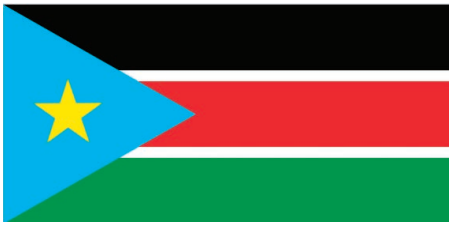
South Sudan



Malaria Indicator Survey

2023

REPUBLIC OF SOUTH SUDAN

MINISTRY OF HEALTH

Malaria Indicator Survey

2023

Final Report

Juba, South Sudan

The 2023 South Sudan Malaria Indicator Survey (2023 SSMIS) was implemented by the National Malaria Control Programme (NMCP) on behalf of the Ministry of Health (MoH) in collaboration with the National Bureau of Statistics (NBS). Financial support was provided by the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) through United Nation's Children Emergency Fund (UNICEF).

Contact: Additional information about the 2023 SSMIS may be obtained from the National Malaria Control Programme, Ministry of Health, through the Undersecretary's office.

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FOREWORD

Malaria remains the leading cause of morbidity and mortality in South Sudan, particularly among vulnerable groups, including children under the age of 5 and pregnant women. It affects 246 per 1000 people and accounts for 64% of outpatient visits at public health facilities, 30% inpatient admissions, and 45% of deaths.

The Ministry of Health (MOH) in collaboration with partners has been implementing various key malaria control interventions, including case management, vector control and community engagement activities in the fight against malaria. Although, tremendous progress has been made in the control of malaria, the prevalence remains high. The Health Sector Strategic Plan (2023-2027) provides guidance for malaria disease burden reduction efforts and related health system strengthening initiatives for better health outcomes for the population.

The South Sudan Malaria Indicator Survey 2023 (SSMIS 2023) was conducted by the MoH through the National Malaria Control Program (NMCP) in collaboration with the National Bureau of Statistics (NBS). The survey is an activity conducted every three years and provides a comprehensive assessment of malaria prevalence, coverage and effectiveness of malaria control intervention and the overall impact of the national malaria control program.

The findings from this survey provide evidence for decision-making and guiding effective strategies to reduce the burden of malaria in the country thereby facilitating the country towards attaining the Global Technical Strategy targets 2016-2030. This calls for increased levels of partnership in the area of malaria control to provide a solid foundation for sound coordination of malaria control within the context of planning, management and decision-making. In order to achieve high impact, and to consolidate gains, we need to lay emphasis on universal coverage, sustained and adequate surveillance, community engagement and provision of adequate resources to support the relevant interventions.

The successes highlighted by the SSMIS 2023 were achieved through financial support of Global Fund through UNICEF and technical assistance from the WHO and also through concerted efforts of various partners and stakeholders in a shared vision for a malaria-free South Sudan.

I urge us all to embrace these results, finding and recommendations. We look forward to the required support in the implementation of the recommendations arising from the survey to achieve a zero malaria status in South Sudan.

Hon. Dr. Annin Ngot Ngot Mou
Undersecretary,
Ministry of Health, Republic of South Sudan

ACKNOWLEDGMENTS

The Ministry of Health, through the Directorate of Preventive Health Services, wishes to acknowledge the support of the Minister of Health, Hon. Yolanda Awel Deng Juac, the undersecretary Hon. Dr Ader Macar Aciek and the States' leadership in successfully conducting this survey. Special thanks to Dr John Rumunu, the former Director General for Preventive Health Services, for providing overall technical support and guidance.

Many thanks to the National Malaria Control Program and the entire NMCP staff, Directorate of Policy, Planning, Budgeting, Research and Monitoring and Evaluation, National Bureau of Statistics (NBS), and National Public Health Laboratory for effectively coordinating and executing this survey.

My heartfelt thanks to the Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria (GFATM), which provided financial support through the United Nation's Children Emergency Fund (UNICEF), WHO for providing technical assistance and other partners for their unwavering support in the realization of the objectives of the survey.

Additionally, I would like to sincerely thank the team that participated in the survey, including data collectors, supervisors, drivers and survey respondents who generously participated in the field data collection, including laboratory technicians, nurses, doctors, community engagement personnel and the community at large who participated and supported the survey. I extend our gratitude to all States and Administrative Areas survey teams who provided operational support during the survey. Finally, I would like to thank the team of consultants, especially Mr. Bol Atem Manyuon, for their key role in the survey design, fieldwork, data cleaning and analysis, and report writing.

I sincerely thank anyone who may have contributed directly or indirectly to the success of this MIS2023 survey. Your contributions go a long way in saving and improving the health and well-being of the people of South Sudan.

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Dr. Kediende M. A. Chong
Director of Preventive Health Services,
Ministry of Health

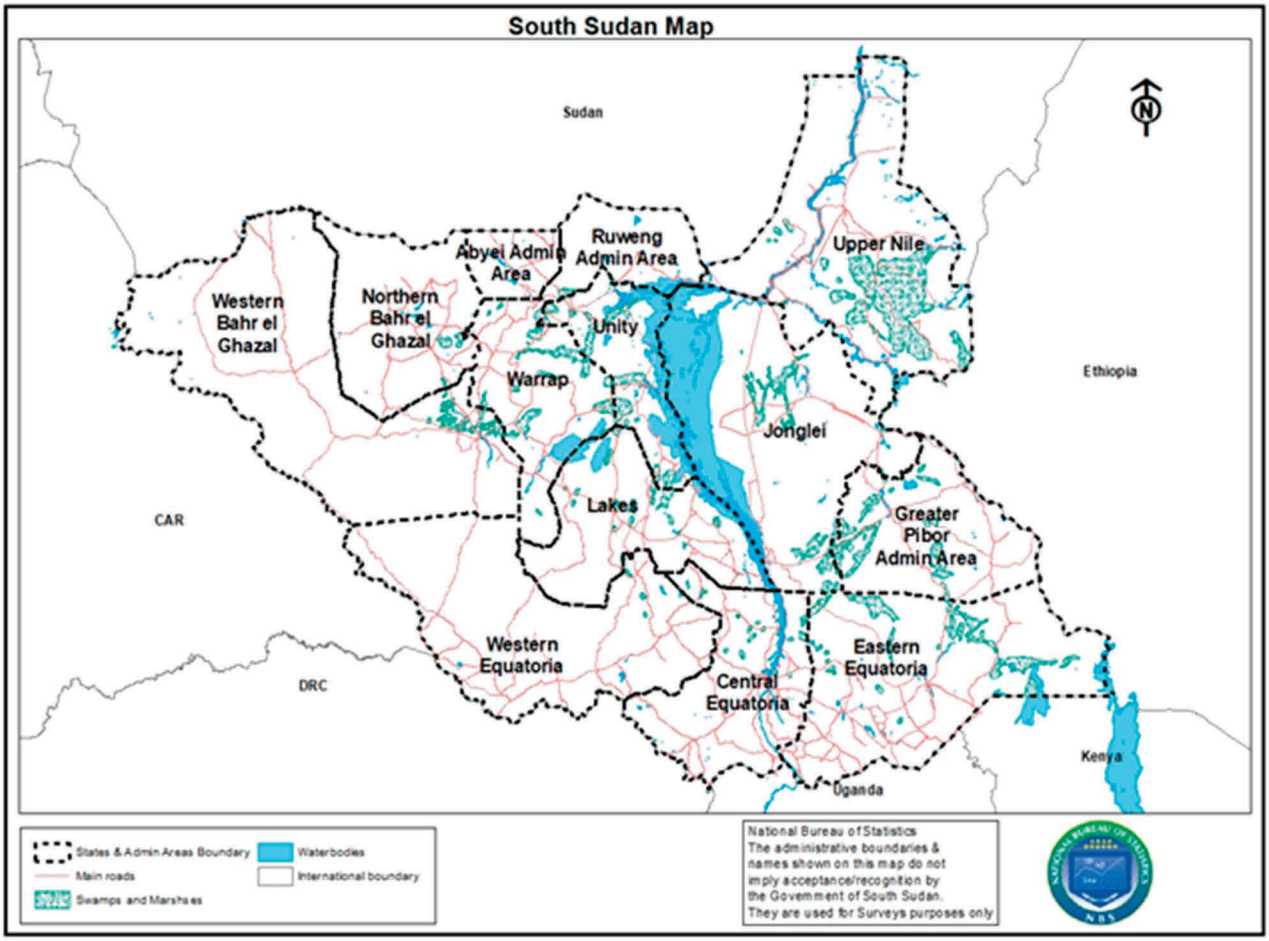
ACRONYMS AND ABBREVIATIONS

ACT	Artemisinin-Based Combination Therapy
AL	Artemether/Lumefantrine
ANC	Antenatal Care
ASAQ	Artesunate/Amodiaquine
CAPI	Computer-Assisted Personal Interviewing
CDC	U.S. Centers for Disease Control and Prevention
CSPro	Census and Survey Processing System
DHS	Demographic and Health Survey
EA	Enumeration Area
EQC	External Quality Control
g/dl	Grams Per Deciliter
GPS	Global Positioning System
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
IPTp	Intermittent Preventive Treatment (of malaria) in Pregnancy
ITN	insecticide-Treated Net
JMP	Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene
LLIN	Long-Lasting Insecticidal Net
LPG	Liquefied Petroleum Gas
MERG	Monitoring and Evaluation Reference Group (of RBM)
MICS	Multiple Indicator Cluster Survey
MIS	Malaria Indicator Survey
MoH	Ministry of Health
NMCP	National Malaria Control Programme
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
SBC	Social Behavior Change
SDG	Sustainable Development Goal
SP	Sulfadoxine-Pyrimethamine
SSMIS	South Sudan Malaria Indicator Survey
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
VIP	Ventilated Improved Pit-Latrine
WHO	World Health Organization

1. INTRODUCTION

The 2023 South Sudan Malaria Indicator Survey (2023 SSMIS) was implemented by the National Malaria Control Programme (NMCP) in collaboration with the National Bureau of Statistics (NBS). Data collection took place from October 16 to November 29, 2023. The Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) provided financial support through UNICEF, the Principal Recipient (PR), UNICEF and WHO provided technical assistance.

South Sudan is one of the African Region countries that continue to carry the heavy burden of the malaria disease accounting for 1.1% of global cases and 1.1% of malaria deaths (WHO, 2023). The country continues to face challenges with malaria control initiatives, compounded by fragile health systems, inadequate surveillance, and chronic funding deficits as well as antimalarial drug resistance amid an environment of endemic conflict, displacement and climate change.



2. SURVEY METHODOLOGY

2.1 SURVEY OBJECTIVES

The primary objective of the 2023 SSMIS was to evaluate progress toward achieving the goals and targets outlined in the National Malaria Strategic Plan 2020-2025, by providing up-to-date estimates of basic demographic and health indicators related to malaria. Specifically, the survey collected information on vector control interventions (such as mosquito nets), intermittent preventive treatment of malaria among pregnant women, and care seeking for and treatment of fever among children. In addition, young children were tested for anemia and for malaria. In addition, the survey captured information on the population's exposure to malaria messages, but also knowledge, attitudes, and practices regarding malaria prevention and control.

The information collected through the 2023 SSMIS is intended to help policymakers and program managers in evaluating programmes, planning future interventions, and implementing relevant strategies for lifting the malaria burden and improving the health of the population of South Sudan.

2.2 SAMPLING

The 2023 SSMIS targeted the de facto individual members of selected households throughout the country. This includes usual members and visitors who spent the previous night in the household. A national sample of 5,600 households (1,140 in 57 urban clusters and 4,460 in 223 rural clusters) was planned for the survey. The sample was distributed to ensure adequate representation and statistical robustness of estimates for urban and rural areas as well as the 10 states and 3 administrative areas of South Sudan. Therefore, the survey will produce national estimates for the urban and rural areas of the 10 states of Upper Nile, Jonglei, Unity, Warrap, Northern Bahr El Ghazal, Western Bahr El Ghazal, Lakes, Western Equatoria, Central Equatoria, Eastern Equatoria, and the 3 administrative areas (AAs) of Greater Pibor, Ruweng, and Abyei.

State / AA	Planned sample		State / AA	Planned sample	
	EAs	Households		EAs	Households
Upper Nile	28	560	Western E.Q.	28	560
Jonglei	22	440	Central E.Q.	28	560
Unity	23	480	Eastern E.Q.	28	560
Warrap	26	520	Pibor AA	6	120
Northern B.G.	28	560	Ruweng AA	5	100
Western B.G.	28	560	Abyei AA	2	40
Lakes	28	560	**Total**	**280**	**5600**

In order to achieve the above representativeness, the 2023 SSMIS used a stratified two-stage sample design. In the first stage, 280 enumeration areas (EAs) or clusters were selected randomly with probability proportional to size in terms of number of households present in the EA as per the sampling frame. The EAs were derived from the Master Sample of the 2008 Population and Housing Census.

Following the first stage of sample selection, a household listing exercise took place in the selected clusters. The household listing for each of the selected clusters consisted of establishing an exhaustive and updated list of all the households present within the boundaries of the cluster, which would serve as the basis for the second-degree draw. This exercise was combined with field operations and was conducted for each cluster just before the selection of households as secondary sample units, which was immediately followed by data collection.

In the second stage, a subsample of 20 households per cluster was selected using a systematic draw with equal probability, which resulted in a total sample of 5,600 households nationwide.

Due to having selected the same number of clusters and households for strata of inequal size, and in order to account for the actual coverage of the planned sample in each of the strata, the sample was not self-weighting when it comes to combining results across strata to produce aggregates or national level estimates. Results shown in this report have been weighted to account for the complex sample design.

All women aged 15-49 who were residents of selected households or visitors who spent the night preceding the interview in the household were eligible to be interviewed. In addition, all children aged 6-59 months were eligible for malaria and anemia tests with the parent's or guardian's consent.

2.3 QUESTIONNAIRES

A set of three (03) different questionnaires were used to collect information from the households and eligible individuals:

- the household questionnaire
- the woman questionnaire,
- the biomarker questionnaire

The questionnaires were based on model questionnaires developed by the DHS Program and were adapted to reflect the specific population and health issues as well as malaria control needs relevant to South Sudan. Country-specific topics included questions about knowledge and attitudes, and the recent 2022-2023 insecticide-treated net (ITN) mass distribution campaign. All three questionnaires were prepared in English and were programmed into tablet computers to allow for data collection using computer-assisted personal interviewing (CAPI).

The household questionnaire was used to list all the usual members and visitors who spent the previous night in the selected households. Basic demographic information was collected on the characteristics of each person listed in the household, including age, sex, and relationship to the head of the household. Age and sex of household members were used to identify the women eligible for individual interviews, and the children who were eligible for anemia and malaria testing. Additionally, the household questionnaire captured information on ownership and use of mosquito nets; the characteristics of the dwelling units such as source of drinking water; type of toilet facilities; materials used for flooring, external walls, and roofing; number of rooms used for sleeping; ownership of livestock and various durable goods/assets, cooking fuel, access to electricity, etc.

The woman questionnaire was used to collect information from all eligible Women aged 15-49 who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey. These women were asked questions on the following topics:

i) Background characteristics (including age, education, and media exposure)
ii) Reproductive history for the last 5 years
iii) Intermittent preventive malaria treatment during pregnancy (IPTp)
iv) Occurrence and treatment of fever in children
v) Exposure to messages about malaria
vi) Knowledge, practice, and attitudes towards malaria

The biomarker questionnaire was used to record the results of the anemia and malaria rapid diagnostic testing for children aged 6-59 months.

Consent statements were included in each of the questionnaires, and specific consent statements were formulated for malaria and anemia testing, and for treatment and referral of children who tested positive for malaria (RDT).

The questionnaires were available in English, but interviewers were trained to translate key terms and conduct interviews in local languages. The 2023 SSMIS used a digitalized system on Android tablet computers for data collection. The questionnaires were programmed on CSPro (Census and Survey Processing) software, and interviews were conducted on tablet devices using Computer/tablet Assisted Personal interviewing (CAPI).

2.4 ANEMIA AND MALARIA TESTING

The protocol for the 2023 SSMIS, including collection and testing of blood samples from children under five years of age, received approval from the National Ethical Review Board prior to implementation. Blood samples were collected via finger pricks from children aged 6-59 months to perform anemia and RDT-based malaria testing, and to prepare thick and thin blood smears to be analyzed in the laboratory. The presence, species, density and development stage of malaria parasites in the blood samples would be determined by microscopy in the laboratory at a later stage. Each field team included a laboratory technician/scientist who carried out the anemia and malaria tests and prepared the blood smears. The team also included a nurse/clinician who performed diagnostic and provided treatment (malaria medications) and referral in accordance with the approved treatment guidelines for children who tested positive for malaria with a rapid diagnostic test (RDT). Oral informed consent was requested from the child's mother or adult guardian before performing the tests.

Anemia testing and case management: Due to the strong correlation between malaria infection and anemia, the 2023 MIS included anemia testing for children aged 6-59 months. Finger-prick blood samples were drawn with a single-use sterile lancet. Lab technicians then collected blood in a microcuvette from the finger prick. Hemoglobin analysis was carried out on site using a battery-operated portable HemoCue® Hb 301 system, which produces a result in less than 1 minute. For children found with hemoglobin levels of less than 7g/dL and a negative RDT, the child's parent or guardian was given written results, and the child received an appropriate two-week dosage of daily iron and folate, plus chewable mebendazole (if older than 12 months of age as per the Integrated Management of Childhood Illness guidelines) and was referred to a health center for follow-up care. The referral was accompanied by a referral form/letter containing the hemoglobin reading. Results of the anemia test were recorded in the biomarker questionnaire.

Malaria testing (RDT) and treatment protocol: Utilizing the same finger prick used for anemia testing, a drop of blood was tested immediately using RDT. All survey lab technicians were trained to perform the RDT. Malaria RDT results were provided to the child's parent or guardian and recorded on the biomarker questionnaire. The South Sudan-approved First Response Malaria HRP2 was used to guide treatment of positive cases, and the clinical severity was assessed by the survey nurse/clinician. Children with a positive RDT and clinically not fitting into the severe malaria classification received immediate treatment for malaria using an artemisinin-containing combination, according to South Sudan national treatment guidelines (currently Artesunate/Amodiaquine). Children with a positive RDT and classified as uncomplicated malaria with mild to moderate anemia (Hb between 8-11.5 g/dL) were treated with Artesunate/Amodiaquine® and given a two-weeks course of folic acid only and no ferrous sulphate. Children diagnosed with severe malaria were immediately referred to the nearest health facility with a referral form/letter. Children already treated with Artesunate/Amodiaquine® within the past two weeks were referred for additional evaluation.

Preparation of blood smears: In addition to the RDT, thick and thin blood smears were prepared in the field. Each slide with blood smears was given a barcode label, with a duplicate affixed to the transmittal form to track the blood samples from the field to the laboratory. The slides were stored in dry and dust-free slide boxes, and periodically sent from the field to the National Public Health Laboratory (NPHL) in Juba.

Malaria testing by microscopy: The blood smears were examined to determine the presence or absence of Plasmodium parasites and to determine parasite density. Blood smears were considered negative if no parasites were found after 100 high-powered fields had been examined. If parasites were present, the microscopist counted both asexual parasites and white blood cells. All stained slides were read by two independent microscopists. Slides with discordant results were reanalyzed by a third microscopist to determine the final result. Slides were tracked from their arrival in the NPHL through the examination process using barcode labels.

The microscopy results were quality checked through internal and external quality control processes. Routine internal quality control was performed on 5% of the slides (310 in total) as per the laboratory standard operating procedures.

2.5 PREPARATION FOR MICROSCOPY

Malaria microscopy is historically considered the gold standard for malaria diagnosis. RBM recommends that malaria prevalence should be based on microscopically examined blood films prepared in the field and read in a quality-controlled laboratory by well-trained microscopists in settings where there is reasonable evidence (from household surveys, routine data, or special studies) that either (a) non-falciparum malaria or mixed infections account for more than 10%; or (b) parasite density is expected to be below 200 parasites/µl in a substantial proportion of cases.

Malaria microscopy was included in the 2023 SSMIS and would allow the generation of an internationally comparable estimate of malaria prevalence for South Sudan.

The inclusion of parasitemia by microscopy in the previous 2017 SSMIS faced a number of technical challenges during the implementation and analysis phase, and results could not be published as planned, especially for the subnational estimates of malaria prevalence.

For the 2023 SSMIS, the NMCP tried to incorporate key lessons learnt from the 2017 experience and took several measures in order to improve the performance and quality of the microscopy component of the survey. The measures include the following:

(a) Use of readable barcode stickers
(b) Use of transmittal forms during the survey
(c) Use of quality laboratory materials
(d) Extensive training of slide readers (laboratory technologist/technicians)
(e) Selection of a high-capacity laboratory for staining and reading of blood slides
(f) External Quality Assurance (EQA) by an internationally accredited laboratory

The National Public Health Laboratory (NPHL) in Juba was selected to conduct the malaria microscopy for the 2023 SSMIS. The National Institute for Medical Research (NIMR) in Dar Es Salam, Tanzania was selected for EQA.

Training and selection of slide readers

The training of slide readers was attended by 18 participants who are laboratory technicians or technologists. This training took place between October 30 and November 3rd, 2023. The participants were drawn from the National Public Health Laboratory (9), the Juba Training Hospital (6) and the Central Equatoria Ministry of

Health (3). The training was led by an experienced laboratory specialist from the NPHL, assisted by one of the 2023 SSMIS's principal investigators (Co-PI) from NMCP.

A digital form was developed on CSPro and deployed on tablet devices for entering the reading of the slides. The attendees were equally trained for data entry, which would be done immediately after the reading of the slides. At the end of the training, a competence-based selection was organized and a list of 15 slide readers was retained.

2.6 ETHICAL CONSIDERATIONS

The protocol for the 2023 SSMIS was approved by the Ministry of Health Ethical Review Committee. All data and other information were maintained confidentially to the greatest extent possible. All datasets remain the property of the National Malaria Control Programme. The list of the identification numbers and respondents' names were stored separately during fieldwork and were removed from the electronic database during analysis. The blood samples were stored only with code identifiers to protect the identity of the respondent.

Oral informed consent was sought, during which the purpose of the survey as well as the risks and benefits of participation were explained to potential respondents. The risks incurred by participants were minimal and limited to the temporary discomfort associated with either discussing potentially sensitive information, or finger-prick blood collection for children under five. On the other hand, the benefits of participation in the survey included anemia and malaria testing for children and treatment or referral as appropriate. Furthermore, the results will benefit NMCP's and MOH's ability to monitor key health indicators and will provide evidence for decision-making that will enable NMCP to improve its policies and interventions. No forms of compensation or incentive was given nor proposed to respondents in order to encourage their participation.

2.7 TRAINING OF TRAINERS AND PRETEST

The training of trainers (ToT) for the Malaria Indicators Survey (MIS) took place in Juba, from 13 to 15 September 2023. The objective of the ToT was to train and refresh the core team members in order to ensure they have sufficient knowledge to adequately serve as trainers for the main training of the fieldworkers (composed Enumerators, Field Supervisors, Nurses/Clinicians and Laboratory Technicians) and to serve as survey coordinators during fieldwork.

A total of 35 persons participated in the 3-days ToT in Juba, the venue was the Royal Palace Hotel. The participants included various staff from the MoH/NMCP and NBS, moderators included malaria experts and core team members from MoH/NMCP, NBS, and partners (UNICEF, WHO, Malaria Consortium (MC)).

Participants were briefed/refreshed on the survey background and objectives, the methodology, the data capture tools (questionnaires and CAPI), the training techniques, including the challenges faced in the previous MIS surveys in South Sudan, and the expectations for the 2023 SSMIS.

2.8 TRAINING OF FIELD STAFF

The main survey training for the fieldworkers took place from 25 September to 2nd October 2023. The objective of this second layer of MIS training was to train and prepare data collection teams, including the Enumerators, the Team Supervisors, the Nurses/Clinicians, and the Lab Technicians.

For quality assurance, it was resolved not to have data collector's training in each state or statistical area (SA) as was the case in the previous 2017 MIS survey. Yet for logistic reasons, it was not possible to organize centralized training for all teams at one unique venue in Juba. Eventually the training was organized in two different venues:

a) one training venue in Juba which received participants from six (06) states of Greater Equatoria and Greater Upper Nile region.
b) another training venue in Wau for the participants from the four (04) states of the Greater Bahr El Ghazal region.

The training sessions covered the full set of topics included in the South Sudan's 2023 MIS survey. The participants were thoroughly trained in interviewing techniques and means to collect information on the following subjects:

i) Possession and use of mosquito nets
ii) IPT for pregnant women
iii) Treatment of fever episodes in children
iv) Care seeking for children with fever
v) Access to malaria diagnostics and effective treatment (antimalarials)
vi) Prevalence of malaria and anaemia

The training involved both theoretical and practical sessions, including digital data capture using the CSPro platform on tablet devices. The in-doors sessions, which took six (06) days of training, involved a good deal of mock interviews meant to emulate real situations and scenarios as they are expected to happen in the field during the actual survey.

The last two (02) days of training were devoted for field practice. For the field practice/testing, a few clusters were selected out of the main survey sample. The interviewer teams were deployed in the selected clusters to practice their acquired skills in a mini-survey. The practice covered from informing the local authorities, map reading and household listing, interviewing, blood testing, etc.

2.9 FIELDWORK

The 2023 SSMIS data collection was conducted by a total of 223 personnels including 200 data collectors, 10 state coordinators and 13 central supervisors. Fieldworkers were grouped into 40 teams of five members each. The team's composition was as follows:

Member	Affiliation	Role(s)	Number
Team supervisor	NBS	- team leadership/coordination - household listing and selection - transfer of data to headquarters - custodian of survey equipment	01
Interviewer / Enumerator	MoH	- conduction of interviews	01
Nurse / Clinician	MoH	- treatment of malaria-positive cases (RDT) - referral of severe malaria cases - conduction of interviews	02
Lab Technician	MoH	Blood testing, collection of biomarkers: - finger prick - hemoglobin testing (HemoCue Hb 301 System) - malaria testing (RDT) - preparation of thick and thin smears of blood	01
Total			**05**

Data collection for the 2023 SSMIS was conducted between October and November, which corresponds to a period of the year whereby malaria transmission is at its peak. This was in line with RBM-MERG's recommendations with regard to seasonality. Malaria transmission in South Sudan is perennial (occurs all year), but seasonal peaks may still influence the parasite prevalence. Therefore, seasonality should be taken into

account when planning for malaria indicator surveys in the country. The MERG's recommendation in this case is to conduct surveys during or immediately after the rainy season, and to conclude no later than 4-6 weeks after the rains stop, as this timeframe is associated with peaks of transmission.

Fieldwork began on October 16, 2023. Data collection was scheduled to be completed within 28 calendar days following the survey kick-off. Most of the teams were able to complete their assigned EAs within the planned schedule, but logistical challenges caused some delays in the completion of a number of EAs - including two clusters in Jonglei state (Akobo County) - extending the overall timeline by two weeks. Data collection ended officially on 29 November 2023.

Over the course of data collection, field teams were closely monitored by 13 state supervisors who were deployed from the central NMCP to the 10 states and 3 administrative areas. The states' supervisors worked jointly with state malaria coordinators to ensure adequate supervision of the field teams throughout the entire duration of the survey. They visited the teams in the field to ensure that the survey was conducted according to the protocol and to provide solutions to any challenges encountered. Teams of UNICEF and WHO staff and consultants also supported MIS supervision at different stages of the field operations.

Data from the field were uploaded in real time to a dedicated Dropbox server and sent to the headquarters, and quality checks were performed by the Data processing team. This allowed remote monitoring of fieldwork by the core team from NMCP headquarters. Regular feedback was sent to the field teams in order to improve data quality.

2.10 DATA PROCESSING

For data collection, the 2023 SSMIS used tablet computers with data entry programmes developed in the CSPro software by NBS. The tablet devices were equipped with Bluetooth® technology to enable remote electronic transfer of files. Each tablet was fitted with a micro-SD card for encrypted data back-up and data was transferred via the internet from the tablets to a central database.

The processing of the 2023 SSMIS data began immediately after the start of fieldwork. As data collection was going on in each cluster, all electronic data files were transferred on a dedicated Dropbox server in the central office in Juba. Data files were downloaded and checked for inconsistencies, incompleteness, and outliers. The field teams were alerted of any inconsistencies and errors. Secondary editing carried out in the central office involved resolving inconsistencies in the responses and controlling and fixing the structure of the datasets. Data entry and editing were carried out using the CSPro software. Concurrent processing of the data offered a distinct advantage because it maximized the likelihood of the data being error-free and accurate. Secondary editing of the data was completed in December 2023.

The CSPro databases were exported in Stata format, and additional data cleaning and analysis were conducted in Stata version 18. Results from the laboratory microscopic reading of the bloods smears were first entered onto paper forms, then entered into a CSPro entry form and later on imported also in Stata format for cleaning and analysis.

2.11 RESPONSE RATES

Table 1.1 shows the response rates for the 2023 SSMIS. A total of 5,600 households were selected for the survey. As the survey took place immediately after listing, all 5,600 households were found occupied and 5,526 were successfully interviewed, yielding a response rate of 98.7 percent. In the interviewed households, 6,458 women aged 15-49 were identified for individual interviews. Interviews were completed with 5,750 women, yielding a response rate of 92 percent.

Table 1.1 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), South Sudan 2023

	Residence		
Result	Urban	Rural	Total
Household interviews			
Households selected	1,140	4,460	5,600
Households occupied	1,060	4,540	5,600
Households interviewed	1,135	4,391	5,526
Household response rate[1]	99.6%	98.5%	99.0%
Interviews with women age 15-49			
Number of eligible women	1,464	5,246	6,710
Number of eligible women interviewed	1,341	4,409	5,750
Eligible women response rate[2]	92.0%	84.0%	86.0%

[1] Households interviewed/households occupied

[2] Respondents interviewed/eligible respondents

3. HOUSING, HOUSEHOLD POPULATION, AND RESPONDENT CHARACTERISTICS

Key Findings
• ***Source of drinking water:*** 78% of South Sudan households use an improved source of drinking water.
• ***Sanitation:*** Overall, only 19% of households use improved sanitation facilities, 19% use unimproved facilities while up to 62% engage in open defecation.
• ***Electricity:*** overall 2.7% of households have access to electricity (nearly 18.2% of urban households and 2.1% of rural households).
• ***Household composition:*** The average household size is 6 persons; 53.6% of households are headed by a female.
• ***Literacy:*** Overall, 37.4% of women in South Sudan are literate (22.1% in urban and 15.3% rural areas).

Information on the socioeconomic characteristics of the household population in the 2023 SSMIS provides a context for interpreting demographic and health indicators and gives an indication of the representativeness of the survey. The information also sheds light on the living conditions of the population.

This chapter presents information on sources of drinking water, type of sanitation facility, housing characteristics and household possessions, use of clean fuels and technologies related to cooking, wealth, and the composition of the household population. The chapter also presents information on characteristics of the survey respondents such as age, education, literacy, and exposure to mass media. These socioeconomic characteristics are useful for understanding the factors that affect the use of health services and other health behaviors related to malaria control.

3.1. DRINKING WATER SOURCES

Improved sources of drinking water

Include piped water, public taps, standpipes, tube wells, boreholes, protected dug wells and springs, rainwater, and bottled water.

Sample: Households and de jure population.

Improved sources of water protect against outside contamination so that water is more likely to be safe to drink. **Table 2.1** shows that 78% of households use an improved source of drinking water; 47% use tube wells, boreholes, or hand pumps, 11.4% use public taps or standpipes, while only 3.9% use rainwater and 4.9% use protected dug wells as their main source of drinking water. However, 13.3% of households use surface water, 6.7% use unprotected dug wells and 2% use unprotected spring.

35% of households have water on the premises, 67% take 30 minutes or less (round trip) to obtain drinking water, and 14% take more than 30 minutes to obtain water.

***Trends*:** The percentage of households using an improved drinking water source increased consistently from 69% in the 2013 SSMIS to 71% in the 2017 SSMIS, and now 78% in the 2023 SSMIS.

Patterns by background characteristics:

- The percentage of households using improved sources of drinking water is higher in urban areas (87.7%) than in rural areas (75.1%).
- The percentage of households drinking water on the premises is slightly higher in urban areas (35%) than in rural areas (15%).

Table 2.1 Household drinking water

Percent distribution of households and de jure population by source of drinking water and by time to obtain drinking water, according to residence, South Sudan 2023

	Households			Population		
Characteristic	Rural	Urban	Total	Rural	Urban	Total
Source of drinking water						
Improved source	**75.1**	**87.7**	**77.7**	**75.8**	**88.3**	**78.5**
Tube well or Borehole	49.2	38.2	46.9	49.9	38.9	47.5
Public Tap/Standing pipe	10.2	15.7	11.4	11.2	15.6	12.1
Protected dug well	4.6	6.1	4.9	4.9	3.5	4.6
Piped in to dwelling	4.8	4.2	4.6	4.4	5.8	4.7
Rainwater	4.2	2.8	3.9	3.4	2.8	3.3
Tanker Truck/cart with small tank	0.7	16.0	3.9	0.7	17.3	4.3
Piped to Yard/Plot	0.4	1.7	0.7	0.6	0.9	0.6
Protected spring	0.6	0.9	0.7	0.6	1.5	0.7
Piped to Neighbor	0.2	1.8	0.5	0.2	1.9	0.5
Bottled water, improved source for cooking/handwashing	0.1	0.3	0.1	0.1	0.2	0.1
Unimproved source	**25.1**	**7.7**	**22.0**	**24.4**	**7.2**	**21.2**
Surface water	15.7	3.8	13.3	15.0	3.3	12.6
Unprotected dug well	7.5	3.7	6.7	7.4	3.5	6.7
Unprotected Spring	2.4	0.3	1.9	2.0	0.4	1.9
Bottled water, unimproved source for cooking/handwashing						
Other source	**0.1**	**4.2**	**0.3**	**0.2**	**0.7**	**0.3**
Total	**100**	**100**	**100**	**100**	**100**	**100**
Time to obtain drinking water (round trip)						
Water on premises[2]	19.3	14.1	15.2	19.2	14.7	15.7
Less than 30 minutes	35.2	42.8	41.1	35.1	44.7	42.4
30 minutes or longer	45.5	43.2	43.7	45.3	45.1	45.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Number	1,004	4,466	5,470	5,341	25,782	31,123

Note: *During questionnaire development, water supplied by "tanker truck/cart with small tank" was erroneously classified as an unimproved water source.*

3.2. DRINKING WATER SERVICE LADDER

Safely managed

Drinking water from an improved water source that is located on the premises, available when needed, and free from fecal and priority chemical contamination.

Basic

Drinking water from an improved source, provided either water is on the premises or round-trip collection time is 30 minutes or less.

Limited

Drinking water from an improved source, and round-trip collection time is more than 30 minutes.

Unimproved

Drinking water from an unprotected dug well or unprotected spring.

Surface water

Drinking water directly from a river, dam, lake, pond, stream, canal, or irrigation canal.

Sample: De jure population

The 2023 SSMIS captured information on four out of the five rungs. Because the survey did not include testing of drinking water for fecal or chemical contamination, safely managed and basic drinking water services cannot be distinguished and are grouped together in **Table 2.1** as "at least basic service."

Overall, 79% of the household population has at least basic drinking water service, 11% has limited service, and 21.2% uses an unimproved source – of which 13.3% use surface water (**Table 2.1**).

3.3. SANITATION

Improved sanitation facilities

Flush/pour flush toilets that flush water and waste to a piped sewer system, septic tank, pit latrine, or unknown destination; ventilated improved pit (VIP) latrines; pit latrines with slabs; or composting toilets. Sample: Households and de jure population.

Sample: Household and de jure population

Nationally, 18.7% of households use improved sanitation facilities, 19% use unimproved facilities, and 62.4% engage in open defecation (no sanitation facilities) (**Table 2.2**).

Trends: The percentage of households using improved sanitation facilities increased from 12% in the 2017 SSMIS to 19% in the 2023 SSMIS.

Patterns by background characteristics:

- A greater percentage of households in urban areas than rural areas use improved sanitation facilities (30.9% and 18.2% respectively). The most commonly used improved toilet facility is Pit latrine with slab (13.2% nationally; 15% of urban households; 13.2% of rural households).
- Use of open defecation is markedly higher among rural households (63.2%) than among urban households (45.7%).

Table 2.2 Household sanitation facilities

Percent distribution of households and de jure population by type of toilet/latrine facilities, according to residence, South Sudan 2023

	Households			Population		
Type and location of toilet/latrine facility	Urban	Rural	Total	Urban	Rural	Total
Improved sanitation	**30.9**	**18.2**	**18.7**	**29.4**	**18.6**	**19**
Flush/pour flush to piped sewer system	3.4	0.6	0.7	2.1	0.4	0.5
Flush/pour flush to septic tank	0.1	0.2	0.2	0.1	0.3	0.3
Flush/pour flush to a pit latrine	5.1	2.2	2.3	5	2.6	2.7
Ventilated improved pit (VIP) latrine	6	1.4	1.6	7.5	1.4	1.6
Pit latrine with a slab	15	13.2	13.3	13.1	13.2	13.2
Composting toilet	1.3	0.6	0.6	1.6	0.6	0.6
Unimproved sanitation						
Shared facility[1]	**63.6**	**51.3**	**51.9**	**62.1**	**49.9**	**50.4**
Flush/pour flush to piped sewer system	0	2.4	2.3	0	1.7	1.6
Flush/pour flush to septic tank	0.5	0.8	0.8	0.5	1.3	1.3
Flush/pour flush to a pit latrine	9.7	7.1	7.2	7.2	8.2	8.2
Ventilated improved pit (VIP) latrine	17.5	3.7	4.4	22	3.4	4.1
Pit latrine with a slab	34.4	35.9	35.8	29.7	34.5	34.3
Composting toilet	1.5	1.3	1.3	2.6	0.8	0.9
				0	0	0
Unimproved facility	**23.4**	**18.6**	**18.8**	**23**	**19.2**	**19.3**
Flush/pour flush not to sewer/ septic tank/pit latrine	1.1	1.4	1.4	0.9	1.3	1.3
Pit latrine without slab/open pit	19.7	13.9	14.1	19.6	14.7	14.9
Bucket	2.2	0.5	0.6	2.1	0.5	0.6
Hanging toilet/hanging latrine	0.2	0.2	0.2	0.2	0.1	0.1
Other	0.3	2.7	2.6	0.2	2.5	2.4
Open defecation (no facility/bush/field)	**45.7**	**63.2**	**62.4**	**47.6**	**62.3**	**61.7**
Total	100	100	100	100	100	100
Number of households/populations	1,034	4,491	5,525	5,490	25,941	31,431
Number of households/populations with a toilet/latrine facility						

[1] Facilities that would be considered improved if they were not shared by two or more households

3.4. HOUSING CHARACTERISTICS

Housing construction materials
Natural floor: Earth/Sand, Dung.
Rudimentary floor: Wood planks, Palm/Bamboo.
Finished floor: Parquet or polished wood, Vinyl or asphalt strips, Ceramic tiles, Cement, Carpet.
Natural roofing: No roof, Grass thatch/palm leaf, Sod.
Rudimentary roofing: Rustic mat, Palm/bamboo, Wood planks, Cardboard.
Finished roofing: Metal, Wood, Calamine/cement fiber, Ceramic tiles, Cement, Roofing shingles, Iron sheets.
Natural walls: No walls, Cane/palm/trunks, Dirt.
Rudimentary walls: Bamboo with mud, Stone with mud, Uncovered adobe, Plywood, Cardboard, Reused wood.
Finished walls: Cement, Stone with lime/cement, Bricks, Cement blocks, covered adobe, Wood planks/shingles.

The 2023 SSMIS collected data on household features such as access to electricity, housing construction materials, number of rooms used for sleeping, and type of cooking technology and fuel. These data, along with information on ownership of household durable goods, sources of drinking water, and sanitation, contribute to the creation of the household wealth index and provide information that may factor into other health indicators.

Overall, only 3% of households in the general population have electricity (Table 2.3). More households in urban areas (19.5%) have access to electricity than in rural areas (1.6%). More details in **Tab 2.3.**

The most common flooring material in South Sudan is earth/sand (79.4%), followed by wood planks (8%), and dung (3.7%).

The number of rooms a household uses for sleeping is an indicator of socioeconomic level and of crowding in the household, which can facilitate the spread of disease. In South Sudan, 70.4% (down from 77% in 2017 SSMIS) of households use either one or two rooms for sleeping.

Exposure to cooking smoke, especially to smoke produced from solid fuels, is potentially harmful to health. The use of solid fuels for cooking is nearly universal (99.6%) for households in South Sudan, with the major sources being wood and charcoal.

The 2023 SSMIS also included information on ownership of household goods, means of transport, agricultural land, and bank accounts (Table 2.4). Urban households are more likely than rural households to own a radio (27% versus 10%), television (16% versus 1.3%), mobile telephone (60.8% versus 48%).

Most households do not own a means of transport: 10.7% of households in the general population own a bicycle. Motorcycle/scooters are more commonly owned in urban households (10%) than in rural households (5.4%). 10% of urban households and 1% of rural households owned a car.

43.6% of urban households and 70% of rural households own agricultural land. Farm animals are owned by 24% of urban households and 49.4% of rural households.

Table 2.3 Household characteristics

Percent distribution of households and de jure population by housing characteristics and percentage using solid fuel for cooking, according to residence, South Sudan 2023

	Households			Population		
Housing characteristic	Urban	Rural	Total	Urban	Rural	Total
Electricity						
Yes	19.5	1.6	2.4	18.2	2.1	2.7
No	80.5	98.4	97.6	81.8	97.9	97.3
Total	**100**	**100**	**100**	**100**	**100**	**100**
Flooring material						
Earth/sand	56.7	77.5	76.6	61.7	80.2	79.4
Dung	12.5	3.6	4	10.8	3.5	3.7
Wood planks	8.8	9.7	9.7	8.2	8.2	8.2
Palm/bamboo	6.3	4.9	5	6.1	3.5	3.6
Parquet or polished wood	0.8	0.3	0.3	1.1	0.3	0.3
Vinyl or asphalt strips	0	0.1	0.1	0	0.1	0.1
Ceramic tiles	3.6	0.3	0.4	2.4	0.2	0.3
Cement	10.8	2.9	3.2	9.5	3.2	3.5
Carpet	0.3	0.2	0.2	0.2	0.2	0.2
Other	0.1	0.6	0.6	0.1	0.6	0.6
Total	**100**	**100**	**100**	**100**	**100**	**100**
Rooms used for sleeping						
One	26.6	29.4	29.3	21.9	22.7	22.6
Two	33.7	38.2	38	33.5	38	37.8
Three or more	39.7	32.4	32.8	44.5	39.3	39.5
Total	**100**	**100**	**100**	**100**	**100**	**100**
Cooking fuel						
Electricity	0.0	0.2	0.2	0.0	0.1	0.1
LPG/natural gas/biogas	0.3	0.1	0.1	0.2	0.1	0.1
Charcoal	18.6	11.7	11.9	16.6	11.4	11.6
Wood	78.8	84.9	84.6	80.8	85.8	85.6
Straw/shrubs/grass	1.9	2.8	2.8	2.0	2.4	2.4
Agricultural crop	0.2	0.3	0.3	0.3	0.2	0.2
Animal dung	0.0	0.0	0.0	0.0	0.0	0.0
Other fuel	0.0	0.0	0.0	0.0	0.0	0.0
No food cooked in household	0.1	0.1	0.1	0.0	0.0	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**
Percentage using solid fuel for cooking[1]	99.54	99.64	99.64	99.65	99.77	99.77
Total	**100**	**100**	**100**	**100**	**100**	**100**
Number of households/populations	1004	4466	5470	5,341	25,782	31,123

LPG = Liquefied petroleum gas

3.5. HOUSEHOLD WEALTH

3.5.1. HOUSEHOLD DURABLE GOODS

The 2023 SSMIS collected information on possession of household goods and means of transportation, ownership of agricultural land, and ownership of farm animals **(Table 2.4)**. About 50% of households own a mobile phone. Possession of a mobile phone is more common in urban households (71%) than in rural households (45%). Only about 12% of households have a radio, while less than 2% of households have a television, and 2% for computers or tablets. Eleven percent of households own a bicycle, 6% own a motorcycle or scooter, and less than 2% own a car or truck.

Overall, 69% of households own agricultural land and 48% own farm animals. As expected, more households in rural areas than urban areas own agricultural land (70% and 44%, respectively) and farm animals (49% and 24%, respectively).

Table 2.4 Household possessions

Percentage of households possessing various household effects, means of transportation, agricultural land and livestock/farm animals, according to residence, South Sudan 2023

	Households		
Possession	Urban	Rural	Total
Household effects			
Radio	26.9	10.0	10.7
Television	16.1	1.3	1.9
Mobile phone	60.4	48.0	48.5
Non-mobile telephone	5.2	1.3	1.5
Computer	9.4	1.4	1.7
Refrigerator	12.0	0.4	0.9
Means of transport			
Bicycle	20.2	10.3	10.7
Animal drawn cart	0.1	0.7	0.6
Motorcycle/scooter	9.9	5.4	5.6
Car/truck	9.8	1.0	1.4
Boat with a motor	0.7	0.3	0.4
Ownership of agricultural land	43.6	70.1	68.9
Ownership of farm animals[1]	24.0	49.4	48.2
Number of households	1004	4466	5470

[1] Cows, bulls, other cattle, horses, donkeys, mules, goats, sheep, chickens, or other poultry

3.5.2. WEALTH INDEX

Wealth index

Households are given scores based on the number and kinds of consumer goods they own, ranging from a television to a bicycle or car, and housing characteristics such as sources of drinking water, toilet facilities, and flooring materials. These scores are derived using principal component analysis. National wealth quintiles are compiled by assigning the household score to each usual (de jure) household member, ranking each person in the household population by her or his score, and then dividing the distribution into five equal categories, each comprising 20% of the population.

Sample: Households

The distribution of the household population by wealth quintile indicates the degree to which wealth is evenly distributed among the population. **Table 2.5** shows the distribution of the de jure household population by wealth quintile, according to residence and state.

46% of the urban population falls in the upper wealth quintiles (4th and 5th), while 38% of the rural population falls in that category. But overall, the household population appears to be evenly distributed across the wealth quintiles.

The concentration of wealth differs substantially by state. The percentages of the population in the lowest wealth quintile are higher in Ruweng AA (65%), Eastern Equatoria (43%), and followed by Warrap (24%) and Upper Nile (23%). Western Equatoria (69%) has the greatest percentages of residents in the highest wealth quintile, followed by Central Equatoria (46%) and Jonglei (31%).

	Wealth quintile						Number
Residence/State	Lowest	Second	Middle	Fourth	Highest	Total	of persons
Residence							
Rural	19.97	21.54	19.60	18.41	20.47	100.0	25212
Urban	19.44	13.40	21.39	27.08	18.68	100.0	6573
State							
Abyei AA	4.39	27.32	21.46	42.93	3.90	100.0	205
Central EQ	14.75	6.27	8.21	24.68	46.09	100.0	2569
Eastern EQ	42.82	16.97	9.65	14.36	16.20	100.0	2828
Jonglei	8.43	15.57	11.36	33.21	31.43	100.0	2087
Lakes	19.59	27.12	30.68	13.61	9.00	100.0	3256
Northern BG	19.15	27.97	25.56	18.44	8.88	100.0	3557
Pibor AA	2.28	22.64	45.77	3.09	26.22	100.0	614
Ruweng AA	64.61	21.33	12.21	1.85	0.00	100.0	647
Unity	19.53	27.14	25.42	21.29	6.61	100.0	2903
Upper Nile	23.18	25.98	32.03	9.89	8.92	100.0	2891
Warrap	24.18	26.95	24.98	20.59	3.30	100.0	3399
Western BG	10.03	14.96	13.31	45.73	15.97	100.0	3081
Western EQ	8.07	3.14	8.59	11.41	68.79	100.0	3086
Total						100.0	31123

3.6. HOUSEHOLD POPULATION AND COMPOSITION

Household

A person or group of related or unrelated persons who live together in the same dwelling unit(s), who acknowledge one adult male or female as the head of the household, who share the same housekeeping arrangements, and who are considered a single unit.

De facto population

All persons who stayed in the selected households the night before the interview (whether usual residents or visitors).

De jure population

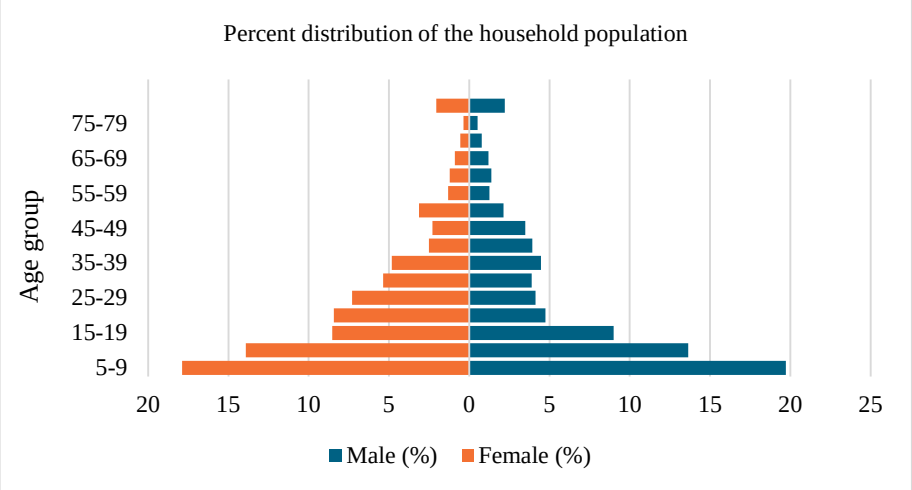
All persons who are usual residents of the selected households, whether or not they stayed in the household the night before the interview.

How data are calculated

All tables are based on the de facto population unless specified otherwise.

Table 2.6 shows the distribution of the de facto household population in the 2023 SSMIS by 5-year age groups, according to sex and residence. A total of 31,439 people were found in the 5,526 households interviewed in the survey. Nationally, 58% of the population falls into the 0–14 and 65 or above dependency age groups. Overall, 63% of household residents are aged 0–19, and 23% are classified as adolescents (age 10–19). Differences between urban and rural residence are generally narrow but fairly wide for population aged 5-9 (3.3 percentage points more in rural than urban) and age 80+ (3.5 percentage points more in urban than in rural areas.

Figure 2.4 Population pyramid



The population pyramid in **Figure 2.4** shows the population distribution by sex and 5-year age groups. The broad base of the pyramid indicates that South Sudan's population is young, with 58% of the population under age 15.

Table 2.6 Household population by age, sex, and residence

Percent distributions of the de facto household population by various age groups and percentage of the de facto household population age according to sex and residence, South Sudan 2023

	Urban			Rural			Total		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
<5	21.8	19.5	20.6	23.9	19.5	21.6	23.5	19.5	21.4
5-9	17.0	15.3	16.1	20.4	18.5	19.4	19.7	17.9	18.8
10-14	12.4	13.1	12.8	14.0	14.1	14.0	13.6	13.9	13.8
15-19	9.0	8.0	8.5	9.0	8.7	8.8	9.0	8.5	8.8
20-24	6.0	9.9	8.0	4.4	8.0	6.3	4.8	8.4	6.7
25-29	4.5	8.4	6.5	4.0	7.0	5.6	4.1	7.3	5.8
30-34	4.4	6.5	5.5	3.7	5.1	4.4	3.9	5.4	4.7
35-39	4.9	4.7	4.8	4.4	4.8	4.6	4.5	4.8	4.7
40-44	4.3	2.8	3.5	3.8	2.4	3.1	3.9	2.5	3.2
45-49	3.7	2.2	2.9	3.4	2.3	2.8	3.5	2.3	2.9
50-54	2.4	2.4	2.4	2.1	3.3	2.7	2.1	3.1	2.7
55-59	1.2	0.9	1.0	1.3	1.4	1.3	1.2	1.3	1.3
60-64	1.3	0.8	1.1	1.4	1.3	1.4	1.4	1.2	1.3
65-69	0.9	0.5	0.7	1.3	1.0	1.1	1.2	0.9	1.0
70-74	0.5	0.3	0.4	0.9	0.6	0.7	0.8	0.6	0.7
75-79	0.5	0.1	0.3	0.5	0.4	0.5	0.5	0.4	0.4
80 +	5.3	4.6	4.9	1.4	1.4	1.4	2.2	2.0	2.1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Dependency age groups									
0-14	51	48	50	58	52	55	57	51	54
15-64	42	47	44	38	44	41	38	45	42
65+	7	5	6	4	3	4	5	5	5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Child and adult populations									
0-17	57.1	52.2	54.6	64.0	57.0	60.4	62.6	56.1	59.2
18+	42.9	47.8	45.4	36.0	43.0	39.6	37.4	45.4	41.6
Total	100	100	100	100	100	100	100	100	100
Adolescents 10-19	21.5	21.1	21.3	22.9	22.8	22.9	22.6	22.4	22.5
Number of persons	**3,081**	**3,314**	**6,395**	**11,887**	**13,157**	**25,044**	**14,968**	**16,471**	**31,439**

Table 2.7 presents the distribution of households by sex of head of household and household size, and mean size of households, according to residence. Nationally, a greater proportion of households are headed by women (56%), households headed my males account for 44%. On average, households consist of 5.8 persons nationally.

Table 2.7 Household composition

Percent distribution of households by sex of head of household and by household size and mean size of households, according to residence, South Sudan 2023

Characteristic	Residence		Total
	Urban	Rural	
Household headship			
Male	45.4	46.5	46.4
Female	54.6	53.5	53.6
Total	**100**	**100**	**100**
Number of usual members			
1	7.1	2.8	3
2	6.5	5.6	5.6
3	12.7	10	10.1
4	16.2	15.4	15.4
5	18.8	16.9	17
6	12.7	15.1	15
7	10.9	10.5	10.5
8	7	9.5	9.3
9+	8.3	14.4	14.1
Total	**100**	**100**	**100**
Mean size of households	5	6	6
Number of households	1,004	4,466	5,470

Note: Table is based on de jure household members, i.e., usual residents.

3.7. Basic Characteristics Of Survey Respondents

A total of 5,719 women aged 15-49 were interviewed with the Woman's questionnaire; their background characteristics are presented in Table 2.8.

Table 2.8 Background characteristics of respondents

Percent distribution of women age 15-49 by selected background characteristics, South Sudan 2023

Background characteristic	Women		
	Weighted percent	Weighted number	Unweighted number
Age			
15-19	22.9	1,709	1,466
20-24	21.3	1,593	1,417
25-29	18	1,345	1,231
30-34	13.2	983	913
35-39	12.5	937	834
40-44	6.3	470	443
45-49	5.8	435	406
Residence			
Urban	19.6	1,316	1,464
Rural	80.4	5,394	5,246
State			
Upper Nile	4.6	306	669
Jonglei	20.2	1,356	489
Unity	9.7	651	693
Warrap	11.4	767	622
Northern B.G.	12	803	717
Western B.G.	5.6	377	699
Lakes	5.4	361	550
Western E.Q.	12.4	829	634
Central E.Q.	5.2	347	622
Eastern E.Q.	8.7	582	684
Pibor AA	3	198	138
Ruweng AA	1.3	90	142
Abyei AA	0.6	42	51
Education			
No education	63.8	3,654	3,554
Primary	28.2	1,611	1,621
Secondary	7.2	410	506
More than secondary	0.9	49	69
Wealth quintile			
Lowest	17.37	970	1061
Second	17.53	978	1028
Middle	18.6	1041	1117
Fourth	20.58	1149	1217
Highest	25.88	1445	1160
Total 15-49	100.0	5583	5,750

Note: *Education categories refer to the highest level of education attended, whether or not that level was completed.*

3.8. EDUCATIONAL ATTAINMENT

Studies have consistently shown that educational attainment has a strong effect on health behaviors and attitudes. In general, the higher the level of education that a woman attains, the more knowledgeable she is about use of health care services for herself, children, and her family.

Table 2.9 shows the percent distribution of women aged 15–49 by highest formal level of schooling attended or completed, according to background characteristics. Overall, 47% of the women aged 15-49 have primary, 42% have no formal education, while 10% have attended secondary education. 10% of women aged 15-19 years have completed secondary school compared to 4% of women aged 45-49 years. More than half of women (67%) in rural areas lack formal education compared with 43% in urban areas.

Women in higher wealth quintiles are more likely to have completed some education. In the lowest wealth quintile, 77% (85% in 2017 SSMIS) of women have no education, whereas only 40% (31% in 2017 SSMIS) of women in the top wealth quintile have no education.

Trends: Median years of education among South Sudanese women increased from 2.0 years in the 2013 SSMIS and 4.2 years in the 2017 SSMIS to 5.4 years in the 2023 SSMIS.

Table 2.9 Educational attainment of survey respondents

Percent distribution of women aged 15-49 by highest level of schooling attended or completed, and median years completed, according to background characteristics, South Sudan 2023

Background characteristic	Highest level of schooling: No education	Primary	Secondary	More than secondary	Total	Number of women
Age						
15-19	42.0	47.0	10.0	0.0	100.0	891
20-24	47.0	37.0	14.0	1.0	100.0	1,011
25-29	61.0	27.0	11.0	1.0	100.0	947
30-34	73.0	21.0	4.0	1.0	100.0	702
35-39	80.0	15.0	5.0	1.0	100.0	651
40-44	80.0	15.0	4.0	1.0	100.0	361
45-49	85.0	11.0	4.0	0.0	100.0	329
Residence						
Urban	43.0	34.0	20.0	3.0	100.0	1,219
Rural	67.0	27.0	5.0	0.0	100.0	4,296
State						
Upper Nile	67.0	29.0	4.0	-	100.0	710
Jonglei	72.0	25.0	3.0	0.0	100.0	258

Unity	85.0	14.0	1.0	-	100.0	508
Warrap	72.0	23.0	5.0	0.0	100.0	610
Northern B.G.	63.0	29.0	8.0	0.0	100.0	615
Western B.G.	49.0	36.0	13.0	1.0	100.0	531
Lakes	77.0	17.0	6.0	0.0	100.0	406
Western E.Q.	41.0	50.0	8.0	1.0	100.0	368
Central E.Q.	31.0	40.0	23.0	6.0	100.0	567
Eastern E.Q.	63.0	24.0	13.0	1.0	100.0	616
Pibor AA	84.0	15.0	1.0	-	100.0	117
Ruweng AA	69.0	22.0	10.0	-	100.0	124
Abyei AA	49.0	40.0	9.0	1.0	100.0	85
Wealth quintile						
Lowest	76.63	18.38	4.62	0.38	100.0	1061
Second	74.42	21.01	4.47	0.10	100.0	1028
Middle	62.40	29.45	7.88	0.27	100.0	1117
Fourth	57.27	29.66	11.83	1.23	100.0	1217
Highest	40.34	41.55	15.26	2.84	100.0	1160

[1] Completed X grade at the primary level
[2] Completed Y grade at the secondary level

3.9. LITERACY

Literacy
Respondents who had attended higher than secondary school were assumed to be literate. All other respondents were considered literate if they could read aloud all or part of a sentence shown to them.

Sample: Women aged 15-49

The ability to read and write is an important personal asset, allowing individuals to have increased opportunities in life. Knowing the distribution of the literate population can help those involved in health communication plan how to reach women with their messages. The 2023 SSMIS assessed the ability to read among women who had never been to school or who had attended only the primary level, by asking them to read a simple, short sentence or part of the sentence.

Table 2.10 shows that, overall, 37% of women in South Sudan are literate, 63% of women illiterate.

Trends: The percentage of women who are literate increased from 21% in the 2017 SSMIS to 37% in the 2023 SSMIS.

Patterns by background characteristics:

- The median number of years of education completed generally falls with increasing age, from 7.3 years among women aged 15-24 to 0.6 years among women aged 35-39. The median number of years cannot be calculated for women aged 40-49 because more than half of women in this age group have no education.

- By residence, the percentage of women with more than a secondary education is higher in urban areas than rural areas (5% and 4%). The median number of years of education completed is 8.0 among urban women and 1.2 among rural women.
- The percentage of women with more than secondary education ranges from less than 1% in Unity, 9% in Jonglei and 10% Warrap State.

Table 2.10 Literacy

Percent distribution of women age 15-49 by level of schooling attended and level of literacy, and percentage literate, according to background characteristics, South Sudan 2023

	No schooling, primary or secondary school								
Background characteristic	Can read a whole sentence	Can read part of a sentence	Cannot read at all	No card with required language	Blind/ visually impaired	Missing	Total	Percentage literate[1]	Number of women
Age									
15-19	10.0	25.0	64.0	0.0	-	-	100	31.9	891
20-24	7.0	20.0	73.0	1.0	-	-	100	22.3	1,011
25-29	2.0	12.0	85.0	1.0	-	-	100	13.1	947
30-34	2.0	11.0	87.0	0.0	-	-	100	11.7	702
35-39	2.0	6.0	92.0	0.0	-	-	100	7.2	651
40-44	1.0	6.0	93.0	-	-	-	100	6.4	361
45-49	2.0	4.0	94.0	0.0	-	-	100	5.2	329
Residence									
Urban	5.0	23.0	70.0	1.0	-	-	100	22.1	1,219
Rural	4.0	12.0	84.0	0.0	-	-	100	15.3	4,296
State									
Upper Nile	1.0	11.0	87.0	1.0	-	-	100	11.9	679
Jonglei	9.0	12.0	79.0	-	-	-	100	20.9	249
Unity	4.0	7.0	90.0	-	-	-	100	10.3	503
Warrap	10.0	6.0	84.0	-	-	-	100	16.2	580
Northern B.G.	4.0	18.0	78.0	1.0	-	-	100	21.4	569
Western B.G.	3.0	15.0	81.0	-	-	-	100	18.6	456
Lakes	3.0	9.0	87.0	1.0	-	-	100	12.2	385
Western E.Q.	4.0	21.0	74.0	-	-	-	100	25.7	335
Central E.Q.	6.0	30.0	62.0	1.0	-	-	100	36.2	403
Eastern E.Q.	4.0	15.0	81.0	-	-	-	100	19.1	530
Pibor AA	1.0	5.0	94.0	-	-	-	100	6.0	116
Ruweng AA	3.0	21.0	77.0	-	-	-	100	23.2	112
Abyei AA	3.0	36.0	62.0	-	-	-	100	38.2	76

Wealth quintile

Lowest	2.6	7.6	89.4	0.4	-	-	100	1008
Second	3.2	9.5	86.6	0.8	-	-	100	983
Middle	5.0	14.2	80.5	0.4	-	-	100	1030
Fourth	5.8	15.6	78.3	0.3	-	-	100	1064
Highest	5.8	25.2	68.6	0.4	-	-	100	950

[1] Refers to women who attended schooling higher than the secondary level and women who can read a whole sentence or part of a sentence

4. MALARIA PREVENTION

Key Findings

Ownership of insecticide-treated nets (ITNs):

- Nationally, 63.86% of South Sudan households own at least one ITN.
- 70% of households have at least one ITN for every two persons
- **Source of nets:** 81.37% of ITNs were obtained through the 2023 mass distribution campaign. 14.80% from markets and 3.33% were from routine programming
- **ITN access:** 71.1% of the de facto household population could sleep under an ITN if each ITN were used by up to two people.
- **ITN use:** 68% of the household population, 67.41% of children under age 5, and 57.25% of pregnant women slept under an ITN the night before the survey.
- **Intermittent preventive treatment during pregnancy (IPTp):** 25.5% of women with a live birth in the 2 years preceding the survey reported having taken one or more doses of sulfadoxine-pyrimethamine (SP)/Fansidar and 16.7% reported taking three or more doses.

This chapter describes the population coverage rates of some of the key malaria control interventions in South Sudan, including ownership, source, and use of mosquito nets and prophylactic use of antimalarial drugs among pregnant women. This is in line with the 2021-2025 NMCP strategic plan 2021-2025, the objective of which is for 85% or more of households to have at least one long-lasting insecticidal net (LLIN/ITN) for every two persons by the year 2025 (NMCP 2020a).

This strategic plan visualizes through mass campaigns distribution and routine programming to reduce malaria burden among vulnerable population such as U-5 years' children and pregnant women. ITNs on routine basis are provided to pregnant women during their first antenatal care visit and to newborns delivered at health facilities or at their first visit to a facility.

4.1. OWNERSHIP AND COVERAGE OF INSECTICIDE-TREATED NETS (ITNS)

Ownership of insecticide-treated nets

Households that have at least one insecticide-treated net (ITN). An ITN is defined as a factory-treated net that does not require any further treatment.

Sample: Households

Full household ITN coverage

Percentage of households with at least one ITN for every two persons.

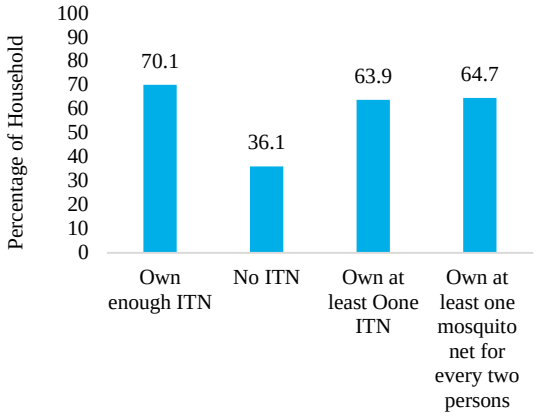
Sample: Households

ITNs repel and kill mosquitoes, thus providing protection against mosquito bites and reducing the transmission of malaria parasites. When high coverage of ITNs is achieved, ITNs help decrease malaria risk at the individual level as well as at the community level by reducing the vector population. The distribution and use of ITNs is one of the core interventions for preventing malaria infection in South Sudan. ITNs are distributed for free through mass campaigns, routine services provided to pregnant women such as antenatal care (ANC) visits, Immunization and school distribution (NMCP 2021). They may also be purchased.

Nationally, 71.92% of households have at least one mosquito net, while 63.86% have at least one ITN. This could be an indication that the majority of the mosquito nets owned by households in South Sudan are ITNs, even though ownership of ITN and ownership of non-ITN are not mutually exclusive. The average number of ITNs per household is 3.28 **(Table 3.1)**.

Less than one in two households have at least one ITN for every two persons who usually spend the night in the household. In other words, **70%** of households own enough ITNs to cover all household members if it is assumed that one net is shared by two people **(Table 3.1 and Figure 3.1).** Thus, to ensure sufficient household coverage of one net per two persons, the scope of distribution needs to expand to reach the **36.14%** of households that do not own any ITNs. In addition, the quantity of ITNs distributed needs to increase to provide sufficient ITNs for the **63.86%** of households that own at least one ITN but have an insufficient supply for the number of household members **(Figure 3.1)**.

Figure 3.1: Percent distribution of ITNs in households



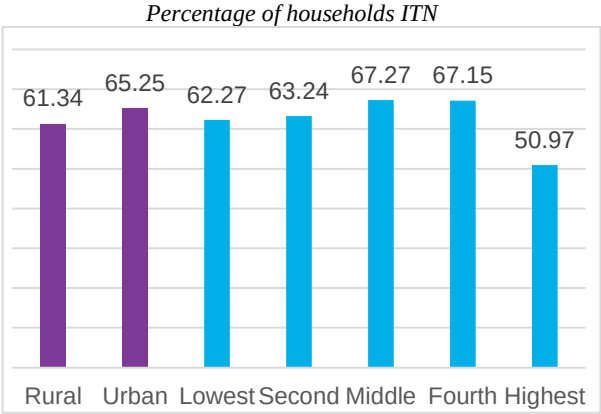
Trends: A zero point eight-six (0.86%) has been a negligible increase in the percentage of households that own at least one ITN from **63%** in the 2017 SSMIS to **63.86%** in the 2023 SSMIS.

Patterns by background characteristics:

- Household ownership of ITNs is higher in urban areas 65.25% than in rural areas (61.34%) **(Table 3.2)**.
- ITN ownership appears to decrease across the wealth quintiles, though the difference is not glaring. Actually, 62.27% of the households that belong to the poorest wealth quintile own an ITN, as compared with 50.97% of households in the lowest wealth quintile **(Figure 3.2)**.
- By state, household ownership of ITNs is highest in Unity State with above 95.5%, Warrap 92.3%, and Northern Bahr El Ghazal 82.5%. It is lowest in Upper Nile, 26.5% and Western Equatoria 26.4%, Abyei Administrative 7.4% and Pibor Administrative 00%.

Figure 3.2 ITN ownership by household residence and wealth

Percentage of households ITN



4.2. SOURCE OF MOSQUITO NETS

Four out of five ITNs found in South Sudan households were obtained through the 2023 mass distribution campaign (81.37%), 14.79% were purchased from a shop or market, while 2.02% were obtained at an ANC visit. All other sources account for less than 1%. **(Table 3.2 and Figure 3.3)**.

Patterns by background characteristics:

- Eighty percent (80%) of ITNs in rural areas and 71.27% in urban areas were

obtained through the 2023 mass distribution campaign **(Table 3.2)**.

- By state, the percentage of households obtaining ITNs through the 2023 mass distribution campaign is highest in Ruweng (95.8) Unity (95.4%), Warrap (93.6%), Lakes (92.7%), Eastern Equatoria (91.6%), Western Bahr El Ghazal (88.8%), Northern Barh El Ghazal (84.05%) Central Equatoria (74.34%), Jonglei (53.4%) and Upper Nile (29.1%). The lowest percentage is found in Western Equatoria (27%), Abyei (7.8%) and Pibor Administrative (00%) respectively.
- The percentage of households obtaining an ITN from shops or markets is higher in Abyei (86.8%), Western Equatoria (65.05%) and Upper Nile (59.5%).

Figure 3.3 Source of ITNs

Percent distribution of ITNs in interviewed households

4.3. HOUSEHOLD ACCESS TO AND USE OF INSECTICIDE-TREATED NETS

Access to an ITN

Percentage of the population that could sleep under an ITN if each ITN in the household were used by up to two people.

Sample: De facto household population.

Use of ITNs

Percentage of the population that slept under an ITN the night before the survey.

Sample: De facto household population.

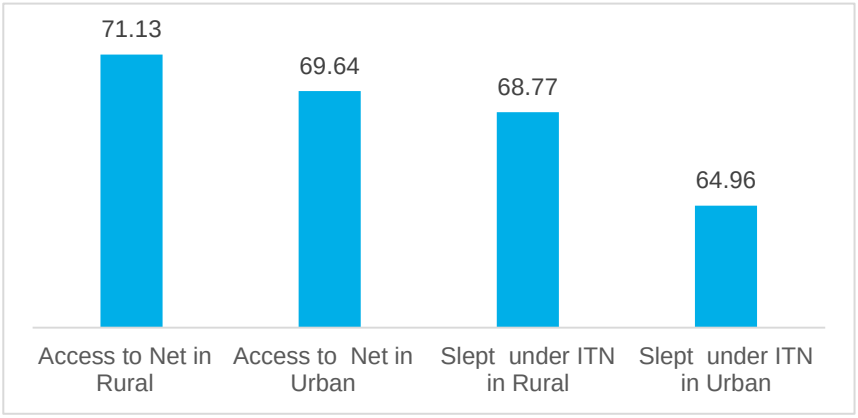
Access to an ITN is measured by the proportion of the population that could sleep under an ITN if each ITN in the household were used by up to two people. Comparing ITN access and ITN use indicators can help programs identify behavioral gaps. Such gaps indicate that available ITNs are not being used. If the difference between these indicators is substantial, the program may need to focus on behavior change and on how to

identify the main drivers of or barriers to ITN use to design appropriate interventions. These data help ITN programs determine whether they need to achieve higher ITN coverage, promote ITN use, or both.

Nationally, 71.1% of the de facto household population in South Sudan could sleep under an ITN if each ITN were used by up to two people **(Table 3.3)**. Sixty-seven percent of the population slept under an ITN the night before the survey **(Table 3.4)**. Thus, there is a difference of 5.5% percentage points between ITN access and ITN use at the population level **(Figure 3.4)**.

Figure 3.4 Access to and use of ITNs

Percentage of the household population with access to an ITN and percentage that slept under an ITN the night before the survey.



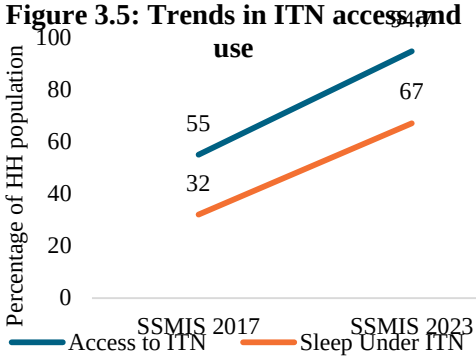
Among the population in households with at least one ITN, 67% slept under an ITN the night before the survey **(Table 3.5)**. Overall, 6 out of 10 (67%) of ITNs present in households were used the night before the survey **(Table 3.5)**.

***Trends*:** The percentage of the household population with access to an ITN increases from 55% in the 2017 SSMIS to 71.1% in the 2023 SSMIS, probably as a result of acceleration in efforts in malaria prevention. Conversely, the percentage of the household population that slept under an ITN the night before the survey increased from 32% in the 2017 SSMIS to 66.9% in the 2023 SSMIS, showing an increased awareness or a reduction of barriers to ITN use **(Figure 3.5)**.

***Patterns by background characteristics*:**

- While household population's access to ITNs is similar in rural 93.5% and urban areas 91.8%, use of ITNs is higher in rural areas as compared to urban areas 2.3% difference **(Figure 3.5)**.
- The percentage of household residents with access to an ITN is inversely correlated with household wealth; access ranges from 93 % among those in the fourth poorest wealth quintile to 91% among those in the highest quintile **(Table 3.3)**.

Figure 3.5: Trends in ITN access and use



- ITN access among the de facto population ranges from 94.2% in Abyei AA and Ruweng AA 97.04% and 99.9% in Unity state respectively. Similarly, the percentage of the household population that slept under an ITN the night before the survey is highest in Unity (99%) and lowest in Lakes (82.3%).
- There are only minimal differences in the use of existing ITNs according to household wealth **(Table 3.5)**.
- Use of existing ITNs is highest in Unity (above 99%) and lowest in Lakes (82.3%).

4.4. USE OF INSECTICIDE-TREATED NETS BY CHILDREN AND PREGNANT WOMEN

Malaria is endemic in South Sudan, and transmission occurs year-round. Pregnant women and children under age 5 are the populations most at risk. While ITN mass distribution campaigns target the general population, South Sudan also conducts routine distribution through ANC and immunization visits at the health facilities that target pregnant women and children under age 5.

4.5. INTERMITTENT PREVENTIVE TREATMENT OF MALARIA DURING PREGNANCY

Intermittent preventive treatment (IPTp) during pregnancy (IPTp3+)

Percentage of women who took at least three doses of sulfadoxine-pyrimethamine (SP)/Fansidar during their last pregnancy.

Sample: Women aged 15-49 with a live birth in the 2 years before the survey.

Malaria infection during pregnancy is a major public health problem in South Sudan, with substantial risks for the mother, her fetus, and the neonate. The World Health Organization (WHO) recommends a package of interventions for reducing the negative health effects associated with malaria in pregnancy: prompt diagnosis and treatment of confirmed infections, use of ITNs, and Intermittent Preventive Treatment of malaria in pregnancy (IPTp) (WHO 2014b).

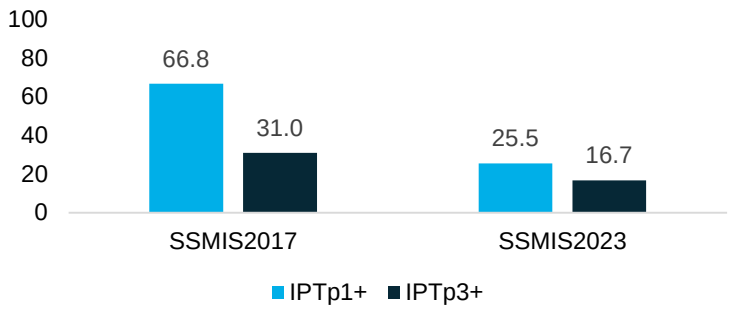
The 2023 SSMIS assessed IPTp usage during the pregnancy for the last birth in the 2 years preceding the survey among Women aged 15-49 years. IPTp is a full therapeutic course of antimalarial medicine given to pregnant women at routine antenatal care visits to prevent malaria. IPTp helps prevent maternal malaria episodes, maternal and fetal anemia, placental parasitemia, low birth weight, and neonatal mortality.

Sulfadoxine-pyrimethamine (SP), also known as Fansidar, is the recommended drug for IPTp in South Sudan. The Ministry of Health has been implementing IPTp, defined as provision of at least three doses of SP/Fansidar during routine antenatal care visits in the second and third trimesters of pregnancy (IPTp3+), for several years. The goal is to protect the mother and her child from malaria.

The NMCP adopted the 2012 WHO recommendation to administer one dose of SP/Fansidar at each ANC visit after the first trimester, with at least 1 month between doses (WHO 2012a; WHO 2012b). The household survey indicator used to measure coverage of this intervention is the percentage of women with a live birth in the 2 years preceding the survey who received three or more doses of SP/Fansidar (IPTp3+).

Figure 3.6 Trends in IPTp use by pregnant women

Percentage of women with a live birth in the 2 years before the survey who received at least 1, 2, or 3 doses of SP/Fansidar



Twenty six percent (25.5 percent) of women aged 15-149 with a live birth in the 2 years preceding the survey reported having taken one or more doses of SP/Fansidar; 22.1 percent reported taking two or more doses, and 16.7 percent reported taking three or more doses **(Table 3.9)**.

Trends: The differences between percentage of women aged 15-49 with a live birth in the last 2 years who received any IPTp1+ and IPTp3+ remained relatively low in 2023- there is a big decrease in the percentage of any IPTp, which dropped from 73% in the 2017 SSMIS to 31% in the 2023 SSMIS – signaling a decrease in compliance with the recommended three dosed of SP/ Fansidar during pregnancy. In fact, over the same time frame, the percentage of women with a live birth in the last 2 years who received IPTp3+ decrease by half from 31.0% to 16.7% in 2023 **(Figure 3.6)**.

Patterns by background characteristics:

- The percentage of women with a live birth in the 2 years preceding the survey who received one or more doses of SP/Fansidar is slightly higher in rural areas (24.4%) than in urban areas (25.8%) **(Table 3.9)**.
- About 41 percent (40.7%) percent of women in Jonglei and 39 percent (38.5%) in Western Equatoria received one or more doses of SP/Fansidar, as compared with 9.6 percent and 7.8 percent of women in Upper Nile and Unity States, respectively.

4.6.LIST OF TABLES

For detailed information on malaria prevention, see the following tables:

- **Table 3.1 Household possession of mosquito nets**
- **Table 3.2 Source of mosquito nets**
- **Table 3.3 Access to an insecticide-treated net (ITN), according to the household size**
- **Table 3.4 Access to an ITN, by background characteristics**
- **Table 3.5 Use of mosquito nets by persons in the household**
- **Table 3.6 Use of existing ITNs**
- **Table 3.6b Main reason mosquito net was not used the night before the survey**
- **Table 3.7 Use of mosquito nets by children**
- **Table 3.8 Use of mosquito nets by pregnant women**
- **Table 3.9 Use of intermittent preventive treatment (IPTp) by women during pregnancy**

Table 3.1 Household possession of mosquito nets

Percentage of households with at least one mosquito net (treated or untreated) and insecticide-treated net (ITN); average number of nets and ITNs per household; and percentage of households with at least one net and ITN per two persons who stayed in the household last night, according to background characteristics, South Sudan 2023

Background characteristic	Percentage of households with at least one mosquito net		Average number of nets per household		Number of households	Percentage of households with at least one mosquito net for every two persons who stayed in the household last night		Number of households with at least one person who stayed in the household last night
	Any mosquito net	Insecticide-treated mosquito net (ITN)[1]	Any mosquito net	Insecticide-treated mosquito net (ITN)[1]		Any mosquito net	Insecticide-treated mosquito net (ITN)[1]	
Residence								
Rural	71.82	61.34	3.60	3.20	3030	71.80	72.10	1105
Urban	73.12	65.25	4.00	3.60	808	57.10	57.20	4219
State								
Abyei AA	100.00	100.00	3.20	3.10	32	56.7	56.7	518
Central EQ	64.30	55.92	3.00	2.60	353	61.6	61.3	414
Eastern EQ	63.74	56.64	2.70	2.40	341	86.6	88.7	452
Jonglei	52.66	40.58	3.30	2.80	218	70.6	71.9	484
Lakes	76.52	74.56	4.20	3.90	391	65.2	65.1	523
Northen BG	98.09	60.61	4.20	4.10	513	60.2	59.0	548
Pibor AA	2.50	1.67	1.30	1.30	3	100.0	100.0	511
Ruweng AA	99.00	99.00	4.00	3.80	99	63.2	63.2	538
Unity	98.23	98.23	4.20	3.80	444	82.4	82.4	549
Upper Nile	82.63	70.66	2.90	2.90	428	77.7	74.9	535
Warrap	97.31	81.40	3.80	3.50	471	69.8	71.2	120
Western BG	72.63	70.62	3.60	3.20	398	48.8	48.5	100
Western EQ	27.32	20.26	2.30	2.10	147	69.6	66.7	32
Wealth quintile								
Lowest	74.19	62.27	3.5	3.1	753	75	75.9	1015
Second	73.80	63.24	3.8	3.3	797	70.3	71.6	1080
Middle	77.93	67.27	3.8	3.4	812	68.9	68.8	1042
Fourth	77.22	67.15	3.5	3.2	851	66.7	65.4	1102
Highest	57.60	50.97	3.8	3.4	625	62.2	62.3	1085
Total	**72.09**	**62.15**	**3.68**	**3.28**	**3838**	**68.8**	**68.9**	**5324**

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2023 SSMIS, this was known as a long-lasting insecticidal net (LLIN).

Note to survey managers: the second sentence in the footnote should reference the most recent, prior MIS. So, for example, it the current MIS was conducted in 2017 and the most recent prior one was in 2012, the second sentence of the footnote should read "In the 2017 MIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.2 Source of mosquito nets

Percent distribution of mosquito nets by source of net, according to background characteristics, South Sudan 2023

Background characteristic	Mass distribution campaign	ANC visit	Immunization visit	Government health facility	Private health facility	Pharmacy	Shop/ market	Community health worker	Religious institution	Other	Don't know	Total	Number of mosquito nets
Type of net													
ITN[1]	81.37	2.02	0.91	0.28	0.11	0.02	14.79	0.01	0.00	0.42	0.06	100	23,689
Other[2]	0.00	0.00	0.00	0.92	0.41	0.41	89.32	0.41	0.71	1.32	6.51	100	3,586
Residence													
Rural	79.75	1.69	0.77	1.08	0.37	0.04	63.74	0.10	0.16	1.77	0.69		4,914
Urban	71.27	2.85	1.28	0.11	0.06	0.04	5.88	0.01	0.00	0.12	0.23		18,775
State													
Abyei AA	7.80	0.00	5.37	0.00	0.00	0.00	86.83	0.00	0.00	0.00	0.00	100	205
Central EQ	74.34	3.30	0.78	0.54	0.06	0.00	20.26	0.12	0.06	0.18	0.36	100	1,668
Eastern EQ	91.61	0.32	0.32	0.05	0.00	0.00	6.61	0.00	0.38	0.54	0.16	100	1,860
Jonglei	53.57	9.24	4.28	0.45	0.90	0.00	29.23	0.08	0.00	1.58	0.68	100	1,331
Lakes	92.70	0.08	0.04	0.47	0.12	0.28	5.05	0.00	0.00	0.16	1.10	100	2,534
Northern BG	84.05	1.03	0.40	0.06	0.00	0.00	13.89	0.00	0.00	0.26	0.31	100	3,505
Pibor AA	0.00	0.00	27.27	0.00	0.00	0.00	0.00	0.00	0.00	36.36	36.36	100	11
Ruweng AA	95.79	0.00	4.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100	641
Unity	95.36	0.21	0.18	0.00	0.42	0.00	3.82	0.00	0.00	0.00	0.00	100	2,826
Upper Nile	29.11	6.87	1.98	1.42	0.00	0.08	59.48	0.16	0.00	0.85	0.04	100	2,473
Warrap	93.64	0.06	0.00	0.09	0.00	0.00	6.21	0.00	0.00	0.00	0.00	100	

													3,302
Western BG	88.82	0.91	0.21	0.21	0.04	0.00	8.56	0.00	0.00	1.16	0.08	100	2,406
Western EQ	26.97	3.88	1.73	0.00	0.00	0.00	65.05	0.00	0.00	0.97	1.40	100	927
Wealth quintile													
Lowest	83.18	1.25	1.04	0.23	0.10	0.00	13.16	0.00	0.15	0.69	0.19	100	4,786
Second	83.01	1.68	0.77	0.41	0.36	0.00	13.59	0.00	0.00	0.16	0.02	100	4,938
Middle	77.56	1.27	0.47	0.51	0.04	0.18	19.51	0.00	0.00	0.18	0.29	100	5,106
Fourth	78.38	2.16	1.23	0.16	0.06	0.00	16.96	0.04	0.00	0.57	0.44	100	5,052
Highest	65.04	3.7	0.87	0.21	0.03	0.00	28.42	0.13	0.03	0.79	0.79	100	3,807
Total													

ANC = Antenatal care

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the [YEAR DHS], this was known as a long-lasting insecticidal net (LLIN).

[2] Any net that is not an ITN

Table 3.3 Access to an insecticide-treated net (ITN)

Percent distribution of the de facto household population by number of ITNs the household owns, and percentage with access to an ITN, according to number of persons who stayed in the household the night before the survey, South Sudan 2023

	Number of persons who stayed in the household the night before the survey								
Number of ITNs[1]	1	2	3	4	5	6	7	8+	Total
0	7.69	4.62	5.91	2.80	2.33	3.69	2.99	5.54	4.17
1	92.31	51.08	26.77	11.97	7.43	5.58	2.99	2.24	6.54
2	0.00	44.31	41.90	43.07	30.04	14.37	13.69	7.55	18.11
3	0.00	0.00	25.25	26.74	33.27	35.00	26.48	16.50	24.37
4	0.00	0.00	0.18	15.28	14.63	23.62	27.15	24.25	20.88
5	0.00	0.00	0.00	0.00	12.30	9.95	12.73	18.98	12.72
6	0.00	0.00	0.00	0.09	0.00	7.79	4.28	10.15	5.89
7	0.00	0.00	0.00	0.05	0.00	0.00	9.68	14.78	7.31
Total	100	100	100	100	100	100	100	100	100
Number	52	325	1117	2180	3309	3709	3573	9314	23579
Total	128	614	1812	3512	4615	4908	4613	11583	31785
Percentage with access to an ITN[1,2]	**92.31**	**51.08**	**26.77**	**11.97**	**7.43**	**5.58**	**2.99**	**2.24**	**71.09**

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2023 MIS, this was known as a long-lasting insecticidal net (LLIN).

[2] Percentage of the de facto household population who could sleep under an ITN if each ITN in the household were used by up to two people

Table 3.4 Access to an ITN

Percentage of the de facto population with access to an ITN in the household, according to background characteristics, South Sudan 2023

Background characteristic	Percentage of the de facto population with access to an ITN[1]	Defacto Population
Residence		
Urban	92.8	6442
Rural	96.6	24681
State		
Abyei AA	100.00	205
Central EQ	90.47	2569
Eastern EQ	98.12	2828
Jonglei	91.81	2087
Lakes	97.79	3256
Northen BG	93.41	3557
Pibor AA	63.64	614
Ruweng AA	100.00	647
Unity	100.00	2903
Upper Nile	95.35	2891
Warrap	99.39	3399
Western BG	98.17	3081
Western EQ	77.35	3086
Wealth quintile		
Lowest	96.03	6314
Second	98.44	6312
Middle	96.04	6347
Fourth	95.21	6422
Highest	92.86	6390
Total	**95.85**	**31785**

[1] Percentage of de facto household population who could sleep under an ITN if each ITN in the household were used by up to two people

Table 3.5 Use of mosquito nets by persons in the household

Percentage of the de facto household population who slept the night before the survey under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN); and among the de facto household population in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, South Sudan 2023

	Household population			Household population in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of persons	Percentage who slept under an ITN[1] last night	Number of persons
Age					
<5	70.09	67.41	6771	93.68	4872
5-14	71.03	68.16	10108	93.96	7333
15-34	71.14	68.27	8011	93.62	5842
35-49	67.98	65.74	3292	92.88	2330
50+	74.06	70.42	2941	93.33	2219
Sex					
Male	70.54	67.86	14738	93.42	10705
Female	71.07	68.09	16385	93.83	11946
Residence					
Urban	69.64	64.96	6442	92.32	4533
Rural	71.13	68.77	24681	93.97	18063
State					
Abyei AA	94.15	94.15	205	94.15	205
Central EQ	58.27	53.13	2569	90.94	1501
Eastern EQ	54.56	53.78	2828	83.89	1813
Jonglei	62.34	57.40	2087	98.04	1222
Lakes	64.25	62.62	3256	82.52	2471
Northern BG	93.90	87.80	3557	95.39	3274
Pibor AA	1.14	1.14	614	100.00	7
Ruweng AA	96.14	96.14	647	97.04	641
Unity	97.31	97.31	2903	99.96	2826
Upper Nile	84.26	80.28	2891	98.43	2358
Warrap	92.82	92.23	3399	95.52	3282
Western BG	71.57	70.63	3081	95.44	2280
Western EQ	26.73	20.51	3086	88.41	716
Wealth quintile					
Lowest	70.62	67.90	6314	93.83	4569
Second	73.40	72.35	6312	94.28	4844
Middle	75.88	72.84	6347	94.68	4883
Fourth	72.91	69.51	6422	93.51	4774
Highest	54.01	50.34	6390	91.24	3526
Total					

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2023 MIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.6 Use of existing ITNs

Percentage of insecticide-treated nets (ITNs) that were used by anyone the night before the survey, according to background characteristics, South Sudan 2023

Background characteristic	Percentage of existing ITNs[1] used last night	Number of ITNs[1]
Residence		
Urban	91.78	4560
Rural	93.54	18146
State		
Abyei AA	94.15	205
Central EQ	90.46	1509
Eastern EQ	83.34	1825
Jonglei	98.04	1222
Lakes	82.28	2478
Northern BG	95.39	3274
Pibor AA	100.00	7
Ruweng AA	97.04	641
Unity	99.96	2826
Upper Nile	98.43	2358
Warrap	95.52	3282
Western BG	92.13	2362
Western EQ	88.28	717
Wealth quintile		
Lowest	93.28	4596
Second	93.95	4861
Middle	94.27	4904
Fourth	92.81	4810
Highest	91.00	3535
Total		

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2023 SSMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.7 Use of mosquito nets by children

Percentage of children under age 5 who, the night before the survey, slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN); and among children under age 5 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, South Sudan 2023 .

	Children under age 5 in all households			Children under age 5 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of children	Percentage who slept under an ITN[1] last night	Number of children
Age in months					
<12	73.02	69.59	367	92.86	350
12-23	74.11	71.93	972	94.57	940
24-35	70.21	67.50	1051	93.75	1008
36-47	71.41	68.38	992	92.63	950
48-59	70.44	68.35	1233	93.29	1192
					4440
Sex					
Female	71.13	68.66	2229	93.39	2149
Male	71.95	69.30	2386	93.58	2291
Residence					
Rural	71.82	69.56	3696	93.60	3579
Urban	70.44	66.69	919	93.03	861
State					
Abyei AA	97.96	97.96	49	97.96	49
Central EQ	65.86	61.70	412	93.93	379
Eastern EQ	59.97	59.50	460	84.22	450
Jonglei	58.14	54.52	229	98.60	214
Lakes	64.72	63.45	494	82.51	486
Northern BG	94.44	88.25	640	95.17	600
Pibor AA	0.00	*	*	*	*
Ruweng AA	99.23	99.23	129	100.00	129
Unity	99.71	99.71	346	100.00	346
Upper Nile	83.53	80.02	721	99.13	691
Warrap	93.55	92.89	594	95.25	590
Western BG	71.46	71.24	346	92.69	342
Western EQ	28.25	23.43	195	89.02	164
Wealth quintile					
Lowest	73.19	70.36	990	93.91	953
Second	75.06	74.21	940	94.17	926
Middle	76.68	73.54	960	94.03	922
Fourth	76.74	73.39	965	93.24	917
Highest	56.61	54.00	760	91.69	722
Total	**71.55**	**68.99**	**4615**	**93.49**	**4440**

Note: Table is based on children who stayed in the household the night before the interview.

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2023 MIS, this was known as a long-lasting insecticidal net (LLIN).

* No observations/data

Table 3.8 Use of mosquito nets by pregnant women

Percentage of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN); and among pregnant women age 15-49 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, South Sudan 2023

Background characteristic	Among pregnant women age 15-49 in all households: Percentage who slept under any mosquito net last night	Among pregnant women age 15-49 in all households: Percentage who slept under an ITN[1] last night	Among pregnant women age 15-49 in all households: Number of pregnant women	Among pregnant women age 15-49 in households with at least one ITN[1]: Percentage who slept under an ITN[1] last night	Among pregnant women age 15-49 in households with at least one ITN[1]: Number of pregnant women
Residence					
Urban	68.21	64.16	173	94.07	107
Rural	79.17	68.75	48	100.00	429
State					
Abyei AA	100.00	100.00	2	2	5
Central EQ	46.15	30.77	13	5	40
Eastern EQ	47.37	36.84	19	7	50
Jonglei	34.78	26.09	23	6	34
Lakes	54.17	54.17	24	18	56
Northern BG	92.31	76.92	13	10	55
Pibor AA	0.00	0.00	3		5
Ruweng AA	*		*	*	1
Unity	100.00	100.00	45	45	73
Upper Nile	76.74	76.74	43	33	75
Warrap	92.86	78.57	14	11	58
Western BG	84.62	84.62	13	12	45
Western EQ	44.44	22.22	9	2	39
Education	73.79	68.28	145	104	314
No education	64.71	61.76	68	44	182
Primary	80.00	40.00	5	2	34
Secondary	33.33	33.33	3	1	7
More than Secondary					
Wealth quintile					
Lowest	70.45	63.64	44	28	107
Second	69.77	65.12	43	32	87
Middle	74.36	71.79	39	30	109
Fourth	77.78	74.07	54	41	124
Highest	58.54	48.78	41	20	109
Total	**70.59**	**65.16**	**221**	**151**	**536**

Note: Table is based on women who stayed in the household the night before the interview.

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2023 MIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.9 Use of intermittent preventive treatment (IPTp) by women during pregnancy

Percentage of women aged 15-49 with a live birth in the 2 years preceding the survey who, during the pregnancy that resulted in the last live birth, received one or more doses of SP/Fansidar, received two or more doses of SP/Fansidar, and received three or more doses of SP/Fansidar, according to background characteristics, South Sudan 2023

Background characteristic	Percentage who	Percentage who	Percentage who	Number of women with a

	received one or more doses of SP/Fansidar[1]	received two or more doses of SP/Fansidar	received three or more doses of SP/Fansidar	live birth in the 2 years preceding the survey
Residence				
Rural	25.8	23.2	17.6	857
Urban	24.4	18.9	13.9	303
State				
Central EQ	38.4	34.1	26.0	180
Eastern EQ	16.8	14.2	10.2	79
Jonglei	40.7	36.2	23.7	72
Lakes	15.9	10.6	7.3	48
Northern BG	34.3	29.3	20.1	157
Unity	7.8	7.6	3.8	35
Upper Nile	9.6	7.4	4.6	62
Warrap	38.0	36.6	30.6	185
Western BG	26.0	25.0	23.6	130
Western EQ	38.5	36.6	32.4	119
Abyei AA	44.6	30.8	27.7	29
Pibor AA	0.0	0.0	0.0	0
Ruweng AA	67.4	30.5	0.0	64
Education				
No education	22.4	19.7	14.6	647
Primary	43.1	37.5	28.7	390
Secondary	20.1	16.7	13.5	114
More than Secondary	18.4	11.3	5.7	9
Wealth quintile				
Lowest	22.9	18.0	12.6	217
Second	22.4	20.0	14.7	201
Middle	22.8	19.0	14.9	218
Fourth	24.1	21.8	16.6	256
Highest	36.8	33.1	26.0	267
Total	**25.5**	**22.1**	**16.7**	**1159**

Note to survey managers: whether or not at least one dose of SP/Fansidar was received during an ANC visit is no longer part of the IPTp indicator.

5. MALARIA IN CHILDREN

Key Findings

- ***Fever prevalence*:** 57.5% of children under age 5 had a fever in the 2 weeks preceding the survey.
- **Care *seeking for fever:*** Advice or treatment was sought for 61% of children with a fever in the 2 weeks preceding the survey; 25% of children with a recent fever received timely care following fever onset.
- **Source of nets:** 81.1% of ITNs were obtained through the 2023 mass distribution campaign.
- ***Source of advice or treatment:*** Among children with a recent fever for whom care was sought, 46% received advice or treatment from a government hospital, 9% from a private hospital or clinic, less than 1% from a Shop.
- ***Testing:*** 24.6% of children with a recent fever had blood taken from a finger or heel for testing.
- ***Type of antimalarial drug used:*** Among children under age 5 with a recent fever who took antimalarial drug, 44.9% received artemisinin-based combination therapy (ACT).
- ***Anemia:*** 8% of children aged 6-59 months have a hemoglobin level below 8 g/dl.
- ***Malaria:***
    - 17.8% of children aged 6-59 months tested positive for malaria with microscopy.
    - *52.6% of children aged 6-59 months tested positive for malaria antigens using RDTs.*

This chapter presents data useful for assessing how well fever management strategies are being implemented. Specific topics include care seeking for febrile children, diagnostic testing of children with fever, and therapeutic use of antimalarial drugs. The prevalence of anemia and malaria among children aged 6-59 months is also assessed.

5.1. CHILDREN WITH FEVER

Fever is a key symptom of malaria and other acute infections in children and an important entry point into case management for malaria. Malaria fevers require prompt and effective treatment to prevent malaria morbidity and mortality. Fifty-six percent of children under age 5 had a fever in the 2 weeks preceding the survey. Advice or treatment was sought for 59% of the children with fever in the 2 weeks preceding the survey, and timely care seeking (the same or next day following fever onset) occurred for 25% of the febrile children (**Table 4.1**).

Patterns by background characteristics

Care-seeking is higher for urban children (59.7%) than for rural children (55.4%). Fever prevalence was slightly higher among boys (58%) compared to girls (54.2%). Timely care (the same day or next day) was sought for 26% of boys and 23.5% of girls.

Mothers in the higher wealth quintiles were more likely to report recent fever among children under five with (57%-66%) whereas prevalence was similar across the lower wealth quintiles (52%)

The percentage of children aged 6 to 59 months for whom advice or treatment was sought the same day or the next day is 25%. Children from households in higher wealth quintiles are more likely to receive advice or care. While care is sought for 57% of children in the lowest wealth quintile, care is sought for 68% of children in the highest quintile.

Trends: Care seeking dropped from 78% in the SSMIS 2017 to 61% in 2023 while timely care seeking remained the same (24%)

Table 4.1 Prevalence, diagnosis, and prompt treatment of children with fever

Percentage of children under age 5 with fever in the 2 weeks preceding the survey; and among children under age 5 with fever, percentage for whom advice or treatment was sought, percentage for whom advice or treatment was sought the same or next day following the onset of fever, and percentage who had blood taken from a finger or heel for testing, according to background characteristics, South Sudan 2023

	Children under age 5		Children under age 5 with fever			
Background characteristic	Percentage with fever in the 2 weeks preceding the survey	Number of children	Percentage for whom advice or treatment was sought[1]	Percentage for whom advice or treatment was sought the same or next day[1]	Percentage who had blood taken from a finger or heel for testing	Number of children
Age in months						
<12	52.3%	618	54.9%	21.8%	18.1%	323
12-23	64.2%	707	67.9%	30.6%	27.9%	454
24-35	56.6%	822	58.6%	26.2%	23.7%	465
36-47	55.3%	752	58.0%	22.5%	20.6%	416
48-59	52.9%	834	56.0%	23.1%	20.6%	441
Sex						
Male	58.0%	2018	60.3%	26.0%	23.3%	1170
Female	54.2%	1715	57.6%	23.5%	21.0%	929
Residence						
Urban	59.7%	709	64.0%	30.7%	28.3%	423
Rural	55.4%	3024	57.9%	23.5%	20.8%	1676
State						
Upper Nile	23.2%	514	27.6%	9.1%	8.6%	44
Jonglei	60.2%	216	64.4%	26.9%	24.5%	53
Unity	62.3%	114	62.3%	21.9%	19.3%	22
Warrap	60.4%	571	61.5%	33.5%	29.6%	169
Northern B.G.	60.0%	535	61.1%	22.4%	19.1%	102
Western B.G.	73.2%	325	78.5%	18.8%	18.8%	61
Lakes	64.3%	199	64.3%	36.7%	32.2%	64
Western E.Q.	79.3%	352	79.3%	12.5%	9.7%	34
Central E.Q.	66.2%	420	67.1%	42.1%	37.4%	157
Eastern E.Q.	21.4%	304	34.5%	11.5%	10.9%	33
Pibor AA		19				85
Ruweng AA	92.4%	92	92.4%	90.2%	88.0%	81
Abyei AA	55.6%	72	55.6%	19.4%	15.3%	11
Mother's education						
No education	47.5%	40	47.5%	22.5%	17.5%	19
Primary	61.2%	1060	64.3%	28.5%	25.2%	649
Secondary	57.0%	305	58.7%	27.5%	24.6%	174
More than secondary	55.6%	27	63.0%	11.1%	11.1%	15
Wealth quintile						
Lowest	52.1%	701	57.1%	24.7%	22.0%	154
Second	52.9%	763	55.2%	25.8%	24.8%	189
Middle	52.7%	710	56.5%	27.5%	24.5%	174
Fourth	56.9%	786	58.3%	23.5%	20.9%	164
Highest	65.8%	773	67.8%	23.0%	19.4%	150
Total	**56.2%**	**3733**	**59.0%**	**24.9%**	**22.3%**	**2099**

5.2. CARE SEEKING FOR FEVER IN CHILDREN

One of the targets set forth in the National Malaria Strategic Plan 2021-2025 (Objective 2) is that, by 2025, 80% of caregivers and/or mothers of children under age 5 will be familiar with malaria prevention signs and symptoms and take appropriate actions. The 2023 SSMIS results show that advice or treatment was sought for 61% of children with a fever. Twenty-five percent of children with a recent fever received timely care (advice or treatment was sought the same or next day) following fever onset (**Table 4.1**).

Patterns by background characteristics

Care-seeking is higher for urban children (60%) than for rural children (55%). There are differences observed between fever prevalence or care seeking by sex (58 % male children and 54% female children respectively). Timely care (the same day or next day) was sought for 26% of male children and 23.5% of female children.

The percentage of children aged 6 to 59 months for whom advice or treatment was sought the same day or the next day is 24.8%. Children from households in higher wealth quintiles are more likely to receive advice or care and to receive it quickly. While care is sought for 66% of children in the highest wealth quintile, care is sought for 57% of children in the second quintile. Timely care was sought for 23% of children in the highest wealth quintile and 27.5% of children in the middle quintile.

***Trends*:** Care seeking increased substantially between 2017 and 2023. The percentage of children with fever in the two weeks preceding the survey was 42% in 2017 and 57.5% in 2023. The percentage for whom advice or treatment was sought decreased from 78% in 2017 to 61% in 2023.

5.3. DIAGNOSTIC TESTING OF CHILDREN WITH FEVER

Diagnosis of malaria in children under 5 with a fever

The percentage of children under age 5 with a fever in the 2 weeks before the survey who had blood taken from a finger or heel for testing. This is a proxy measure of diagnostic testing for malaria.

Sample: Children under age 5 with a fever in the 2 weeks before the survey.

The South Sudan Technical Guidelines for Malaria Case Management and Malaria in Pregnancy recommend confirmation of malaria by microscopy or rapid diagnostic testing for all persons with a fever above 37.5°C or a history of fever in the previous 2 days along with one or more malaria signs and symptoms.

In the 2023 SSMIS, all eligible children under age 5 had blood taken from a finger or heel for testing, presumably for malaria testing (**Table 4.1**). Among children with fever for whom blood was taken from a finger or heel for testing.

Patterns by background characteristics:

In the 2023 SSMIS, 24.6% of children under age 5 with fever had blood taken from a finger or heel for testing. Sixty percent (60%) of urban febrile children had blood taken from a finger or heel for testing compared to 55% from rural areas. Similarly, children from the highest wealth quintile are more likely (66%) to have blood taken for testing than children from the lowest wealth quintile (52%).

***Trends*:** The percentage of children who had blood taken from a finger or heel for testing decreased from 48% in the 2017 SSMIS to 24.6% in 2023 SSMIS. This shows that there is reduction in testing malaria among children whom blood was taken.

The percentage of children under age 5 with recent fever who had blood taken from a finger or heel for testing was higher in Ruweng Administrative Area (RAA) with 88%, Central Equatoria 37.4%, Lakes 32.2% and lowest percentage in Western Equatoria with 9.7% and 8.6% in Upper Nile State.

Table 4.2 Source of advice or treatment for children with fever

Percentage of children under age 5 with fever in the 2 weeks preceding the survey for whom advice or treatment was sought from specific sources; and among children under age 5 with fever in the 2 weeks preceding the survey for whom advice or treatment was sought, the percentage for whom advice or treatment was sought from specific sources, South Sudan 2023

	Percentage for whom advice or treatment was sought from each source:	
Source	Among children with fever	Among children with fever for whom advice or treatment was sought
Public sector		
Government hospital	46.2	53.4
Government health care center	22.4	25.9
Government health care unit	27.3	31.5
Mobile Clinic	8.0	9.3
Fieldworker/BHW	2.2	2.5
Other public sector	1.1	1.3
Private medical sector		
Private hospital/clinic	9.0	10.4
Pharmacy	3.4	3.9
Private doctor	1.9	2.3
Mobile Clinic	0.6	0.7
Fieldworker/CHW	0.2	0.2
Other private medical sector	0.1	0.1
Other private sector		
Shop	0.9	1.1
Traditional practitioner	0.1	0.1
Market	0.0	0.0
Itinerant drug seller	0.0	0.0
Other	0.0	0.0
Number of children	1437	1244

Note : *CHW = Community health worker*

5.4. USE OF RECOMMENDED ANTIMALARIALS

Artemisinin-based combination therapy (ACT) for children under age 5 with a fever

Percentage of children aged 6 to 59 months with a fever in the 2 weeks before the survey who took artemisinin-based combination therapy (ACT).

Sample: Children aged 6 to 59 months with a fever in the 2 weeks before the survey who took any antimalarial drug.

Artemisinin-based combination therapy (ACT) is the recommended first-line antimalarial drug for the treatment of uncomplicated malaria in South Sudan. Among children who took any antimalarial, 44.9% received ACT, 17.6% received amodiaquine, 3% received artesunate injection (**Table 4.3**).

Background Information for Interpretation of Trends

WHO recommends artemisinin-based combination therapy for the treatment of uncomplicated malaria caused by the *Plasmodium falciparum* parasite. In sub-Saharan Africa, the two most frequently recommended types of ACT are the drug combinations artesunate/amodiaquine (ASAQ) and artemether/lumefantrine (AL) (WHO 2015b).

In 2018, South Sudan adopted ASAQ as the first-line treatment of uncomplicated malaria, with AL as the alternative treatment. The results of the ongoing 2023 Therapeutic Efficacy Study may reveal the level of resistance to antimalarial drugs across the country.

As part of the 2023 SSMIS, women who recently sought care for their child's fever were asked "What drugs did (your child) take?" The purpose of this question is to assess if the antimalarial treatment received by children under age 5 is in accordance with national malaria treatment policies.

However, it is not always possible to accurately distinguish types of antimalarial drugs from respondents' recall during fieldwork. To ensure the highest possible data quality during fieldwork, interviewers were given images of common antimalarial drugs to show to respondents or interviewers asked respondents to see the drug packaging to ensure that the correct drug was documented in the questionnaire.

In South Sudan, ASAQ is colloquially referred to as "Artesunate + amodiaquine," while AL is colloquially referred to as "artemether + lumefantrine," making it difficult to distinguish use of the single drug and the combination therapies. Interviewers were aware of this distinction and were required to probe when respondents mentioned amodiaquine or artemether. Follow-up questions were also built into the questionnaire to ensure that this probing was carried out by the interviewer.

Patterns by background characteristics:

Use of ACTs generally increased from the youngest groups (6-8 months old 26%) to older groups (48-59 months old 56% use).

Access to ACTs was higher among rural households (48%) compared to urban areas (34%) with no difference in ACTs use among male and female children (45%).

ACTs use was highest among children with mothers with primary education (41%) and those in the second quintile (54%). This might reflect the availability of ACTs in the lowest healthcare center, primary healthcare units. There was differential access to ACTs depending on statistical area: ACTs use

was highest in Warrap (67%) and Unity (62%) and lowest in Lakes (17%) and Western Bahr el Ghazal (26%).

***Trends*:** The percentage of children receiving any ACT decreased from 61% in SSMIS 2017 to 44.9% in SSMIS2023. This is attributable to both decreased care-seeking, and a low likelihood that children for whom care is sought will receive an ACT.

Table 4.3 Type of antimalarial drugs used

Among children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication, percentage who took specific antimalarial drugs, according to background characteristics, South Sudan 2023

	Percentage of children who took:									Number of children with fever who took any antimalarial drug
Background characteristic	Any ACT	SP/ Fansidar	Artesunate injection/IV	Amodiaquine	. Quinine	Quinine injection/IV	Artesunate rectal	Chloroquine	Other anti-malarial	
Age in months										
<6	26.4%	0.8%	2.5%	13.2%	2.5%		2.5%		98.3%	121
6-11	33.7%	2.9%	2.4%	18.0%	3.9%		3.9%		99.0%	205
12-23	42.8%	1.6%	2.3%	20.1%	2.1%		2.6%		97.9%	383
24-35	47.6%	1.0%	2.0%	19.7%	3.0%		2.0%		100.0%	395
36-47	45.1%	3.1%	4.3%	17.0%	1.5%		2.2%		97.5%	324
48-59	55.8%	2.4%	3.1%	15.2%	1.8%		1.8%		99.2%	382
Sex										
Male	44.5%	2.0%	1.8%	18.8%	2.3%		2.9%		98.6%	1006
Female	45.3%	2.0%	4.1%	16.4%	2.5%		1.7%		98.9%	804
Residence										
Urban	34.3%	4.3%	9.0%	22.8%	5.5%		5.8%		98.3%	400
Rural	47.9%	1.3%	1.1%	16.3%	1.5%		1.4%		98.9%	1410
State										
Upper Nile	55.4%	4.8%	6.0%	9.6%	1.2%		1.2%		100.0%	83
Jonglei		2.4%	3.2%	48.0%	0.8%		6.4%		99.2%	125
Unity	62.1%	*	*	6.1%	*		7.6%		100.0%	66
Warrap	67.3%	0.6%	*	12.9%	0.6%				99.7%	333
Northern B.G.	55.4%	*	1.8%	1.3%	*		0.9%		95.5%	224
Western B.G.	26.2%	7.7%	7.7%	26.2%	10.9%		8.6%		99.1%	221
Lakes	16.5%	*	*	10.6%	2.4%				100.0%	85
Western E.Q.	42.7%	0.4%	0.8%	22.4%	*		2.0%		98.4%	255
Central E.Q.	59.5%	2.4%	3.6%	11.1%	5.2%		0.8%		98.4%	252
Eastern E.Q.	47.9%	4.2%	*	27.1%	*		*		97.9%	48
Pibor AA	*	*	*	43.5%	*		*		100.0%	85
Ruweng AA	1.2%	1.2%	11.8%	3.0%	*		*		100.0%	33
Abyei AA	66.7%						3.0%			
Mother's										

education								
No education	31.6%	*	21.1%	31.6%	*		100.0%	19
Primary	41.2%	1.7%	2.4%	19.6%	*	2.5%	98.5%	592
Secondary	31.8%	3.4%	5.4%	18.2%	2.2%	6.8%	98.6%	148
More than secondary	20.0%	20.0%	33.3%	20.0%	8.8%	6.7%	100.0%	15
Wealth quintile								
Lowest	44.9%	1.9%	2.9%	16.9%	*	0.6%	99.0%	314
Second	54.1%	0.3%	1.9%	12.7%	*	0.3%	98.1%	314
Middle	45.1%	2.8%	4.3%	14.2%	1.6%	2.8%	99.7%	324
Fourth	41.3%	2.8%	2.1%	19.0%	0.3%	3.8%	98.7%	390
Highest	41.5%	1.9%	3.0%	23.1%	*	3.4%	98.3%	468
Total	38.7%	1.7%	2.4%	15.3%	2.0%	2.0%	85.1%	1810

ACT = Artemisinin-based combination therapy

5.5. PREVALENCE OF LOW HEMOGLOBIN LEVELS IN CHILDREN

Prevalence of low hemoglobin in children

The percentage of children aged 6-59 months who had a hemoglobin measurement of less than 8 grams per deciliter (g/dl) of blood. The cutoff of 8 g/dl is often used to classify malaria-related anemia.

Sample: Children aged 6-59 months.

Anemia, defined as a reduced level of hemoglobin in the blood, decreases the amount of oxygen reaching the tissues and organs of the body and reduces their capacity to function. Anemia is associated with impaired motor and cognitive development in children. The main causes of anemia in children are malaria and inadequate intake of iron, folate, vitamin B12, and other nutrients. Other causes of anemia include intestinal worms, hemoglobinopathy, and sickle cell disease. Although anemia is not specific to malaria, trends in anemia prevalence can reflect malaria morbidity, and they respond to changes in the coverage of malaria interventions.

However, RBM 2003 revealed malaria interventions associated with a 60% reduction in the risk of anaemia using a cut-off of 8 g/dl. A hemoglobin level below 8.0 g/dl is classified as severe anemia.

Patterns by background characteristics:

During the 2023 SSMIS, consent was obtained from the mothers or caregivers and testing for anemia was conducted among almost all (99%) eligible children aged 6-59 months from the interviewed households **Table 4.4**.

Whereas **Table 4.5** shows the overall national percentage of children aged 6-59 months classified as having a low hemoglobin level (less than 8.0g/dl) was eight percent (8%). Anaemia has higher prevalent in SSMIS 2023 in rural children (8.8%) than in urban children (6.2%).

Mother's educational level, those with no education their children had the highest anaemia 20%, followed by primary 6.6% and lowest in secondary 4.9%. It differs slightly by wealth quintile with 7.1% in the highest, in the middle 9.9%, and in the lowest 8.7% **Table 4.5**. By statistical area, anaemia ranged from 38.6% in Pibor AA, 15.2% in Warrap to 3.5% in Ruweng AA and 3.1% in Northern Bahr el-Ghazal.

Trends: The percentage of children with severe anaemia slightly increased between 2017 and 2023. In the 2017 SSMIS a threshold of 7.0 g/dl was used for severe anaemia, and 7% of children were below that threshold. In the

2023 SSMIS, with a more severe cut-off of 8.0 dg/dl, anaemia prevalence stood at 8%. In SSMIS2017 anaemia was higher in urban children with 10% than rural 6% as opposed to SSMIS2023

Percentage of eligible children aged 6-59 months who were tested for anemia and for malaria, by background characteristics (unweighted), South Sudan 2023

	Percentage tested for:			
Background characteristic	Anaemia	Malaria with RDT	Malaria by microscopy	Number of children
Age in months				
6-8	99.3	1	1	141
9-11	99.5	1	1	193
12-17	100	1	1	431
18-23	99.8	1	1	500
24-35	99.3	1	1	1018
36-47	99.8	1	1	942
48-59	99.5	1	1	1198
Sex				
Male	99.5	1	1	1382
Female	99.7	1	1	1167
Mother's interview status				
Interviewed	*interview status only indicates completed			
Not interviewed, but in household				
Not interviewed, and not in household[1]				
Residence				
Urban	100.0	1	1	841
Rural	99.5	1	1	3582
State				
Upper Nile	100	1	1	595
Jonglei	96.4	1	1	332
Unity	99.6	1	1	267
Warrap	99.8	1	1	427
Northern B.G.	100	1	1	541
Western B.G.	100	1	1	289
Lakes	100	1	1	490
Western E.Q.	99.5	1	1	418
Central E.Q.	99.7	1	1	352
Eastern E.Q.	99.8	1	1	517
Pibor AA	100	1	1	44
Ruweng AA	100	1	1	113
Abyei AA	100	1	1	38
Mother's education[2]				
No education	100	1	1	25
Primary	100	1	1	714
Secondary	100	1	1	206
More than secondary	100	1	1	24

Wealth quintile				
Lowest	99.9	1	1	965
Second	99.1	1	1	874
Middle	99.5	1	1	865
Fourth	99.9	1	1	844
Highest	99.5	1	1	875
Total	**99.6**	**1**	**1**	**4423**

RDT = Rapid Diagnostic Test ([INSERT NAME OF RDT USED])

[1] Includes children whose mothers are deceased

[2] For women who are not interviewed, information on education is taken from the Household Questionnaire. Excludes children whose mothers are not listed in the Household Questionnaire.

Table 4.5 Hemoglobin <8.0 g/dl in children

Percentage of children age 6-59 months with hemoglobin lower than 8.0 g/dl, according to background characteristics, South Sudan 2023

Background characteristic	Hemoglobin <8.0 g/dl	Number of children
Age in months		
6-8	9.9%	141
9-11	6.7%	193
12-17	12.1%	431
18-23	9.6%	500
24-35	11.3%	1018
36-47	8.1%	942
48-59	4.3%	1198
Sex		
Male	8.5%	1382
Female	7.1%	1167
Mother's interview status		
Interviewed	**Status indicated completed**	
Not interviewed, but in household		
Not interviewed, and not in household[1]		
Residence		
Urban	6.2%	841
Rural	8.8%	3582
State		
Upper Nile	11.1%	595
Jonglei	5.7%	332
Unity	6.4%	267
Warrap	15.2%	427
Northern B.G.	3.1%	541
Western B.G.	4.8%	289
Lakes	13.9%	490

Western E.Q.	8.6%	418
Central E.Q.	4.3%	352
Eastern E.Q.	5.4%	517
Pibor AA	38.6%	44
Ruweng AA	3.5%	113
Abyei AA	7.9%	38
Mother's education[2]		
No education	20.0%	25
Primary	6.6%	714
Secondary	4.9%	206
More than secondary	*	*
Wealth quintile		
Lowest	8.7%	965
Second	8.9%	874
Middle	9.9%	865
Fourth	7.0%	844
Highest	7.1%	875
Total	8.3%	4423

Note: Table is based on children who stayed in the household the night before the interview. Hemoglobin levels are adjusted for altitude using CDC formulas (CDC, 1998). Hemoglobin is measured in grams per deciliter (g/dl).

[1] Includes children whose mothers are deceased

[2] For women who are not interviewed, information on education is taken from the Household Questionnaire. Excludes children whose mothers are not listed in the Household Questionnaire.

5.6. PREVALENCE OF MALARIA IN CHILDREN

Malaria prevalence in children

Percentage of children aged 6-59 months classified as infected with malaria according to RDT and microscopy results.

Sample: Children aged 6-59 months.

In South Sudan, malaria transmission is high throughout the year, contributing to development of partial immunity within the first 2 years of life. However, many people, including children, may have malaria parasites in their blood without showing any signs of infection. Such asymptomatic infection not only contributes to further transmission of malaria but also increases the risk of anaemia and other associated morbidity among the infected individuals

The 2023 SSMIS was conducted from October through November 2023 at the peak of the malaria transmission season. Normally, a spike in malaria cases occurs during these months. Previous surveys that incorporated malaria testing included the 2009 SSMIS, 2013 SSMIS, and 2017 SSMIS.

All children aged 6-59 months were tested for malaria using RDTs and microscopy. Among eligible children aged 6-59 months from interviewed households, 100% were tested for malaria with a rapid diagnostic test (RDT) and 100% were tested by microscopy (**Table 4.4**). (See Chapter 1 for details on malaria testing procedures.)

In the 2023 SSMIS, 17.8% of children aged 6-59 months were positive for malaria parasites according to microscopy results. RDTs were performed in conjunction with microscopy to facilitate treatment of infected children during survey fieldwork. 52.6% of children aged 6-59 months tested positive for malaria antigens using RDTs (Table 4.6).

Patterns by background characteristics:

Malaria prevalence by RDT generally increased from the youngest groups (6-8 months old have 33% prevalence) to older groups (48-59 months old have 60% prevalence). A similar trend is observed with malaria prevalence according to microscopy, increase from the youngest group (6-8 months old have 11% prevalence) to older groups (48-59 months old have 20% prevalence).

The prevalence of malaria according to RDT does not vary substantially by sex, with 53% prevalence for both male and female children 6-59 months, and prevalence by microscopy being 19% and 17% for male vs female children.

Malaria prevalence is higher among rural children, who have 55% prevalence by RDT, compared to

40% prevalence for urban children 6-59 months, while by microscopy 18% of children and 14% comparing urban vs rural areas.

Malaria prevalence varied substantially between statistical areas, with Warrap and Western Equatoria (both 77%) and Lakes (64%) having the highest prevalence, compared to Unity (23%) and Western Bahr el Ghazal (32%). Malaria prevalence by microscopy was generally substantially lower than prevalence from RDTs for each statistical area.

Children born to mothers with no education have a high malaria prevalence at 64% while children born of mothers with secondary education had prevalence of 44%.

***Trends*:** The prevalence of malaria in children aged 6-59 months RDT positive increased drastically from
32% in 2017 to 52.6% (53%). The general patterns of differing malaria prevalence by urban vs. rural residence increased between 2017 and 2023. In SSMIS2017 in rural children the prevalence was 32% by RDT and 25% prevalence for urban children 6-59 months. While, in SSMIS2023 the prevalence among rural children 55% by RDTs and 40% in urban children 5-59 months by microscopy respectively.

Table 4.6: Prevalence of malaria in children

Percentage of children aged 6-59 months classified **in two tests** as having malaria, by background characteristics, South Sudan 2023

	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
Background characteristic	RDT positive	Number of children	Microscopy positive	Number of children
Age in months				
6-8	33.3	141	11.3	141
9-11	25.4	193	13.5	193
12-17	42.9	431	15.5	431
18-23	43	500	13.4	500
24-35	51.6	1018	17.9	1018
36-47	57.7	942	18.8	942
48-59	59.7	1198	19.6	1198
Sex				
Male	52.9	1382	18.5	1382
Female	52.4	1167	17.1	1167
Mother's interview status				
Interviewed				
Not interviewed, but in household				
Not interviewed, and not in household[1]				
Residence				
Urban	38.5	841	13.8	841
Rural	54.6	3582	18.3	3582
State				
Upper Nile	36.3	595	13.6	595
Jonglei	54.8	332	18.4	332
Unity	22.5	267	9.7	267
Warrap	77.5	427	24.8	427
Northern B.G.	49.9	541	12.8	541
Western B.G.	31.5	289	11.4	289
Lakes	64.1	490	19	490
Western E.Q.	77	418	25.4	418
Central E.Q.	41.2	352	10.8	352
Eastern E.Q.	51.5	517	23	517

Pibor AA	27.3	44	13.6	44
Ruweng AA	54	113	25.7	113
Abyei AA	26.3	38	7.9	38
Education[2]				
No education	64	25	8	25
Primary	51.8	714	17.4	714
Secondary	43.7	206	16.5	206
More than secondary	4.2	24	0	
Wealth quintile				
Lowest	49.5	965	17.3	965
Second	52.6	874	18.1	874
Middle	47.3	865	16.1	865
Fourth	48.2	844	15.4	844
Highest	60.1	875	20.1	875
Total	51.5	4423	17.4	4423

RDT = Rapid Diagnostic Test

[1] Includes children whose mothers are deceased

[2] For women who are not interviewed, information on education is taken from the Household Questionnaire. Excludes children whose mothers are not listed in the Household Questionnaire.

6. EXPOSURE TO MALARIA MESSAGES

This chapter assesses the extent to which malaria communication messages reach Women aged 15-49 and the channels through which women receive such messages. The chapter also presents data on the acceptability of malaria prevention interventions.

Key Findings

Media exposure to malaria messages: 37.1 percent of interviewed women reported seeing or hearing a message about malaria in the 6 months preceding the survey. When asked about the sources of malaria messages seen or heard in the past 6 months, 25.8 percent mentioned community health workers, 26.4 percent mentioned health facilities, 2.5 percent mentioned community events and 2.5 percent mentioned radio.

Knowledge of ways to avoid malaria: 84 percent of women stated that there are ways to avoid getting malaria. Among those who said there are ways to avoid getting malaria, 77.2% cited sleeping under a mosquito net or ITN. Other commonly cited measures included use of mosquito repellants (20.4%), taking preventive medication (18.4%), and keeping one's surroundings clean by cutting grass around the house and burning leaves (16%).

6.1. EXPOSURE TO MALARIA MESSAGES

Exposure to communication messages: Percentage of Women aged 15-49 who recall seeing or hearing a message about malaria through various sources in the last 6 months

Sample: Women aged 15-49.

Social behavior change (SBC) is key to the uptake of malaria control interventions. The Ministry of Health and the National Malaria Control Programme (NMCP) have outlined SBC approaches that focus on critical areas of malaria prevention and treatment. As part of the National Strategic Plan 2021-2025, the NMCP seeks to engage in advocacy and resource mobilization, promote prevention by strengthening information education campaigns and behavior change communication, establish social media platforms to increase awareness regarding malaria prevention and control, and strengthen and sustain community engagement to promote effective health-seeking behavior among the population.

Information exposure plays a critical role in behavioral changes that will help increase malaria prevention knowledge and practices. To assess the coverage of malaria messages, Women aged 15-49 were asked if they had seen or heard any messages about malaria prevention in the 6 months preceding the survey.

In the general population, 37.1 percent (46% in 2017 SSMIS) of interviewed women reported seeing or hearing a message about malaria in the 6 months preceding the survey **(Table 3.10).** When asked about the source of malaria messages seen or heard in the past 6 months, 25.8 percent (39% in 2017 SSMIS) mentioned community health workers, 26.4 percent (27% in 2017 SSMIS) mentioned health facilities, 2.5 percent (24% in 2017 SSMIS) mentioned community events and 2.5 percent (20% in 2017 SMISS) mentioned radio. Exposure to messages about malaria was higher in urban areas estimated at 58 percent (48% in 2017 SSMIS) compared to rural estimated at 32.4 percent (45% in 2017 SSMIS) areas. Exposure to malaria messages differed by statistical area, ranging from 18.7 percent Lakes to 58 percent in Jonglei statistical areas. In the 2017 SSMIS, exposure to malaria messages ranged from 20% in Upper Nile to 76 in Western Equatoria statistical area.

Table 3.10 Media exposure to malaria messages

Percentage of women aged 15-49 who have seen or heard a message about malaria in the past 6 months through specific sources of media, by background characteristics, South Sudan 2023

Background characteristic	TV	Radio	Health Worker	Health Facility	Community event	Poster	Any Source	Number of women
Age								
15-19	1.1	2.3	22.5	24.0	4.1	1.2	33.9	300
20-24	1.3	3.5	25.3	27.1	2.9	1.8	37.2	472
25-29	1.1	2.4	28.5	28.7	1.2	1.7	39.5	445
30-34	1.1	2.6	26.1	28.0	2.4	2.1	37.2	332
35-39	0.4	1.9	27.4	25.9	2.2	1.3	39.1	308
40-44	1.5	1.9	24.5	22.0	2.1	2.3	34.8	163
45-49	0.9	2.5	24.9	24.9	1.8	1.5	35.3	115
Residence								
Rural	0.3	1.2	25.4	25.0	1.7	1.1	36.5	1518
Urban	2.9	5.8	25.7	28.3	4.2	3.2	36.7	617
State								
Central EQ	0.3	2.4	14.2	16.9	2.0	0.5	28.3	167
Eastern EQ	0.5	0.8	45.8	42.8	4.0	2.1	54.7	344
Jonglei	0.0	1.5	32.3	49.6	1.9	1.1	57.5	153
Lakes	0.2	0.7	14.1	11.4	1.5	1.0	18.7	77
Northern BG	0.2	4.3	16.9	10.5	0.8	0.6	28.5	177
Unity	0.0	0.2	21.8	29.4	0.2	0.0	36.6	188
Upper Nile	0.4	0.5	15.6	12.4	2.2	0.7	21.7	165
Warrap	0.0	1.4	28.5	39.7	1.1	0.5	48.3	304
Western BG	0.7	3.5	25.9	28.4	3.8	2.8	35.7	215
Western EQ	0.0	2.3	41.6	21.8	4.7	2.3	48.1	185
Abyei AA	0.0	2.2	13.3	31.1	0.0	1.1	33.3	30
Pibor AA	0.0	0.0	2.5	2.5	0.0	0.0	4.2	5
Ruweng AA	36.4	35.6	93.9	92.4	16.7	27.3	94.7	125
Education								
No education	1.2	1.9	25.3	25.9	1.7	1.5	35.4	1218

Primary	0.8	3.0	29.3	29.9	3.2	1.6	43.5	600
Secondary	0.8	4.0	21.4	21.3	4.1	2.6	31.7	280
Higher	0.8	3.4	19.3	20.2	3.4	0.0	31.1	37
Wealth quintile								
Lowest	3.5	4.1	29.8	31.0	4.0	4.0	39.3	464
Second	0.7	1.6	21.2	22.3	1.4	0.7	31.9	344
Middle	0.2	1.7	20.8	20.3	1.8	0.6	29.4	362
Fourth	0.4	2.2	25.1	27.8	1.9	1.6	37.3	521
Highest	0.4	3.1	31.5	28.7	3.2	1.4	47.0	444
Total	**1.1**	**2.5**	**25.8**	**26.4**	**2.5**	**1.7**	**37.1**	**2135**

6.2. KNOWLEDGE OF WAYS TO AVOID MALARIA AND OF RECOMMENDED TREATMENT

Better knowledge of ways to prevent malaria, such as increasing use of ITNs, is a foundational step toward changing behaviour. Women aged 15-49 were asked if there are ways to avoid getting malaria. Women who said that there are ways to avoid getting malaria were further asked to report specific ways to avoid malaria. Eighty-four percent of women stated that there are ways to avoid getting malaria. Among those who said there are ways to avoid getting malaria, 77.2% cited sleeping under a mosquito net or ITN.

Other commonly cited measures included use of mosquito repellants (20.4%), taking preventive medication (18.4%), and keeping one's surroundings clean by cutting grass around the house and burning leaves (16%). See **Table 3.11.**

Women's knowledge with respect to how to avoid malaria is primarily in ITN use as opposed to other malaria prevention interventions such as indoor residual spraying (IRS) and intermittent preventive treatment during pregnancy (IPTp). This could be due to past efforts promoting net use during mass net distribution campaigns and routine net distribution in health facilities**.**

Patterns by background characteristics

- A higher percentage of women in urban areas (88.1%) than rural areas (79.4%) state that there are ways to avoid getting malaria.
- Ninety percent of women with more than a secondary education state that there are ways to avoid getting malaria, as compared with 77% of women with no education.
- Knowledge of ways to avoid getting malaria is highest among women aged 25-29 and lowest among women aged 15-19 (77.1%).
- Knowledge of ways to avoid getting malaria is highest among women in Unity, Warrap, Jonglei and Ruweng Administrative Area.

Table 3.11 Knowledge of ways to avoid malaria

Percentage of women age 15-49 who state there are ways to avoid getting malaria, and among women who state there are ways to avoid getting malaria, percentage reporting specific ways of avoiding malaria, by background characteristics, SSMIS 2023

		Ways to avoid getting malaria										
Background characteristic	Percentage who state there are ways to avoid getting malaria	Sleep under net or ITN net	Take preventive medication	Use mosquito repellant	Spray house with insecticide	Fill puddles	Keep surrounding clean	Use mosquito coil	Indoor residual spray	Cut grass & burning leaves	Others	Don't know
Residence												
Rural	79.4	75.0	17.9	19.2	9.1	4.1	8.7	8.4	5.1	14.7	1.7	3.4
Urban	88.1	84.6	19.9	24.3	13.3	7.1	4.2	17.3	8.3	21.0	1.2	1.6
Age												
15-19	77.1	71.4	17.1	17.2	7.4	2.8	4.1	7.9	3.6	10.0	2.0	3.9
20-24	83.1	78.0	17.8	19.0	9.5	4.5	7.1	10.4	4.9	17.1	1.4	3.8
25-29	83.3	80.2	18.8	22.9	10.7	3.5	6.2	11.0	6.7	14.8	1.5	2.1
30-34	82.4	78.1	20.8	22.9	11.5	5.2	6.3	12.4	7.0	15.9	1.1	2.4
35-39	80.1	76.5	16.2	19.7	11.7	6.8	9.8	10.0	6.8	19.4	2.5	3.1
40-44	82.3	78.8	20.6	23.5	11.9	8.2	14.8	13.5	7.5	20.1	1.3	3.1
45-49	79.4	77.4	18.5	16.2	8.2	5.6	13.2	8.5	5.0	21.5	1.8	2.1
Education												
No Education	77.4	73.4	17.5	20.4	11.0	4.3	10.1	8.7	6.2	16.3	1.4	3.3
Primary	87.2	82.7	18.0	17.7	6.6	4.3	2.0	9.4	3.8	14.6	2.6	2.8
Secondary	89.5	85.0	23.2	25.6	13.4	8.1	7.3	19.8	8.4	18.6	0.8	2.3
Higher	89.7	85.1	26.4	24.1	8.0	9.2	4.6	29.9	6.9	16.1	1.1	0.0
Wealth Quintile												
Lowest	82.5	77.9	20.7	27.5	13.4	5.1	7.5	10.5	8.6	17.1	1.8	3.3
Second	76.3	72.3	15.9	18.3	9.7	4.7	10.4	7.3	5.0	14.1	1.6	5.1
Middle	77.2	72.6	15.4	19.9	7.6	4.5	10.1	7.8	3.7	14.8	1.6	3.6
Fourth	85.7	82.5	20.7	21.4	12.1	4.3	6.4	12.6	7.6	17.5	1.5	1.7
Highest	84.3	79.5	18.9	15.1	7.8	5.4	4.5	13.5	4.1	16.8	1.7	1.9
State												
Central EQ	82.1	75.1	14.0	6.9	3.9	3.7	0.0	18.1	2.9	12.4	3.7	1.4
Eastern EQ	89.5	79.2	20.5	19.1	8.1	3.0	0.0	7.0	2.9	21.1	0.0	3.3
Jonglei	92.1	91.7	27.4	27.1	21.1	2.6	12.4	35.0	18.4	15.4	0.0	0.0
Lakes	75.2	72.7	7.3	9.2	1.5	1.7	0.0	5.6	1.7	6.3	1.0	4.1
Northern BG	70.9	64.3	10.0	5.5	1.8	1.3	0.0	1.4	0.2	7.1	6.1	5.0
Unity	97.7	94.0	31.1	26.3	14.8	1.0	19.8	10.1	3.5	27.0	0.0	0.2
Upper Nile	75.0	72.1	23.8	30.4	15.5	13.0	40.2	15.5	12.2	23.0	0.0	7.2
Warrap	92.1	90.0	11.6	22.4	9.7	0.6	0.0	1.3	1.0	8.9	0.2	1.9
Western BG	77.1	74.6	16.4	32.4	13.5	5.6	0.0	11.1	10.1	12.8	2.7	2.0
Western EQ	88.3	84.9	24.2	17.9	9.6	12.2	0.0	8.1	2.6	24.4	3.1	4.2
Abyei AA	52.2	52.2	6.7	21.1	1.1	0.0	0.0	1.1	1.1	28.9	0.0	0.0
Pibor AA	9.2	8.4	3.4	2.5	0.0	0.8	0.0	0.0	0.8	2.5	0.0	0.0
Ruweng AA	94.7	94.7	49.2	56.1	46.2	17.4	0.0	38.6	40.2	30.3	0.0	0.0
Total	**81.4**	**77.2**	**18.4**	**20.4**	**10.1**	**4.8**	**7.7**	**10.5**	**5.8**	**16.1**	**1.6**	**3.0**

Notes:

More than one source may have been cited.

ITN = insecticide-treated net SP = Sulfadoxine pyrimethamine

7. APPENDIXES

APPENDIX A: Sample Design

Table A.1 Enumeration areas and households

Distribution of the enumeration areas and households in the sampling frame by State and residence, South Sudan 2023

2008 SSPHC	Number of enumeration areas in frame			Number of households in frame		
State	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Upper Nile	209	630	839	33,613	108,825	142,438
Jonglei	54	911	965	14,318	155,365	169,683
Unity	55	502	557	10,303	49,544	59,847
Warrap	51	1,256	1,307	10,750	150,859	161,609
Northern B.G.	43	1,070	1,113	8,255	125,308	133,563
Western B.G.	152	250	402	25,932	32,759	58,691
Lakes	36	783	819	6,476	85,847	92,323
Western E.Q.	84	710	794	15,280	101,056	116,336
Central E.Q.	301	805	1,106	56,357	122,714	179,071
Eastern E.Q.	55	841	896	13,072	140,779	153,851
Pibor AA	10	177	187	1,247	21,494	22,741
Ruweng AA	11	63	74	1,817	10,450	12,267
Abyei AA	15	53	68	2,320	5,576	7,896
South Sudan	**1,076**	**8,051**	**9,127**	**199,740**	**1,110,576**	**1,310,316**

Table A.2 Population

Distribution of the population in the sampling frame by State and residence, South Sudan 2023

	Population in frame			Percentage of total population	Percent urban
State	Urban	Rural	Total		
Upper Nile	243,938	720,415	964,353	11.67%	17.36%
Jonglei	120,693	1,089,434	1,210,127	14.65%	8.59%
Unity	108,319	379,188	487,507	5.90%	7.71%
Warrap	70,156	849,889	920,045	11.14%	4.99%
Northern B.G.	55,398	665,500	720,898	8.73%	3.94%
Western B.G.	142,907	190,524	333,431	4.04%	10.17%
Lakes	65,033	630,697	695,730	8.42%	4.63%
Western E.Q.	100,034	518,995	619,029	7.49%	7.12%
Central E.Q.	382,362	721,230	1,103,592	13.36%	27.20%
Eastern E.Q.	80,420	825,706	906,126	10.97%	5.72%
Pibor AA	8,648	139,827	148,475	1.80%	0.62%
Ruweng AA	12,913	86,542	99,455	1.20%	0.92%
Abyei AA	14,731	38,152	52,883	0.64%	1.05%
South Sudan	**1,405,552**	**6,856,099**	**8,261,651**	**100%**	**100%**

Table A.3 Sample allocation of clusters and households

Sample allocation of clusters and households by State, according to residence, South Sudan 2023

	Allocation of clusters			Allocation of households		
State	Urban	Rural	Total	Urban	Rural	Total

Upper Nile	7	21	28	140	420	560
Jonglei	2	20	22	40	400	440
Unity	4	20	24	80	400	480
Warrap	3	23	26	60	460	520
Northern B.G.	2	26	28	40	520	560
Western B.G.	12	16	28	240	320	560
Lakes	3	25	28	60	500	560
Western E.Q.	4	24	28	80	480	560
Central E.Q.	10	18	28	200	360	560
Eastern E.Q.	3	25	28	60	500	560
Pibor AA	1	5	6	20	100	120
Ruweng AA	2	2	4	40	40	80
Abyei AA	0	2	2	0	40	40
South Sudan	**53**	**227**	**280**	**1,060**	**4,540**	**5,600**

Table A.4 Sample allocation of completed interviews with women

Sample allocation of expected number of completed interviews with women by State, according to residence, South Sudan 2023

State	Women 15-49		
	Urban	Rural	Total
Upper Nile	155	606	761
Jonglei	25	241	266
Unity	63	451	514
Warrap	52	577	629
Northern B.G.	83	538	621
Western B.G.	264	338	602
Lakes	12	399	411
Western E.Q.	111	274	385
Central E.Q.	286	305	591
Eastern E.Q.	123	506	629
Pibor AA	1	118	119
Ruweng AA	115	17	132
Abyei AA	-	90	90
South Sudan	1,341	4,409	5,750

APPENDIX B: TECHNICAL ISSUES IN THE SURVEY

Note on table sample sizes and data merging: There were limitations in how the electronic data collection was implemented using CSPro, resulting in some lost data from children and nets caused by lack of a unique identifier consisting of states, cluster numbers, and household line number which had duplicates. To mitigate these the duplicates had to be manually corrected to generate unique identifiers. Even after correction, there were cases of no matches in the children and net datasets with the household. This results in some discrepancies between the sample sizes of different groups within different tables.

Errors with barcode: There were issues with the barcode labels due to factory fault, barcode scanner malfunctioning and misuses by the field enumerators who assigned three identical barcode labels meant for a sample of one child to three (3) different children causing lots of duplicates. A total of 6046 slides were read in the lab and microscopy results were recorded. Upon matching the microscopy results with the rest of field data captured via biomarker questionnaire, 78% of the microscopy results matched with the rest of field data while the other 22% of microscopy results could not match with field data due to barcode issues. Despite these mismatches, the positivity rates of microscopy results across the total slides results and of those matched remain pretty much the same (17%). The positivity rates of the slide test (RDT) and all the 6047 microscopy results are shown in the table below.

Microscopy: Total slides read at the lab

Results	# of Slides test read	% Negative/Positive
Negative	5021	83.05
Positive	1025	16.95
Total	6046	100.0

Microscopy: total lab results that matched with field biomarker data: Microscopy

Results	# of Slides test read	% Negative/Positive
Negative	3904	82.92
Positive	804	17.08
Total	4708	100.0

APPENDIX C: Key Partners and Survey Personnel

Stakeholders in the 2023 MIS implementation

1. Ministry of Health, Republic of South Sudan
2. National Bureau of Statistics, Republic of South Sudan
3. UNICEF
4. World Health Organization
5. Malaria Consortium

List of survey key personnels

Name	Designation	Institution
Dr Augustino T. Mayai	Principal Investigator	National Bureau of Statistics
Dr Kediende Chong	Co- Principle Investigator	Ministry of Health
Bol Atem Manyuon	Consultant	UNICEF, National Bureau of Statistics
Adwok Chol	Consultant	UNICEF

List of Central Supervisors

SN	Name	Institution	States
1	Ahmed Ismail Julla	NMCP	EES
2	Constantino Doggale	NMCP	WES
3	Bakhit Sebit Saleh	NMCP	PAA
4	Chan Lam	NMCP	Jonglei
5	Theresa Ajiba	NMCP	NBG
6	Koor Arua Luach	NMCP	Warrap
7	John Garang	NMCP	Lakes
8	Dr. Wegh Gai	NMCP	Unity
9	Jacob Amanya	MOH	CES
10	Besta Araba	NMCP	WBS
11	Chol Omak	MOH	UNS
12	Atemthi Dau	NMCP	RAA
13	Leju Emmanuel	NMCP	AAA

APPENDIX D: QUESTIONNAIRES

The 2023 SSMIS questionnaires are included in the following pages, starting with the Household Questionnaire, followed by the Woman's Questionnaire, the Biomarker Questionnaire for Children and the Biomarker Questionnaire for Pregnant Women.

National Malaria Indicator Survey

South Sudan

Household Questionnaire

2023

IDENTIFICATION ***(TO BE COMPLETED FROM THE LISTING INFORMATION)***

REGION……..

STATE/ADMIN AREA.....

COUNTY.....

AREA TYPE …… 1 RURAL

…… 2 URBAN

…… 3 POC

…… 4 IDPS

ENUMERATION AREA (EA) NUMBER……..

HOUSEHOLD NUMBER…….....

HOUSEHOLD COORDINATES .....

N __ __ . __ __ __ __ __o

E __ __ __ . __ __ __ __ __o

INTERVIEWER VISITS ***(TO BE COMPLETED AT THE END OF THE INTERVIEW)***

	1	2	3	FINAL VISIT
DATE				DAY / MONTH / YEAR
INTERVIEWER'S NAME				
RESULT*				RESULT
NEXT VISIT: DATE				TOTAL NO. OF VISITS
TIME				

INTERVIEWER VISITS ***(TO BE COMPLETED AT THE END OF THE INTERVIEW)***

*RESULT CODES:

1	COMPLETED
2	NO HOUSEHOLD MEMBER AT HOME OR NO COMPETENT RESPONDENT AT HOME AT TIME OF VISIT
3	ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD OF TIME
4	POSTPONED
5	REFUSED
6	DWELLING VACANT OR ADDRESS NOT A DWELLING
7	DWELLING DESTROYED
8	DWELLING NOT FOUND
9	OTHER _____ (SPECIFY)

TOTAL PERSONS IN HOUSEHOLD ┌┬┐

TOTAL ELIGIBLE WOMEN ┌┬┐

LINE NUMBER OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE ┌┬┐

LANGUAGE OF QUESTIONNAIRE** **0 1**

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:
01 ENGLISH
02 ARABIC

SUPERVISOR	OFFICE EDITOR	KEYED BY
NAME _____		
DATE _____		

INTRODUCTION AND CONSENT

INFORMED CONSENT

TO BE COMPLETED AFTER THE HOUSEHOLD INFORMATION SHEET HAS BEEN READ

Hello. My name is _____ and I am working with MOH/GOSS. We are conducting a national survey about malaria. Now that you have read/ been read the study information sheet, I want to tell you again that as part of this interview, I am going to ask you about your household, how many members live here and whether you own a bed net. This questionnaire will take about 35 to 40 minutes to complete. I will then ask questions to all the women aged 15-49 years in the household on the number of children, whether intermittent preventive malaria treatment was taken during pregnancy, how many episodes of fever the children have had, and what treatment they took. I will then take blood samples (using a small finger prick) from all children under 5 in your household to detect malaria parasites in the blood and anaemia.

We would very much appreciate your participation in this survey. The information you provide will help the government to plan health services. Whatever information you provide will be kept strictly confidential and will not be shown to other persons. Participation in this survey is voluntary and you can choose not to answer any individual question or all of the questions. However, we hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the survey?

May I begin the interview now?

IF PERMISSION IS GIVEN, BEGIN THE INTERVIEW AFTER FILLING THE PRESENT PAGE. IF THE PERSON REFUSES, PLEASE NOTIFY YOUR SUPERVISOR

Respondent name: _____

Date: _____ (DD/MM/YYY)

Signature: _____or Right thumb print:

SIGNATURE OF INTERVIEWER: ..... Date: _____ (DD/MM/YYY)

HOURS…… RECORD THE TIME.		
MINUTES……		

RESPONDENT AGREES TO BE INTERVIEWED..... 1 RESPONDENT DOES NOT AGREE TO BE INTERVIEWED ..... 2 ⟶ END

↓

SECTION 1: HOUSEHOLD LISTING

Now we would like some information about the people who usually live in your household or who are staying with you now.

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	ELIGIBILITY	
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household.	What is the relationship of (NAME) to the head of the household?*	Is (NAME) male or female? Male=1 Female=2	Does (NAME) usually live here? Yes=1 No=2	Did (NAME) stay here last night? Yes=1 No=2	How old is (NAME)? Age in complete years (for those aged more than one year) and in complete months for children under one year) **IF 95 or more, RECORD '95'**	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-5
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
01 (HEAD OF HOUSEHOLD)							01	01
02							02	02
.							03	03
.							04	04
20							05	05

* CODES FOR Q.3 (RELATIONSHIP TO HEAD OF HOUSEHOLD:
05 = GRANDCHILD
06 = PARENT

01 = HEAD	07 = PARENT-IN-LAW
02 = WIFE/HUSBAND	08 = BROTHER OR SISTER
03 = SON OR DAUGHTER	09 = NEICE/NEPHEW
04 = SON-IN-LAW OR DAUGHTER-IN-LAW	10 = ADOPTED/FOSTER/ STEPCHILD
	11 = OTHER
	12 = NOT RELATED
	98 = DON'T KNOW

TICK HERE IF CONTINUATION SHEET USED ☐

Just to make sure that I have a complete listing:

1) Are there any other persons such as small children or infants that we have not listed?
YES ☐ -> ENTER EACH IN TABLE NO ☐

2) In addition, are there any other people who may not be members of your family, such as domestic servants, lodgers or friends who usually live here?
YES ☐ -> ENTER EACH IN TABLE NO ☐

3) Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed?
YES ☐ -> ENTER EACH IN TABLE NO ☐

SECTION 2: SOCIO-ECONOMIC QUESTIONS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
10	What is the main source of drinking water for members of your household? (CIRCLE ONLY ONE RESPONSE)	**PIPED WATER** PIPED INTO DWELLING..... 11 PIPED INTO YARD/PLOT..... 12 PIPED TO NEIGHBOR……..13 PUBLIC TAP/STANDPIPE ..... 14 TUBE WELL OR BOREHOLE …..…… 21 **DUG WELL** PROTECTED WELL ..... 31 UNPROTECTED WELL..... 32 **WATER FROM SPRING** PROTECTED SPRING ..... 41 UNPROTECTED SPRING..... 42 RAINWATER …..…….51 TANKER TRUCK..... 61 CART WITH SMALL TANK ..... 71 SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/ IRRIGATION CHANNEL..... 81 BOTTLED WATER ..... 91 OTHER _____ 96 (SPECIFY)	
11	What kind of toilet facilities does your household mainly use?[1] (INTERVIEWER TO OBSERVE, CIRCLE ONLY ONE RESPONSE)	**FLUSH OR POUR FLUSH TOILET** PRIVATE FLUSH TOILET……11 SHARED FLUSH TOILET……12 **PIT LATRINE** PRIVATE PIT LATRINE…….21 SHARED PIT LATRINE……22 COMPOSTING TOILET…….……31 BUCKET TOILET……41 NO FACILITY/BUSH/FIELD……..61 OTHER _____ 96 (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
12	Does your household have: Electricity? A radio? A television? A telephone (Land Line)? Mobile phone? A refrigerator? A satellite dish? Air conditioner/cooler? A fan? A computer?	YES NO ELECTRICITY ..... 1 2 RADIO ..... 1 2 TELEVISION ..... 1 2 TELEPHONE (LANDLINE) ..... 1 2 MOBILE PHONE ..... 1 2 REFRIGERATOR ..... 1 2 SATELLITE DISH…….. 1 2 AIR CONDITIONER/COOLER…..1 2 FAN……1 2 COMPUTER 1 2	
13	Does any member of your household own: A bicycle? A motorcycle or motor scooter? A car or truck?	YES NO BICYCLE ..... 1 2 MOTORCYCLE/SCOOTER ..... 1 2 CAR/TRUCK 1 2	
14	What type of fuel does your household mainly use for cooking? (CIRCLE ONLY ONE RESPONSE)	ELECTRICITY ..... 01 LPG/NATURAL GAS ..... 02 BIOGAS ..... 03 KEROSENE/PARAFFIN ..... 04 CHARCOAL ..... 06 FIREWOOD ..... 07 STRAW/GRASS……..08 DUNG ..... 09 OTHER _____ 96 (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
15A	WHAT TYPE OF DWELLING DOES THIS HOUSEHOLD MAINLY LIVE IN? (INTERVIEWER TO OBSERVE, CIRCLE ONLY ONE RESPONSE)	TENT.....11 DWELLING OF STRAW MATS.....21 TUKUL/GOTTIYA-MUD.....31 TUKUL/GOTTIYA-STICKS.....41 FLAT OR APARTMENT.....51 VILLA.....61 HOUSE OF ONE FLOOR-MUD.....71 HOUSE OF ONE FLOOR-BRICK/CONCRETE.....81 HOUSE CONSTRUCTED OF WOOD.....91 MULTI-STOREY HOUSE.....101 INCOMPLETE.....111 OTHER _____ 96 (SPECIFY)	
15B	MAIN MATERIAL OF THE HOUSE/TUKUL FLOOR? (INTERVIEWER TO OBSERVE, CIRCLE ONLY ONE RESPONSE)	NATURAL FLOOR EARTH/SAND .....11 DUNG.....12 RUDIMENTARY FLOOR WOOD PLANKS.....21 PALM/BAMBOO.....22 FINISHED FLOOR PARQUET OR POLISHED WOOD .....31 VINYL OR ASPHALT STRIPS .....32 CERAMIC TILES.....33 CEMENT.....34 CARPET.....35 OTHER _____ 96 (SPECIFY)	

SECTION 3: MALARIA QUESTIONS

16A	At any time in the past 12 months, has anyone sprayed the interior walls of your dwelling against mosquitoes? THIS REFERS TO MASS-SPRAYING OF WALLS RATHER THAN INSECTICIDE THAT THE RESPONDENT HAS PURCHASED THEMSELVES	YES.....1 NO.....2 DON'T KNOW.....8	┐ └□17

16B	How many months ago was the house sprayed? IF LESS THAN ONE MONTH, RECORD '00' MONTHS AGO.	MONTHS AGO........................ |__|__|	
16C	Who sprayed the house?	GOVERNMENT WORKER/PROGRAM.....1 NGO……………………………………….2 PRIVATE COMPANY…….........................3 HOUSEHOLD MEMBER...........................4 OTHER __________________________ 6 (SPECIFY) DON'T KNOW..8	
17	Does your household have any mosquito nets that can be used while sleeping?	YES..1 NO..2	→ END
18	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS .... |__|	

		NET # 1	NET #2	NET #3
19	ASK RESPONDENT TO SHOW YOU THE NET(S) IN THE HOUSEHOLD. IF MORE THAN THREE NETS, MOVE TO NEXT PAGE; IF MORE THAN SIX USE ADDITIONAL QUESTIONNAIRES	OBSERVED..............................1 NOT OBSERVED..................... 2	OBSERVED..............................1 NOT OBSERVED..................... 2	OBSERVED..............................1 NOT OBSERVED..................... 2
20	How long ago did your household obtain the mosquito net?	MONTHS AGO |__|__| MORE THAN 3 YEARS AGO…….95	MONTHS AGO |__|__| MORE THAN 3 YEARS AGO….95	MONTHS AGO |__|__| MORE THAN 3 YEARS AGO…..95
21	Where did you obtain the net?	GOV HEALTH FACILITY…………....1 NGO……………………………..........2 COMMUNITY BASED DISTRIBUTION…..………………. 3 COMMUNITY OUTREACH e.g. EPI…………………………...4 PRIVATE SECTOR SHOP……………………………….5 VENDOR…………………………...6	GOV HEALTH FACILITY…………....1 NGO……………………………..........2 COMMUNITY BASED DISTRIBUTION…..………………. 3 COMMUNITY OUTREACH e.g. EPI…………………………...4 PRIVATE SECTOR SHOP……………………………….5 VENDOR…………………………...6	GOV HEALTH FACILITY…………....1 NGO……………………………..........2 COMMUNITY BASED DISTRIBUTION…..………………. 3 COMMUNITY OUTREACH e.g. EPI…………………………...4 PRIVATE SECTOR SHOP……………………………….5 VENDOR…………………………...6 PHARMACY…………………………...7

		NET # 1	NET #2	NET #3
		PHARMACY……..7 OTHER_____8 (SPECIFY) DON'T KNOW……9	PHARMACY……..7 OTHER_____8 (SPECIFY) DON'T KNOW……9	OTHER_____8 (SPECIFY) DON'T KNOW……9
22	Did you purchase the net?	YES……..1 NO……2 OTHERS …….3 (SPECIFY)	YES……..1 NO……2 OTHERS…….3 (SPECIFY)	YES……..1 NO……2 OTHERS ……...3 (SPECIFY)
23	How much did you pay for the net when it was purchased?	□□ SDG……1 OTHERS_____ 2 (SPECIFY)	□□ SDG……1 OTHERS_____ 2 (SPECIFY)	□□ SDG……1 OTHERS_____ 2 (SPECIFY)
24	OBSERVE OR ASK THE BRAND OF MOSQUITO NET. IF BRAND IS UNKNOWN, AND YOU CANNOT OBSERVE THE NET, SHOW PICTURES OF TYPICAL NET TYPES/BRANDS TO RESPONDENT.	'PERMANENT' PERMANET……..1 OLYSET……...2 TREATED DAMURIA…….3 'PRETREATED NET' BASF……..4 SERENA……...5 'OTHERS'……..31 (SPECIFY) DON'T KNOW BRAND.....98	'PERMANENT' PERMANET……..1 OLYSET……..2 TREATED DAMURIA…….3 'PRETREATED NET' BASF……..4 SERENA……...5 'OTHERS'……...31 (SPECIFY) DON'T KNOW BRAND…...98	'PERMANENT' PERMANET……..1 OLYSET……...2 TREATED DAMURIA…….3 'PRETREATED NET' BASF……..4 SERENA……...5 'OTHERS'……..31 (SPECIFY) DON'T KNOW BRAND……..98
25	Since you got the mosquito net, was it ever soaked or dipped in a liquid to repel mosquitoes or bugs?	YES .....1 NO.....2 (SKIP TO 27)□□——┤ NOT SURE.....8	YES.....1 NO .....2 (SKIP TO 27)□□——┤ NOT SURE.....8	YES .....1 NO.....2 (SKIP TO 27)□□——┤ NOT SURE.....8
26	How long ago was the net last soaked or dipped? IF LESS THAN 1 MONTH AGO, RECORD 00' MONTHS. IF LESS THAN 2 YEARS AGO, RECORD MONTHS AGO. IF '12 MONTHS AGO' OR '1 YEAR AGO,' PROBE FOR EXACT NUMBER OF MONTHS.	MONTHS AGO □□ MORE THAN 2 YEARS AGO…….95 NOT SURE.....98	MOS AGO □□ MORE THAN 2 YEARS AGO…….95 NOT SURE.....98	MOS AGO □□ MORE THAN 2 YEARS AGO…….95 NOT SURE.....98
27	Did anyone sleep under this mosquito net last night?	YES.....1 NO.....2 (SKIP TO 29)□□□——┤	YES.....1 NO.....2 (SKIP TO 29) □□——┤	YES.....1 NO.....2 (SKIP TO 29) □——┤

		NET # 1	NET #2	NET #3
		NOT SURE.....8	NOT SURE.....8	NOT SURE.....8
28	Who slept under this mosquito net last night? RECORD THE RESPECTIVE LINE NUMBER FROM THE HOUSEHOLD LISTING.	NAME _____ LINE NO: NO NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO	NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO	NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO NAME _____ LINE NO
		GO BACK TO 19 FOR NEXT NET; OR, IF NO MORE NETS, END QUESTIONNAIRE.	GO BACK TO 19 FOR NEXT NET; OR, IF NO MORE NETS, END QUESTIONNAIRE.	GO BACK TO 19 IN THE FIRST COLUMN OF NEW PAGE; OR, IF NO MORE NETS, END QUESTIONNAIRE.
29	Why was the net not used last night?	NOT HUNG UP……...……1 END OF RAINY SEASON……..2 PERSON NOT AROUND…….....3 NOT CONSIDERED EFFECTIVE…….,...4 TOO HOT…….5 TOO BIG……..……..……6	NOT HUNG UP……...……1 END OF RAINY SEASON…….2 PERSON NOT AROUND…….....3 NOT CONSIDERED EFFECTIVE…….,...4 TOO HOT…….5 TOO BIG……..……..……6	NOT HUNG UP……...……1 END OF RAINY SEASON…….2 PERSON NOT AROUND…….....3 NOT CONSIDERED EFFECTIVE…….,...4 TOO HOT…….5 TOO BIG……..……..……6

		NET # 1	NET #2	NET #3
		TOO SMALL……..……7 HAVE OTHER NETS……..8 ALLERGIC TO NET……9 NET IS DANGEROUS/ POISONOUS…….10 OTHER_____11 (SPECIFY)	TOO SMALL……..……7 HAVE OTHER NETS……..8 ALLERGIC TO NET……9 NET IS DANGEROUS/ POISONOUS…….10 OTHER_____11 (SPECIFY)	TOO SMALL……..……7 HAVE OTHER NETS……..8 ALLERGIC TO NET……9 NET IS DANGEROUS/ POISONOUS…….10 OTHER_____11 (SPECIFY)

TICK HERE IF CONTINUATION SHEET USED ☐

END OF HOUSEHOLD QUESTIONNAIRE. PROCEED TO WOMEN'S QUESTIONNAIRE(S). THEN TAKE BLOOD SAMPLES AND COMPLETE SECTIONS ON HAMEOGLOBIN AND PARASATAEMIA.

SECTION 4: BLOOD TESTS

HAEMOGLOBIN MEASUREMENT

CHECK COLUMN (7) OF HOUSEHOLD LISTING: RECORD THE LINE NUMBER, NAME AND AGE OF ALL CHILDREN UNDER AGE 5. THEN ASK THE DATE OF BIRTH.

CHILDREN UNDER AGE 5 YEARS				HAEMOGLOBIN MEASUREMENT OF CHILDREN BORN IN 2019 OR LATER			
LINE NUMBER FROM COL. (1)	NAME FROM COL. (2)	AGE FROM COL. (7)	What Is (NAME's) date of birth? COPIES MONTH AND YEAR OF BIRTH FROM 215 IN MOTHER'S BIRTH HISTORY AND ASK DAY. FOR CHILDREN NOT INCLUDED IN ANY BIRTH HISTORY, ASK DAY, MONTH AND YEAR.	LINE NUMBER OF PARENT/ADULT RESPONSIBLE FOR THE CHILD RECORD '00' IF NOT LISTED IN HOUSEHOLD SCHEDULE	READ CONSENT STATEMENT TO PARENT/ADULT RESPONSIBLE FOR THE CHILD CIRCLE CODE AND SIGN GRANTED = 1 REFUSED = 2	HAEMOGLOBIN LEVEL (G/DL)	RESULT 1 MEASURED 2 NOT PRESENT 3 REFUSED 4 OTHER
(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
[ ][ ]		[ ][ ]	DAY [ ][ ] MONTH [ ][ ] YEAR [ ][ ][ ][ ]	[ ][ ]	1 SIGN/PRINT_______________ NEXT LINE← 2	[ ][ ] . [ ]	[ ]
[ ][ ]		[ ][ ]	[ ][ ] [ ][ ] [ ][ ][ ][ ]	[ ][ ]	1 SIGN/PRINT_______________ NEXT LINE← 2	[ ][ ] . [ ]	[ ]
[ ][ ]		[ ][ ]	[ ][ ] [ ][ ] [ ][ ][ ][ ]	[ ][ ]	1 SIGN/PRINT_______________ NEXT LINE← 2	[ ][ ] . [ ]	[ ]

[ ][ ]		[ ][ ]	[ ][ ] [ ][ ] [ ][ ][ ]	[ ][ ]	1 SIGN/PRINT________________ NEXT LINE⟵ 2	[ ][ ].[ ]	[ ]
[ ][ ]		[ ][ ]	[ ][ ] [ ][ ] [ ][ ][ ]	[ ][ ]	1 SIGN/PRINT________________ NEXT LINE⟵ 2	[ ][ ].[ ]	[ ]
[ ][ ]		[ ][ ]	[ ][ ] [ ][ ] [ ][ ][ ]	[ ][ ]	1 SIGN/PRINT________________ NEXT LINE⟵ 2	[ ][ ].[ ]	[ ]
		TICK HERE IF CONTINUATION SHEET USED ☐	CONSENT STATEMENT: As part of this survey, we are studying anaemia and blood parasite levels among children. Anaemia is a serious health problem that results from poor nutrition or diseases such as malaria. This survey will assist the government to develop programs to prevent and treat these important health problems. We request that all children born in 2019 or later participate in the anaemia and parasitaemia testing part of this survey and give a few drops of blood from a finger. The test uses disposable sterile instruments that are clean and completely safe. The blood will be analyzed with new equipment and the results of the test will be given to you right after the blood is taken and treatment provided if necessary. The results will be kept confidential. May I now ask that (NAME OF CHILD[REN]) participate in the blood tests. However, if you decide not to have him/her/them tested, it is your right and we will respect your decision. Now please tell me if you agree to have the test(s) done.				

PARASITAEMIA TESTING

LINE NUMBER FROM COL. (1)	RESULT: MEASURED=1 NOT PRESENT=2 REFUSED=3 OTHERS=4	RDT RESULT POSITIVE=1 NEGATIVE=2 INVALID=3	TREATMENT (ANEMIA/MALARIA) (CIRCLE ALL THAT APPLY)	BLOODSLIDE: DONE……..…1 NOT PRESENT……...2 REFUSED…….....3 OTHERS……..4	BLOODSLIDE NUMBER A=THICK SLIDE B=THIN SLIDE
(38)	(39)	(40)	(41)	(42)	(43)
			AS+AQ……1 IRON……..2 ALBENDAZOLE……...3 REFERRED……...…4 REFUSED……..5		A: B:
			AS+AQ……1 IRON……..2 ALBENDAZOL……..3 REFERRED…..……..……4 REFUSED……..……..5		A: B:
			AS+AQ……1 IRON……..……..2 ALBENDAZOLE…….……..3 REFERRED…….……..…4 REFUSE……..5		A: B:
			AS+AQ……1 IRON……..……...2 ALBENDAZOLE……...3 REFERRED……4 REFUSED……..……..5		A: B:
			AS+AQ……..…1 IRON……..……..2 ALBENDAZOLE……...3 REFERRED……4		A: B:

			REFUSED……..…..5		
			AS+AQ…….……1 IRON……..……..2 ALBENDAZOLE……...3 REFERRED……4 REFUSED……..…..5		A: B:

44	CHECK 36: NUMBER OF CHILDREN WITH HAEMOGLOBIN LEVEL BELOW 7 G/DL ONE OR MORE NONE  ↓ ↓ GIVE EACH PARENT/ADULT RESPONSIBLE FOR RESULT OF THE HAEMOGLOBIN AND CONTINUE WITH 45 GIVE EACH PARENT/ADULT RESPONSIBLE FOR CHILD THE THE CHILD THE RESULT OF THE HAEMOGLOBIN MEASUREMENT MEASUREMENT AND END THE HOUSEHOLD INTERVIEW.
45	We detected a low level of haemoglobin in the blood of [NAME OF CHILD(REN)]. This indicates that (NAME OF CHILD(REN) has/have developed severe anaemia, which is a serious health problem. We would like to inform the doctor at _____ about the condition of [NAME OF CHILD(REN)]. This will assist you in obtaining appropriate treatment for the condition. Do you agree that the information about the level of haemoglobin in the blood of [NAME OF CHILD(REN)] may be given to the doctor?

NAME OF CHILD WITH HAEMOGLOBIN BELOW 7 G/DL	NAME OF PARENT/RESPONSIBLE ADULT	AGREES TO REFERRAL?
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2
		YES……..1 NO……2

National Malaria Indicator Survey

South Sudan

Women's Questionnaire

FORMATTING DATE: 16-Jun-23
ENGLISH LANGUAGE: 16 JUNE 2023

MALARIA INDICATOR SURVEY
WOMAN'S QUESTIONNAIRE

SOUTH SUDAN
NATIONAL MALARIA CONTROL PROGRAME

IDENTIFICATION (1)

STATE/ADMIN AREA _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER ..... | | | | |

HOUSEHOLD NUMBER ..... | | | | |

NAME AND LINE NUMBER OF WOMAN _____ | | |

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE				DAY | | MONTH | | YEAR | | | |
INTERVIEWER'S NAME				INT. NO. | | | |
RESULT*				RESULT* | |
NEXT VISIT: DATE				TOTAL NUMBER OF VISITS | |
TIME				

*RESULT CODES: 1 COMPLETED; 2 NOT AT HOME; 3 POSTPONED; 4 REFUSED; 5 PARTLY COMPLETED; 6 INCAPACITATED; 7 OTHER _____ (SPECIFY)

LANGUAGE OF QUESTIONNAIRE** 0 1 LANGUAGE OF INTERVIEW** | |

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:
01 ENGLISH
02 ARABIC

SUPERVISOR

NAME _____ NUMBER | | | | |

INTRODUCTION AND CONSENT

Hello. My name is _____. I am working with the Ministry of Health. We are conducting a survey about malaria all over South Sudan. The information we collect will help the government to plan health services. Your household was selected for the survey. The questions usually take about 35 to 40 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.

Do you have any questions?
May I begin the interview now?

SIGNATURE OF INTERVIEWER _____ DATE _____

RESPONDENT AGREES TO BE INTERVIEWED . 1

RESPONDENT DOES NOT AGREE TO BE INTERVIEWED . 2 → END

8.

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOURS ..... [ ][ ] MINUTES ..... [ ][ ]	
102	In what month and year were you born?	MONTH ..... [ ][ ] DON'T KNOW MONTH ..... 98 YEAR ..... [ ][ ][ ][ ] DON'T KNOW YEAR 9998	
103	How old were you at your last birthday? COMPARE AND CORRECT 102 AND/OR 103 IF INCONSISTENT.	AGE IN COMPLETED YEARS ..... [ ][ ]	
104	Have you ever attended school?	YES ..... 1 NO 2	→ 108
105 (2)	What is the highest level of school you attended: primary, secondary, or higher?	PRIMARY ..... 1 SECONDARY ..... 2 HIGHER 3	
106 (2)	What is the highest [GRADE/FORM/YEAR] you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	[GRADE/FORM/YEAR] ..... [ ][ ]	
107	CHECK 105: PRIMARY OR SECONDARY ☐ ↓ HIGHER ☐ →		109
108 (3)	Now I would like you to read this sentence to me. SHOW CARD TO RESPONDENT. IF RESPONDENT CANNOT READ WHOLE SENTENCE, PROBE: Can you read any part of the sentence to me?	CANNOT READ AT ALL ..... 1 ABLE TO READ ONLY PART OF THE SENTENCE ..... 2 ABLE TO READ WHOLE SENTENCE ..... 3 NO CARD WITH REQUIRED LANGUAGE _____ 4 (SPECIFY LANGUAGE) BLIND/VISUALLY IMPAIRED 5	
109	COUNTRY-SPECIFIC QUESTION ON RELIGION, IF APPROPRIATE.	YES ..... 1 NO 2	→ 201
110	COUNTRY-SPECIFIC QUESTION ON ETHNICITY, IF APPROPRIATE. a) #N/A b) #N/A c) #N/A d) #N/A e) #N/A f) #N/A	YES NO RADIO ..... 1 2 TELEVISION ..... 1 2 POSTER/BILLBOARD ..... 1 2 COMMUNITY HEALTH WORKER ..... 1 2 COMMUNITY EVENT ..... 1 2 ANYWHERE ELSE 1 2	

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES . . . . . 1 NO 2	→ 206
202	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES . . . . . 1 NO 2	→ 204
203	a) How many sons live with you? b) And how many daughters live with you? IF NONE, RECORD '00'.	a) SONS AT HOME . . . . . [ ][ ] b) DAUGHTERS AT HOME . . . . . [ ][ ]	
204	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES . . . . . 1 NO 2	→ 206
205	a) How many sons are alive but do not live with you? b) And how many daughters are alive but do not live with you? IF NONE, RECORD '00'.	a) SONS ELSEWHERE . . . . . [ ][ ] b) DAUGHTERS ELSEWHERE . . . . . [ ][ ]	
206	Have you ever given birth to a boy or girl who was born alive but later died? IF NO, PROBE: Any baby who cried, who made any movement, sound, or effort to breathe, or who showed any other signs of life even if for a very short time?	YES . . . . . 1 NO 2	→ 208
207	a) How many boys have died? b) And how many girls have died? IF NONE, RECORD '00'.	a) BOYS DEAD . . . . . [ ][ ] b) GIRLS DEAD . . . . . [ ][ ]	
208	SUM ANSWERS TO 203, 205, AND 207, AND ENTER TOTAL. IF NONE, RECORD '00'.	TOTAL BIRTHS . . . . . [ ][ ]	
209	CHECK 208: Just to make sure that I have this right: you have had in TOTAL _____ births during your life. Is that correct? YES ☐ NO ☐ → PROBE AND CORRECT 201-208 AS NECESSARY.		
210	CHECK 208: ONE OR MORE BIRTHS ☐ NO BIRTHS ☐		→ 225
211	Now I'd like to ask you about your more recent births. How many births have you had in 2019-2023? RECORD NUMBER OF LIVE BIRTHS IN 2019-2023	TOTAL IN 2019-2023 . . . . . [ ][ ] NONE 00	→ 225

SECTION 2. REPRODUCTION

212 Now I would like to record the names of all your births in 2019-2023, whether still alive or not, starting with the most recent one you had.

RECORD IN 213 THE NAMES OF ALL THE BIRTHS BORN IN 2019-2023. RECORD TWINS AND TRIPLETS ON SEPARATE ROWS. IF THERE ARE MORE THAN 5 BIRTHS, USE AN ADDITIONAL QUESTIONNAIRE STARTING WITH THE SECOND ROW.

213 What name was given to your (most recent/ previous) baby? RECORD NAME. BIRTH HISTORY NUMBER.	214 Is (NAME) a boy or a girl?	215 Were any of these births twins?	216 On what day, month, and year was (NAME) born?	217 Is (NAME) still alive?	218 IF ALIVE: How old was (NAME) at (NAME)'s last birthday? RECORD AGE IN COMP-LETED YEARS.	219 IF ALIVE: Is (NAME) living with you?	220 IF ALIVE: RECORD HOUSEHOLD LINE NUMBER OF CHILD. RECORD '00' IF CHILD NOT LISTED IN HOUSEHOLD.	221 Were there any other live births between (NAME) and (NAME OF PREVIOUS BIRTH), including any children who died after birth?
01	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ MONTHS	YES 1 NO 2 → (NEXT BIRTH)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐ → (NEXT BIRTH)	
02	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ MONTHS	YES 1 NO 2 → (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO 2 (NEXT BIRTH)
03	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ MONTHS	YES 1 NO 2 → (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO 2 (NEXT BIRTH)
04	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ MONTHS	YES 1 NO 2 → (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO . . . . . 2 (NEXT BIRTH)
05	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ MONTHS	YES 1 NO 2 → (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO . . . . . 2 (NEXT BIRTH)

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
222	Have you had any live births since the birth of (NAME OF MOST RECENT BIRTH)?"	YES ..... 1 (RECORD BIRTH(S) IN TABLE) NO 2	
223	COMPARE 211 WITH NUMBER OF BIRTHS IN BIRTH HISTORY NUMBERS ARE SAME ☐ NUMBERS ARE DIFFERENT ☐ (PROBE AND RECONCILE)		
224 (4)	CHECK 216: ENTER THE NUMBER OF BIRTHS IN 2019-2023	NUMBER OF BIRTHS ..... ☐☐ NONE 0	
225	Are you pregnant now?	YES ..... 1 NO ..... 2 UNSURE 8	→ 227
226	How many months pregnant are you? RECORD NUMBER OF COMPLETED MONTHS.	MONTHS ..... ☐☐	
227 (4)	CHECK 224: ONE OR MORE BIRTHS IN 2019-2023 ☐ (GO TO 301) NO BIRTHS IN 2019-2023 ☐ Q. 224 IS BLANK ☐		→ 428 → 428

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	RECORD THE NAME AND SURVIVAL STATUS OF THE MOST RECENT BIRTH FROM 213 AND 217,	MOST RECENT BIRTH NAME _____ LIVING ☐ DEAD ☐	
302	Now I would like to ask you some questions about your last pregnancy that resulted in a live birth. When you got pregnant with (NAME), did you see anyone for antenatal care for this pregnancy?	YES ..... 1 NO 2	→ 304
303 (5)	Whom did you see? Anyone else? PROBE TO IDENTIFY EACH TYPE OF PERSON AND RECORD ALL MENTIONED.	**HEALTH PERSONNEL** DOCTOR ..... A NURSE/MIDWIFE ..... B CERTIFIED NURSE ..... C **OTHER PERSON** TRADITIONAL BIRTH ATTENDANT ..... D COMMUNITY/VILLAGE HEALTH WORKER .... E OTHER _____ X (SPECIFY)	
304	During this pregnancy, did you take SP/Fansidar to keep you from getting malaria?	YES ..... 1 NO ..... 2 DON'T KNOW 8	→ 307
305	How many times did you take SP/Fansidar during this pregnancy?	TIMES ..... ☐☐	
306	Did you get the SP/Fansidar during any antenatal care visit, during another visit to a health facility or from another source? IF MORE THAN ONE SOURCE, RECORD THE HIGHEST SOURCE ON THE LIST.	ANTENATAL VISIT ..... 1 ANOTHER FACILITY VISIT ..... 2 OTHER SOURCE 6	
307 (4)	CHECK 216 AND 217: ONE OR MORE LIVING CHILDREN BORN IN 2019-2023 ☐ → (GO TO 401) NO LIVING CHILDREN BORN IN 2019-2023 ☐		→ 429

9.
10.
11.

12.

SECTION 4. FEVER IN CHILDREN

401 (4)	CHECK 213: RECORD THE BIRTH HISTORY NUMBER IN 402 AND THE NAME AND SURVIVAL STATUS IN 403 FOR EACH BIRTH IN 2019-2023. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE MOST RECENT BIRTH.IF THERE ARE MORE THAN 2 BIRTHS, USE ADDITIONAL QUESTIONNAIRE(S). Now I would like to ask some questions about the health of your children born since January 2019. (We will talk about each separately.) a		
402	BIRTH HISTORY NUMBER FROM 213 IN BIRTH HISTORY.	MOST RECENT BIRTH BIRTH HISTORY NUMBER ..... [ ][ ]	NEXT MOST RECENT BIRTH BIRTH HISTORY NUMBER ..... [ ][ ]
403	FROM 213 AND 217:	NAME _____ LIVING ☐ DEAD ☐ (SKIP TO 428)	NAME _____ LIVING ☐ DEAD ☐ (SKIP TO 428)
404	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES ..... 1 NO ..... 2 (SKIP TO 428) DON'T KNOW 8	YES ..... 1 NO ..... 2 (SKIP TO 428) DON'T KNOW 8
405	At any time during the illness, did (NAME) have blood taken from (NAME)'s finger or heel for testing?	YES ..... 1 NO ..... 2 DON'T KNOW 8	YES ..... 1 NO ..... 2 DON'T KNOW 8
406	Did you seek advice or treatment for the illness from any source?	YES ..... 1 NO ..... 2 (SKIP TO 411)	YES ..... 1 NO ..... 2 (SKIP TO 411)
407 (5)	Where did you seek advice or treatment? PROBE TO IDENTIFY THE TYPE OF SOURCE. IF UNABLE TO DETERMINE IF PUBLIC OR PRIVATE SECTOR, WRITE THE NAME OF THE PLACE(S). _____ (NAME OF PLACE)	**PUBLIC SECTOR** GOVERNMENT HOSPITAL .. A GOVERNMENT PRIMARY HEALTH CARE CENTER ..... B GOVERNMENT PRIMARY HEALTH CARE UNIT ..... C MOBILE CLINIC ..... D BOMA HEALTH WORKER ..... E OTHER PUBLIC SECTOR _____ F (SPECIFY) **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/ CLINIC ..... G PHARMACY ..... H PRIVATE DOCTOR ..... I MOBILE CLINIC ..... J FIELDWORKER/CHW ..... K OTHER PRIVATE MEDICAL SECTOR _____ L (SPECIFY) **OTHER SOURCE** SHOP ..... M TRADITIONAL PRACTITIONER ..... N MARKET ..... O ITINERANT DRUG SELLER ..... P OTHER _____ X (SPECIFY)	**PUBLIC SECTOR** GOVERNMENT HOSPITAL .. A GOVERNMENT PRIMARY HEALTH CARE CENTER ..... B GOVERNMENT PRIMARY HEALTH CARE UNIT ..... C MOBILE CLINIC ..... D BOMA HEALTH WORKER ..... E OTHER PUBLIC SECTOR _____ F (SPECIFY) **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/ CLINIC ..... G PHARMACY ..... H PRIVATE DOCTOR ..... I MOBILE CLINIC ..... J FIELDWORKER/CHW ..... K OTHER PRIVATE MEDICAL SECTOR _____ L (SPECIFY) **OTHER SOURCE** SHOP ..... M TRADITIONAL PRACTITIONER ..... N MARKET ..... O ITINERANT DRUG SELLER ..... P OTHER _____ X (SPECIFY)

SECTION 4. FEVER IN CHILDREN

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME_____	NEXT MOST RECENT BIRTH NAME _____
408	CHECK 407:	TWO OR MORE CODES CIRCLED ↓ / ONLY ONE CODE CIRCLED → (SKIP TO 410)	TWO OR MORE CODES CIRCLED ↓ / ONLY ONE CODE CIRCLED → (SKIP TO 410)
409	Where did you first seek advice or treatment? USE LETTER CODE FROM 407	FIRST PLACE ..... ☐	FIRST PLACE ..... ☐
410	How many days after the illness began did you first seek advice or treatment for (NAME)? IF THE SAME DAY RECORD '00'.	DAYS ..... ☐☐	DAYS ..... ☐☐
411	At any time during the illness, did (NAME) take any drugs for the illness?	YES ..... 1 NO ..... 2 → (SKIP TO 428) DON'T KNOW 8	YES ..... 1 NO ..... 2 → (SKIP TO 428) DON'T KNOW 8
412 (6)	What drugs did (NAME) take? Any other drugs? RECORD ALL MENTIONED.	**ANTIMALARIAL DRUGS** ARTEMISININ COMBINATION THERAPY (ACT) ..... A SP/FANSIDAR ..... B CHLOROQUINE ..... C AMODIAQUINE ..... D QUININE PILLS ..... E INJECTION/IV ..... F ARTESUNATE RECTAL ..... G INJECTION/IV ..... H OTHER ANTIMALARIAL _____ I (SPECIFY) **ANTIBIOTIC DRUGS** PILL/SYRUP ..... J INJECTION/IV ..... K **OTHER DRUGS** ASPIRIN ..... L ACETAMINOPHEN ..... M IBUPROFEN ..... N OTHER _____ X (SPECIFY) DON'T KNOW ..... Z	**ANTIMALARIAL DRUGS** ARTEMISININ COMBINATION THERAPY (ACT) ..... A SP/FANSIDAR ..... B CHLOROQUINE ..... C AMODIAQUINE ..... D QUININE PILLS ..... E INJECTION/IV ..... F ARTESUNATE RECTAL ..... G INJECTION/IV ..... H OTHER ANTIMALARIAL _____ I (SPECIFY) **ANTIBIOTIC DRUGS** PILL/SYRUP ..... J INJECTION/IV ..... K **OTHER DRUGS** ASPIRIN ..... L ACETAMINOPHEN ..... M IBUPROFEN ..... N OTHER _____ X (SPECIFY) DON'T KNOW ..... Z
413	CHECK 412: ANY CODE A-I CIRCLED?	YES ↓ / NO → (SKIP TO 428)	YES ↓ / NO → (SKIP TO 428)
414	CHECK 412: ARTEMISININ COMBINATION THERAPY ('A') GIVEN	CODE 'A' CIRCLED ↓ / CODE 'A' NOT CIRCLED → (SKIP TO 416)	CODE 'A' CIRCLED ↓ / CODE 'A' NOT CIRCLED → (SKIP TO 416)

415	How long after the fever started did (NAME) first take an artemisinin combination therapy?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8
416	CHECK 412: SP/FANSIDAR ('B') GIVEN	CODE 'B' CIRCLED CODE 'B' NOT CIRCLED (SKIP TO 418)	CODE 'B' CIRCLED CODE 'B' NOT CIRCLED (SKIP TO 418)
417	How long after the fever started did (NAME) first take SP/Fansidar?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8
418	CHECK 412: CHLOROQUINE ('C') GIVEN	CODE 'C' CIRCLED CODE 'C' NOT CIRCLED (SKIP TO 420)	CODE 'C' CIRCLED CODE 'C' NOT CIRCLED (SKIP TO 420)
419	How long after the fever started did (NAME) first take chloroquine?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8
420	CHECK 412: AMODIAQUINE ('D') GIVEN	CODE 'D' CIRCLED CODE 'D' NOT CIRCLED (SKIP TO 422)	CODE 'D' CIRCLED CODE 'D' NOT CIRCLED (SKIP TO 422)

421	How long after the fever started did (NAME) first take amodiaquine?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8
422	CHECK 412: QUININE ('E' OR 'F') GIVEN	CODE 'E' OR 'F' CIRCLED CODE 'E' OR 'F' NOT CIRCLED (SKIP TO 424)	CODE 'E' OR 'F' CIRCLED CODE 'E' OR 'F' NOT CIRCLED (SKIP TO 424)
423	How long after the fever started did (NAME) first take quinine?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8
424	CHECK 412: ARTESUNATE ('G' OR 'H') GIVEN	CODE 'G' OR 'H' CIRCLED CODE 'G' OR 'H' NOT CIRCLED (SKIP TO 426)	CODE 'G' OR 'H' CIRCLED CODE 'G' OR 'H' NOT CIRCLED (SKIP TO 426)
425	How long after the fever started did (NAME) first take artesunate?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8
426	CHECK 412: OTHER ANTIMALARIAL ('I') GIVEN	CODE 'I' CIRCLED CODE 'I' NOT CIRCLED (SKIP TO 428)	CODE 'I' CIRCLED CODE 'I' NOT CIRCLED (SKIP TO 428)
427	How long after the fever started did (NAME) first take (OTHER ANTIMALARIAL)?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW 8
428		GO BACK TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 429.	GO TO 403 IN FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 429.
429	RECORD THE TIME.	HOURS ..... MINUTES	

INTERVIEWER'S OBSERVATIONS

(TO BE FILLED IN AFTER COMPLETING INTERVIEW)

COMMENTS ABOUT RESPONDENT:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

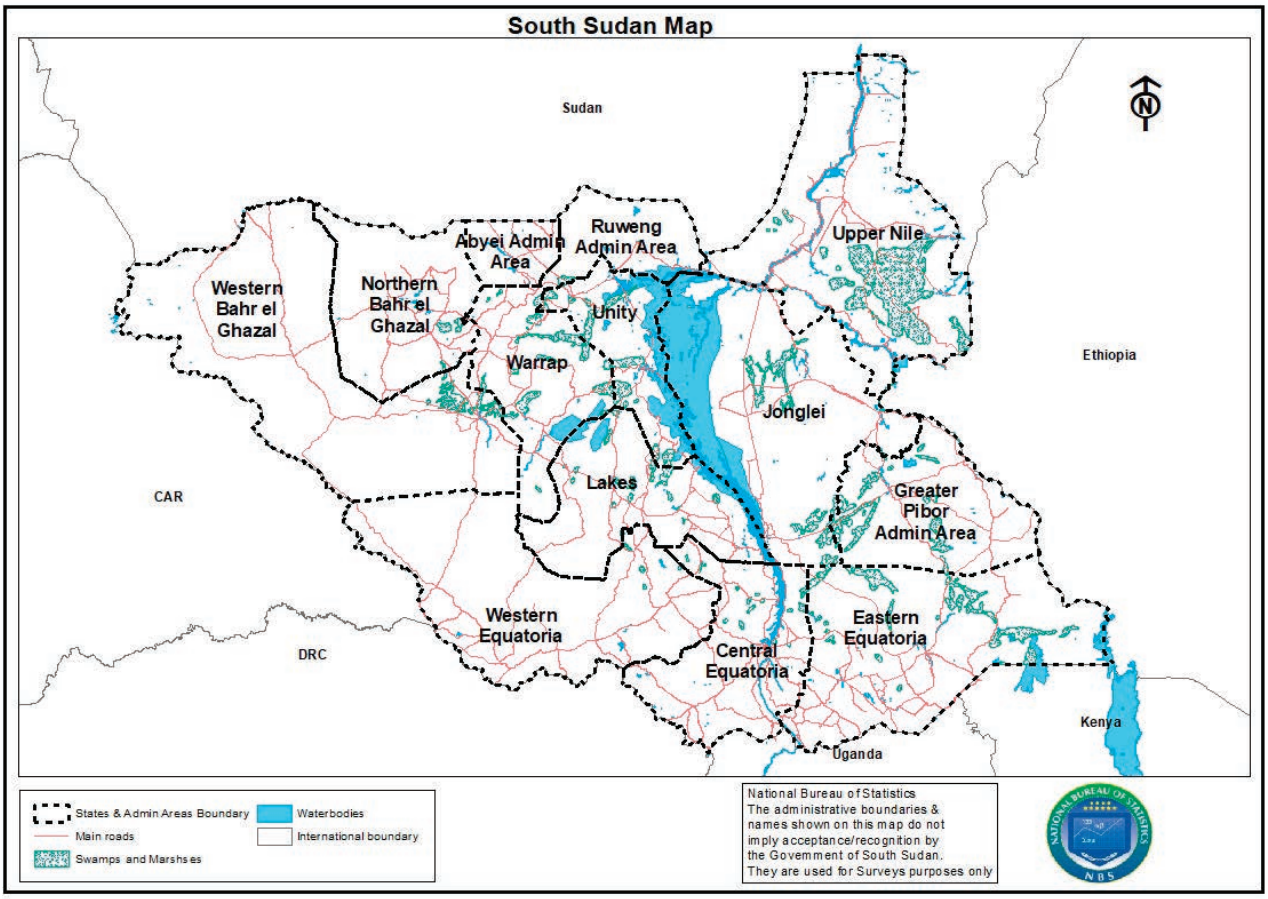
NAME OF THE SUPERVISOR: _____ DATE: _____

APPENDIX E: READING AND UNDERSTANDING TABLES FROM THE 2023 MALARIA INDICATOR SURVEY

The following section outline the organization and presentation of the tables in this report on the 2023 SSMIS, describing the background characteristics, explaining the denominators, and giving a summary of how the data is weighted using the weights from the sample design. This section also includes exercises to help the user understand and interpret SSMIS tables through practice.

The report is based **41** tables in total, and are presented at the end of each chapter rather than being embedded in the text. While the comments and figures in each chapter highlight some of the most important findings from the tables, not every finding can be presented or displayed graphically. For this reason, data users should be comfortable in reading and interpreting SSMIS tables.

MAP OF SOUTH SUDAN

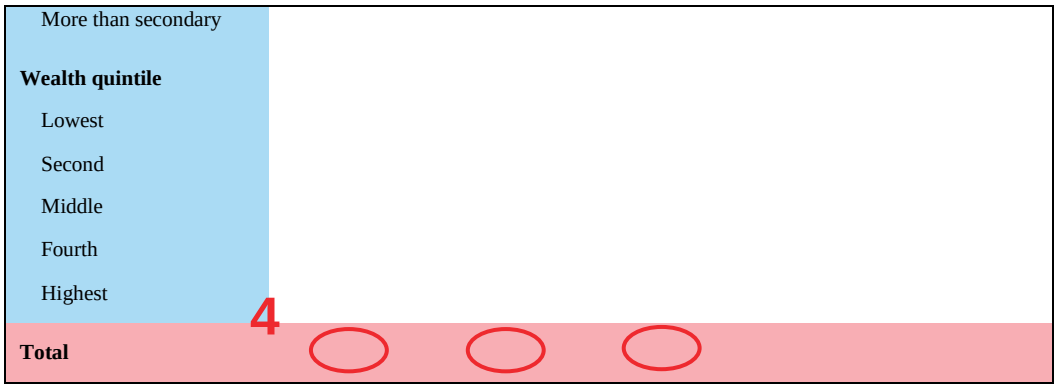


Example 1: Exposure to mass media
a question asked to all eligible respondents

Table 2.16: Exposure to mass media 1

Percentage of women who are exposed to specific media on a weekly basis, according to background characteristics, South Sudan MIS 2023

3 3 Background characteristics	Reads newspaper at least once a week	Watches television at least once a week	Uses all three media at least once a week	Uses none of the three media at least once a week	2 Number of women
Age					
15-19					
20-24					
25-29					
30-34					
35-39					
40-44					
45-49					
Residence					
Urban					
Rural					
State					
Upper Nile					
Jonglei					
Unity					
Warrap					
Northern B.G.					
Western B.G.					
Lakes					
Western E.Q.					
Central E.Q.					
Eastern E.Q.					
Education					
No education					
Primary					
Secondary					



Step 1: Read the title and subtitle—highlighted in orange in Example 1. They tell you the topic and the specific population group being described. In this case, the table is about Women aged 15-49 who are exposed to specific media on a weekly basis.

Step 2: Scan the column headings - highlighted in green in Example 1. They describe how the information is categorized. In this table, the first three columns of data show women who are exposed to different types of media at least once a week. The fourth column shows women who are exposed to all three types of media at least once a week, and the fifth column shows women who are exposed to none of the three types of media at least once a week. The last column shows the number of Women aged 15-49 who were interviewed during the survey.

Step 3: Scan the row headings - the first vertical column highlighted in blue in Example 1. These show the different ways the data are divided into categories based on population characteristics. In this case, the table presents women's exposure to media by age, residence, state, education, and wealth quintile. Most of the tables in the 2023 SSMIS report will be divided into these categories.

Step 4: Look at the row at the bottom of the table - highlighted in red in Example 1. These percentages represent the totals of Women aged 15-49 who were or were not exposed to different types of media. In this case, 6.4% of Women aged 15-49 read a newspaper at least once a week, while 47.4% watch television at least once a week and 14.5% listen to the radio at least once a week*.

Step 5: Draw two imaginary lines, as shown on the table, to find out what percentage of Women aged 15-49 with a primary education listen to the radio at least once a week. This shows that 9.7% of women with a primary education listen to the radio at least once a week.

By looking at patterns by background characteristics, we can see how exposure to mass media varies across South Sudan. Resources are often limited. Knowing how mass media exposure varies across groups can help program planners and policymakers determine how to use resources effectively.

(*) In this document, data are presented exactly as they appear in the table, including the number of decimals. However, in the remainder of this report figures will be rounded to the nearest whole percentage point.

Practice: Use the table in Example 1 to answer the following questions about women's exposure to mass media:

a) What percentage of women are not exposed to any of the three media at least once a week?

b) Compare women by residence—in which residence category is newspaper exposure the highest?

c) Is there a clear relationship between educational attainment and access to all three types of media at least once a week?

d) Is there a clear relationship between weekly television exposure and wealth quintile?

e) What is the range (minimum and maximum percentages) of women who are not exposed to any media by state?

Answer

a) 48.3%
b) Newspaper exposure is highest among women in XXX
c) Yes. Weekly access to all these types of media increase as education attainment increases XXX
d) Yes. The percentage of women watching television weekly increases with increasing wealth XXX
e) By state, the percentage of women who do not access any media at least one varies from XXX

Example 2: Use of mosquito nets by pregnant women

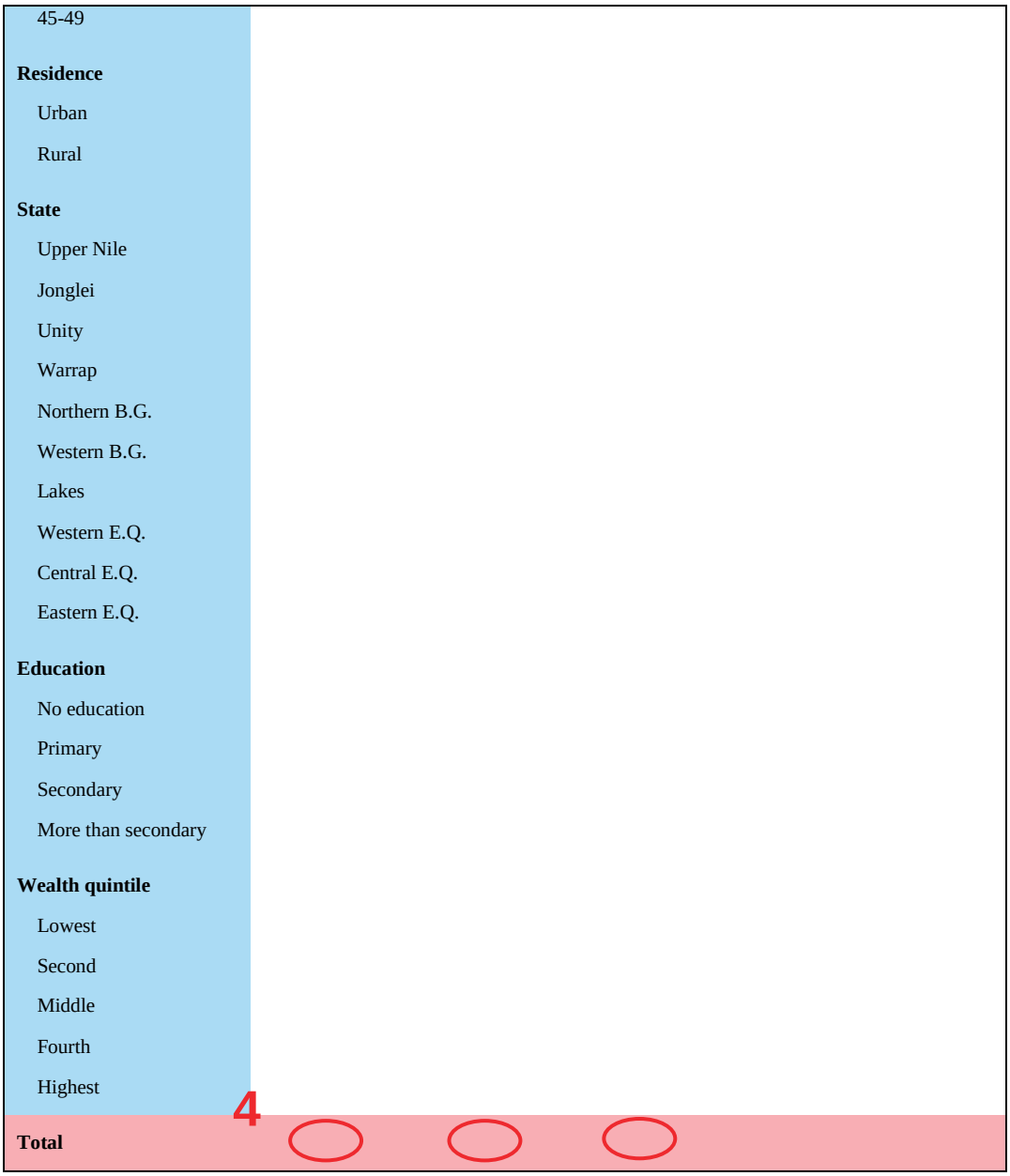
A Question Asked for a Subgroup of Survey Respondents

Table 3.7: Use of mosquito nets by pregnant women 1

Percentage of pregnant Women aged 15-49 who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey, and among pregnant Women aged 15-49 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, South Sudan MIS 2023 2

3

3 Background characteristics	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN last night	Number of children	Percentage who slept under an ITN last night	Number of children
Age					
15-19					
20-24					
25-29					
30-34					
35-39					
40-44					



Step 1: Read the title and subtitles. In this case, the table is about two separate groups: pregnant Women aged 15-49 in all households (a) and pregnant Women aged 15-49 in households with at least one ITN (b).

Step 2: Identify the two groups. First, identify the columns that refer to pregnant women in all households (a), and then isolate the columns that refer only to pregnant women in households with at least one ITN (b). The second panel is a subset of the first panel.

Step 3: Look at the first panel. How many pregnant Women aged 15-49 in all households were interviewed? 541. Now look at the second panel. How many pregnant Women aged 15-49 in households with at least one ITN were interviewed? 431.

Step 4: Look across the background characteristics rows and note any cells with asterisks or with percentages in parentheses. When pregnant Women aged 15-49 in all households and in households with at least one ITN are further divided into the background characteristic categories, there may be too few cases for the percentages to be reliable.

What percentage of pregnant women in all households with a higher education slept under a mosquito net last night? 68.2%. This percentage is in parentheses because there are between 25 and 49 pregnant Women aged 15-49 (unweighted) in this category. You should use this number with caution - it may not be reliable. (See Example 3 for more information on weighted and unweighted numbers.)

What percentage of pregnant women in all households in the Southwest region slept under an ITN the night before the survey? There is no number in this cell - only an asterisk. This is because fewer than 25 pregnant Women aged 15-49 were interviewed in the survey. The subgroup is too small, so the data are not reliable. Results for this group are not reported.

Note: When parentheses or asterisks are used in a table, the explanation will be noted under the table. If there are no parentheses or asterisks in a table, you can proceed with confidence that enough cases were included in all categories for the data to be reliable.

Example 3: Understanding Sampling Weights in SSMIS Tables

A sample is a group of people who have been selected for a survey. In the SSMIS, the sample is designed to represent the national population age 15-49. In addition to national data, most countries want to collect and report data on smaller geographical or administrative areas. However, doing so requires a minimum sample size per area. For the 2023 SSMIS, the survey sample is representative at the national and state levels and for urban and rural areas.

To generate statistics that are representative of the country as a whole and of the 10 states and 3 administrative areas (AA), the number of women surveyed in each state/AA should contribute to the size of the total (national) sample in proportion to size of the state/AA. However, if some areas have small populations, then a sample allocated in proportion to the population may not include sufficient women for analysis. To solve this problem, areas with small populations are oversampled. For example, let's say that you have enough money to interview 6,141 women and want to produce results that are representative of South Sudan as a whole and its states/AAs (as in Table 2.13). However, the total population of South Sudan is not evenly distributed among the states/AAs: some states are heavily populated (e.g. Warrap) while others are less populated (e.g. Western Bahr El Ghazal). Thus, Western Bahr El Ghazal must be oversampled.

To get reliable statistics, a sampling statistician determines how many women should be interviewed in each state/AA. The blue column (1) in the table above shows the actual number of women interviewed in each state/AA. Within the states, the number of women interviewed ranges from 275 in Jonglei to 851 in Upper Nile. The number of interviews is sufficient to get reliable results in each state/AA.

With this distribution of interviews, some areas are overrepresented, and some are underrepresented. For example, the population in Warrap state is 21.2% of the total population of South Sudan, but as shown in the

blue column, the number of women interviewed in Warrap state accounts for only 10.4% of the total sample of women interviewed (639/6,141). Meanwhile, the population in Western Bahr El Ghazal contributes only 4.5% of the country's population but the number of women interviewed accounts for 6.9% of the total sample of women interviewed (425/6,141). The unweighted distribution of women in the sample (21.2% for Warrap and 6.9% for Western Bahr El Ghazal) does not accurately represent the population.

To get statistics that are representative of South Sudan, the distribution of the women in the sample needs to be weighted (or mathematically adjusted) so that it resembles the true distribution in the country. Women from a small state, like Western Bahr El Ghazal, should contribute only a small amount to the national total. Women from a large state, like Warrap, should contribute much more. Therefore, statisticians mathematically calculate a "weight" that is used to adjust the number of women from each state so that each state/AA's contribution to the total sample is proportional to the actual population of the state/AA.

The numbers in the purple column (2) represent the "weighted" values. The weighted values can be smaller or larger than the unweighted values at the regional level. The total national sample size of 6,141 women has not changed after weighting, but the distribution of the women in the states has been changed to represent their contribution to the total population size.

How do statisticians weigh each category? They take into account the probability that a woman was selected in the sample. If you were to compare the green column (3) to the actual population distribution of South Sudan, you would see that women in each state/AA are contributing to the total sample with the same weight that they contribute to the population of the country. The weighted number of women in the survey now accurately represents the proportion of women who live in Warrap and the proportion of women who live in Western Bahr El Ghazal.

With sampling and weighting, it is possible to interview enough women to provide reliable statistics at national and state levels. In general, only the weighted numbers are shown in each of the 2023 SSMIS tables, so do not be surprised if these numbers seem low: they may represent a larger number of women interviewed.

13.