 will be the same regardless of the number of survey populations.

Table 3.2. Survey population targeted for preventive chemotherapy by disease

Disease	Survey population	Target coverage threshold[a]
Lymphatic filariasis	Everybody living in the supervision area	≥ 65%
Onchocerciasis	Everybody living in the supervision area	≥ 80%[d]
Schistosomiasis[b]	• School-age children (5–14 years) • High-risk adults	75%[e]
Soil-transmitted helminthiases[c]	• Preschool-age children (1–4 years) • School-age children (5–14 years) • Women of child-bearing age • Everybody living in the supervision area (in areas receiving preventive chemotherapy for lymphatic filariasis)	75%[e]
Trachoma	Everybody living in the supervision area	> 80%

[a] Refers to disease-specific thresholds set by WHO above which levels of treatment are considered to be effective for achieving programme goals.

[b] The survey population may vary, based on national treatment priorities; preschool-age children are currently ineligible to receive praziquantel.

[c] The survey population may vary, based on national treatment priorities.

[d] Threshold applies when the goal is elimination of ocular morbidity caused by onchocerciasis.

[e] WHO specifies a minimum target coverage threshold of 75% for school-age children.

2.2 Step 2: Identify the supervision area to monitor

The geographical area in which the SCT is conducted is commonly referred to as a supervision area. This area corresponds to the smallest administrative or geographical unit for which a first-level supervisor is responsible. More practically, it is the catchment area of the person who supervises the community drug distributors. Its size will vary by country and may range from a partial community to several communities. Within a given district, the SCT may be conducted in all supervision areas, if budget permits, or be selected strategically by prioritizing areas where coverage is expected to be low.

Selection of supervision areas. To select supervision areas strategically, the district-level supervisor should review the figures on reported coverage from the previous round of MDA submitted by the sub-district data aggregation level (the administrative level directly below the district level where data on preventive chemotherapy are aggregated) and identify those sub-districts where coverage was low. The likely reasons for the low coverage should be considered, as the SCT is well-suited for improving coverage where the challenge involved compliance with treatment or the drug distribution platform; the SCT is not well-suited for addressing challenges related to the supply chain. The district-level data can be reviewed as soon as the information on reported coverage is submitted, but no later than 4–6 weeks before the next round of MDA, in order to allow sufficient time to train and plan for the SCT.

Once the sub-districts in which coverage needs to be improved have been selected, one or more supervision areas within the sub-district should be selected for the actual implementation of the SCT. This selection can be purposeful (based on areas with historically low coverage) or random. As a supervisory tool, some countries consider it beneficial not to announce which supervision areas have been selected for the SCT in advance. By not disclosing this information in advance, both the supervisors and the community drug distributors are motivated to work hard because their work may be supervised with the SCT.

If this is the first year that MDA has been conducted then random selection can be used to pick the supervision areas in which to implement the SCT.

Large supervision areas. The SCT becomes impracticable and loses much of its efficiency in supervision areas that are very large. If the selected area is large (e.g. > 5000 people) it should be subset into groups of < 5000 people, based on existing administrative boundaries (e.g. villages, hamlets, blocks, zones, barrios) and one or more of these subsets should be randomly selected.

Example 1

Suppose the selected supervision area (SA) is large (> 5000 people) and comprises three villages: Because the total population in the SA is expected to be large (8651 people), the SCT Implementer should randomly select one of the three villages in which to focus the SCT.

Supervision area	Village	Estimated population
	Gumu	2105
	Assosa	3066
	Shula	3480

Example 2

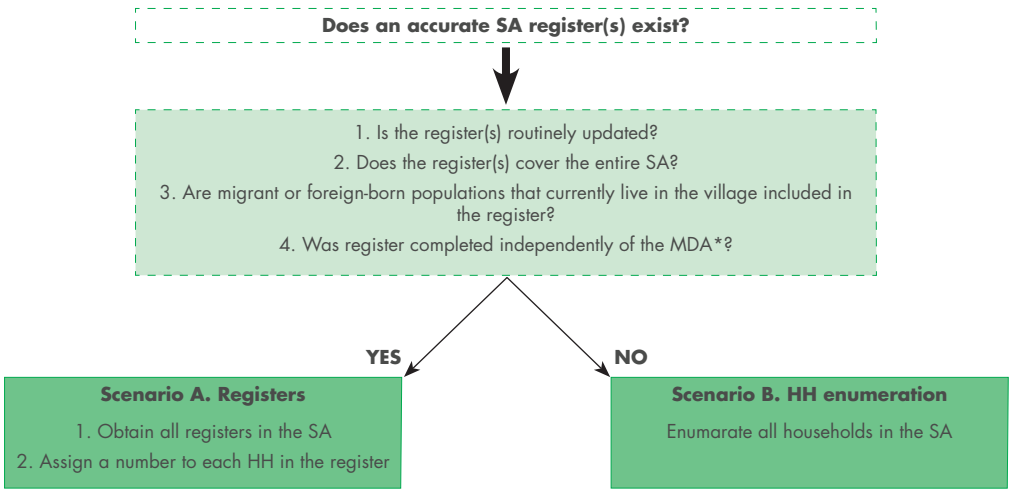
Suppose the selected SA corresponds to a semi-urban area (Concepción) that is estimated to have 10 934 inhabitants spread throughout seven blocks. Because each block is likely to be fairly small (1000–2000 people), the SCT Implementer chooses to randomly pick two of these blocks in which to conduct the SCT:

Supervision area	Village / Block	Estimated population
	Concepción	10934
	Block A.1	
	Block A.2	
	Block B.1	
	Block B.2	
	Block B.3	
	Block C.1	
	Block C.2	

2.3 Step 3: Obtain a list of all households using registers or enumeration

In order to select households randomly for the SCT, a list of all the households in the supervision area (SA) should first be obtained either through all existing village registers (or censuses) or by physically enumerating all the households. Use the decision tree in Figure 3.1 to determine which of the two approaches is most appropriate in your SA. Table 3.3 summarizes the advantages and disadvantages of using registers to select households randomly.

Figure 3.1. Decision-tree for determining whether to use registers or enumeration for random household selection



MDA, mass drug administration; HH, household; SA, supervision area; SCT, supervisors' coverage tool

* Registers created as part of the MDA should not be used for the SCT, as any households that were excluded from the register would be systematically excluded from both the MDA and the SCT.

Table 3.3 Considerations for using registers to select households randomly

Advantages of using registers	Disadvantages to using registers
✓ Can save a lot of time	✗ If the register/census is inaccurate the SCT results may be biased
✓ Selecting households at random is straight forward	

Ultimately, the decision about whether to use existing registers is the responsibility of the SCT implementer. Whichever method is used should be applied consistently throughout the SA.

Scenario A: Village registers or censuses

Where village registers (or censuses) will be used to obtain a list of all households in the supervision area the following steps should be followed:

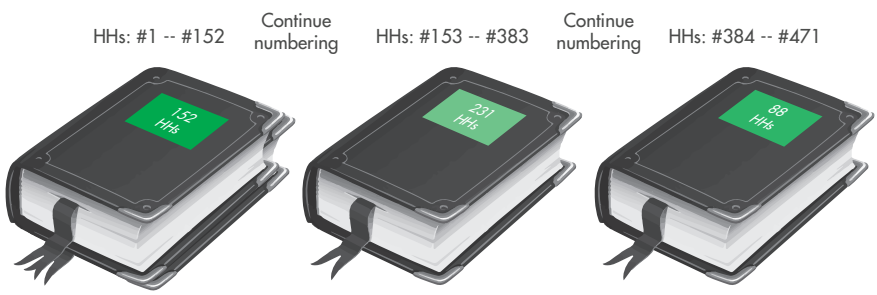
1. Gather all the village registers needed to fully cover the supervision area, such that each household is contained in only one register. Sometimes a single register may cover the entire supervision area; for those that span several villages multiple registers may be necessary.

2. Check that each household in the register is assigned a sequential number (e.g. HH #1, HH #2, HH #3, etc.). If households are not numbered then the SCT team should use pencil to number each household sequentially in the register.

3. If multiple registers are required to cover every household then the households should be numbered sequentially across the registers, with no skipped numbers and no repeated numbers.

Example 3

Suppose that three registers are needed to cover the SA: Register A contains 152 households, Register B contains 231 households, and Register C contains 88 households. So households in Register A will be numbered #1–#152, households in Register B will be numbered #153– #383 (152 + 231) and households in Register C will be numbered #384–#471.



Scenario B: Household enumeration

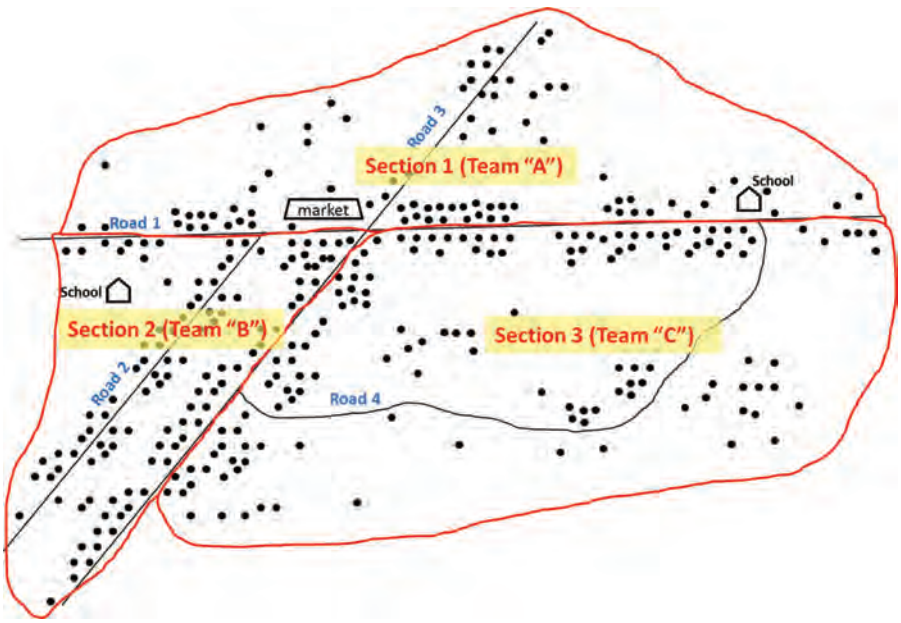
If village registers are non-existent or inaccurate, each household in the supervision area should be assigned a number. While there are many ways to number all households in a village, the following steps describe one approach that has proven efficient in the field.

1. Upon arrival in the village, and following introductions with local leaders, each member of the SCT team should pair up with a volunteer from the village who can serve as a guide.

2. Divide the village into as many sections as there are pairs (SCT team member + village guide). None of the sections should overlap or completely cover the village (e.g. each household should fall into only one section). Assign each pair to one of the sections.

Example

If three team members are conducting the SCT, then each member of the team would pair up with one village volunteer to form three pairs. As a result the village should be divided into three sections.



3. Assign each pair a letter code (e.g. "A", "B", "C").

4. Each pair should walk past each household in their assigned section and number every household, using chalk to write a household code on each door. The household code should be written as follows: "Letter code" + Household number. In some places it may not be socially acceptable to write on the door with chalk, in which case an alternative marker, such as stickers or flags, should be used.

   Example

   Pair A should write the following codes on the doors of each household in their section: A-1, A-2, A-3, A-4, A-5, … until a code has been assigned to each household. Similarly, pair B would assign the codes B-1, B-2, B-3, … to the households in its section.

5. As the pairs assign a code to each household, they should also record the codes on a sheet, as shown in **Figure 3.2**, in order to keep track of the numbers assigned.

6. After each team has numbered all the houses in its section, the lists should be combined and each household assigned a cumulative number to determine the TOTAL number of households in the village.

7. If the supervision area has multiple villages, all the households in each village should be numbered before proceeding with Step 4 and a single cumulative list of all the households will be required. In this instance, each village is considered as a section.

Figure 3.2. Sample team-based technique for enumerating households within a village. Panel A: The teams assign a letter + numerical code to each household in their section and record this number on a sheet of paper as shown. Panel B: The lists from each team are aggregated and a cumulative count of the number of households ("HH Count" column) is determined. Panel C: Households are chosen randomly for inclusion in the SCT by picking random numbers between 1 and the total number of households found to be in the community (e.g. 152), with the help of a random number table.

Panel A

HH Code	HH Count	Selected
A-1		
A-2		
A-3		
A-4		
A-5		
A-6		
A-7		
A-8		
.....		
A-47		
A-48		

HH Code	HH Count	Selected
B-1		
B-2		
B-3		
B-4		
B-5		
B-6		
B-7		
B-8		
.....		
B-33		
B-34		

HH Code	HH Count	Selected
C-1		
C-2		
C-3		
C-4		
C-5		
C-6		
C-7		
C-8		
.....		
C-69		
C-70		

Panel B

HH Code	HH Count	Selected
A-1	1	
A-2	2	
A-3	3	
A-4	4	
A-5	5	
A-6	6	
A-7	7	
A-8	8	
.....		
A-47	47	
A-48	48	

HH Code	HH Count	Selected
B-1	49	
B-2	50	
B-3	51	
B-4	52	
B-5	53	
B-6	54	
B-7	55	
B-8	56	
.....		
B-33	81	
B-34	82	

HH Code	HH Count	Selected
C-1	83	
C-2	84	
C-3	85	
C-4	86	
C-5	87	
C-6	88	
C-7	89	
C-8	90	
.....		
C-69	151	
C-70	152	

Panel C

HH Code	HH Count	Selected
A-1	1	
A-2	2	
A-3	3	
A-4	4	
A-5	5	
A-6	6	
A-7	7	×
A-8	8	
.....		
A-47	47	
A-48	48	

HH Code	HH Count	Selected
B-1	49	×
B-2	50	
B-3	51	
B-4	52	
B-5	53	
B-6	54	
B-7	55	
B-8	56	×
.....		
B-33	81	
B-34	82	

HH Code	HH Count	Selected
C-1	83	
C-2	84	
C-3	85	
C-4	86	
C-5	87	
C-6	88	
C-7	89	
C-8	90	
.....		
C-69	151	×
C-70	152	

2.4 Step 4: Randomly select 20 households

Once every household in the supervision area has been assigned a number, either through the existing registers or by physically numbering the households with chalk, the SCT implementer should select 20 households at random. This can be done by using a random number table to select 20 numbers between one and the total number of households in the supervision area. Annex 6 provides instructions on how to use a random number table. For each random number, the correspondingly numbered household from the village register or enumerated list should be selected.

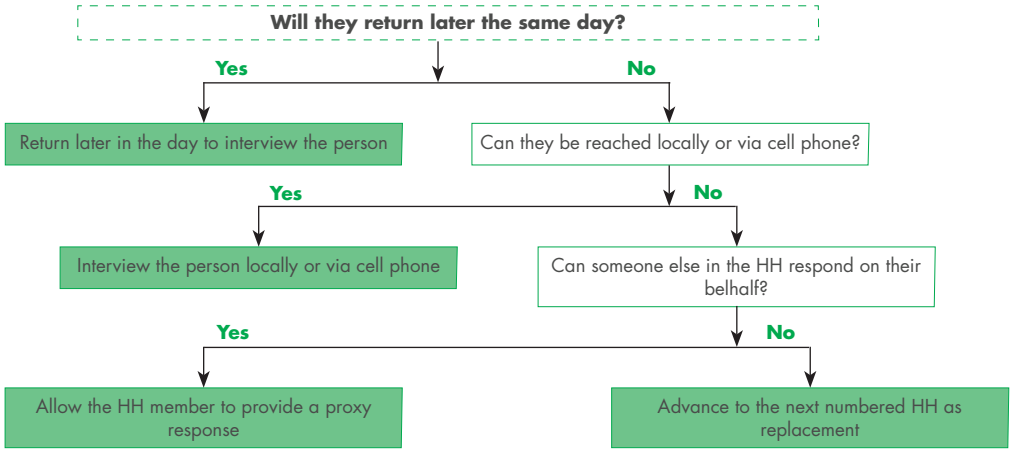
2.5 Step 5: Visit each selected household and randomly select one member of the survey population

The SCT team should then visit each of the 20 selected households, in the supervisory area. At each household the members of the team should first introduce themselves and explain the purpose of their visit; Annex 7 contains a sample interview script. The team should then list the names of all the individuals living in the household who are part of the survey population on a piece of paper, regardless of whether they are present at the time of the visit. One person from this list should be randomly selected by drawing names from a hat or using the random number table. Figure 3.3 shows how to make decisions when individuals are absent. If the selected household does not have any members of the survey population, advance to the next numbered household (according to the register or enumerated list). Continue selecting the next household until a household is identified with at least one person in the survey population to interview. Box 3.2 explains the special case of how to select individuals for an integrated SCT.

Box 3.2. Selecting individuals for an integrated SCT: a special case

If the SCT is used to classify more than one disease, there will likely be multiple survey populations. Upon arrival at the selected household, list all members of the first survey population (e.g. children aged 5–14 years) and choose one to interview from them. Next, list all members of the same household who are part of the second survey population (e.g. everyone) and choose one to interview from among them. It is possible that an individual who falls within both survey populations could, by chance, be interviewed twice – once for each drug package. If the selected household does not have any members of one or more of the survey populations, advance to the next numbered household (according to the register or enumerated list). Continue selecting the next household until you identify a household with at least one person in the survey population to interview.

Figure 3.3. Decision-tree for selecting individuals who were absent at the time of the household visit



HH, household

2.6 Step 6: Interview the selected individuals to assess coverage

Using a data collection form, interview the selected individuals to determine whether or not they were offered the medicines and whether or not these medicines were swallowed. It is important to ask both questions: whether the respondents were offered the medicines (to provide a measure of the programme's ability to reach the population) and whether they swallowed the medicines (to provide an estimate of the coverage of preventive chemotherapy). A separate data collection form should be used for each medicine, even if the two medicines are given out together. For example, if the population received ivermectin and albendazole for lymphatic filariasis, the responses for ivermectin would be recorded on a separate form than those for albendazole, even though it will be the same individuals responding for both medicines. When more than one medicine was given it is important that the SCT team carries samples of the medication to improve recall accuracy. **Annex 1 (Appendix 11)** contains a sample data collection form.

3. Interpretation and action

3.1 Step 7: Analyse and interpret the results

Use the decision rules table (**Table 3.4**, **Box 3.3**) to determine the appropriate classification for the supervision area based on the number of people who responded affirmatively to having swallowed the medicine. If the number of people who swallowed falls within the range of numbers in the appropriate green column, then the supervision area can be classified as having "good" coverage; if the number falls within the numbers in red, then the area can be classified as having "inadequate" coverage, and if the number falls in the yellow zone then you cannot conclude with statistical confidence that coverage was good or inadequate. For a more detailed interpretation of these classifications see **Figure 3.4**.

Table 3.4: Decision rules table

Disease	Survey population	Target coverage threshold	Decision rules: based on no. of people covered out of 20 people sampled[1]		
			Good coverage	Cannot conclude coverage is good	Inadequate coverage
Lymphatic filariasis	Everyone	≥ 65%	16–20	11–15	0–10
Onchocerciasis	Everyone	≥ 80%	19–20	14–18	0–13
Soil-transmitted helminthiases and schistosomiasis	School-age children (5–14 years)	75%	18–20	13–17	0–12
Trachoma	Everyone	> 80%	19–20	14–18	0–13

1 The numbers in the green and red columns are based on the binomial distribution:

$P(X \geq k) = (n/k)\ p^k\ (1-p)^{n-k} \approx <0.1$ and $P(X \leq k) = (n/k)\ p^k\ (1-p)^{n-k} \approx <0.1$, respectively.

Where P is probability, n is the total number of people sampled (20), p is the WHO-defined target coverage threshold (e.g. 75%), and k is the number of people who reported swallowing the medicine out of the 20 people interviewed.

3.2 Step 8: Develop an action plan to improve or maintain MDA performance

This is the most important step of the tool because it helps the district-level supervisor devise an actionable plan to improve the current and future rounds of MDA. Three forms – SCT Data Summary (**Annex 1 (Appendix 12)**), SCT Critical Review (**Annex 1 (Appendix 13)**) and action plan (**Annex 1 (Appendix 3)**) – should be used to critically review and interpret the results of the SCT. The Action Plan should be developed immediately after the SCT to allow time for mop-up activities to be implemented if necessary. For example, treatment mop-up – in which drugs are redistributed to individuals or geographical areas that were untreated during the mass administration – is indicated in any supervision area classified as having "inadequate" coverage, according to the SCT. Depending on the situation, areas with "inconclusive" results can also be targeted for treatment map-up activities. The supervisor may choose to limit the mop-up to only those areas where coverage was classified as "inadequate" or to extend the mop-up activities to other parts of the district. The results from multiple SCT implementations can be compiled, and the percentage of areas that required mop-up can give an indication of the MDA's success and the quality of social mobilization.

Figure 3.4. SCT decision-tree rule interpretations and suggested next steps

Coverage conclusion	Good (> target coverage threshold)	Inconclusive (Cannot conclude coverage was good)	Inadequate (< target coverage threshold)
Interpretation	It is very likely that the true coverage in the SA is at or above the target threshold	Not enough information to conclude with statistical confidence if coverage was above or below threshold	It is very likely that the true coverage in the SA is below the target threshold
Suggested next steps	Share these positive findings with those involved in the MDA Do these results agree with the reported coverage (e.g. is the reported coverage also above the threshold)? If not, try to identify reasons for the discrepancy If people were identified who were not offered or did not swallow the medicines, review the reasons why and take whatever steps are indicated to raise coverage even higher than it already is	Investigate why coverage may have been low by looking at the "no" responses from the SCT (e.g. insufficient supply of medicines, poor compliance with treatment, suboptimal performance of CDDs, insufficient social mobilization) Check if the untreated individuals are in the area of responsibility of the same CDDs	Does reported coverage show that coverage is above the target threshold? If so, identify reasons for the discrepancy; consider conducting a data quality self-assessment Investigate why coverage may have been low by looking at the "no" responses from the SCT (e.g. insufficient supply of medicines, poor compliance with treatment, suboptimal performance of CDDs, insufficient social mobilization) Is a mop-up campaign needed? Check if the untreated individuals were the responsibility of the same CDDs.

CDD, community drug distributor; HH, household; MDA, mass drug administration; SA, supervision area

Box 3.3. The SCT at a glance

Purpose of the tool: A quick and simple tool for monitoring and supervising MDA at the sub-district level
Geographical domain: Smallest MDA supervisory level
When to use: < 2 weeks after MDA
Who uses: District or sub-district NTD supervisors
Total sample size: 20 individuals

Nine steps:

- Steps 1–2: Identify the survey population(s) and supervision area(s) in which to conduct SCT.
- Step 3–4: Obtain a list of all households using registers or household enumeration and randomly select 20.
- Step 5: Visit each selected household and randomly select one person from the survey population.
- Step 6: Interview the selected person to determine whether they received the appropriate medicine.
- Step 7: Determine how many of the 20 individuals received and swallowed the medicine; use the decision rule table to classify coverage as "good", "cannot conclude good" or "inadequate" relative to the target threshold.
- Steps 8–9: Develop and implement an Action Plan.

Disease	Survey population	Target coverage threshold (%)	Decision rules: based on no. of people covered out of 20 people sampled[1]		
			Good coverage	Cannot conclude coverage is good	Inadequate coverage
Lymphatic filariasis	Everyone	≥ 65	16–20	11–15	0–10
Onchocerciasis	Everyone	≥ 80	19–20	14–18	0–13
Soil-transmitted helminthiases and schistosomiasis	School-age children (5–14 years)	75	18–20	13–17	0–12
Trachoma	Everyone	> 80	19–20	14–18	0–13

Conclusion	Good coverage	Cannot conclude coverage is good	Inadequate coverage
Interpretation	It is very likely that the true coverage in the SA is at or above the target coverage threshold	There is not enough information to conclude with statistical confidence if coverage was above or below the target coverage threshold	It is very likely that the true coverage in the SA is below the target coverage threshold
Next steps	Share these positive findings with those involved in the MDA If individuals were found who did not ingest the medicines, investigate reasons why	Investigate the reasons given for not taking the medicines Compare with the reported coverage to see if it suggests coverage may be above the target coverage threshold	Investigate the reasons given for not taking the medicines Look at the reported coverage to see if it suggests coverage was good or low Does low coverage appear to be associated with particular CDDs?

Advantages	Drawbacks
• Straightforward sampling design • Quick and relatively inexpensive to implement • Can be used to identify areas in need of treatment mop-up • Simple interpretation of results (classifies coverage as likely above or below the coverage target threshold)	• Cannot be used to generate statistical point estimate of coverage • Not an equal probability sample (e.g. individuals in large HHs less likely to be sampled than individuals in small HHs)

CDD, community drug distributor; HH, household; MDA, mass drug administration; SA, supervision area

3.3 Step 9: Implement the action plan

If the action plan outlines the steps required to improve the current round of MDA, these actions should be taken immediately to maximize use of the available personnel and any momentum still lingering from the MDA. Furthermore, it is important to complete any actions taken to improve the current round before the coverage data have been aggregated and reported. Some of the activities may address improvements to future MDA rounds (such as refresher trainings for community drug distributors, targeted social mobilization, and improved information and education materials) and will have the most impact when implemented immediately before future rounds. Supervisors at district and provincial levels should hold district-level staff accountable for completing the activities specified in the action plan.

Treatment mop-up

The tool should be conducted towards the end of, or immediately after, the MDA, to allow time for treatment to be mopped up or other remedial actions to be taken, if needed. Mop-up activities are indicated in any supervision area classified as having "inadequate" coverage, according to the SCT, although the supervisor may also choose to conduct mop-up activities when the SCT results fall within the yellow category ("cannot conclude coverage is good").

The results from multiple exercises can be compiled, and the percentage of areas that required mop-up can give an indication of the MDA's success and the quality of social mobilization. Once the data collection form results are tallied, the action plan should be completed to help interpret the results and identify the next steps to improve the programme's performance.

Annexes
Annex 1: Materials

National programmes should ensure that adequate supplies of the following materials are available before the planning phase.

COVERAGE EVALUATION SURVEYS (CES)

Planning

- ✓ Computer with the Coverage Survey Builder (CSB) tool in Microsoft Excel[1]
- ✓ List of all subunits in the survey area and their estimated size (ideally in terms of number of households, if this information is available)

Implementation

- ✓ List of the selected subunits (available from the online CSB tool[1])
- ✓ Questionnaire (**Appendix 1**)
- ✓ Pencil/pen
- ✓ Clipboard
- ✓ Sample of the medicines for which coverage is being evaluated (to improve participants' recall)
- ✓ Lists A and B (available from the online CSB tool[1])
- ✓ Maps of the selected subunits (optional)
- ✓ Chalk (optional)

Interpretation and action

- ✓ Coverage survey questionnaire results
- ✓ Results entry form (**Appendix 2**, available also from the online CSB tool[1])
- ✓ Action plan (**Appendix 3**)

1. http://www.ntdsupport.org/resources/coverage-survey-builder-coverage-evaluations

DATA QUALITY ASSESSMENT (DQA)

Planning

- ✓ List of district(s) in which the DQA will be implemented
- ✓ List of all subunits in the districts where the DQA will be implemented, and their estimated population size
- ✓ List of indicators to be assessed
- ✓ Authorization from relevant authorities, such as national, regional, district, village, for selected sites

Training

- ✓ Diagram of data flow diagram
- ✓ List of strengths and weaknesses observed during review of national programme preventive chemotherapy data management system design
- ✓ Copies of templates for data collection/analysis/reporting tools for every level of preventive chemotherapy reporting system; at least 1 copy of each per trainee
- ✓ List of district(s) in which the DQA will be implemented
- ✓ List of all subunits in the districts where the DQA will be implemented, and their estimated population size
- ✓ List of indicators to be assessed
- ✓ Copies of preliminary questionnaire to be adapted; at least 2 per trainee
- ✓ Historical reported treatment records for the past 3 years, aggregated to the site being assessed during training/pilot
- ✓ Total population for the past 3 years, aggregated to the site being assessed during training/pilot
- ✓ All the reports submitted to that site for the most recent round of preventive chemotherapy for the site being assessed during training/pilot

- ✓ Calculators; at least 1 per trainee
- ✓ Pens or pencils; at least 1 per trainee
- ✓ Faciliator's manual; 1 per faciliator
- ✓ Participant's workbook; 1 per trainee
- ✓ Pre/post tests: 1 of each per trainee
- ✓ Training PowerPoint; at least one hard copy per trainee
- ✓ Copies of results verification form; at least 2 per trainee (Appendix 5)
- ✓ Copies of final questionnaire (Appendix 6); at least 2 per trainee if using paper copy (produce from tailored DQA Excel file)

- ✓ Copies of inputs for DQA Action Plan; at least 1 per trainee (**Appendix 7**)
- ✓ DQA schedule: arrival at sites (**Appendix 8**)
- ✓ Transportation to training/pilot sites

Implementation: review of national programme preventive chemotherapy data management system design

- ✓ Templates for data collection/analysis/reporting tools for every level of the preventive chemotherapy reporting system (paper and/or electronic)
- ✓ National programme documentation or standard operating procedures (SOPs) for data collection, data analysis, data storage, reporting, and data use of preventive chemotherapy data, including submission deadlines for reports on preventive chemotherapy treatment and any procedures to address late, incomplete, inaccurate, and/or missing reports
- ✓ Documentation of national programme definitions for indicators selected to be assessed for data verification during DQA
- ✓ Documentation or SOPs of staff roles for data collection/analysis/reporting at all levels; e.g. at each level:
  - position responsible for compiling data
  - position responsible for submitting data to the next level
  - position responsible for receiving reported data
  - position responsible for reviewing data (quality, programme performance, etc.) and providing feedback
  - position responsible for ensuring data are used.
- ✓ Training curriculum that includes data collection/analysis/reporting/use of data on preventive chemotherapy; may be part of overall training curriculum
- ✓ Organization chart (organigram) of national NTD programme staff, including monitoring and evaluation specialist and/or data manager
- ✓ Reports from any previous assessments related to data quality, including DQAs, post-MDA coverage evaluation surveys, supportive supervision, etc.
- ✓ Annual work plans and reports, focusing on any references to data quality and the reporting system
- ✓ Copies of questionnaire

Implementation: data collection and review

The data collection and review phase of the DQA consists of reviewing data, verifying data and conducting a systems assessment through key informant interviews. The following is needed for the data collection and review phase of the DQA:

- ✓ List of selected sites (district, sub-district, SDP) and phone numbers for site point persons
- ✓ Telephones with airtime credit for communication with site point persons, central-level staff and other DQA team members
- ✓ Historical reported treatment records for the past 3 years, aggregated to each site being assessed through DQA
- ✓ Total population for the past 3 years, aggregated to each site being assessed through DQA
- ✓ All the reports submitted to that site for the most recent round of preventive chemotherapy (e.g. for the national level: all the district treatment reports; for the district level: all the sub-district treatment reports, etc.)
- ✓ Calculators; at least 1 per person verifying data
- ✓ Pens or pencils; at least 1 per person
- ✓ Copies of results verification form; at least 4 per IAL site and at least 10 per SDP (**Appendix 5**)
- ✓ Copies of final questionnaire (**Appendix 6**); at least 1 per site if using paper copy (produce from tailored DQA Excel file)
- ✓ Copies of inputs for DQA action plan; at least 1 per site (**Appendix 7**)
- ✓ DQA schedule: arrival at sites (**Appendix 8**)
- ✓ Transportation to DQA sites
- ✓ Compensation/incentives for DQA participants, as appropriate to country policies

Interpretation and action

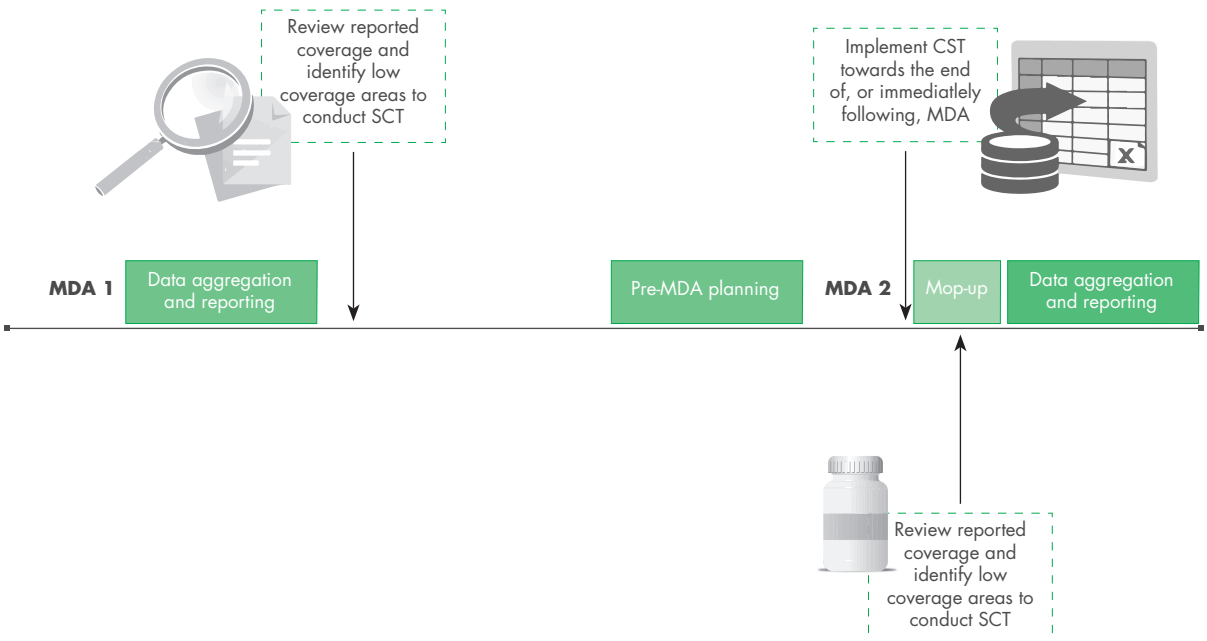
- ✓ Completed questionnaire from all sites entered into DQA tool
- ✓ Graphs and tables generated from completed DQA tool
- ✓ Completed inputs for the DQA action plan from all sites
- ✓ DQA debrief template
- ✓ DQA report template (**Appendix 9**)
- ✓ Computer with word processor
- ✓ 12-month calendar, noting the dates for the next round of preventive chemotherapy work planning and implementation

SUPERVISORS' COVERAGE TOOL (SCT)

Planning

- ✓ Questionnaire (at least 1 per team per supervision area)
- ✓ Random number table (ideally laminated)
- ✓ Coin (for random selection)
- ✓ Chalk
- ✓ Examples of the medication (and any additional visual aids, e.g. dose pole)
- ✓ SCT quick guide (Figure A1.1)
- ✓ Clipboard (1 per team)
- ✓ Household enumeration sheets
- ✓ Notebook or scrap paper
- ✓ Pencils
- ✓ Action plan handout (at least 1 per supervision area)

Figure A1.1. Sample timeline for integrating planning and implementation of the SCT into routine programme activities



CDD, community drug distributor; SCT, supervisors' coverage tool; MDA, mass drug administration

Appendix 1: Sample household survey questionnaire

Planning

Before using this questionnaire, it is necessary to replace [medicine] with the names of the medicines being assessed and to complete the title of the survey form with the appropriate information. If more than two medicines are being assessed by the same survey, two questionnaires will be required per household to accommodate the number of medicines. It is also important to fill in the survey population to remind the survey team which individuals should be included in the survey. The survey team should also circle the type of subunit used (e.g. enumeration area (EA), village or other).

If the medicines were distributed through a school-based mass drug administration (MDA) then it is recommended to include question 1 about school attendance; question 2 is optional:

1. Have you attended school in the last school year [enter reference dates (months)]? (Yes/No)
2. What type of school do you attend?
   - ☐ Primary (public or private)
   - ☐ Secondary (public or private)
   - ☐ Religious school

The survey team should bring examples of each medicine to show the participants at the time of questioning to help with recall. For integrated coverage surveys with multiple survey populations it is recommended to use a separate form for each survey population. If only one medicine is being assessed, it is possible to delete the excess columns in this questionnaire. The survey coordinator may choose to add more questions to better understand factors such as: the incidence of side-effects; knowledge, attitudes and practices of the population; and status of water, sanitation and hygiene in the household.

If a survey respondent is absent and not expected to return, an attempt should be made to reach the adult via cellphone. If this is not possible an adult in the household may serve as a proxy respondent and answer on behalf of the absent individual. In this event, the name, age and sex of the absent individual should be recorded in the questionnaire and the response to the question "Participant present?" should be "No". In all other cases, when the respondent is present at the time of interview, the response to this same question should be "Yes".

Finally, this questionnaire is an example that can be edited and modified to fit the goals of the coverage survey. The reasons given for not receiving or swallowing the medicines should be modified to fit the local context. The final questionnaire should be tested locally before its use. A Microsoft Word version of this questionnaire is available at: http://www.ntdsupport.org/resources/coverage-survey-household-questionnaire.

HOUSEHOLD SURVEY TO MEASURE COVERAGE OF [LIST MEDICINES HERE] AMONG [LIST SURVEY POPULATION HERE]

Interviewer code: |__|__|__| District: |_____| Sub-district: |_____|

Subunit (EA/village/other_____): |_____| HH no: |__|__|__|

Date of interview (dd/mm/yyyy): |__|__|/|__|__|/|__|__|__|__| Household head:_____

Survey population: _____

					Medicine 1					Medicine 2				
#	First name	Sex (M/F)	Age (years)	HH member present (Y/N)	Offered the medicine? (Y/N/DK)	Reason not offered[a]	Swallowed the medicine? (Y/N/DK)	Reason DID NOT swallow[b]	Reason DID swallow[c]	Offered the medicine? (Y/N/DK)	Reason not offered[a]	Swallowed the medicine? (Y/N/DK)	Reason DID NOT swallow[b]	Reason DID swallow[c]
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														

CDD, community drug distributor; D, don't know; HH, household; N, no; Y, yes.

[a]Reason treatment was not offered:
1=Underage; 2=Pregnant; 3=Breastfeeding; 4=Sick; 5=Absent; 6=Didn't hear about the MDA; 7=Ran out of the medicine; 8=Nobody came; 9=Other.

[b]Reason treatment was not swallowed
1=Fear of side-effects; 2=Bad taste; 3=Not sick; 4=Not enough information given; 5=Other

[c]Reason treatment was swallowed
1= Fear of disease(s); 2=To treat disease(s); 3= Because it was given or was free; 4=Useful information from CDD; 5=Other

Appendix 2: Results entry form

Medicine:

Selection order	Subunit name	No. of people interviewed	No. of males offered medicine	No. of females offered medicine	No. of males who swallowed medicine	No. of females who swallowed medicine	Remarks

Total sample size	–
Programme reach	–
Surveyed coverage	–

Appendix 3: Action plan

Problem/weakness identified (What is the problem?)	Action required (What tasks do you need to do to address the problem?)	Success criteria (How will you identify your success?)	Timeframe (By when do you need to complete the tasks?)	Resources (Who or what can help you to complete the tasks?)

Appendix 4: Sample questionnaire with additional KAP questions

Consent script

''Hello, my name is <name>. I am here on behalf of the Ministry of Health. We are surveying houses in your community about the most recent community drug distribution. We would like to know if the members of your house took the medicines. If you wish to participate in the survey, tell us and we will note your answer. If you agree, the survey will only take a few minutes. Taking part in the house survey will not benefit you directly, but the results will help the Ministry of Health improve the programme. It is your choice to take part, or not to take part, in this survey. You may refuse without penalty. Would you like to take part in our survey?''

Yes No

[if No, skip to END and record the refusal]

Personal section

Q1. First name: _____

Q2. Sex (M/F) _____

Q3. Age (years)_____ Note: approximate age if unknown

Q4. Were you in the community between **Time** and **Time**?

No = 0 Yes = 1 Unsure = 2

Q5.How long have you lived in this community?

___ years ____ months

[If not living here at time of MDA, skip to END]

Q6. Is the respondent answering for him or herself?

No = 0 Yes = 1

[Enumerator should answer without asking respondent]

Q7. What is the highest level of education that you have completed?

1 = No formal education

2 = Primary school

3 = Lower secondary school

4 = Upper secondary school or vocational training

5 = University

6 = Graduate/postgraduate

Q8. [For school-age children respondents only] How often do you attend school?

0 = Rarely attends or not enrolled
1 = Occasionally attends
2 = Frequently attends
3 = Always or almost always attends.

Main section

Q9. Did someone give you **MEDICINE A** and **MEDICINE B** between **Time** and **Time** to treat **Disease X** or **Disease Y**? [Show the pills to the respondent]:

MEDICINE A	No = 0	Yes = 1
MEDICINE B	No = 0	Yes = 1

[If any Yes, skip to Q11]

Q10. Why didn't you receive the medicines?

0 = unaware of MDA
1 = distributor did not come to my house/school/fixed point location
2 = medicines finished
3 = pregnant
4 = breastfeeding
5 = ill
6 = old
7 = underage
8 = afraid of side-effects
9 = I am not at risk for this disease
10 = I am taking other medications
11 = medicine doesn't work
12 = I was busy
13 = I was too far away
14 = other (specify) _____

[Skip to Q18 below]

Q11. Did you swallow **MEDICINE A** and **MEDICINE B**?
[Show the pills to the respondent]:

MEDICINE A	No = 0	Yes = 1
MEDICINE B	No = 0	Yes =1

[If Yes to all, Skip to Q13]

Q12. Why didn't you swallow the pill(s)?

0 = unaware of MDA
1 = distributor did not come to my house/school/fixed point location
2 = medicines finished
3 = pregnant
4 = breastfeeding
5 = ill
6 = old
7 = underage
8 = afraid of side-effects
9 = I am not at risk for this disease
10 = I am taking other medications
11 = medicine doesn't work
12 = I was busy
13 = I was too far away
14 = other (specify) _____
[Skip to Q15]

Q13.Why did you swallow the medicines?

1 = to be healthy
2 = afraid of getting the disease
3 = someone told me to
4 = everyone else is taking it
5 = other (specify) _____

Q14. Did you swallow these medicines in front of the person who gave them to you?

No = 0 Yes =1 Unsure = 2

Q15. Who gave you the medicines?

1 = family member
2 = health staff
3 = drug distributor
4 = community leader
5 = teacher
7 = other (specify) _____
99 = not applicable

Q16.Did you feel any side effects after swallowing the medicines?

No = 0 Yes =1 Unsure = 2

[If No, skip to Q18 below]

Q17. Which of the following statements are true about side-effects you experienced after swallowing the medicines:

1 = mild (did not interfere with daily activities)
2 = moderate (interfered with daily activities)
3 = serious (required hospitalization)

Q18. Were you aware of the MDA before it happened?

No = 0 Yes =1 Unsure = 2

[If No, skip to Q20]

Q19.How did you know the MDA was going to happen? [Prompt: anywhere else?]

[Select all that apply]

1 = family member/friend/neighbour
2 = professional health staff
3 = community drug distributor/community health worker/teacher
4 = community or religious leader
5 = brochures/flyers
6 = posters
7 = banners
8 = radio
9 = TV
10 = social media
11 =unaware of MDA
12 = other (specify) _____

Q20. Did any of your neighbours take the medicines from the MDA?

No = 0 Yes = 1 Unsure = 2

Thank you for your time

Note: The following additional questions are recommended if information is needed on the estimated number of lymphoedema and hydrocele patients in the coverage survey area. Questions 21 and 22 should be used in conjunction with visual aids in order to estimate the prevalence and number of lymphoedema and hydrocele cases in the evaluation unit.

Q21. Have you had [insert local word for lymphoedema] for the past 3 months? [Show photo of lymphoedema from job aid]

No = 0 Yes = 1 Unsure = 2 Refuse to answer = 3

Q22. Do you have [insert local word for hydrocele]? [Show photo of hydrocele from job aid]

No = 0 Yes = 1 Unsure = 2 Refuse to answer = 3

Notes for adapting questionnaire to country context (Delete from final copy)

- Replace **bold words** with relevant drug types and MDA details
- Add additional lines to Q9 and Q11 if more drug packages are needed
- Insert local phrases into the script or hints to reference concepts (e.g. "after rainy season", "before the election") if local phrases better reference the concept
- Review answer options to ensure they include relevant choices for survey context.

Appendix 5: Results verification form

Country: _____ District: _____

Date (dd/mm/yyyy): _____ Name of site: _____

Level (e.g. village or parish): _____ Name of person completing form: _____

	Data source of recounting: Write the data source in the box below the indicator. **Recounted value**: In each row, write the value that you recounted for that page/sheet number or lower aggregation site. Then, sum the recounted values for all the recounted results, and compare the recounted value with the reported value.				
	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
Page or sheet number (if data source is a register) **or** Lower aggregation site (if data source is summary reports from lower level)					
Total					

Appendix 6: Questionnaire to review the design of the national preventive chemotherapy data management system

1) How are data intended to flow? Indicate each level (e.g. village, health facility, district, region, national; feedback the reverse flow).
2) What tools should be used at each level?
    a) Are they paper-based or electronic?
    b) Are multiple versions of the tools available (e.g. updated register in 2015, but register from 2009 still in use)?
3) Who is expected to do the following, at each level? What are the skills that these individuals would need?
    a) compile the data
    b) submit the data to the next level
    c) receive the reported data at each level
    d) review the data and provide feedback at each level; this encompasses both data quality as well as programme performance (such as meeting targets)
    e) ensure the data are used at each level; for example, prioritizing areas with low coverage.
4) What are the procedures for cleaning data, and addressing if data appear to be inaccurate?
5) What are the submission deadlines at each level? In your opinion, do these make sense with the burden placed on NTD staff at the various levels for reporting? Are these aligned with the national programme's requirements for using and reporting data?
6) Are there any procedures in place to address late, incomplete and/or missing reports?
7) What is the source of the denominator used to calculate coverage at each level?
8) Are there standard definitions of key indicators? Are these definitions shared with each level completing the forms? E.g. how to calculate "number of persons treated for LF"

9) Is the information on collection/analysis/reporting/use of preventive chemotherapy data in the training curriculum accurate? In your opinion, is it sufficient for high-quality data to be reported? Is it sufficient for data to be appropriately acted upon?

10) Is there evidence that previous assessments have, or have not, been acted upon? If they have, what was the outcome? If they have not, what were the barriers to action?

11) Describe whether/how preventive chemotherapy data have been used for making decisions:

   a) to inform the next year's activities?
   b) to prioritize geographical areas (e.g. districts, villages)?
   c) to prioritize diseases?
   d) to prioritize sub-population groups (e.g. school-age children, females)?
   e) to set targets?
   f) to report on medicines used and request additional stocks?
   g) to determine when to implement disease-specific assessments, such as transmission assessment surveys or trachoma impact surveys?

12) How are the data stored or kept at each level?

   a) Are data records electronic at this level or not?
   b) Is there a back-up system for electronic records? Who has access to these files?
   c) If a paper-based system is used, are the paper records filed in an organized system? Are these files stored securely? Are these files readily available upon request?
   d) Is a basic analysis of the data conducted at this level, e.g. comparison of number treated as compared to number of persons targeted?

13) Record the data sources you reviewed.

Appendix 7: Template for inputs on DQA action plan at each site

Country: _____ District: _____

Date (dd/mm/yyyy): _____ Name of site: _____

Level (e.g. village or parish): _____ Name of person completing form: _____

Based on the findings of the assessment at each site, please describe any challenges to data quality identified and recommended strengthening measures, and estimate the length of time the improvement measure could take.				
Priority	Identified weaknesses	Description of action point	Responsible(s)	Timeline
1				
2				
3				
4				

Appendix 8: Sample schedule of DQA activities to be conducted at each site

1. Greet the appropriate authorities and individuals in the area, and explain the team's purpose.
2. Request to meet with the individual responsible for data compilation and reporting.
3. One person should explain the DQA in more detail, setting the stage for open discussion. Ask the respondent if he/she has any questions before starting.
4. Systems assessment: The team member familiar with monitoring and evaluation should conduct the systems assessment with the individual responsible for data compilation and reporting, recording the data on the paper copy of the tool. It is beneficial for two people to be part of the interview, in order to harmonize interpretation of the responses. The systems assessment can take place simultaneously to steps 5–10.
5. Ask what data source was used to prepare the reports at that level (registers, summary forms, etc.).
6. Ask to see the data collection/reporting documents (registers, summary forms, etc.), including the summary data for the past 3 years or more as well as the data disaggregated by site for the most recent MDA under assessment. For example, if you are in District A, you would want to see the total number of persons treated and the total population for the entire district for the past 3 years, as well as all the health facility reports for the most recent MDA.
7. Review the historical data and make observations (numerator, denominator, coverage, patterns, etc.).
8. Review the documents to see if they are
   a. All available
   b. Complete
   c. Submitted on time

9. Data verification

    a. One person should start recounting the indicators from all the available documents (not just those for the sampled areas from the lower level), using the results verification form as needed. For example, at the district level, you should review the summary reports from all the health centres in the district, not just the health centres that were sampled for the DQA.

    b. Once finished, a second person should also recount the indicators.

    c. The recounted values should be compared to each other.

    d. Once a final recounted value is agreed upon, the value should be recorded on the paper copy of the tool.

    e. The value that was reported for that level should be recorded on the paper copy of the tool. For example, if you are at the district level, you should indicate the value that the district reported to the national level, for the selected indicators.

    f. The ratio of recounted to reported should be recorded on the paper copy of the tool, for each indicator.

10. If there are sites below this site that will be visited, be sure to take note of the reported values for the DQA indicators to take with you to the next site.

    a. For example, if District A has Health Centre 5's report, and you have sampled Health Centre 5 to be assessed through the DQA, write down the values of the DQA indicators for Health Centre 5.

11. Together with the respondent, identify any weaknesses, action to be taken to address those weaknesses, the individual responsible for addressing the action, and the timeline.

12. Any issues identified during the site visit should be discussed with the respondent.

13. Ask the respondent if there are any questions, and thank him/her.

Appendix 9: DQA report template

Acknowledgements

Executive summary

1. Background
    a. NTDs in [Country]
    b. [Year of assessment] reported results
    c. Data flow in [Country]
    d. Rationale for DQA
    e. Objectives of DQA in [Country]
2. Methodology
    a. Indicators selected and rationale
    b. Time period assessed, timing of assessment relative to most recent MDA
    c. Sampling strategy
    d. Training
    e. Data collection
        i. Structure of data collection teams: no. of individuals/team, roles, no. of teams, organizations represented
        ii. Data collection tools
        iii. Language in which interview questions were administered
        iv. Coordination with partners
        v. Schedule

f. Data management

   i. How confidentiality of respondents was maintained
   ii. Data entry method and software used
   iii. Data editing or cleaning methods (if any)
   iv. Data validation and quality control steps performed

g. Data analysis

   i. Data verification and reporting performance (availability, completeness, timeliness)
   ii. Systems assessment

3. Results

a. National level

   i. Data verification and reporting performance
   ii. Systems assessment

b. Regional level (only if data are aggregated at this level)

   i. Data verification and reporting performance
   ii. Systems assessment

c. District level

   i. Data verification and reporting performance
   ii. Systems assessment

d. Health centre level

   i. Data verification and reporting performance
   ii. Systems assessment

e. Village level

   i. Data verification and reporting performance
   ii. Systems assessment

f. Cross-cutting results

   i. Highlights/issues with data verification of specific indicators (e.g. any indicator that has high/poor quality reporting across multiple levels/sites)
   ii. Reporting performance highlights/issues (e.g. reports were consistently available, regardless of the indicator or level)
   iii. Systems assessment highlights/issues (e.g. none of the respondents at any of the intermediate aggregation sites reported that they received feedback on the quality of their reporting, or the functional area "Links with the National Reporting System" was weak)
   iv. Any other observations that may affect data quality for NTDs in [Country]

4. Recommendations and Action Plan for strengthening NTD data quality in [Country]
    a. Specific recommendations
    b. Responsible individual(s)/organization(s)
    c. Timeline to address
5. Recommendations for strengthening DQA process
    a. Specific recommendations related to content, process, translation, tool formatting, etc. that can be used to strengthen future DQAs in [Country] and other countries
6. Conclusion
7. Annexes
    a. Sampling frame
    b. Field team members and contact information
    c. Specific tables/charts of relevant results not already included in the Results section

Appendix 10: DQA schedule and timeline

Activity	Responsible	Timeframe												
		Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12
Team orientation training – classroom	DQA team leader													
Team orientation training – practical	All													
Team travel to regions; teams 1–2	Team leaders													
Courtesy call to Regional Office	Team leaders													
Data collection verification at regional level; teams 1–2 in different regions	Team leaders													
Team travel to districts	Team leaders													
Courtesy call to district	Team leaders													
Data collection verification at district level	Team leaders													
Review work done	Team leaders													
Visit 1st health facility + 2 villages	Team leaders													
Visit 3rd health facility + 2 villages	Team leaders													
Visit 3rd health facility + 2 villages	Team leaders													
Debrief at district level; teams return to capital	All													
Debrief at Ministry of Health	All													

Appendix 11: SCT data collection form

Instructions

1. A separate form should be used for each drug package. When multiple drugs are given to treat the same disease, the SCT supervisor may decide to use separate forms for each medicine (e.g. ivermectin and albendazole for lymphatic filariasis). An advantage of using separate forms is that the team will be able to identify if there is differential uptake by medicine or stock-out of a single medicine.
2. The interviewer should show the interviewee an example of the medication they are referring to at the time of the interview.
3. The three ways of getting a response for each participant (in order of preference) are: (i) self (the respondent answers for him or herself in person), (ii) mobile (the respondent answers for him or herself via mobile phone if not present in the household at time of the interview) or (iii) by proxy (the respondent is not present and cannot be reached via mobile and another adult member of the household answers on behalf of the absent individual, if available). A parent or guardian should respond on behalf of children aged < 10 years.
4. The reasons listed for not receiving or not swallowing the medicine should be customized to reflect the local situation.
5. If an individual responds "no" to having been offered the medicine, the interviewer may automatically fill in "no" for swallowing the medicine (without needing to question the individual).
6. After all 20 individuals have been interviewed, tally up the number of "yes" and "no" responses to each question and record them in the boxes at the bottom of the sheet. Note that if an individual is not sure if they received the medicine, another member of the household should be randomly selected until someone who can give a definitive response (either "yes" or "no") is found.

DATA COLLECTION FORM – SUPERVISORS' COVERAGE TOOL

Supervision area (SA):_____ Interviewer:_____ Date (dd/mm/yyyy):_____

Drug package: _____ Disease being assessed:_____ Survey population: _____

No	Village	Respondent		Type of response S=answering for him/herself, P=proxy, M =mobile	Were you offered_____ during the last MDA? Show respondent example of medication		If not, why? A=away at work or travelling, S=supply ran out, D=distributor never came, O=other	Did you swallow _____ during the last MDA? Show respondent example of medication		If not, why? F=fear of side-effects, N=not enough information, T=taste, O=other
		Age	Sex (M/F)							
1					No	Yes		No	Yes	
2					No	Yes		No	Yes	
3					No	Yes		No	Yes	
4					No	Yes		No	Yes	
5					No	Yes		No	Yes	
6					No	Yes		No	Yes	
7					No	Yes		No	Yes	
8					No	Yes		No	Yes	
9					No	Yes		No	Yes	
10					No	Yes		No	Yes	
11					No	Yes		No	Yes	
12					No	Yes		No	Yes	
13					No	Yes		No	Yes	
14					No	Yes		No	Yes	
15					No	Yes		No	Yes	
16					No	Yes		No	Yes	
17					No	Yes		No	Yes	
18					No	Yes		No	Yes	
19					No	Yes		No	Yes	
20					No	Yes		No	Yes	
Total					No	Yes		No	Yes	

Appendix 12: SCT data summary

If the SCT assessed multiple medicines, complete a separate Action Plan for each medicine.

Name: _____

Title: _____

Supervision area: _____

Medicine: _____

Data collection start date (dd/mm/yyyy): _____

Total days of data collection: _____

Administrative coverage (note if the reported coverage is district-wide or specific to the supervision area): _____

For each question, enter the total number of people who responded "yes" or "no". In the last row write the appropriate interpretation of the results (e.g. "good coverage", "cannot conclude coverage is good" or "inadequate coverage".

	Were you offered the medicine?	Did you swallow the medicine?
Yes		
No		
Classification of coverage according to SCT: (e.g. "good", "cannot conclude coverage is good" or "inadequate")		

Appendix 13: SCT critical review

Question	Response
How did the results from the SCT compare with the administrative coverage? *For example, if the SCT suggests the coverage was "good", is the administrative coverage also good (i.e. above the target coverage threshold)?*	
What were the reasons given for not being offered the medicine? Were any of these reasons given more than once?	
What were the main reasons given for not swallowing the medicine? Were any of these reasons given more than once?	
If the results from your SCT suggest the supervision area had coverage that was "cannot conclude coverage is good" or "inadequate," why do you think the coverage might have been low?	
If the results of the SCT classified your supervision area as having "inadequate" coverage, what do you plan to do between now and the next MDA round to ensure that coverage is better in the next round?	
Based on the results of the SCT, will you do anything else differently in the next MDA round?	

Annex 2: CES statistical formulae and rationale

The coverage survey methodology described in this guide is derived from the "modified segment design" option described in the manuals for UNICEF's Multiple-Indicator Cluster Surveys 2–4[1] and by Turner et al.[2]. In the "modified segment design," subunits (enumeration areas) are chosen with probability proportional to estimated size in segments, using 20–30 households as the segment-size range. In the field, the subunits selected for the survey sample are divided into this predetermined number of segments, such that the segments are of approximately the same size in households. Then, one segment is selected at random and all households and eligible household members in the segment are included in the survey sample. Thus, it is a compact-segment design.

This coverage evaluation survey design is the same except that it is does not use compact segments. The desired segment size is set at 50 households and if fewer than 50 households per segment are needed on average to obtain the desired survey sample size (as would usually be the case), a fixed proportion of households is selected systematically from among the households in segments selected for the survey sample. Although this change introduces the extra step of sampling households within segments rather than selecting all of them, it has the advantage of reducing the time needed for segmentation since subunits do not need to be divided into so many segments. In addition, it may lead to some reduction of homogeneity within clusters to the extent that homogeneity increases with increasing proximity of sample households. Both the "modified segment design" and the coverage evaluation survey produce equal probability samples of the survey population.

Formula for equal probability sample

The formula below demonstrates how the sampling strategy used by this method results in an equal probability sample.

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1. Multiple indicator cluster survey. New York (NY): United Nations Children's Fund (http://mics.unicef.org/tools, accessed February 2019).

2. Turner AG, Magnani RJ, Shuaib M. A not quite as quick but much cleaner alternative to the Expanded Programme on Immunization (EPI) cluster survey design. Int J Epidemiol. 1996;25:198–203. doi.org/10.1093/ije/25.1.198.

Definition of terms

f = sampling fraction (may refer to households or compounds). The same value is used for all selected segments.

$households_i'$ = the estimated number of households in subunit i

m = number of clusters

$P(child_{ijkl})$ = the probability that child l, in household k, in segment j, in subunit i is selected

$segments_i'$ = the estimated number of segments in subunit i

$$P(child_{ijkl}) = m \left(\frac{segments_i'}{\sum segments_i'} \right) \left(\frac{1}{segments_i'} \right) (f)$$

$$P(child_{ijkl}) = m \left(\frac{m}{\sum segments_i'} \right) (f)$$

$$\text{Where } segments_i' = \text{round to nearest integer} \left(\frac{households_i'}{\text{target no. of households per segment}} \right)$$

Note:

$households_i'$ always $\geq \left(\frac{\text{target no. of households per segment}}{2} \right)$ so $segments_i'$ always $\geq$; any subunit with an expected number of households that is less than half the target number of households per segment should be combined with the next subunit on the sampling frame that is in close geographical proximity (**section 5, Box 2, Step 3**).

Approach for determining the target segment size

This number is the number of households that should be included, on average, in each segment. The target segment size is automatically calculated by the Coverage Survey Builder but can be calculated manually as follows:

$$\text{Target segment size} = \max \left[\frac{\text{(Sample size)}}{30*\text{(Expected no. of people in coverage pop. per HH)}}, 50 \right]$$

where:

$\max[1,\ldots,n]$ = maximum of elements $[1,\ldots,n]$

The "expected number of people in the survey population per household" used above is the same figure that was calculated in section 3. If the sample size divided by the product of the expected number of people in the survey population per household and the number of clusters (e.g. 30) is greater than 50, then this larger number will be the target sample size and each segment should contain, on average, this many households. Otherwise, when this figure is less than 50, the target sample size will be equal to 50 households.

In the event of an integrated coverage survey with two survey populations, the survey population with the fewest expected number of people per household should be used in the equation above to calculate the target segment size. This will ensure that each segment has sufficient households to collect the samples size required for both survey populations.

Annex 3: CES interviewing techniques

In order for the coverage evaluation survey to provide helpful information to national programmes, the data must be as accurate as possible. The quality of the data collected by the survey team can be greatly affected by the interviewer. The information contained in this annex is intended to minimize data errors caused by interviewers.

1. Building rapport

- Introduce yourself and the purpose of your visit. If you have a village leader or health volunteer acting as a community guide it may be recommendable for him or her to introduce the team.
- Take into consideration your target respondents and make efforts to connect with them. You need to dress appropriately and conduct yourself in a manner that will not cause discomfort or embarrassment.
- Give the respondent an opportunity to ask questions he or she may have before you start the interview.
- Seek the respondent's consent before starting the interview.
- People who were directly involved in the distribution of medicines within the subunit (e.g. community health volunteers, auxiliary nurses, teachers) should not accompany the survey team to the household interviews, as their presence may influence the responses given.

2. Conducting interviews

- Do not suggest answers to the respondents.
- Spend time describing the mass drug administration (MDA) using as much local context as possible. For example, describe what the distributers were wearing, list any additional items the distributers were carrying or distributing (e.g. bednets, dose poles), give the time of year that the MDA took place and any other details that may help respondents to accurately recall receipt of MDA.
- Show each respondent an example of the medication. It is often helpful to let respondents hold the medication in their hand to help jog their memory.
- Speak slowly and clearly.

3. Ending the interview

- Thank the respondent.
- Ask the respondent if he or she has any questions.

Annex 4: Sampling using PPES

Steps to be followed in selecting DQA sites

1. **Prepare the sampling frame.** The DQA team should prepare a list of all the primary sampling units (typically districts or regions, province, or state) where the assessment is taking place, in consultation with the national programme staff. The size of each sampling unit in terms of total population should be obtained. Selection shall be done proportionate to the size of the clusters (see example in **Appendix 1**). If re-districting has recently occurred, it is important to ensure that the sampling frame matches the year for which the indicators are being assessed.
2. **Compute the cumulative population for the sampling frame**. List all the sampling units in the sampling frame together with their corresponding total population. Listing the units in alphabetical order is recommended to avoid periodicity.[1] The cumulative total population should then be computed by cumulatively adding up populations for the units as shown in **Appendix A4.1**.
3. **Compute a sampling interval.** The sampling interval shall be obtained by dividing the total population by the number of units to be selected.
4. **Select the units for assessment.** Selecting the units will involve selection of a random start. The random start should be any number between one and the sampling interval inclusive. For example, if the sampling interval is 67, then the random start can take any number from 01 to 67. The random start should be selected using random number tables or a similar random method. The sampling unit whose cumulative population coincides with the random start is selected as the first unit. Proceed to select the required number of units using the formula: random start + sampling interval = second unit; random start + 2 sampling intervals = third unit, etc. **Appendix A4.2** gives instructions on how to use a random number table.

1. A pattern that occurs regularly in a sampling frame is called periodicity, and this may result in a biased sample.

5. Use the same approach to select primary, secondary and tertiary sampling units.
6. Select service delivery sites. Three service delivery points should be randomly selected from each of the selected clusters at the lowest aggregation level. Simple random sampling may be used to select the SDPs. In the case of simple random sampling, all the SDPs have an equal chance of being selected.

Some programmes may have concerns about data quality that vary across diseases or drug packages. This may necessitate stratifying the districts by diseases or drug packages before selecting the sites for assessment.

There may be situations where the DQA exercise is not intended to get information on a representative sample of the sites. This may happen where, for instance, a district is suspected of having some serious data quality issues that the DQA is intended to identify. In this case the sites at that level may be selected purposively. The sites below that level should still be selected using PPES.

A focal disease such as schistosomiasis presents a situation where a district may include schistosomiasis-endemic areas but not all the SDPs are endemic for the disease. Moreover, an area may be endemic for schistosomiasis but not treated in a given year due to the alternate year treatment schedule. Should the DQA data verification include indicators related to schistosomiasis treatment, then stratification of the districts should take the endemicity and treatment schedule into consideration. Caution should be taken to exclude from the sampling frame districts that did not treat schistosomiasis during the year or reference period of the DQA. At the SDP and each data disaggregation level, care should be taken to include in the sampling frame only those areas that were treated for schistosomiasis during the round of preventive chemotherapy being assessed.

Appendix A4.1. Sample for selecting four clusters with probability proportionate to estimated size

District	Population	Cumulative population	Sampled units
Budumbuli	1345	1345	
Kasolokamponye	4435	5780	3642
Kifumbira	854	6634	
Kikubamutwe	4504	11 138	8330
Kyanja	6623	17 761	13 018
Mwanamugimu	992	18 753	17 706
Total	18 753		

- Sampling interval =18 753 / 4 = 4688
- Random start = 3642 (randomly selected number between 1 and 4688)
- First cluster selected coincides with random start (Kasolokamponye)
- Second cluster will be 3642 + 4688 = 8330 (Kikubamutwe), etc.

Alphabetical order

Total population added cumulatively

Appendix A4.2. How to use a random number table

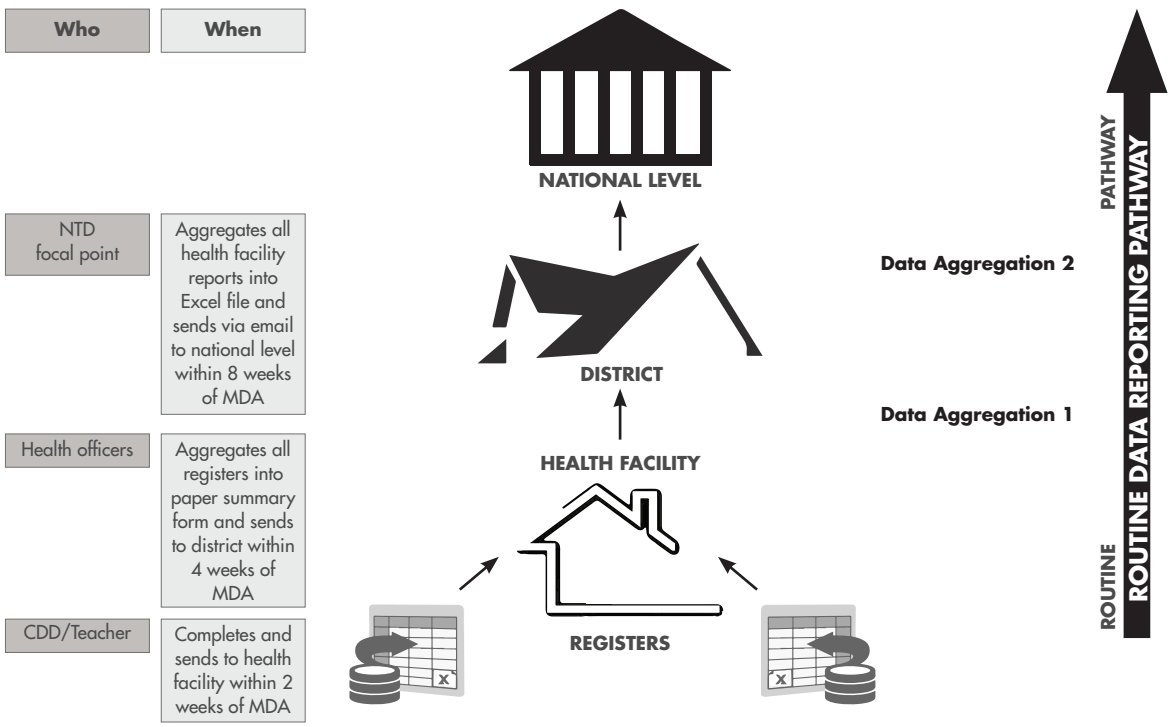
The following steps describe how to pick a random number using a random number table.

1. Determine how many digits you need your random number to have. This will be equal to the number of digits in the sampling interval calculated using PPES. In the example in **Appendix A4.1**, the sampling interval 4688 has four digits, so the random number selected should contain four digits.
2. Close your eyes and use a pointed object, such as a pen or pencil, to touch the random numbers in the table. Your starting point is the number closest to where you touched the random number table.
3. Read the number of the digits required from left to right, starting with the number that is closest to the tip of your pen. Discard numbers that are larger than the sampling interval (e.g. 4688). Continue reading from left to right until you find a number that is equal to or less than the maximum number. This number will correspond to the selected random number. In the example in **Appendix A4.1**, our pointer landed on the number 3 in the random number table. Moving to the right, the next three numbers were 6, 4 and 2. Our random start is therefore 3642.
4. If, in selecting a random number from the table, the end of the row is reached before a viable number is selected, continue the selection at the beginning of the next row.

Random number table

2	8	9	0	4	6	2	0	7		1	0	7	8	2	3	3	9	5		5	0	1	2	0	4	2	1	5		6	9	5	8	6	0	8
4	2	0	7	8	5	9	0	6		9	9	2	7	3	4	6	9	5		6	5	2	8	6	5	2	5	6		4	6	0	2	4	6	1
0	1	1	5	9	1	9	7	4		1	3	0	7	8	2	9	6	2		7	3	1	4	0	3	2	0	8		7	6	4	9	8	5	2
7	3	7	0	1	1	2	5	6		0	9	4	9	2	4	2	2	3		2	0	0	0	5	6	5	2	5		5	3	7	0	7	0	0
5	0	8	3	5	5	7	2	8		9	1	7	8	2	1	3	8	8		5	8	4	2	9	7	8	4	7		3	1	9	3	3	2	8
3	6	0	6	5	0	1	9	3		0	3	5	0	4	8	1	2	8		8	4	2	7	5	0	0	1	8		9	8	8	9	8	6	3
0	2	3	1	3	2	9	9	0		9	0	8	2	1	9	2	0	5		4	1	0	3	1	2	2	5	6		2	6	7	3	3	9	5
3	5	3	1	4	9	4	5	0		0	3	9	3	7	7	6	4	7		2	5	0	2	0	8	6	4	2		2	6	8	6	6	4	1
0	5	5	6	3	0	3	2	1		0	1	7	7	6	7	0	7	1		2	2	7	4	0	7	3	7	6		0	1	9	5	9	1	6
1	6	9	2	9	8	5	5	8		7	6	8	9	4	6	2	3	3		8	2	9	4	4	6	3	7	7		1	3	2	1	5	6	7
4	5	0	9	0	7	3	5	4		5	2	1	5	9	6	7	0	2		6	4	8	7	4	5	0	5	7		6	1	0	7	4	2	1
9	0	0	4	3	8	4	5	3		3	6	5	2	8	6	8	4	8		8	1	1	4	1	0	1	4	8		2	8	1	6	1	7	5
2	0	0	8	9	4	1	2	0		0	2	8	8	7	9	3	1	5		5	6	0	4	1	1	6	8	7		2	9	1	3	6	5	9
8	9	4	9	3	9	4	3	4		9	3	8	9	9	1	1	1	8		0	3	7	3	4	9	5	2	6		0	9	3	7	5	8	7
4	0	0	1	2	2	1	5	6		6	2	7	5	4	0	6	0	6		9	4	5	5	3	6	9	5	0		5	9	1	6	8	6	3
1	2	2	3	0	6	9	2	4		4	8	3	4	9	1	5	9	0		8	9	3	3	4	8	2	9	0		7	9	3	5	6	6	1
4	4	0	4	2	7	9	8	8		4	3	1	9	7	0	2	2	2		6	9	9	4	3	7	1	6	6		2	5	3	1	9	1	8
4	8	2	5	3	7	2	2	5		3	9	0	3	9	9	2	9	4		4	7	0	4	8	4	9	4	5		7	2	8	7	2	3	7
9	7	3	4	5	0	5	8	0		2	1	0	8	3	5	1	1	4		9	0	2	5	1	6	1	5	7		3	0	9	0	7	3	5
7	5	7	3	4	1	1	5	6		4	2	6	2	1	6	0	9	0		5	9	9	5	4	2	7	8	0		0	3	4	8	6	8	5
6	7	7	8	1	1	0	3	4		3	8	8	6	3	1	9	3	0		7	8	8	8	0	3	8	7	5		3	7	2	2	6	9	0
1	9	8	3	0	2	5	6	7		4	4	9	7	4	4	9	5	8		6	8	3	7	6	8	0	1	8		9	3	6	1	6	1	7
7	5	5	5	5	4	4	1	8		0	4	3	6	9	3	4	7	4		7	1	0	0	9	2	1	6	1		5	3	3	7	8	2	4
0	3	5	1	5	9	7	1	0		2	6	0	8	4	1	2	5	5		4	6	2	8	3	5	3	0	6		5	4	9	0	7	9	6
5	6	6	9	6	4	6	3	5		6	8	4	7	9	3	7	5	1		6	7	7	7	1	2	0	6	2		9	3	8	3	0	0	6
3	1	1	7	5	9	4	5	8		0	5	3	5	8	7	7	0	0		6	5	6	3	4	7	5	9	2		5	1	0	2	7	4	9
3	2	9	7	7	4	6	1	0		8	3	6	4	2	0	1	9	9		6	3	0	6	7	7	4	2	0		0	8	4	4	4	1	6
4	5	6	4	8	3	8	8	8		2	2	8	6	7	7	4	4	7		9	9	9	4	1	0	3	5	7		1	8	3	9	3	3	2
6	9	1	7	2	2	9	7	6		1	1	0	8	6	7	3	6	4		0	6	4	7	9	8	1	9	9		7	4	3	6	4	7	6
5	1	0	7	0	4	9	0	9		3	2	5	8	9	1	5	7	0		8	5	9	4	6	6	6	1	6		0	9	1	3	8	9	6
0	1	1	6	3	8	4	5	2		0	7	6	9	1	2	0	0	8		2	2	9	8	6	4	4	2	8		7	0	1	4	5	5	5
1	7	2	1	6	3	9	0	9		1	3	6	0	0	5	5	0	2		5	4	7	1	1	2	6	6	1		7	3	4	9	8	9	0
5	8	7	2	2	5	8	2	3		0	6	4	2	0	9	3	3	7		2	4	5	0	0	5	7	7	1		7	9	8	5	2	9	1
4	9	4	1	5	0	9	4	3		7	5	7	2	7	6	9	8	5		3	0	2	3	9	8	1	6	3		5	7	5	6	4	8	3
9	7	3	8	3	7	5	1	6		6	7	1	8	8	9	9	4	1		7	7	4	0	4	9	6	3	6		1	1	1	7	6	9	6
5	1	6	1	2	5	8	2	3		1	2	2	8	5	4	7	8	4		8	3	7	8	7	7	0	1	3		2	1	8	4	0	7	4
0	5	5	3	6	7	7	3	5		2	9	9	7	1	4	1	8	7		6	8	7	3	1	7	8	3	5		5	6	1	4	7	2	0
7	3	3	2	7	7	8	8	6		1	5	0	0	5	1	8	4	4		8	0	6	3	4	0	3	7	1		8	3	5	6	5	3	6
4	2	7	3	4	0	4	0	8		0	2	7	1	6	0	5	3	4		3	1	9	2	9	0	3	3	8		6	2	3	0	1	9	2
1	3	8	8	5	9	4	2	4		5	0	9	3	2	3	1	4	6		7	9	8	4	2	4	8	7	9		1	3	8	6	3	9	0

Annex 5: Data flow diagram for compiling and reporting MDA data



CDD, community drug distributor; MDA, mass drug administration

Annex 6: How to use a random number table

The following steps describe how to use a random number table to pick a random number. An example of a random number table is given in Annex 4 (Appendix A4.2).

1. Determine how many digits you need your random number to have. This will be equal to the number of digits in the total number of items from which you are selecting. For example, if you need to select 20 households out of 215 then your random number will need three digits because "215" contains three digits ("2", "1" and "5").
2. Close your eyes and use a pointed object, such as a pen or pencil, to touch the random numbers in the table. Your starting point is the number closest to where you touched the random number table.
3. Read the number of the digits required from left to right, starting with the number that is closest to the tip of your pen. Numbers that are larger than the maximum number of items (e.g. 215 households) will be discarded. Continue reading from left to right until you find a number that is equal to or less than the maximum number. This number will correspond to the selected random number.
4. If, in selecting a random number from the table, the end of the row is reached before a viable number is selected, the selection should continue with the beginning of the next row.

Example for selecting households

Suppose a total of 367 households are enumerated in the supervision area and you need to choose 20 to interview. This means that you need to pick 20 different random numbers between 1 and 367. Because the total number has three digit ("3","6" and "7") you will need to read three digits from the random number table. Close your eyes and touch the random number table with the tip of a pen. Read the number that is closest to the tip of your pen. Suppose your pen lands on the number "6" and the next two digits are "1" and "9". This means your selected number is 619; however, because the number 619 is > 367, you must choose again. Continuing to the right of the "6", the next three numbers on the table are "1", "9" and "0". Because 190 is < 367, this is a valid selection. This means that the 190th household should be selected. Repeat this process for 19 more households (note that the same household cannot be selected more than once).

Example for selecting individuals

Suppose a selected household has 7 people living there who are part of the survey population. From these 7 individuals only 1 of these people needs to be chosen at random to interview. Assign each person a number from 1 to 7. Because the total number from which you are selecting has only one digit ("7"), you need only to read one digit from the random number table. Suppose you close your eyes and your pen touches the number "0". Because 0 does not fall between 1 and 7 it is necessary to pick again. The number immediately to the right of the "0" is "8": this number is also not within the desired range. Suppose the number after the "8" is a "7": this number is valid and means that the 7th member of the survey population in that household has been selected for interview.

Annex 7: SCT interview script

"Good day. My name is _____*insert name*_____ and I am here on behalf of the Ministry of Health. We are conducting some brief interviews to understand how the recent distribution of _____*insert medicine(s)*_____ for _____*disease(s)*_____ is functioning. Your household has been randomly selected for inclusion in our survey. With your permission we would like to randomly select one person in your household to ask a few questions about the distribution. The questionnaire should take approximately 5 minutes. Would you be willing to let us select a member of your household to participate in this survey?"

If the response is "No":

"Thank you for your time." *Leave the household and proceed to the next numbered household (according to either the village register or the next enumerated household) to replace this household.*

If the response is "Yes":

Can you please tell me the names and ages of _____*insert survey population (e.g. "everyone" or "children aged between 5 and 14 years")*_____ in the household?

The member of the Supervisors' Coverage Tool team should then write each name on a piece of scrap paper then randomly select one person for interview (by drawing names from a hat or using a random number table). If there is no one in the survey population who lives in the household, the team should proceed to the next numbered household (according to either the village register or the next enumerated household) until they find a household that has at least one person in the survey population.