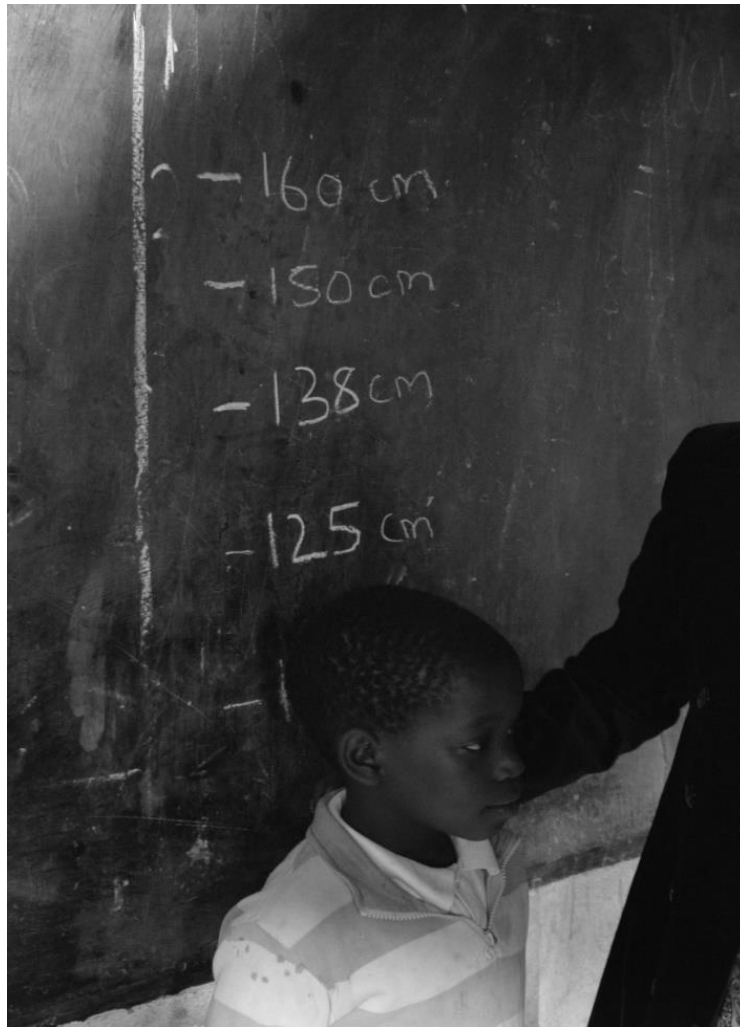


Malawi Coverage Survey 2017

Measuring *treatment coverage* for schistosomiasis and soil transmitted helminths with preventive chemotherapy



Contents

| | |
|---|----|
| Contents..... | 2 |
| Introduction | 4 |
| Background to the Coverage Survey..... | 4 |
| Schistosomiasis and STH in Malawi | 5 |
| Previous mapping | 5 |
| Treatment History..... | 5 |
| Previous Coverage Surveys | 6 |
| 2012 | 6 |
| 2014 | 6 |
| 2016 | 7 |
| Details of the MDA in Malawi 2017 | 8 |
| Coverage targets for MDA in 2017 | 8 |
| Reported coverage from the MDA | 9 |
| Study Aim..... | 11 |
| Ethical approval..... | 11 |
| Study Objectives | 11 |
| Study Design | 11 |
| Overview | 11 |
| Survey team | 12 |
| Timing of survey..... | 12 |
| Implementation unit selection | 12 |
| Number of villages and households to survey within each IU..... | 13 |
| Selection of villages to survey within each IU..... | 13 |
| Selection of households to survey within each village | 13 |
| Selection of individuals to survey within each household..... | 13 |
| Study Participant Recruitment..... | 13 |
| Data collection and analysis..... | 14 |
| APPENDIX A: Field team planning manual..... | 15 |
| Survey team composition | 15 |
| Survey team training..... | 15 |
| Training Material..... | 15 |
| Timetable of activities..... | 16 |
| Roles and responsibilities | 16 |

| | |
|---|----|
| APPENDIX B: Malawi 2017 Coverage survey interviewer manual | 18 |
| Before arriving at the village..... | 18 |
| Arriving at the village | 18 |
| What to do if a village cannot be visited | 18 |
| Selecting households to interview..... | 18 |
| Definition of a household | 18 |
| Selecting households method 1: Village lists..... | 19 |
| Selecting households method 2: Modified random walk..... | 20 |
| Obtaining household permission to survey | 21 |
| What to do if a household cannot be interviewed | 22 |
| Selecting individuals within a household..... | 22 |
| What to do if an individual cannot be interviewed | 23 |
| Interviewing selected individuals..... | 23 |
| Finishing the survey | 23 |
| APPENDIX C: Data Collection Forms | 24 |
| Village Questionnaire..... | 25 |
| Household Questionnaire | 27 |
| Individual Questionnaire..... | 30 |
| Individual Answer Code | 35 |
| Translated Survey..... | 37 |
| Appendix D: Detailed survey methodology & sample size estimation..... | 42 |
| Deviations from general statistical approach in this protocol..... | 42 |
| Sample size details..... | 42 |
| Statistical approach to coverage survey | 42 |
| Appendix E: Selected Villages | 45 |
| Chitipa District Village..... | 45 |
| Karonga District Villages | 45 |
| Rumphi District Villages | 46 |
| Dedza District Villages..... | 46 |
| Mchinji District Villages..... | 47 |
| Ncheu District Villages | 47 |
| Authors..... | 48 |
| References | 48 |

Introduction

This survey protocol describes the background and implementation design for the coverage survey that will be conducted in Malawi during October 2017. Mapping was conducted in January to March 2012 by the Ministry of Health (MoH) which has informed the strategy for the implementation of the preventive chemotherapy (PC) programme for schistosomiasis (SCH) and soil transmitted helminth infections (STH). The aim of this coverage survey is to evaluate the effectiveness of the PC campaign in July 2017 in reaching the target population.

Background to the Coverage Survey

Schistosomiasis or Bilharzia is a parasitic disease caused by infection with the trematode blood-flukes schistosomes. In sub-Saharan Africa, two major forms of human schistosomiasis occur: intestinal schistosomiasis caused by mainly *Schistosoma mansoni* infection and urinary schistosomiasis due to *Schistosoma haematobium* infection. Soil-transmitted helminthiasis is caused by infection with a group of intestinal nematode worms, most important of which within much of sub-Saharan Africa are the hookworms (both *Ancylostoma duodenale* and *Necator americanus*), the roundworm (*Ascaris lumbricoides*) and whipworm (*Trichuris trichiura*). Both schistosomiasis and STH are among the neglected tropical diseases (NTDs), which remain serious public health problems, posing unacceptable threats to human health and welfare.

The World Health Assembly resolution 54.19 urges all member states to regularly treat at least 75% of all school aged children who are at risk of morbidity from schistosomiasis and STH with Praziquantel (PZQ) and Albendazole or Mebendazole (ALB or MBD), respectively. To determine if these global goals are being reached, each national programme **routinely reports** drug coverage. This metric is calculated using the number of treatments distributed during a round of PC recorded in treatment registers and/or tally sheets for the numerator, and population figures (often obtained from routine census figures) as the denominator.

In order to monitor and support NTD programme performance, independent drug **coverage surveys** are recommended by the WHO (WHO 2006). These coverage surveys should be carried out across all areas given PC, particularly at crucial time points during the programmes i.e. in the first year of the programme, in cases where coverage might be suspiciously high or low, to ensure any corrective actions where needed. In areas where routinely reported coverage is low, additional methods i.e. Key Informant Interviews and Focus Group Discussion are recommended to assess the causes of low coverage (WHO, 2005; WHO, 2010).

SCI currently uses cluster-sample surveys similar to those widely used by the Expanded Programme in Immunisation (EPI) and in other NTD programmes (WHO 1991; WHO 2005; Worrell and Mathieu 2012; Cromwell *et. al.* 2013; Baker *et. al.* 2013). The accuracy of routinely reported coverage estimates can be assessed by comparing these with survey-derived coverage estimates and their 95% confidence intervals. In addition to identifying over and under-reporting, in routinely collected data, these coverage surveys also provide data to assess other issues such as, MDA delivery strategies, biases in treatment coverage for example by gender, school enrolment, and examination of possible reasons for coverage failure. This information assists in the identification for recommended actions to improve programme delivery.

Schistosomiasis and STH in Malawi

Intestinal and urogenital schistosomiasis caused by infection with *S. mansoni* and *S. haematobium* is a widespread public health problem in Malawi. The Malawian Ministry of Health (MoH) has an ongoing national scale treatment programme for schistosomiasis control. All 29 districts are at varying stages of programme implementation. All districts are endemic for *Schistosoma mansoni* and *S. haematobium* and have received five or more rounds of annual treatment with praziquantel (PZQ) and albendazole (ALB) for Soil Transmitted Helminths (STH) since 2009 (MoH report). The mean prevalence of *S. mansoni* has reduced from 2.23% eggs per gram (epg) at baseline to 0.82% epg at the third follow up. With the prevalence of heavy infection reducing from 0.19% to 0. The prevalence of *S. haematobium* has also reduced from 9.21% at baseline to 3.64% at follow up three. Prevalence of heavy infection has reduced from 1.60% at baseline to 0.73% at baseline and mean intensity of infection (eggs/10ml) has reduced from 3.59 to 1.12.

Previous mapping

Prior to SCI working with the MoH in 2011 baseline mapping surveys had been conducted in a number of the districts between 2003 and 2010 to enable the national program to commence mass treatment campaigns. The first mapping exercise was carried out in Malawi in 2003 to determine the distribution of infection and help guide planned control through treatment. The surveys that were conducted focused on urine filtration to detect *S. haematobium* and found there was a significant burden of disease in all targeted districts. Results indicated both a widespread occurrence of infection, and a marked variability in infection prevalence. However, information relating to *S. mansoni* and STH infection was not gathered. Since the baseline mapping in 2003, 26 out of 28 districts have been mapped. Mapping results presented between 2003 and 2010 have varying protocols and results are taken straight from MoH unpublished reports¹.

Treatment History

Due to the willingness of the MoH, financial support from SCI and availability of purchased and donated PZQ and ALB, Malawi has conducted national treatment annually since 2012. This followed limited treatments which were distributed between 2009 - 2012 in several parts of the country.

All districts in Malawi have now received at least five rounds of treatment. From 2012 to date the target population within each district has expanded from targeting school-age children (SAC) through school treatments, to treating SAC through school and communities and some adults, to now conducting both school and community treatments targeting all SAC as well as adults in known high risk areas (which may sometimes be whole districts) based on previous mapping results. In 2014 districts were asked to begin categorising health centres, schools and villages into areas of high risk or not. This was based on either previous mapping results, abundance of water bodies or high risk agricultural activities i.e rice farming or fishing. Categorisation of high risk areas is based on local knowledge and practices of the areas and population.

¹ S:\SCI - post 3 June 2011\Current programmes\DFID\ICOSA\COUNTRIES\Malawi\Mapping\pre-ICOSA mapping\ Baseline Prevalence studies from Dr Jemu

Table 1: WHO guidelines for treatment of schistosomiasis (WHO 1993, 1998)

| Category | Prevalence | Action | |
|---------------|---------------|--|--|
| High-risk | ≥50% | Treat all school-age children once a year | Simultaneously treat all adults once a year |
| Moderate-risk | ≥10% but <50% | Treat all school-age children once a year | Also treat adults considered to be at risk |
| Low-risk | <10% | Treat all school-age children twice during their primary schooling | Praziquantel should be available in dispensaries and clinics |

Previous Coverage Surveys

Malawi has conducted three coverage surveys the first in 2012, second in 2014 and third in 2016.

2012

The first coverage survey in 2012 was conducted in two districts Mangochi and Mulanje. In SAC, overall therapeutic coverage rate in the survey was 75.6% (95% CI: 68.5%, 82.7%) for PZQ, and lower at 55.7% for ALB (95% CI: 48.2%, 63.2%). There were significant differences in coverage by district, with coverage for both drugs higher in Mulanje than Mangochi. Gender differences in coverage were minimal in both districts. Nevertheless, there was a very large effect of school attendance, with children attending school approximately 4-6 times more likely to receive both PZQ and ALB, in both districts. Reported school attendance rates were high among SAC (91% overall, 87% in Mangochi and 95% in Mulanje; such that school-attending children drove the overall coverage patterns

2014

In 2014 treatment was delivered in all 28 districts. All districts were told to target adults in hot spot areas within their districts as well as carrying out community treatment to capture non-attending children. The coverage survey was carried out in August 2014, during school holidays. Six districts were purposively selected for a KAP survey pre-MDA and it was decided these districts and villages would be revisited post MDA to carry out a post-MDA KAP and coverage survey. Six districts Dedza, Salima, Rumphi, Nkhata Bay, Blantyre and Chikwawa were chosen as areas to examine in greater detail their reported versus actual coverage.

This survey took place over four weeks in August 2014, within 3 months of MDA being implemented, and 2100 adults, 1492 attending children and 204 non-attending SAC were interviewed throughout the six districts.

Findings from this survey show that all but one district managed to reach the 75% coverage target for SAC (Figure 2). This is reflected in the reported coverage received by the districts and Chikwawa was known to have particularly low coverage during the MDA. They were asked to carry out an extensive mop up. Although and improvement from the 2012 survey results, the 2014 coverage survey reported that non-attending SAC coverage was still under 40% for the surveyed districts.

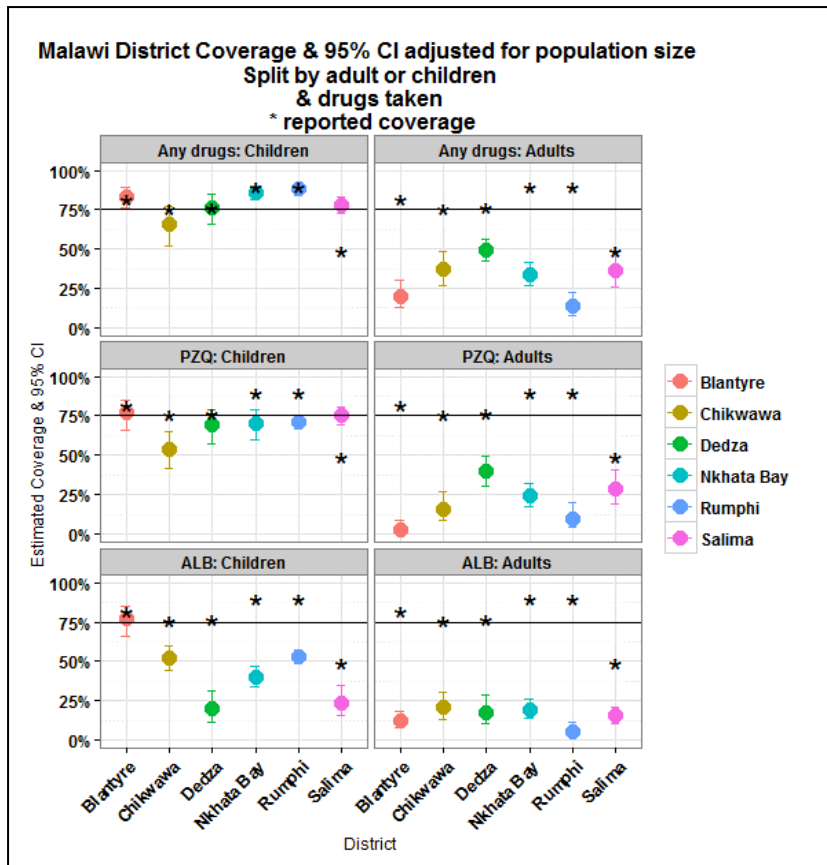


Figure 2: Results from previous coverage survey in 2014. Chikwawa, Rumphii and Salima were selected to be revisited during the 2016 coverage survey.

2016

The 2016 coverage survey was conducted in six districts. One district in each region was purposively selected (Chikwawa, Rumphii and Salima), as these were previously surveyed during the 2014 coverage survey and results had demonstrated a need for improvement. In addition, three other districts randomly selected, one from each of the same three region were also surveyed Mchinji, Karonga and Neno districts.

Overall, the surveyed coverage was above the WHO recommended coverage of 75% of SAC in 5 of 6 districts surveyed. When adjusting for population size Mchinji fell below the 75% coverage for SAC. Reported coverage was not significantly different from surveyed coverage in four of the districts for ALB and PZQ, reported coverage was significantly different than surveyed coverage in the remaining two remaining districts, one higher and one lower than reported.

This survey also found there was a significant difference in the coverage between those who do and do not attend school for all districts and there was no significant difference in coverage between the genders. The full protocol and recommendations report can be found here:

https://share.imperial.ac.uk/fom/IDE/SCI/The%20Hub/MWI_2016CoverageSurveyProtocol_EN.docx

https://share.imperial.ac.uk/fom/IDE/SCI/The%20Hub/MWI_Coverage_Recommendations_Report_EN.docx

Details of the MDA in Malawi 2017

The MDA took place between the 10-14th July 2017. The MDA was conducted in every district in Malawi except the islands of Likoma. SAC were targeted in every district and treatment predominantly delivered in schools for the SAC, as well community-based treatments for children who do not attend school and adults in the high-risk areas.

In addition to the standard radio campaigns and social mobilisation that are conducted annually, the MoH was supported by SCI and Development Media International (DMI) with the delivery of an enhanced media plan which involved 3 x 1 minute radio clips which started with the Doctor testimonial (25/6/17 – 1/7/17), followed by the Mother testimonial (2/7/17 – 8/7/17) and lastly the clip “Give me my breakfast” Appendix F. Each of the clips was broadcast 70 times (7 times adjacent to the News), across 9 radio stations and in 4 languages: Chichewa, Lhomwe, Tumbuka and Yao.

Coverage targets for MDA in 2017

The aim of the MDA was to target school aged children (SAC) and adults as follows:

| | Praziquantel (PZQ) | Benzimidazoles (ALB) |
|--------------------------|--------------------|----------------------|
| Pre-SAC | Not targeted | Not targeted |
| SAC attending school | > 75% | > 75% |
| SAC not attending school | > 75% | > 75% |
| At-risk adults | > 75% | > 75% |

With the following definitions:

- Pre-SAC: 1 to 4 years
- SAC: 5 to 14 years
- Child attending primary school: which is defined as ‘attendance at some point during the school year’. This based on the parents’ or guardians’ report as to whether the child is currently at school or, if not, whether the child attended school at some time during the school year. If the answer to either question is “yes”, the child is considered to have attended in the reference school year, even if currently absent or out of school.²
- At-risk adults: typically individuals ≥ 15 years at the implementation/sub-implementation unit

² UNESCO definition Children Out Of School: Measuring Exclusion From Primary Education
<http://www.uis.unesco.org/Library/Documents/oosc05-en.pdf>

Reported coverage from the MDA

Reported coverage from the most recent 2017 MDA is available for all districts except Chitipa at this time.

| DISTRICT | REGISTRATION SCHOOL | | | | | TREATMENT WITH PRAZIQUANTEL SCHOOL | | | | | |
|----------------------|---------------------|------------------|----------------|----------------|------------------|------------------------------------|------------------|----------------|----------------|------------------|-----------|
| | MALE | FEMALE | MALE | FEMALE | TOTAL | MALE | FEMALE | MALE | FEMALE | TOTAL | COVERAGE |
| | 5-14YRS | | 15YRS+ | | | 5-14YRS | | 15YRS+ | | | |
| Karonga | 48,339 | 48,782 | 10,367 | 8,515 | 116,003 | 41,580 | 41,883 | 8,242 | 6,875 | 98,580 | 85 |
| Rumphi | 27,586 | 27,318 | 4,784 | 3,328 | 63,016 | 24,258 | 24,240 | 3,770 | 2,850 | 55,118 | 87 |
| Chitipa | | | | | - | | | | | - | - |
| Dedza | 86,956 | 95,754 | 17,981 | 17,013 | 217,704 | 81,557 | 91,239 | 16,435 | 15,573 | 204,804 | 94 |
| Salima | 48,618 | 52,043 | 9,038 | 8,711 | 118,410 | 42,128 | 45,734 | 7,644 | 7,375 | 102,881 | 87 |
| Mchinji | 67,574 | 75,612 | 7,843 | 6,955 | 157,984 | 57,192 | 65,391 | 6,797 | 6,139 | 135,519 | 86 |
| Ntheu | 67,636 | 73,130 | 13,486 | 12,176 | 166,428 | 55,025 | 59,559 | 10,343 | 9,442 | 134,369 | 81 |
| Country Total | 1,870,598 | 1,788,119 | 336,811 | 327,905 | 4,323,433 | 1,639,582 | 1,626,800 | 288,779 | 253,669 | 3,808,830 | 88 |

| DISTRICT | REGISTRATION SCHOOL | | | | | TREATMENT WITH ALBENDAZOLE SCHOOL | | | | | |
|----------------------|---------------------|------------------|----------------|----------------|------------------|-----------------------------------|------------------|----------------|----------------|------------------|-----------|
| | MALE | FEMALE | MALE | FEMALE | TOTAL | MALE | FEMALE | MALE | FEMALE | TOTAL | COVERAGE |
| | 5-14YRS | | 15YRS+ | | | 5-14YRS | | 15YRS+ | | | |
| Karonga | 48,339 | 48,782 | 10,367 | 8,515 | 116,003 | 41,580 | 41,883 | 8,242 | 6,875 | 98,580 | 85 |
| Rumphi | 27,586 | 27,318 | 4,784 | 3,328 | 63,016 | 24,258 | 24,240 | 3,770 | 2,850 | 55,118 | 87 |
| Chitipa | | | | | - | | | | | 40,917 | #DIV/0! |
| Dedza | 86,956 | 95,754 | 17,981 | 17,013 | 217,704 | 55,483 | 61,791 | 9,464 | 9,147 | 135,885 | 62 |
| Salima | 48,618 | 52,043 | 9,038 | 8,711 | 118,410 | 42,128 | 45,734 | 7,644 | 7,375 | 102,881 | 87 |
| Mchinji | 67,574 | 75,612 | 7,843 | 6,955 | 157,984 | 57,192 | 65,391 | 6,797 | 6,139 | 135,519 | 86 |
| Ntheu | 67,636 | 73,130 | 13,486 | 12,176 | 166,428 | 55,025 | 59,559 | 10,343 | 9,442 | 134,369 | 81 |
| Country Total | 1,870,598 | 1,788,119 | 336,811 | 327,905 | 4,323,433 | 1,399,774 | 1,408,166 | 256,519 | 213,128 | 3,277,587 | 76 |

| DISTRICT | REGISTRATION COMMUNITY | | | | | TREATMENT WITH PRAZIQUANTEL COMMUNITY | | | | | |
|----------------------|------------------------|----------------|----------------|------------------|------------------|---------------------------------------|----------------|----------------|------------------|------------------|-----------|
| | MALE | FEMALE | MALE | FEMALE | TOTAL | MALE | FEMALE | MALE | FEMALE | TOTAL | COVERAGE |
| | 5-14YRS | | 15YRS+ | | | 5-14YRS | | 15YRS+ | | | |
| Karonga | 3,310 | 3,537 | 16,711 | 18,394 | 41,952 | 2,552 | 2,745 | 15,260 | 16,331 | 36,888 | 88 |
| Rumphi | 2,967 | 2,928 | 12,950 | 13,585 | 32,430 | 2,575 | 2,468 | 11,594 | 12,044 | 28,681 | 88 |
| Chitipa | | | | | 4,033 | | | | | 3,509 | 87 |
| Dedza | 44,496 | 45,678 | 36,319 | 44,145 | 170,638 | 35,080 | 38,567 | 30,420 | 39,753 | 143,820 | 84 |
| Salima | 17,817 | 20,320 | 36,967 | 47,262 | 122,366 | 13,998 | 16,264 | 32,130 | 41,365 | 103,757 | 85 |
| Mchinji | 8,364 | 8,833 | 9,366 | 11,165 | 37,728 | 7,811 | 8,224 | 8,075 | 9,586 | 33,696 | 89 |
| Ntheu | 18,267 | 19,019 | 22,357 | 28,664 | 88,307 | 15,058 | 16,275 | 19,115 | 25,091 | 75,539 | 86 |
| Country Total | 524,740 | 583,686 | 936,904 | 1,208,422 | 3,467,590 | 522,312 | 600,837 | 836,477 | 1,034,036 | 2,993,662 | 86 |

| DISTRICT | REGISTRATION COMMUNITY | | | | | TREATMENT WITH ALBENDAZOLE COMMUNITY | | | | | |
|----------------------|------------------------|----------------|----------------|------------------|------------------|--------------------------------------|----------------|----------------|----------------|------------------|-----------|
| | MALE | FEMALE | MALE | FEMALE | TOTAL | MALE | FEMALE | MALE | FEMALE | TOTAL | COVERAGE |
| | 5-14YRS | | 15YRS+ | | | 5-14YRS | | 15YRS+ | | | |
| Karonga | 3,310 | 3,537 | 16,711 | 18,394 | 41,952 | 2,552 | 2,745 | 15,260 | 16,331 | 36,888 | 88 |
| Rumphi | 2,967 | 2,928 | 12,950 | 13,585 | 32,430 | 2,562 | 2,447 | 6,809 | 6,990 | 18,808 | 58 |
| Chitipa | | | | | 4,033 | | | | | - | - |
| Dedza | 44,496 | 45,678 | 36,319 | 44,145 | 170,638 | 20,586 | 23,626 | 12,382 | 15,980 | 72,574 | 43 |
| Salima | 17,817 | 20,320 | 36,967 | 47,262 | 122,366 | 13,938 | 16,188 | 31,448 | 40,645 | 102,219 | 84 |
| Mchinji | 8,364 | 8,833 | 9,366 | 11,165 | 37,728 | 7,814 | 8,232 | 8,076 | 9,604 | 33,726 | 89 |
| Ntheu | 18,267 | 19,019 | 22,357 | 28,664 | 88,307 | 15,058 | 16,275 | 19,115 | 25,091 | 75,539 | 86 |
| Country Total | 524,740 | 583,686 | 936,904 | 1,208,422 | 3,467,590 | 392,395 | 436,140 | 594,041 | 820,062 | 2,242,638 | 65 |

Study Aim

This survey protocol is designed to monitor the treatment coverage of PC with PZQ and ALB for the MDA campaign in 2017.

Ethical approval

The MoH in Malawi has granted ethical approval and a letter has been sent

https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/MWI_Ethical%20Approval_Coverage_2017.docx?d=w0e80b9b922da45bca382cd0e9f66800b&csf=1

Coverage surveys have been granted ethical approval by Imperial College Research Ethics Committee (ref: ICREC_8_2_2).

Study Objectives

The objectives of the coverage survey are:

Survey Objective (SO) 1. To measure validated treatment coverage of PZQ and ALB in SAC, and adults relative to coverage targets

SO 2. To compare reported and validated coverage of PZQ and ALB for SAC and adults

SO 3. To assess coverage in SAC and adults disaggregated by gender

SO 4. To assess coverage in SAC disaggregated by school attendance

SO 5. Collect information on why targeted eligible individuals did not receive or accept treatment

SO 6. To assess the impact of radio campaigns on improving knowledge about schistosomiasis

SO 7. To assess whether radio campaigns improved attendance/coverage of treatment with PZQ and ALB

Where validated coverage rate is defined as:

$$\frac{\text{Total number of interviewed individuals that ingested the target drug}}{\text{Total number of interviewed individuals}} * 100 \%$$

Note that people interviewed but with missing information on whether they ingested the drug will be assumed to have **not** taken the drug for the purposes of calculating validated coverage.

Study Design

Overview

The coverage survey will take place in nine implementation units (IUs) known as the district. Each IU will be considered separately. Within each IU, the survey will be household (HH) based in randomly selected villages. See Appendix D for a detailed explanation of the statistical approach to the coverage survey.

Survey team

Interviewers must not have been involved in any previous activities related to the NTD programme, specifically the MDA, to ensure that they remain unbiased.

Selection of enumerators will be done by the Programme Managers, ensuring that none of the interviewers were involved with the MDA in July 2017. The majority of interviewers have experience in coverage surveys, but everyone will attend compulsory training to ensure standardisation of knowledge and ability to carry out coverage surveys. Training will include teaching about schistosomiasis and soil transmitted helminth infections as well as familiarisation with the health questionnaires and the phones that the information will be stored on.

Although programme managers will not take part in any of the individual interviews in interviewee households, they will facilitate in the training and logistics of the survey as well as support the teams of enumerators if problems arise.

See Appendix A for more details of the survey teams and logistics.

Timing of survey

Coverage surveys should ideally take place as soon as possible following treatment (especially in areas with frequent MDAs) to minimise recall bias³.

The survey should also take place during the day, and preferably not during school holidays⁴.

In Malawi the coverage survey will take place in October, which is 4 months following the MDA. The survey will take place during the day and will not be during the school holidays.

Implementation unit selection

The number of IUs selected for a coverage survey is generally dependent on budget and logistical reasons. Typically, at least 10% of the eligible IUs should be surveyed. See Appendix D for more information on approaches to IU selection.

In Malawi the IU is the district. The coverage survey will take place in 9 IUs. Each implementation unit will be treated independently in the analysis.

Nine districts were originally selected for the survey, three from each region of Malawi: Central, North and South. Between September and October 2017, in the Southern districts of Malawi, health care workers, local leaders and medical services were attacked in villages due superstition surrounding witchcraft. It was decided for the security of survey teams that the Southern districts would not be visited and, therefore, the selection of districts was revisited. The districts originally selected in the Central and North were kept and after discussion with the MoH additional 3 districts were chosen in these regions based on safety and results from the MDA.

Districts were purposively selected for this survey, four of which were surveyed in 2016, based on safety and whether they were surveyed previously. One of the districts (Salima), as well as Dedza districts, were selected based on poor socioeconomic status, risk of schistosomiasis and level of coverage for an additional qualitative

³ Several recent studies demonstrate that recall bias may not affect accurate reporting of treatment in populations receiving integrated MDA (Knipes *et. al.* 2014; Budge *et. al.* 2016)

⁴ Several SCI coverage surveys conducted during school holidays revealed that the same populations of SAC that received treatment were not available during the school holidays.

survey (protocol available on request). Although districts were purposively selected, the villages and traditional areas were randomised during the selection process.

| District | Selection Criteria | Part of Qualitative survey |
|----------|-------------------------|----------------------------|
| Salima | Surveyed Previously | Yes |
| Karonga | Surveyed Previously | |
| Mchinji | Surveyed Previously | |
| Rumphi | Surveyed Previously | |
| Ntcheu | Not surveyed previously | |
| Dedza | Not surveyed previously | Yes |
| Chitipa | Not surveyed previously | |

Number of villages and households to survey within each IU

Sample size calculations indicated that 17 villages per IU, and 15 HHs per village are required to obtain 9% precision on the coverage of SAC and adults within each district. As the MDA was community-wide, two adults will be randomly sampled, and to capture more information about school attendance rates, all eligible children within a HH will be interviewed. See Appendix D for full details of sample size calculations.

Selection of villages to survey within each IU

A list of all traditional areas (TAs), and all their villages, within the selected districts were collected from the district health offices. The list of all TAs and their villages will ensure all villages have the opportunity to be selected. Each village was allocated a number and was then randomly selected by the in-country team using a random number generator until 18 villages per district were selected. The sample size calculation requires 17 villages, for logistical purposes 18 villages have been selected so that each team will visit 6 villages per district.

A short list of ‘reserve villages’ was provided, such that if a selected village cannot be visited for security or other unpredictable reasons, it can be replaced with another in the same district. See Appendix B: Coverage Survey Interviewer Manual for more details. Appendix E has a list of all selected villages and reserves

Selection of households to survey within each village

HH selection will be performed on site. Selection will be random, with the methodology dependent on whether HHs lists are available (see data collection protocol). If lists are not available HH selection will be by the modified random walk procedure (please see data collection protocol).

Although ideally the survey would include nomadic populations and transient communities, because this is a HH-based survey, those without a fixed residence at the site selected for the coverage survey will not be included in the survey target population.

Selection of individuals to survey within each household

The HH or another responsible individual will be interviewed to obtain the HH information. Two adults within each HH will be randomly selected for individual interview as well as all the children in that household. See Appendix C for more details of individual interview procedures.

Study Participant Recruitment

Consent: The village chief will be notified about the study at least a week prior to the survey by the team leader, survey coordinator, or through other channels. Upon arrival in the village, there will be a meeting with

the village chief where the survey is explained and verbal permission to perform the survey in the village is obtained before any household (HH) is visited.

Informed consent from each selected HH head will be obtained at arrival and before the team enters the house for the interview, see Annex 5 'Household Consent Form'.

Data collection and analysis

Data will be collected by mobile devices, and if not possible by paper forms, by survey teams in the field (see annex 'Forms'). All data will be uploaded to a remoter server each evening, or whenever internet connection allows. Throughout the survey SCI will review the data collected at the end of each day to allow feedback to the team and make any adjustments to interviewer technique or the protocol.

Analysis of the data will include calculation of survey coverage and associated 95% confidence intervals using appropriate analytical tools that account for clustering in the data (i.e. interviewees clustered in HHs and villages, and IU if appropriate). Sub-group analysis (e.g. using multi-level logistic regression) will be used to test how coverage in SAC varies according to school attendance and gender, and in adults by gender. All analyses will be fully shared with collaborating partners in country.

APPENDIX A: Field team planning manual

Survey team composition

Include a brief description of the survey teams: The participants were identified by the Malawi program manager as people with skills and experience relevant for the activity. The backgrounds from the participants ranged from IT Graduates, retired teachers to experienced Nurses from within the MoH.

Survey teams will be made up of students and people known to the program with interview skills but had no part in the MDA.

There will be 6 teams made up of 1 team leader, 3 interviewers and a driver.

The survey will take 5 weeks to complete all districts working Monday – Saturday each week.

Survey team training

Training for the survey will be conducted by the SCI PM, MoH PM with additional input from other Program staff. Below are links to the various training materials that will be used. Each interviewer will be provided with an Interviewer manual and cheat sheet for using the phones.

The questionnaire will be translated prior to the training and will be reviewed during the training to ensure they are fully understood. Each team will be provided with the same dose pole that was used during each distribution (MDA), samples of each of the drugs that were provided, and examples of the posters and leaflets used during social mobilization. These will act as visual cues to the individuals in each HH.

Training Material

Agenda:

https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/MWI_Coverage%20Survey%20Training%20Agenda_OCT%202017.docx

Schisto Overview:

https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/GLO_Schisto%20Program%20Overview%20for%20Coverage%20Survey%20Training.pptx

Coverage Survey Overview:

https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/GLO_PP_Coverage%20Survey%20Training%20Template.pptx

Household Selection Exercise: <https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/MDG-%20HH%20selection%20exercise.pptx>

Phone Use:

https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/TOOL_Coverage_SurveyCTO_Cheat_Sheet_EN.docx

Practice Scenarios:

https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/GLO_Coverage%20Survey%20Training%20Practice%20Household%20Scenarios_EN.docx

Coverage Manual:

<https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/MWI%20Interviewer%20Manual%202017.docx?d=w9fd6a56081c14123b115a778483f6a84&csf=1>

Timetable of activities

https://imperiallondon.sharepoint.com/sites/fom/SCI/The%20Hub/MWI_Coverage_Survey_Planning_2017.xlsx

Roles and responsibilities

The survey team will include the following main members:

Survey Coordinator

The NTD focal point (or other relevant national NTD control programme staff) will be the survey coordinator.

The primary duties of the survey coordinator are:

- Together with the SCI program manager and biostatistician, adapt and finalise the survey protocol, including the questionnaire
- If necessary, arrange translation and back translation of questionnaire in local languages
- Together with the SCI program manager, identify the survey team
- Together with the SCI program manager, organise the survey logistics
- Together with the SCI program manager, train the survey team
- Together with the SCI program manager, oversee the data entry (paper or mobile-based).
- Lead one of the teams

SCI Program Advisor

The primary duties of the SCI program manager are to:

- Obtain necessary ethical approvals (with the Ministry of Health)
- Adapt and finalise the survey protocol, including the questionnaire (with survey coordinator and SCI biostatistician)
- Obtain SCI sign-off of protocol
- Together with survey coordinator, identify the survey team
- Together with survey coordinator, organise survey logistics
- Together with survey coordinator, train and supervise the survey team
- Together with survey coordinator, oversee the data entry
- Together with survey coordinator, write the final survey report

Team Leader

A team leader should be identified for each field team. The primary duties of the team leader are to:

- Contact local authorities in the survey area to advise them about the study
- Lead the selection of HHs within a village
- Ensure strict adherence to the survey protocol
- Provide the survey teams with necessary materials for daily activities
- Review surveys for accuracy and completeness after each village is done.
- Review collected data (and eventual upload of data if mobile-based) at the end of each day
- Manage daily logistics
- Lead a daily debrief with the team
- Provide the field report

Interviewers

The primary duties of the interviewers are to:

- Conduct interviews according to protocol and entering data (paper or mobile-based)
- Report any issues or concerns to the team leader as they occur

The team members must have the following competencies:

- **Understanding of the sampling protocol and the necessity of protocol compliance**

- S/he does not need specific skills besides those that should be acquired during the survey training. If such a person is not available at the district level, he/she can be recruited from the national or regional level. In such cases, this person can administer surveys throughout the country as part of a national survey team.
- **Proficiency in the local language as well as general knowledge of the district**
If possible, the team members should have some experience interviewing people.

Local Guide

Often, in each selected village, the team will be accompanied by a local guide. The local guide can help familiarize surveyors with the selected cluster (i.e. identifying village boundaries or included HHs), and introduce the survey team to local authorities and HH members if necessary. However, the local guide should not be involved with the HH selection or interview process. The local guide should not have been involved in the drug distribution.

Drivers

Due to the nature of cluster surveys, drivers play a vital role in the success of the survey by helping the survey team navigate between clusters. Preferably, drivers should be familiar with the survey area. The number of drivers needed will vary based on the local situation.

Data Entry Personnel

The data entry personnel must be knowledgeable of data management and data entry.

SCI Biostatistician

The primary duties of the SCI biostatistician are to:

- Together with the survey coordinator and SCI program manager, adapt and finalise the survey protocol, including the questionnaire
- Determine the sampling strategy and number of villages and HHs to sample
- Select the villages to sample
- Clean the data
- Analyse the data and produce graphs and tables with SCI PM
- Write the data cleaning notes in the report

APPENDIX B: Malawi 2017 Coverage survey interviewer manual

Before arriving at the village

- The team leader should ensure that the village leader is notified of the study at least one week before the survey. The district coordinator may be able to help with this.
- The village leader should be asked if they can provide a list of all households in the village when the team arrives

Arriving at the village

- It is important to be at the village when people are available. This means interviewers should be in the village and ready to start at 8am every day.
- The first thing the team should do when arriving at the village is to seek out the head of the village:
 1. Introduce the team and ask for permission to survey
 2. Ask the head of the village for a list of houses in the village
 3. If a list of houses is available, select households using the 'village list' method
 4. If a list of households is not available, select households using the 'modified random walk' method
- The team leader will be responsible for completing the village questionnaire by interviewing the village leader:
 - The **GPS co-ordinates** of the village should be entered on **arrival and departure** if the data is being collected on paper forms

What to do if a village cannot be visited

If a selected village cannot be visited for security or other unpredictable reasons, replaced the village with the first reserve village in the same district that hasn't yet been visited.

Selected villages should only be replaced with those on the reserve list in extreme circumstances where it is impossible to survey that village, and not for reasons of distance, access difficulty and so on. It is important to document in the field report any villages that have been replaced and the reason for this replacement, as this could be a reason for biased coverage results.

Selecting households to interview

20 households will be randomly selected per village.

Definition of a household

We define a HH to be "a group of persons who normally live and eat their meals together in the household, and did so during the time of the survey" . These people may or may not be related by blood, but make common provision for food or essentials for living and they have only one person whom they all regard as head of the household"

If the HH comprises of one man with more than one wife then all wives and any children should classified as one HH.

In some villages, several HHs, normally within the extended family, share the same compound. At the selected compound, if there are a number of HHs which could be selected, one HH should be randomly selected from the HHs in the compound (selection should not take the most senior, but be done by numbering the HHs and randomly selecting pieces of papers with the respective numbers written on them).

Selecting households method 1: Village lists

The village list selection of HHs is the preferred selection method. At village level, the village chief or equivalent administrative leader will be approached for a list of all HHs in the village. Team leaders must ensure that this HH list is fully up to date and captures all HHs within the area.

Sampling using the village list is when every h HHs in the village are sampled with the initial HH being a random number between 1 and h , where h is the sampling fraction as detailed below.

The steps to take for sampling using the village list are:

1. Find the total number of HHs in the village from the village list
2. Calculate the sampling fraction (h) using the equation below. Non-whole numbers should be rounded down.

$$h = \frac{\textit{Total number of households in village}}{\textit{Number of households to survey}}$$

3. Select the first HH by randomly selecting a number between 1 and h . Random number selection can be done in the field by writing numbers on pieces of paper, folding them up, placing them in a container and mixing before drawing one out at random, and then selecting the HH that is on this row in the village list.
4. The second HH to sample should be the initial number + h .
5. Sampling should then proceed in this manner with every h^{th} HH being sampled.

Example of selection of HHs with a village list:

1. The protocol is to sample 12 HHs in the village.
2. The village list shows that there are 200 HHs in the village.
3. Therefore $h = 200 / 12 = 16.66$, which is rounded down to 16
4. The numbers 1 – 16 are written on pieces of paper, folded up and placed in a container and mixed up. The random piece of paper drawn out is 5.
5. The HH on the 5th row of the village list is identified.
6. The second HH to select for interviews is $5 + 16 = 21$. The HH on the 21st row of the village list is identified.
7. Sampling then continues to HHs 37 (= 21 + 16), 53, 69, 85, 101, 117, 133, 149, 165, 181 and 197 giving 12 HHs sampled in total.

Random selection to start at house 5

Select every 16th house (21 = 5 + 16)

| | | | | |
|----------|----------|----------|----------|-----------|
| House 1 | House 21 | House 41 | House 61 | House 81 |
| House 2 | House 22 | House 42 | House 62 | House 82 |
| House 3 | House 23 | House 43 | House 63 | House 83 |
| House 4 | House 24 | House 44 | House 64 | House 84 |
| House 5 | House 25 | House 45 | House 65 | House 85 |
| House 6 | House 26 | House 46 | House 66 | House 86 |
| House 7 | House 27 | House 47 | House 67 | House 87 |
| House 8 | House 28 | House 48 | House 68 | House 88 |
| House 9 | House 29 | House 49 | House 69 | House 89 |
| House 10 | House 30 | House 50 | House 70 | House 90 |
| House 11 | House 31 | House 51 | House 71 | House 91 |
| House 12 | House 32 | House 52 | House 72 | House 92 |
| House 13 | House 33 | House 53 | House 73 | House 93 |
| House 14 | House 34 | House 54 | House 74 | House 94 |
| House 15 | House 35 | House 55 | House 75 | House 95 |
| House 16 | House 36 | House 56 | House 76 | House 96 |
| House 17 | House 37 | House 57 | House 77 | House 97 |
| House 18 | House 38 | House 58 | House 78 | House 98 |
| House 19 | House 39 | House 59 | House 79 | House 99 |
| House 20 | House 40 | House 60 | House 80 | House 100 |

Selecting households method 2: Modified random walk

If there are no village lists available then the HHs can be selected using the Modified Random Walk Procedure. The first HH is determined using the traditional spin the bottle method.

The steps for carrying out a random walk are:

1. Identify a central point (i.e. central meeting place, house of the village chief) within the village.
2. Spin a bottle/pen at this central point to randomly select a direction. If there is no road in the direction indicated by the bottle, move the bottle clockwise until a road is encountered.
3. Count all HHs along the direction indicated by the bottle between the central point and the village boundary. **Do NOT count empty/destroyed houses, businesses, or administrative buildings.** It is important to remember which HHs were included in the counting. A map indicating the HHs and their numbers should be drawn up.
4. The sampling fraction h should then be calculated using the equation below. Non whole numbers should be rounded down.

$$h = \frac{\text{Total number of households counted}}{\text{Number of households to survey}}$$

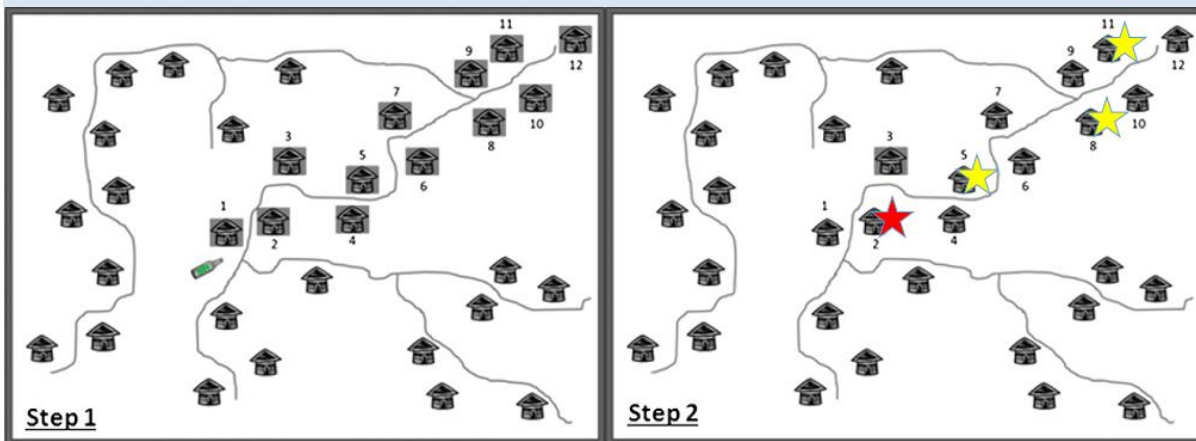
5. Find the first HH to sample by randomly selecting a number between 1 and h . Random number selection can be done in the field by writing numbers on pieces of paper, folding them up, placing them in a container and mixing before drawing one out at random, and then selecting the HH that is on this row in the village list.
6. The second HH to sample should be the initial number + h
7. Sampling should then proceed in this manner with every h^{th} HH being sampled.

Example of selection of houses with a random walk (Worrell and Mathieu 2012):

Step 1

1. The protocol is to sample 4 HHs to in the village.
2. The central point of the village has been found (see diagram below).
3. The bottle has been spun and the direction of survey determined.
4. A total of 12 HHs have been found between the direction of the bottle and the village boundary (see step 1 in the diagram below).
5. Therefore $h = 12 / 4 = 3$.

Diagram illustrating a random walk with 12 HHs and 4 HHs to be interviewed



Step 2

6. The first HH to be surveyed is randomly selected between numbers 1 – 4 and is number 2. HH number 2 is identified, and is shown with a red star on the diagram above.
7. The second HH to sample is HH 2 + 3 = 5. This is shown with a yellow star on the diagram above.
8. Sampling then continues to HHs 8 (=5+3) and 11 giving 4 HHs sampled in total.

Obtaining household permission to survey

Once the HH has been selected for interviews, the survey team should approach the house in a friendly and respectful manner and follow the below steps:

- Ask to speak with the head of the HH or the most senior person present.
- Introduce yourself to the head of the HH
- Explain the purpose of your visit and obtain consent from the head of the HH. Ensure the introduction is factual and does not influence or bias the HH's responses

- See below for example introduction:

Hello, my name is <name>. I am here on behalf of the Ministry of Health of <country>, and we are here to conduct a household survey about an activity that has taken place in the village during the past months.

We would like to speak to some members of your households; and if you agree, the survey will only take a few minutes. Your answers will be treated anonymously.

The results will the Ministry of Health improve the programme.

It is your choice to take part, or not to take part, in this survey. If you do not wish to participate, it will not have any consequences for you.

Would you like to take part in our survey?

Answer: Yes or No.

- If the head of the HH provides consent, ask them to complete the household consent form (appendix C). If the person is not literate, read out the consent form in the local language, and obtain consent by thumb print.
- If the head of the HH **DOES NOT** provide consent for the survey; thank them for their time and continue to the next HH.

What to do if a household cannot be interviewed

If people in the selected home refuse to participate, try to encourage participation. If they still refuse, indicate this on the survey form, and count this HH as one of the HHs visited, indicate this on the survey form. **DO NOT replace the house with another HH.**

If no-one is at home in the selected HH, return later in the day. If, again, nobody is at home, indicate this on the survey form in the “Household questions” section, and count this HH as one of the HHs visited. **DO NOT replace the HH with another one**⁵.

If there are no eligible individuals for interview in the HH (e.g. no SAC live at the address, or all HH members moved in after the drug distribution), note this on the survey form, do not ask the questions, **but replace the HH with the next HH in the direction of travel with any eligible interviewee.**

Selecting individuals within a household

- If the head of the HH agrees to participate, proceed with the interview.
- Two adults and all school-aged children (SAC) within each HH will be randomly selected for interview.
- SAC is all children aged 5 -14 years
- Adults is all people aged 15 or over

The steps to take for interviewing SAC within a HH are:

1. Write the name of each SAC (i.e. all children aged 5 -14) in the HH on a separate piece of paper. **Include all SAC living in the HH, even if they are not in the HH at the time.**
2. Begin interviewing the children who are available for interview

⁵ If this happens for many households (e.g. frequently >2 households/village) in several villages, the supervisors should discuss with the study co-ordinator to consider increasing the number of households to randomly select per village.

3. If a selected individual cannot be interviewed, record who they are and please see below.

The steps to take for interviewing adults within a HH are:

1. Write the name of each adult (i.e. all individuals 15 or over) in the HH on a separate piece of paper.
Include all adults living in the HH, even if they are not in the HH at the time.
2. Fold up the pieces of paper and put into a container
3. Pick out two pieces of paper
4. Interview the adults whose names are on the paper
5. If a selected individual cannot be interviewed, please see below

What to do if an individual cannot be interviewed

- If an individual (SAC or adult) cannot be interviewed then return later to try to interview them.
- If an individual is away from the house (e.g. at school), go to try to find them if permission from the head of the HH has been obtained.
- **If they still cannot be interviewed then DO NOT replace them with another individual.** Record them on the survey form as not being interviewed and the reason why.

Interviewing selected individuals

- Interview the randomly selected individuals using the phones or paper forms
- Interviews should be conducted with each person privately; parents can accompany children.
- Avoid leading questions or providing the HH with information which later you will be asking them to provide to you either as an answer, or to check their responses. Use visual cues as much as possible (dose poles, drugs etc)
- **DO NOT** read the multiple-choice options to the interviewee or suggest an answer
- Wait for the interviewee to provide an answer and then choose the most appropriate option on the phone or from the codes provided with the paper forms
- If using paper forms, be very careful when answering questions with multiple parts that no contradictory answers are given – e.g. person says that they did take drugs but also give a reason why they didn't take drugs

Note: The survey can be conducted by either one (1) or both interviewers at a time. If the interviewers feel confident that they can conduct the interview alone then the other interviewer and field supervisor can proceed to the next HH according to the sampling protocol.

Finishing the survey

- After everyone selected has been interviewed and all the responses recorded on the data collection form thank everyone for their assistance and leave the HH.
- Move on to the next selected HH and repeat.

APPENDIX C: Data Collection Forms

Household Consent Form

For adults or for adults on behalf of children <15 years

Informed Consent per household – to be submitted to the head of the household

| |
|------------------------|
| Coverage Survey |
|------------------------|

District: |_____| Village: |_____|

Interviewer Name: _____ HH No: |_|_|_|

Interview date (dd/ mm/yyyy): |_|_|/|_|_|/2017

We are asking any individuals of both sexes to learn more about the Ministry of Health-led activity which took place in this village during the past months.

Bilharzia, hookworms and other gut pathogens are endemic through large parts of Malawi and pose a major public health threat. The Ministry of Health Malawi are working to combat the diseases.

Your house has been randomly selected to inform the program about how they are performing.

An interviewer will ask you a few questions about a program that has been carried out in your area and we ask you to answer as honestly as possible.

If you consent to take part your information will be recorded and analysed to help inform the program about how to improve the coverage.

All information will be treated as strictly confidential. You are free to withdraw from the study at any stage without disadvantages. There will be no problem if you or any of the household members do not want to answer.

If you and your family want to take part in the survey, please provide your consent to perform the interviews and we will treat your answer anonymously.

Have all the members of this household been residing in this household since the last MDA?

YES **NO**

If yes, can we proceed with the survey and interview the eligible household members?

YES **NO**

Continue with questionnaire

| |
|---|
| <i>Thumb print or signature of household head</i> |
|---|

Village Questionnaire

| Coverage Survey - Village Questionnaire <i>To be answered by the interviewee</i> | | |
|---|---|--|
| 1 | Date (DD/MM/YYYY) | |
| 2 | Interviewer Name | |
| 3 | GPS South on Arrival | |
| 4 | GPS East on Arrival | |
| 5 | District name (of implementation unit) | |
| 6 | TA name | |
| 7 | Village name | |
| 8 | What is the position in the village of the person being interviewed? (ENTER CODE) | |
| 9 | What is the total population of the village? | |
| 10 | What is the number of households in the village (<i>interviewee to estimate if not known</i>) | |
| 11 | Source of population data? (ENTER CODE) | |
| 12 | When was the mass treatment for schistosomiasis carried out? (month/year) | |
| 13 | How was the mass treatment provided in the village? (ENTER CODE) | |
| 14 | Did this treatment include adults? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 15 | If the treatment was community based, how was treatment in the village carried out? (ENTER CODE) | |
| To be answered by the interviewer | | |
| 16 | Method of random sampling of households | <input type="checkbox"/> Random selection from household list <input type="checkbox"/> Bottle spinning method |
| 17 | Notes about village interview | |

| | | |
|---|---|---|
| <p>8. Interviewee position?</p> <ol style="list-style-type: none"> 1. Village chief 2. Village deputy chief 3. School head teacher | <p>11. Source of population data</p> <ol style="list-style-type: none"> 1. Village register 2. Election register 3. LF register 4. Malaria register 5. Onchocerciasis register 6. General health register 7. Other (please specify) | <p>13 How was the MDA treatment provided in the village??</p> <ol style="list-style-type: none"> 1. No MDA treatment was carried out 2. School-based treatment 3. Community-based treatment 4. Both school-based and community-based treatment 5. Do not know |
| <p>15. If treatment was community based, how was treatment in the village carried out?</p> <ol style="list-style-type: none"> 1. Door to door 2. At the house of the village head 3. Central point in the village 4. Local health centre 5. At the village school 6. Other 7. Do not know | | |

Household Questionnaire

| Coverage Survey – Household Form <i>To be answered by the interviewer</i> | | |
|---|--|--|
| 7 | What number house is this for you in the village? <i>(Enter one number)</i> | |
| 8a | Was this house interviewed? <i>(Tick one box)</i> | <input type="checkbox"/> No <input type="checkbox"/> Yes on first visit <input type="checkbox"/> Yes on second visit |
| 8b | <i>If household not interviewed:</i> Reason why household not interviewed <i>(Tick one box)</i> | <input type="checkbox"/> Nobody home <input type="checkbox"/> Refused to participate <input type="checkbox"/> Household not found or destroyed <input type="checkbox"/> Other |
| 8c | <i>If household not interviewed and reason 'other'</i> Reason not interviewed: other <i>(Enter reason)</i> | |
| 9 | <i>If household interviewed:</i> Consent form signed by Head of House? <i>(Tick one box)</i> | <input type="checkbox"/> No: <i>stop interview</i> <input type="checkbox"/> Yes |
| To be answered by the interviewee <i>Household head or other adult</i> | | |
| 10 | How many people live in this household? <i>(Enter one number)</i> | |
| 11 | How many adult males live in this house (15 or older)? <i>(Enter one number)</i> | |
| 12 | How many adult females live in this house (15 or older)? <i>(Enter one number)</i> | |
| 13 | How many boys live in this house (5-14 years old)? <i>(Enter one number)</i> | |
| 14 | How many girls live in this house (5-14 years old)? <i>(Enter one number)</i> | |
| 15 | Notes about household interview <i>Answered by interviewer</i> | |
| Equity Questionnaire – To be answered by the household head or other adult interviewee | | |
| E1. | Does your household have mobile telephone? <i>(Tick one box)</i> | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E2. | Does your household have a television? <i>(Tick one box)</i> | <input type="checkbox"/> Yes <input type="checkbox"/> No |

| | |
|---|---|
| E3. Does your household have electricity ? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E4. Does your household have a radio? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E5. Does your household have a telephone(landline)? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E6. Does your household have a refrigerator? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E7. Does any member of your household own a bicycle? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E8. Does any member of your household own a motorcycle or motor scooter? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E9. Does any member of your household own a car or truck? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E10. Does any member of this household have a bank account? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E11. What is the main source of drinking water for members of your household? (Tick one box) | <input type="checkbox"/> Piped into dwelling <input type="checkbox"/> Piped into yard/plot <input type="checkbox"/> Public tap / standpipe <input type="checkbox"/> Tube well or borehole <input type="checkbox"/> Unprotected dug well <input type="checkbox"/> Unprotected Spring <input type="checkbox"/> Surface water-river, lake, dam, pond <input type="checkbox"/> Other |
| E12. What kind of toilet facility do members of your household usually use? (Tick one box) | <input type="checkbox"/> Flush or pour flush toilet <input type="checkbox"/> Ventilated Pit Latrine (VIP) latrine <input type="checkbox"/> Pit latrine without slab / open pit <input type="checkbox"/> Pit latrine with slab <input type="checkbox"/> No facility/bush/field <input type="checkbox"/> Other |
| E13. Do you share this toilet facility with other households? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| E14. What type of fuel does your household mainly use for cooking? (Tick one box) | <input type="checkbox"/> Electricity <input type="checkbox"/> Wood <input type="checkbox"/> Charcoal |

| | |
|--|---|
| | <input type="checkbox"/> Other |
| E15. What is the main material of the floor in your household? <i>(Tick one box)</i> | <input type="checkbox"/> Cement <input type="checkbox"/> Ceramic Tile <input type="checkbox"/> Earth, Sand, Dung <input type="checkbox"/> Other |
| E16. What is the main material of the exterior walls in your household? <i>(Tick one box)</i> | <input type="checkbox"/> Stone walls with lime/cement <input type="checkbox"/> Unburnt bricks <input type="checkbox"/> Cane/pal/trunks/dirt <input type="checkbox"/> Bamboo/tree trunks with mud <input type="checkbox"/> Cement <input type="checkbox"/> Burnt bricks <input type="checkbox"/> Other |
| E17. What is the main material of the roof in your household? <i>(Tick one box)</i> | <input type="checkbox"/> Thatch/palm leaf <input type="checkbox"/> Pal/Bamboo/grass <input type="checkbox"/> Iron Sheet <input type="checkbox"/> Other |

Individual Questionnaire

| English Questions | Participant |
|--|--|
| Name of person randomly selected? (Enter name) | |
| Was this person interviewed? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| If person not interviewed: Reason for no interview? (Tick one box) | <input type="checkbox"/> Absent during survey <input type="checkbox"/> Refused to participate <input type="checkbox"/> Other |
| If person not interviewed and reason no interview 'other': Other reason no interviewed? (Enter reason) | |
| Interview start time (HH.MM) | |
| Is this person being interviewed confidentially? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Consent received? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Participant age? (Enter one number) | |
| Sex (M/F)? (Tick one box) | <input type="checkbox"/> Male <input type="checkbox"/> Female |
| Adults only: What is your occupation? (ENTER CODE) | |
| Adults only, if occupation is other: What is your occupation - other? (write answer) | |
| Adult female only: Were you pregnant or breastfeeding in July 2017? | <input type="checkbox"/> |
| Children only: Have you attended school in the last school year: January 2017 to December 2017? (Tick one box) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| If attended school in last school year: What type of school do you attend? (ENTER CODE) | |
| How did you hear about the mass treatment? (ENTER CODE) | |

| English Questions | Participant |
|--|--|
| <p><i>If heard about mass treatment is other:</i> How did you hear about the mass treatment - other? <i>(write answer)</i></p> | |
| <p>Individual knowledge of the schistosomiasis mass treatment <i>show participants props and (tick all objects recognised, or 'none' if don't recognise any)</i></p> | <input type="checkbox"/> Schisto <input type="checkbox"/> PZQ <input type="checkbox"/> ALB <input type="checkbox"/> Dose pole <input type="checkbox"/> None of above |
| <p>Did you swallow PZQ at the mass treatment? (show dose pole/tablets) <i>(Tick one box)</i></p> | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <p><i>If did not swallow PZQ:</i> Reasons for not swallowing PZQ (ENTER CODE)</p> | |
| <p><i>If did not swallow PZQ, and other reason for not swallowing PZQ:</i> Other reasons for not swallowing PZQ <i>(write answer)</i></p> | |
| <p><i>If swallowed PZQ:</i> Where did you take the PZQ? (ENTER CODE)</p> | |
| <p>Did you swallow ALB at the mass treatment (show tablet)? <i>(Tick one box)</i></p> | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <p><i>If did not swallow ALB:</i> Reasons for not swallowing ALB (ENTER CODE)</p> | |
| <p><i>If did not swallow ALB, and other reason for not swallowing ALB:</i> Other reasons for not swallowing ALB <i>(write answer)</i></p> | |
| <p><i>If swallowed ALB:</i> Where did you take the ALB? (ENTER CODE)</p> | |
| <p><i>If swallowed PZQ or ALB:</i> How did you take the PZQ and ALB tablets? (ENTER CODE)</p> | |
| <p><i>If swallowed PZQ or ALB:</i> Was the distributor present when you swallowed the tablets? <i>(Tick one box)</i></p> | <input type="checkbox"/> Yes <input type="checkbox"/> No |

| English Questions | Participant |
|---|--|
| <p><i>If swallowed PZQ or ALB/MEB:</i> Had you eaten in the two hours before you took the tablets? (Tick one box)</p> | <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> |
| <p>Who decided whether you took the treatment or not? (ENTER CODE)</p> | |
| <p><i>If who decided is other:</i> Who decided whether you took the treatment or not - other? (write answer)</p> | |
| <p>Did you know beforehand when and where the MDA would take place? (ENTER CODE)</p> | |
| <p>How far was the distribution point from your home if walking? (ENTER CODE)</p> | |
| <p>What is the language you use to communicate at home?</p> | <p><input type="checkbox"/> Chewa / Nyanja <input type="checkbox"/> Yao <input type="checkbox"/> Lomwe <input type="checkbox"/> Nkhonde <input type="checkbox"/> Ngoni <input type="checkbox"/> Tumbuka <input type="checkbox"/> Sena <input type="checkbox"/> Nyakusa <input type="checkbox"/> Tonga <input type="checkbox"/> Lambya <input type="checkbox"/> Senga <input type="checkbox"/> Sukwa <input type="checkbox"/> Other</p> |
| <p><i>How frequently do you listen to the radio during a week?</i> READ OPTIONS</p> | <p><input type="checkbox"/> More than once a day <input type="checkbox"/> At least once a day <input type="checkbox"/> 2 or 3 times per week <input type="checkbox"/> Once a week <input type="checkbox"/> Never</p> |
| <p>[IF AT LEAST ONCE A WEEK] <i>What radio station do you most commonly listen to?</i> WRITE ANSWER</p> | <p><input type="checkbox"/> Zodiak Station <input type="checkbox"/> MBC Radio <input type="checkbox"/> Dzimwe Community Radio <input type="checkbox"/> Nkhota–Kota Radio <input type="checkbox"/> Neno Community Radio <input type="checkbox"/> Mzati Community Radio <input type="checkbox"/> Dziko Community Radio</p> |

| English Questions | Participant |
|--|---|
| | <input type="checkbox"/> Mzimba Radio <input type="checkbox"/> Dinosaur Community Radio Other |
| What other radio stations do you listen to? READ OPTIONS. TICK ALL STATIONS MENTIONED AND STATE OTHERS | <input type="checkbox"/> Zodiak Station <input type="checkbox"/> MBC Radio <input type="checkbox"/> Dzimwe Community Radio <input type="checkbox"/> Nkhota–Kota Radio <input type="checkbox"/> Neno Community Radio <input type="checkbox"/> Mzati Community Radio <input type="checkbox"/> Dziko Community Radio <input type="checkbox"/> Mzimba Radio <input type="checkbox"/> Dinosaur Community Radio <input type="checkbox"/> Other |
| The proceeding questions are played with radioclips (10seconds in length) in the relevant language | |
| During June and July 2017, the Ministry of Health broadcasted a series of radio shows to inform residents about MDA against schistosomiasis. I will now ask you a few questions about these broadcastings. | |
| During that time, do you recall having listened to this radio clip: [PLAY CLIP 1: Mother testimonial] ? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| [IF YES] Can you tell us what you recall was mentioned in this radio clip? TICK ALL ELEMENTS RESPONDENT IDENTIFIES AS PART OF CLIP | <input type="checkbox"/> A Mother describes a conversation with a doctor <input type="checkbox"/> Malawi’s children have SCH <input type="checkbox"/> SCH affect mental and physical health <input type="checkbox"/> SCH may show no symptoms <input type="checkbox"/> Children need treatment (medicine) every year <input type="checkbox"/> Distribution is for free <input type="checkbox"/> Children who don’t attend school can receive treatment <input type="checkbox"/> Children need to eat prior to MDA. |
| During that time, do you recall having listened to this radio clip: [PLAY CLIP 2: Doctor testimonial] ? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| [IF YES] Can you tell us what you recall was mentioned in this radio clip? TICK ALL ELEMENTS RESPONDENT IDENTIFIES AS PART OF CLIP | <input type="checkbox"/> A doctor talks to the audience about SCH <input type="checkbox"/> Malawi’s children have SCH <input type="checkbox"/> SCH affect mental and physical health <input type="checkbox"/> SCH may show no symptoms |

| English Questions | Participant |
|--|---|
| | <input type="checkbox"/> Children need treatment (medicine) every year <input type="checkbox"/> Distribution is for free <input type="checkbox"/> Children who don't attend school can receive treatment <input type="checkbox"/> Children need to eat prior to MDA. |
| During that time, do you recall having listened to this radio clip: [PLAY CLIP 3: Give me my breakfast] ? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| [IF RECALLED EITHER CLIP 1, 2 OR 3] Did you discuss the content of any of those clips with your family, friends or neighbours? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| [IF YES] What topics did you discuss with them? TICK ALL TOPICS MENTIONED | <input type="checkbox"/> MDA dates <input type="checkbox"/> Malawi's children have SCH <input type="checkbox"/> SCH affect mental and physical health <input type="checkbox"/> SCH may show no symptoms <input type="checkbox"/> Children need treatment (medicine) every year <input type="checkbox"/> Distribution is for free <input type="checkbox"/> Children who don't attend school can receive treatment <input type="checkbox"/> Children need to eat prior to MDA. <input type="checkbox"/> Other (specify) |
| Apart from the clips we played to you, did you listen to any other radio broadcastings between June and July 2017 about MDAs against [LOCAL TERM FOR SCH] ? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| [IF YES] What information was provided in these radio programmes? TICK ALL ELEMENTS MENTIONED | <input type="checkbox"/> MDA dates <input type="checkbox"/> Malawi's children have SCH <input type="checkbox"/> SCH affect mental and physical health <input type="checkbox"/> SCH may show no symptoms <input type="checkbox"/> Children need treatment (medicine) every year <input type="checkbox"/> Distribution is for free <input type="checkbox"/> Children who don't attend school can receive treatment <input type="checkbox"/> Children need to eat prior to MDA. <input type="checkbox"/> Other (specify) <input type="checkbox"/> |

Individual Answer Code

Answer codes for Household and Individual questions

| | |
|--|--|
| <p>23a: What is your occupation?</p> <ol style="list-style-type: none"> 1. Farmer 2. Merchant 3. Health worker 4. Housewife 5. Student 6. Fisherman 7. Medicines distributor 8. Teacher 9. Village Head 10. Does not work 11. Other (please specify) | <p>24b: What type of school do you attend?</p> <ol style="list-style-type: none"> 1. Primary (public or private) 2. Secondary (public or private) 3. Religious school |
| <p>25a: How did you hear about the drug distribution?</p> <ol style="list-style-type: none"> 1. Teacher 2. Village Meeting 3. Posters / flyers 4. Health professional 5. Newspaper 6. Radio 7. TV 8. Town crier (loud speaker) 9. Place of worship 10. Banner 11. Other (please specify) | <p>27b: Reasons for not swallowing PZQ 28b: Reasons for not swallowing ALB/MEB</p> <ol style="list-style-type: none"> 1. Too young 2. Too old 3. Pregnant 4. Breast feeding 5. Too sick 6. Feels healthy 7. Fear of side effects 8. Bad smell or taste 9. Tablets are too large 10. Rumours 11. Does not know 12. Drugs ran out 13. Was at work 14. Not living in the village at time of MDA 15. Absent from school on day of MDA 16. Does not attend school 17. There was no MDA 18. Had not heard about MDA 19. Too far from distribution point 20. Refused to answer 21. Was not invited to MDA 22. Had not eaten before MDA 23. Too many tablets 24. Medicine does not work 25. Other (please specify) |

| | |
|---|--|
| <p>27d: Where did you take PZQ? 28d: Where did you take ALB?</p> <ol style="list-style-type: none"> 1. School 2. Home (door-to-door) 3. House of the village head 4. Central point in the village 5. Local Health Centre 6. District Clinic 7. Other 8. Does not know | <p>29: How did you take the PZQ and ALB tablets?</p> <ol style="list-style-type: none"> 1. All at the same time 2. I took them all throughout the day but not all at the same time 3. I took them all but not on the same day 4. One tablet a day until they were all finished 5. I took some but not all of them 6. I was given the tablets but did not swallow them 7. Do not remember |
| <p>32: Who decided whether you took the treatment or not?</p> <ol style="list-style-type: none"> 1. Me 2. Father 3. Mother 4. Other family member 5. School teacher 6. Village Head 7. Traditional Healer 8. Health worker or drug distributor 9. Other (please specify) 10. Did not know about the distribution | <p>33: Did you know beforehand when and where the MDA would take place?</p> <ol style="list-style-type: none"> 1. Did not know when or where 2. Knew when only 3. Knew where only 4. Knew when and where |
| <p>34: How far was the distribution point from your home if walking?</p> <ol style="list-style-type: none"> 1. 0 - at home or in school 2. Less than 30 minutes 3. 30 to 60 minutes 4. 1 to 2 hours 5. More than 2 hours 6. Do not know | |

Translated Survey

| English | Chichewa |
|--|--|
| Village Questions | |
| What is the total population of the village? | Kodi muli ndi anthu ochuluka bwanji mmudzi muno |
| What is the number of households in the village <i>(interviewee to estimate if not known)</i> | Muli mabanja angati mmudzi muno |
| Source of population data? | Munagwilitsa njira yanji kuti mupeze chiwerengero chimenechi |
| When was the mass treatment for schistosomiasis carried out? | Mankhwala a Likodzo anagawidwa liti mmudzi muno |
| Where was the mass treatment provided in the village? | Kodi mankhwalawa amagawidwa kuti |
| Did this treatment include adults? (should be swapped with question 15) | Kodi aakulu amalandila nawo |
| If the treatment was community based, how was treatment in the village carried out? | Ngati anaperekedwa kumudzi, ndi njira yanji anasata |
| Household Questions | |
| Does your household have mobile telephone? | Muli ndi foni ya mmanja |
| Does your household have a television? | Muli ndi kanema/TV |
| Does your household have electricity ? | Kodi nyumbayi ili ndi magetsi |
| Does your household have a radio? | Muli ndi wayilesi |
| Does your household have a telephone(landline)? | Kodi muli ndi foni ya chingwe/mnyumba |
| Does your household have a refrigerator? | Muli ndi filiji |
| Does any member of your household own a bicycle? | Alipo amene ali ndi njinga ya kapalasa mnyumba muno |
| Does any member of your household own a motorcycle or motor scooter? | Alipo amene ali ndi njinga ya moto nyumba muno |
| Does any member of your household own a car or truck? | Alipo amene ali ndi galimoto yaying'ono kapena lore mnyumba muno |

| English | Chichewa |
|--|--|
| Does any member of this household have a bank account? | Alipo amene ali ndi bukhu la ku banki mnyumba muno |
| What is the main source of drinking water for members of your household? | Mumatunga kuti madzi akumwa |
| What kind of toilet facility do members of your household usually use? | Chimbudzi chanu nchotani |
| Do you share this toilet facility with other households? | Chimbudzichi Mumagwiritsa ntchito ndi mabanja ena |
| What type of fuel does your household mainly use for cooking? | Mumaphikila pachani nthawi zones |
| What is the main material of the floor in your household? | Pansi panyumba yanu mpotani |
| What is the main material of the exterior walls in your household? | khoma la nyumba yanu mudamangila chani |
| What is the main material of the roof in your household? | Nyumba yanu munafolela ndichani |

Individual Questions

| English Questions | Chechewa Translation |
|---|----------------------|
| Name of person randomly selected? (Enter name) | |
| Was this person interviewed? (Tick one box) | |
| If person not interviewed: Reason for no interview? (Tick one box) | |
| If person not interviewed and reason no interview 'other': Other reason no interviewed? (Enter reason) | |
| Interview start time (HH.MM) | |
| Is this person being interviewed confidentially? (Tick one box) | |
| Consent received? (Tick one box) | |
| Participant age? (Enter one number) | |

| English | Chichewa |
|---|--|
| Sex (M/F)? (Tick one box) | |
| Adults only: What is your occupation? (ENTER CODE) | Mumagwira ntchito yanji |
| Adults only, if occupation is other: What is your occupation - other? (write answer) | |
| Adult female only: Were you pregnant or breastfeeding in July 2017? | |
| Children only: Have you attended school in the last school year: January 2017 to December 2017? (Tick one box) | Mumapita kusukulu telemu yathayi |
| If attended school in last school year: What type of school do you attend? (ENTER CODE) | Munali kalasi yanji telemu yathayi |
| How did you hear about the mass treatment? (ENTER CODE) | Munamvera kuti/kwandani za ku gawa mankhwala a likodzo |
| If heard about mass treatment is other: How did you hear about the mass treatment - other? (write answer) | |
| Individual knowledge of the schistosomiasis mass treatment show participants props and (tick all objects recognised, or 'none' if don't recognise any) | |
| Did you swallow PZQ at the mass treatment? (show dose pole/tablets) (Tick one box) | Munamwera konko mankhwala a likodzo. |
| If did not swallow PZQ: Reasons for not swallowing PZQ (ENTER CODE) | Ngati simunamwere konko, Chifukwa chani |
| If did not swallow PZQ, and other reason for not swallowing PZQ: Other reasons for not swallowing PZQ (write answer) | Zifukwa zina |
| If swallowed PZQ: Where did you take the PZQ? (ENTER CODE) | Munamwera kuti mankhwala a likodzo |
| Did you swallow ALB at the mass treatment (show tablet)? (Tick one box) | Munamwera konko mankhwala a njoka za mmimba. |
| If did not swallow ALB: Reasons for not swallowing ALB (ENTER CODE) | Chifukwa chani simunamwere popmo mankhwala a njoka za mmimba |

| English | Chichewa |
|---|---|
| <i>If did not swallow ALB, and other reason for not swallowing ALB:</i> Other reasons for not swallowing ALB (write answer) | Pali zifukwa zina |
| <i>If swallowed ALB:</i> Where did you take the ALB? (ENTER CODE) | Munamwera kuti mankhwala a njoka za mmimba |
| <i>If swallowed PZQ or ALB:</i> How did you take the PZQ and ALB tablets? (ENTER CODE) | Munamwa motani |
| <i>If swallowed PZQ or ALB:</i> Was the distributor present when you swallowed the tablets? (Tick one box) | Ogawa mankhwala ankakuonani mukumwa mankhwala |
| <i>If swallowed PZQ or ALB/MEB:</i> Had you eaten in the two hours before you took the tablets? (Tick one box) | Munali mutadya musanamwe mankhwala |
| Who decided whether you took the treatment or not? (ENTER CODE) | Anakupangila chiganizo ndani kuti mumwe kapena musamwe mankhwala |
| <i>If who decided is other:</i> Who decided whether you took the treatment or not - other? (write answer) | |
| Did you know beforehand when and where the MDA would take place? (ENTER CODE) | Kodi munali mukudziwa kale za nthawi/masiku ndi malo omwera mankhwala a likodzo |
| How far was the distribution point from your home if walking? (ENTER CODE) | Munayenda nthawi yochuluka bwanji kukafika komwe amagawila mankhwala |
| What is the language you use to communicate at home? | Mumayankhula chiyankhulo chanji |
| <i>How frequently do you listen to the radio during a week?</i> READ OPTIONS | Mumamvera ka ngati wayilesi pa sabata/mulungu |
| [IF AT LEAST ONCE A WEEK] <i>What radio station do you most commonly listen to?</i> WRITE ANSWER | Mumakonda kumvera wayilesi yanji |
| What other radio stations do you listen to? READ OPTIONS. TICK ALL STATIONS MENTIONED AND STATE OTHERS | Mumakonda kumvera wayilesi imodzi mwa izi |
| The proceeding questions are played with radioclips (10seconds in length) in the relevant language | |

| English | Chichewa |
|--|---|
| During June and July 2017, the Ministry of Health broadcasted a series of radio shows to inform residents about MDA against schistosomiasis. I will now ask you a few questions about these broadcastings. | Mwezi wa juni ndi julayi chaka chino a unduna wa za umoyo analengezesa za kupereka kwa mankhwala a likodzo. Ndikufunsani mafunso angapo pa zomwe zinalengezedwazo |
| During that time, do you recall having listened to this radio clip: [PLAY CLIP 1: Mother testimonial] ? | Mukumbukila kuti mudamverapo uthengawu |
| [IF YES] Can you tell us what you recall was mentioned in this radio clip? TICK ALL ELEMENTS RESPONDENT IDENTIFIES AS PART OF CLIP | Tandiuzeni kuti mukukumbukilapo chani pa uthenga mwamverawu |
| During that time, do you recall having listened to this radio clip: [PLAY CLIP 2: Doctor testimonial] ? | Mukumbukila kuti mudamverapo uthengawu |
| [IF YES] Can you tell us what you recall was mentioned in this radio clip? TICK ALL ELEMENTS RESPONDENT IDENTIFIES AS PART OF CLIP | Tandiuzeni kuti mukukumbukilapo chani pa uthenga mwamverawu |
| During that time, do you recall having listened to this radio clip: [PLAY CLIP 3: Give me my breakfast] ? | Mukumbukila kuti mudamverapo uthengawu |
| [IF RECALLED EITHER CLIP 1, 2 OR 3] Did you discuss the content of any of those clips with your family, friends or neighbours? | Munakambilanapo za uthengawu ndi wina aliyense |
| [IF YES] What topics did you discuss with them? TICK ALL TOPICS MENTIONED | Munakambilana mitu yanji |
| Apart from the clips we played to you, did you listen to any other radio broadcastings between June and July 2017 about MDAs against [LOCAL TERM FOR SCH]? | kupati uthenga mwamverawu munamveraponso uthenga wina pa wayilesi okhuzana ndi kupereka mankhwala a likodzo chaka chino |
| [IF YES] What information was provided in these radio programmes? TICK ALL ELEMENTS MENTIONED | Uthenga wake unali woti chani |

Appendix D: Detailed survey methodology & sample size estimation

Deviations from general statistical approach in this protocol

The sample size details below follow the general statistical approach for SCI coverage surveys. For this survey the enumerators will interview all eligible SAC per household to try and gather more information regarding those SAC who do not attend school. It is not anticipated that this will impact the minimum number of interviews per village.

Sample size details

Values imputed to the sample size calculation were:

- # children in each implementation unit = 391
- Number of children interviewed in each household on average = 2
- Number of individuals targeted in each village = 24
- Non-response rate = 20%
- Margin of error for confidence interval = 9%
- Expected true coverage = 50%
- Intra-class correlation coefficient = 0.1
- Confidence level of intervals = 95%

Statistical approach to coverage survey

Statistical approach to coverage survey methodology & sample size estimation

Scope

These principles are applicable for assessing treatment coverage in all MDA settings where the method of sampling is two stage cluster sampling.

Implementation units monitored

Logistical and financial constraints will almost always mean that not all implementation units will be assessed. There are two main options when choosing which implementation units to assess:

1. **Non-random selection of implementation units** where units are chosen for their particular properties. These properties may be due to reported coverage rates or other external factors (e.g. donor-support; geography). Where the implementation units are chosen for their reported coverage rates a mix of districts that have reported low and high coverage are often chosen. This is to allow comparison between districts and to investigate if particularly low performing district may actually have performed better than expected perhaps due to the population being lower than estimated. Non-random selection is most commonly used in programs covering large areas (such as large countries) where logistical and cost constraints mean only a small number of implementation units can be visited. However, this method does not enable an estimate of coverage at the population level to be obtained.
2. **Random selection of implementation units** where the units are chosen randomly from a list of all implementation units, with or without weighting for population size. This strategy allows estimation of coverage at a program level if sufficient implementation units are visited. This strategy is most commonly used in programs that cover relatively small areas where travel distances between implementation units is not prohibitive.

Sample size calculation

The sample size calculations find the number of primary sampling units (PSUs; normally villages) required in order to have expected 95% confidence intervals of $\pm 9\%$ when true population coverage is 50%, given a specified target number of households (HHs) to survey in each PSU. It is assumed that coverage estimates of a pre-specified precision are required at an IU-level (the highest level of resolution) and that sample size calculations need not aim to achieve a pre-specified precision for any particular sub-group (e.g. attending vs. non-attending children). Thus the precision of coverage estimates for sub-groups will vary according to their frequency in the survey.

The parameters used in the calculation are:

- **True implementation unit coverage assumed = 50%.** This is chosen as it is the most conservative level and will give the largest sample size required of any assumed coverage percentage.
- **Number of HHs sampled in each primary sampling unit = variable.** This is chosen by the program management and is primarily motivated by logistical issues such as team size and expected distances between PSUs. Arguably the biggest driver of cost in coverage surveys is the staff costs (per diems) for enumerators. Therefore we try to minimise the time needed for a survey (person-hours), given a pre-specified precision. A cluster size (number of HHs per village) that permits two villages to be surveyed per day rather than just one, is preferable, and will minimise the time needed for the survey. We assume the maximum number of villages that can be surveyed per day is 2, if a relatively small number of HHs are interviewed per village.
- **Number of individuals in the implementation unit:** The average IU population size is considered. Often this will make little difference to the estimated sample size required, though may do when IUs are small. (see below for further options when implementation units are small).
- **Differences between PSUs in coverage: Intra-class correlation coefficient = 0.1.** An intra-class correlation coefficient (*rho*) of 0.1 is assumed. This is based on a review of coverage survey data from several countries: Baker et al. (Baker, et al., 2013), suggested a design effect of approximately 6 is appropriate when designing a district-level NTD PCT coverage survey based on coverage survey results from several countries in sub-Saharan Africa. Assuming approximately 50 individuals were surveyed per district in the reviewed surveys (though this is not explicitly reported in the paper), leads to an estimate of *rho* around 0.1. In countries where IUs are smaller than a district and implementation may therefore be expected to be more homogeneous within an IU, a smaller value of *rho*/design effect may be more realistically assumed during sample size calculations.
- **Margin of error for confidence intervals.** A maximum margin of error of 9 percentage points on a 95% confidence interval for the IU coverage estimate is specified.
- **Width of confidence intervals calculated during the analysis = 95%.** This is a standard metric.
- **Number of adults and children to sample in each HH = 2.** This is generally assumed to be two as only two SAC, or two SAC and two adults, per HH should be interviewed, with the individuals being randomly selected.
- **Expected non-response rate = 20%.** The expected non-response rate is assumed to be 20% when adults are being surveyed to allow for less than two adults on average in a HHs. When only SAC are being surveyed, this may be lowered to 12%.

Sample size calculations when implementation units are small

When implementation units are small (e.g. health care centres), and comparable to PSU sizes in some larger surveys, then the sampling methodology may be altered. In this instance, we would assume the overall program to be the implementation unit and the implementation unit to be the primary sampling unit. The sample size calculation would then proceed as normal but would instead calculate the number of implementation units required to have expected 95% confidence intervals of $\pm 9\%$ when true population coverage is 50%, given a specified number of HHs to survey in each implementation unit. This methodology will generally require HH lists to be available for random HH selection. Unbiased estimates of population

coverage will then be calculable, assuming that the implementation units to be surveyed were randomly selected and a sufficient number (>15) were surveyed.

Selection of primary sampling units

Selection of primary sampling units is conducted by an SCI biostatistician. There are two main options when selecting PSUs to survey:

- 1. PSUs are selected from a list of all PSUs within the implementation unit, with no reference to population size.** In this instance, every PSU has an equal probability of being selected and consequently HHs in small PSUs are more likely to be selected than HHs in large PSUs due the same number of individuals being interviewed in each PSU. This selection method is most commonly used when population sizes of the primary sampling units are not known. Analyses of coverage rates and associated 95% confidence intervals are be performed with and without adjustment for PSU size, collected as part of the survey.
- 2. PSUs are selected from a list of all PSUs within the implementation unit, with probability proportional to population size.** In this instance, larger PSU's have a higher probability of being selected than smaller PSUs, leading to an equal probability of each individual in the implementation unit being selected. Analysis therefore does not require any adjustment for population size. Selection is performed without replacement to guard against the possibility of especially large PSUs being selected multiple times.

Sampling of individuals within a HH

Our standard protocol is for two SAC and two adults (if eligible for treatment) to be interviewed in each HH. Much of the differences in whether or not people received treatment is often between HHs rather than between individuals within a HH. If we were to interview everybody in the same HH then if particularly large HHs were surveyed the interview process could take a very long time meaning either that the teams would have to stay in the villages longer, or reduce the number of houses visited within some villages, neither of which is optimal. We believe that this method will not induce any biases as long as the protocol is followed of randomly selecting from the list of all eligible individuals in the HH.

Appendix E: Selected Villages

Chitipa District Village

| Selected | District | TA | Village |
|-----------|----------|------------|--------------|
| 1 | Chitipa | Mwaulumbia | Reuben |
| 2 | Chitipa | Mwaulumbia | Mwenechula |
| 3 | Chitipa | Mwaulumbia | Chinamwene |
| 4 | Chitipa | Mwaulumbia | Chololoka |
| 5 | Chitipa | Wenya | Kasanjira |
| 6 | Chitipa | Mwaulumbia | Kabilangwa |
| 7 | Chitipa | Mwaulumbia | Amos |
| 8 | Chitipa | Mwaulumbia | Nakasongwi |
| 9 | Chitipa | Nthalire | Chimphusu |
| 10 | Chitipa | Nthalire | Skabana |
| 11 | Chitipa | Mwaulumbia | Musyembele |
| 12 | Chitipa | Misuku | Chilalika |
| 13 | Chitipa | Mwaulumbia | Chabwanga |
| 14 | Chitipa | Wenya | Muyombe |
| 15 | Chitipa | Wenya | Nankhonza |
| 16 | Chitipa | Nthalire | Nkhalyechi |
| 17 | Chitipa | Mwaulumbia | Mwakile |
| 18 | Chitipa | Mwaulumbia | Kadabula |
| Reserve 1 | Chitipa | Kameme | Ibuzga III |
| Reserve 2 | Chitipa | Nthalire | Masele |
| Reserve 3 | Chitipa | Mwaulumbia | Kanyenjere |
| Reserve 4 | Chitipa | Nthalire | Mataghanduwi |
| Reserve 5 | Chitipa | Kameme | Iyanga II |

Karonga District Villages

| Selected | District | TA | Village |
|----------|----------|--------------|---------------|
| 1 | Karonga | Kilupula | Chibobola |
| 2 | Karonga | Mwirang'ombe | Mwazolokele 1 |
| 3 | Karonga | Mwirang'ombe | Njalayikwenda |
| 4 | Karonga | Kyungu | Mwamatope |
| 5 | Karonga | Mwirang'ombe | Myeleka |
| 6 | Karonga | Kilupula | Katumbi |
| 7 | Karonga | Kyungu | Melele |
| 8 | Karonga | Kyungu | Mwenitete 1 |
| 9 | Karonga | Kilupula | Peteli |
| 10 | Karonga | Kilupula | Mwakisulu |
| 11 | Karonga | Mwirang'ombe | Mwakisenjere |
| 12 | Karonga | Mwirang'ombe | Wanyanya |
| 13 | Karonga | Kilupula | Etiwel 1 |
| 14 | Karonga | Wasambo | Jalanthowa |
| 15 | Karonga | Wasambo | Mwakanyamale |
| 16 | Karonga | Wasambo | Mwamtawali |

| | | | |
|-----------|---------|-----------|--------------|
| 17 | Karonga | Wasambo | Mponela |
| 18 | Karonga | Kilupula | Msomba 1 |
| Reserve 1 | Karonga | Wasambo | Kachaka |
| Reserve 2 | Karonga | Kilupula | Gideon |
| Reserve 3 | Karonga | Wasambo | Kamtenthenga |
| Reserve 4 | Karonga | Mwakaboko | Lyamayolo 1 |
| Reserve 5 | Karonga | Kyungu | Mwanganda |

Rumphi District Villages

| Selected | District | TA | Village |
|-----------|----------|----------------|-------------------|
| 1 | Rumphi | ZOLOCKERE | GONG'ONTHA |
| 2 | Rumphi | CHAPINDUKA | CHIVWALAFWITI |
| 3 | Rumphi | Chikulamayembe | YAWAKA |
| 4 | Rumphi | MWALWENI | WANDEMBO |
| 5 | Rumphi | Chikulamayembe | MWALUHEMBA |
| 6 | Rumphi | MWANKHUNIKIRA | YALERO |
| 7 | Rumphi | Chikulamayembe | MWAZULANGA |
| 8 | Rumphi | KATUMBI | MIKULE -CHAWINGA |
| 9 | Rumphi | Chikulamayembe | BAMATHA |
| 10 | Rumphi | KATUMBI | MUNYOTWA - NUNDWE |
| 11 | Rumphi | MWALWENI | KAMPHONE |
| 12 | Rumphi | CHAPINDUKA | VYAZOWA |
| 13 | Rumphi | Chikulamayembe | MUWOWA |
| 14 | Rumphi | MWANKHUKIRA | Chinyaza/Dauzga |
| 15 | Rumphi | Chikulamayembe | MUYOMBO |
| 16 | Rumphi | MWALWENI | ZUNDA |
| 17 | Rumphi | Chikulamayembe | SITIMA |
| 18 | Rumphi | MWALWENI | BWINYANI |
| Reserve 1 | Rumphi | Chikulamayembe | KALULUMA |
| Reserve 2 | Rumphi | KACHULU | MPHONAWAYENI |
| Reserve 3 | Rumphi | Chikulamayembe | MSANDUZA |
| Reserve 4 | Rumphi | MWANKHUNIKIRA | WALOOKA |
| Reserve 5 | Rumphi | Chikulamayembe | MAGAWA |

Dedza District Villages

| Selected | District | TA | Village |
|----------|----------|----|------------|
| 1 | Dedza | - | KASONDA |
| 2 | Dedza | - | CHINYAMULA |
| 3 | Dedza | - | MPOTOLA 2 |
| 4 | Dedza | - | KAMPHINDA |
| 5 | Dedza | - | MKUTU |
| 6 | Dedza | - | KAMTAMBO |
| 7 | Dedza | - | TSUCHI |
| 8 | Dedza | - | GULIGULI |
| 9 | Dedza | - | MTUKULA |
| 10 | Dedza | - | MARTEN |

| | | | |
|-----------|-------|---|---------------|
| 11 | Dedza | - | CHAKHULUNGIRA |
| 12 | Dedza | - | Chitule |
| 13 | Dedza | - | JAMES |
| 14 | Dedza | - | MAFEDWE |
| 15 | Dedza | - | CHAO |
| 16 | Dedza | - | Chiude |
| 17 | Dedza | - | MNGWERE |
| 18 | Dedza | - | LAUDEN |
| Reserve 1 | Dedza | - | CHILITSOKA |
| Reserve 2 | Dedza | - | FIFITINI |
| Reserve 3 | Dedza | - | MSOKOLO |
| Reserve 4 | Dedza | - | MKOMERA |
| Reserve 5 | Dedza | - | MATAYA |

Mchinji District Villages

| Selected | District | TA | Village |
|-----------|----------|----------|------------------|
| 1 | Mchinji | MKANDA | Mdenga |
| 2 | Mchinji | SIMPHASI | Khwawe |
| 3 | Mchinji | MKANDA | Kampandeni |
| 4 | Mchinji | MDUWA | Chimphuno |
| 5 | Mchinji | MKANDA | Masambabise |
| 6 | Mchinji | MKANDA | Pseda |
| 7 | Mchinji | ZULU | Chalilima |
| 8 | Mchinji | ZULU | Kalima |
| 9 | Mchinji | MAVWERE | Kalita |
| 10 | Mchinji | SIMPHASI | Chikoloka |
| 11 | Mchinji | MDUWA | Kalombo |
| 12 | Mchinji | MAVWERE | Kamchere |
| 13 | Mchinji | KAPONDO | Mateche |
| 14 | Mchinji | MDUWA | Kachala |
| 15 | Mchinji | MKANDA | Estate 52 |
| 16 | Mchinji | MDUWA | Tcholonjo |
| 17 | Mchinji | MDUWA | Kazuche |
| 18 | Mchinji | SIMPHASI | Mndakwa |
| Reserve 1 | Mchinji | MKANDA | Chinkhumba |
| Reserve 2 | Mchinji | MLONYENI | Gulawe |
| Reserve 3 | Mchinji | MDUWA | Gaseni |
| Reserve 4 | Mchinji | MKANDA | Sankhani/Chilaro |
| Reserve 5 | Mchinji | ZULU | Chithumba |

Ncheu District Villages

| Selected | District | TA | Village |
|----------|----------|-------------|--------------|
| 1 | Ntcheu | - | ZIMENYANA |
| 2 | Ntcheu | CHAKHUMBIRA | KACHIPEYA |
| 3 | Ntcheu | NJOLOMOLE | JULIUS/ISAAC |

| | | | |
|-----------|--------|-------------|--------------|
| 4 | Ntcheu | NJOLOMOLE | NDOMBO |
| 5 | Ntcheu | GANYA | KANDEU |
| 6 | Ntcheu | GANYA | JOELO |
| 7 | Ntcheu | PHAMBALA | MUSSA |
| 8 | Ntcheu | PHAMBALA | MATCHEREZA 1 |
| 9 | Ntcheu | GANYA | CHIWIZA |
| 10 | Ntcheu | GANYA | KADAMMANJA |
| 11 | Ntcheu | MPANDO | ZIDANA |
| 12 | Ntcheu | GANYA | MPOLA |
| 13 | Ntcheu | KWATAINE | PHEZA |
| 14 | Ntcheu | MAKWANGWALA | BEMELANI 2 |
| 15 | Ntcheu | NJOLOMOLE | DAULE |
| 16 | Ntcheu | MPANDO | ZUZE |
| 17 | Ntcheu | MAKWANGWALA | MAUYANA |
| 18 | Ntcheu | KWATAINE | DAMBO |
| Reserve 1 | Ntcheu | MAKWANGWALA | SAIWA |
| Reserve 2 | Ntcheu | NJOLOMOLE | SESANI |
| Reserve 3 | Ntcheu | MPANDO | HAISA |
| Reserve 4 | Ntcheu | GANYA | KASADZU |
| Reserve 5 | Ntcheu | NJOLOMOLE | CHIPULA |

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