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Sierra Leone

Malaria Operational Plan FY 2022

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This FY 2022 Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans relies on the final FY 2022 appropriation from U.S. Congress. Any updates will be reflected in revised postings.

This document was prepared in the early months of 2021 as the COVID-19 pandemic continued to evolve worldwide, including in PMI-focus countries. The effects of the pandemic on malaria control and elimination work in 2022 are difficult to predict. However, because U.S. Congressional appropriations for PMI are specific to work against malaria and any appropriations for work against the COVID-19 are specific for that purpose and planned through separate future U.S. Government planning processes, this FY 2022 MOP will not specifically address the malaria-COVID-19 interface and will reassess any complementary work through timely reprogramming in countries.

CONTENTS

ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BMGF	Bill & Melinda Gates Foundation
CDC	U.S. Centers for Disease Control and Prevention
CHW	Community health worker
CRS	Catholic Relief Services
CY	Calendar year
DDMS	Department of Drugs and Medical Supplies
DHMT	District Health Management Team
DHS	Demographic and Health Survey
DP	Dihydroartemisinin-piperaquine
DPS	Directorate of Pharmaceutical Services
DQA	Data quality assessment
eLMIS	Electronic Logistics Management Information System
EPI	Expanded Program on Immunization
FCDO	UK Foreign, Commonwealth, and Development Office
FETP	Field Epidemiology Training Program
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
HLC	Human landing catch
HMIS	Health management information system
HSS	Health system strengthening
iCCM	Integrated community case management
IPTi	Intermittent preventive treatment for infants
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LMIS	Logistics Management Information System
M&E	Monitoring and evaluation
MBS	Malaria Behavior Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOHS	Ministry of Health and Sanitation
MOP	Malaria Operational Plan
MSCMS	Malaria Supply Chain Monitoring System
NMCP	National Malaria Control Program
NMESP	National Malaria Elimination Strategic Plan
NMSA	National Medical Supply Agency
OPD	Outpatient department
OR	Operational research

OTSS+	Outreach, Training, and Supportive Supervision Plus
PBO	Piperonyl butoxide
PE	Program evaluation
PHU	Peripheral health center
PMI	U.S. President's Malaria Initiative
PSC	Pyrethrum spray catch
QA/QC	Quality assurance/quality control
RAS	Rectal artesunate suppository
RBM	Roll Back Malaria Partnership to End Malaria
RDQA	Routine data quality assessment
RDT	Rapid diagnostic test
RMCH	Reproductive, Maternal, and Child Health Unit
RRIV	Report, Request, and Issue Voucher
SARA	Service Availability and Readiness Assessment
SBC	Social and behavior change
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal malaria chemoprevention
SOP	Standard operating procedure
SP	Sulfadoxine-pyrimethamine
TA	Technical assistance
TBA	Traditional birth attendant
TES	Therapeutic efficacy studies
TWG	Technical working group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

EXECUTIVE SUMMARY

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Sierra Leone to end malaria. PMI has been a proud partner of Sierra Leone since 2017, helping to decrease child death rates by 22 percent through investments totaling almost $74.5 million.

The proposed PMI fiscal year (FY) 2022 budget for Sierra Leone is $14.5 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Sierra Leone using FY 2022 funds. Developed in consultation with the National Malaria Control Program (NMCP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Sierra Leone as well as other donors and partners.

With stable and perennial transmission, malaria is endemic throughout the whole country of Sierra Leone. There are two malaria transmission peaks, one at the beginning of the rainy season in May and the second toward the end of the rainy season in October. The entire population of 8.1 million is at risk of malaria, however children under five years of age and pregnant women are the most vulnerable populations, both in terms of morbidity and mortality. According to the 2020 Malaria Performance Review the all-cause under-five mortality rate decreased from 156 per 1,000 live births in 2014 to 122 per 1,000 live births in 2019. The annual incidence rate of confirmed cases increased from 270 per 1,000 in 2014 to 297 per 1,000 in 2019 due largely to the increase of routine reporting and the scale of integrated community case management (iCCM) which increased access to diagnosis in rural and hard to reach communities.

PMI will support investments in the following intervention areas with FY 2022 funds:

Vector Control

Entomological Monitoring: Key pillars within NMCP's vector control strategy are to strengthen capacity in entomology surveillance, conduct insecticide resistance monitoring, and evaluate vector bionomics. PMI is building capacity within the NMCP by supporting knowledge and skills to implement an informed and evidence-based vector control program. PMI collaborates with NMCP conducting entomological and insecticide resistance monitoring programs in five districts and maintains an insectary and a colony of susceptible *An. gambiae*, recruiting and training entomological staff and supporting laboratory analyses of collected specimens. PMI supports the malaria vector control and integrated vector management technical working groups (TWGs). PMI also provides entomological technical assistance (TA) to assist with training and monitors planning and implementation of vector control activities.

Insecticide-Treated Nets (ITNs): The NMCP supports universal access to ITNs for all households primarily through mass campaigns conducted every three years and reinforced through routine distribution channels—at the first antenatal care (ANC) visit for pregnant women and at the third Expanded Program on Immunization (EPI) visit for children. With FY 2022 funding, PMI will procure 333,000 ITNs for routine, continuous distribution and will support the distribution through these channels. Using insecticide resistance data derived from PMI funded entomological surveillance, PMI will purchase the most appropriate type of ITN with consideration given

to purchasing next-generation bed nets such as the Interceptor® G2. With NMCP, PMI will continue to conduct a three- year ITN durability monitoring study of 2020 mass campaign piperonyl butoxide (PBO) ITNs.

Indoor Residual Spraying (IRS): PMI will support NMCP to conduct an IRS campaign in two districts with FY 2022 funding, including operational support to the NMCP and the Ministry of Health and Sanitation (MOHS) for planning, procurement of insecticides, payment of spray operators, environmental compliance, community mobilization, epidemiological and entomological monitoring, and community mobilization activities. IRS implementation will be guided by best practices and expertise in the field. In addition, PMI will support the NMCP in a systematic assessment of the malaria and vector control impact of co-deployment of IRS in setting of universal PBO ITN distribution.

Human Health

Case Management: PMI will build upon its current support to the NMCP at the national level to ensure the treatment guidelines and standard operating procedures (SOPs) of all MOHS directorates are aligned with the NMCP. With FY 2021 and FY 2022 funding, PMI will expand the full package of facility-based service delivery activities to a total of 10 districts. Also with FY 2022 funding, PMI will support the scale-up of the iCCM program to these 10 districts through support for community health worker (CHW) training and supervision. Severe malaria case management will be emphasized at the facility and in the community, with support for rectal artesunate implementation in all 16 districts.

Drug Based Prevention: With FY 2021 and FY 2022 funding, PMI will scale up malaria in pregnancy (MIP) activities to 10 districts providing a comprehensive package of training in the updated MIP guidelines and ongoing supportive supervision to health providers including health facility staff, CHWs and traditional birth attendants (TBAs), midwives, and public and private sector hospital staff. PMI will also provide support for strengthening MIP activities in Western Rural and Western Urban Areas with refresher training for health facility staff on ANC and MIP. Additionally, PMI will continue to support the MIP TWG, co-chaired by NMCP and Reproductive Health Directorate, to meet, update policies and guidelines, review and use data for decision-making, and address bottlenecks and challenges.

Cross-Cutting and Other Health Systems

Supply Chain: PMI supports the procurement of malaria commodities and provides TA for strengthening the supply chain system including improving forecasting and supply planning of commodities, warehousing, distribution, and logistics management information system (LMIS). With FY 2022 funding, PMI's interventions will build off of previously implemented activities based on the current country's supply chain challenges and priorities, best practices, and innovative approaches that have the potential to transform the supply chain. These interventions will continue to provide the Sierra Leone health supply chain system with capabilities such as availability of policies, guidelines, and strategic documents; automated data capture; end-to-end visibility; and an efficient distribution system focusing on the district and health facility levels.

Specifically PMI's support will be focused on the following key areas:

- Strengthening capacity of Malaria Quantification TWG; annual national stock validation and quantification and district forecasting exercise
- Revising standard operating procedures by Department of Drugs and Medical Supplies (DDMS)/National Medical Supply Agency (NMSA)/district medical stores

- Facilitating malaria supply chain monitoring/quality control checks at selected peripheral health units (PHUs)
- Providing TA to ensure uninterrupted functioning of LMIS and reduction of stockout of malaria commodities
- Supporting the integration of national DHIS and LMIS platforms

Surveillance, Monitoring, and Evaluation (SM&E): The NMCP's SM&E strategic objective is to strengthen surveillance, monitoring, evaluation, and operational research for effective program management. With FY 2022 funding, PMI will continue supporting existing initiatives. PMI will support NMCP's aim to strengthen malaria surveillance and use of malaria information to improve decision-making for program performance, while further decentralizing data management down to the chiefdom level. PMI will focus on improving malaria data quality and timeliness by strengthening the capacity and infrastructure at the district and chiefdom levels, including appropriate use of data for decision-making, and supportive supervisions from districts to health facilities. At the national level, PMI will support the NMCP SM&E team and Department of Policy, Planning, and Information.

Program Evaluation (PE) and Operational Research (OR): Currently, PMI is working with the NMCP on a study to evaluate the impact of co-deploying next-generation PBO ITNs and IRS on entomological and malaria health indicators in comparison to next-generation PBO ITNs as a stand-alone intervention. This research is planned in the Bombali and Bo districts; entomological data collection began in the summer of 2020 and will continue through spring 2021. With FY 2022 funding, PMI will evaluate the potential impact of house screening as an alternative and complementary vector control intervention.

Social Behavioral Change (SBC): PMI has supported the collection of robust formative data on community and facility-level behaviors and influencing factors to improve programming for SBC. With FY 2022 funds, PMI will support the development and implementation of SBC programming and materials that promote uptake for the prioritized behaviors of prompt care-seeking, early and regular ANC attendance, and intermittent preventive treatment for pregnant women (IPTp) targeting multiple stakeholders using multiple approaches deemed most appropriate for addressing behavioral factors. PMI will continue to support capacity-building at the national and district levels through continued engagement with the global Roll Back Malaria (RBM) Partnership to End Malaria SBC working group; provide support for national and district SBC coordination mechanisms; and provide support for NMCP participation in conferences and workshops. With FY 2022 funds, PMI will increase support for SBC implementation with the expansion of activities into one additional district.

Other Health Systems Strengthening (HSS): PMI is aligned with and supports the NMCP's objectives for capacity-building and cross-cutting needs. PMI coordinates closely with other United States Government (USG) partners in HSS and capacity-building efforts. Assuming the return of Peace Corps volunteers in late 2021, PMI will support volunteers in community-based malaria programming through the provision of small project grants during the time period covered by FY 2022 with pipeline funding from previous fiscal years. Third-year volunteers (if available) will be identified to assist with carrying out dedicated malaria projects, working closely with PMI implementing partners. With FY 2022 funding, PMI will invest in the CDC's Field Epidemiology Training Program (FETP) to increase Sierra Leone's scientific and public health capacity.

I. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Sierra Leone to end malaria. PMI has been a proud partner of Sierra Leone since 2017, helping to decrease child death rates by 22 percent through investments totaling almost $74.5 million.

The proposed PMI fiscal year (FY) 2022 budget for Sierra Leone is $14.5 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Sierra Leone using FY 2022 funds. Developed in consultation with the National Malaria Control Program (NMCP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Sierra Leone as well as other donors and partners.

Sierra Leone at a Glance

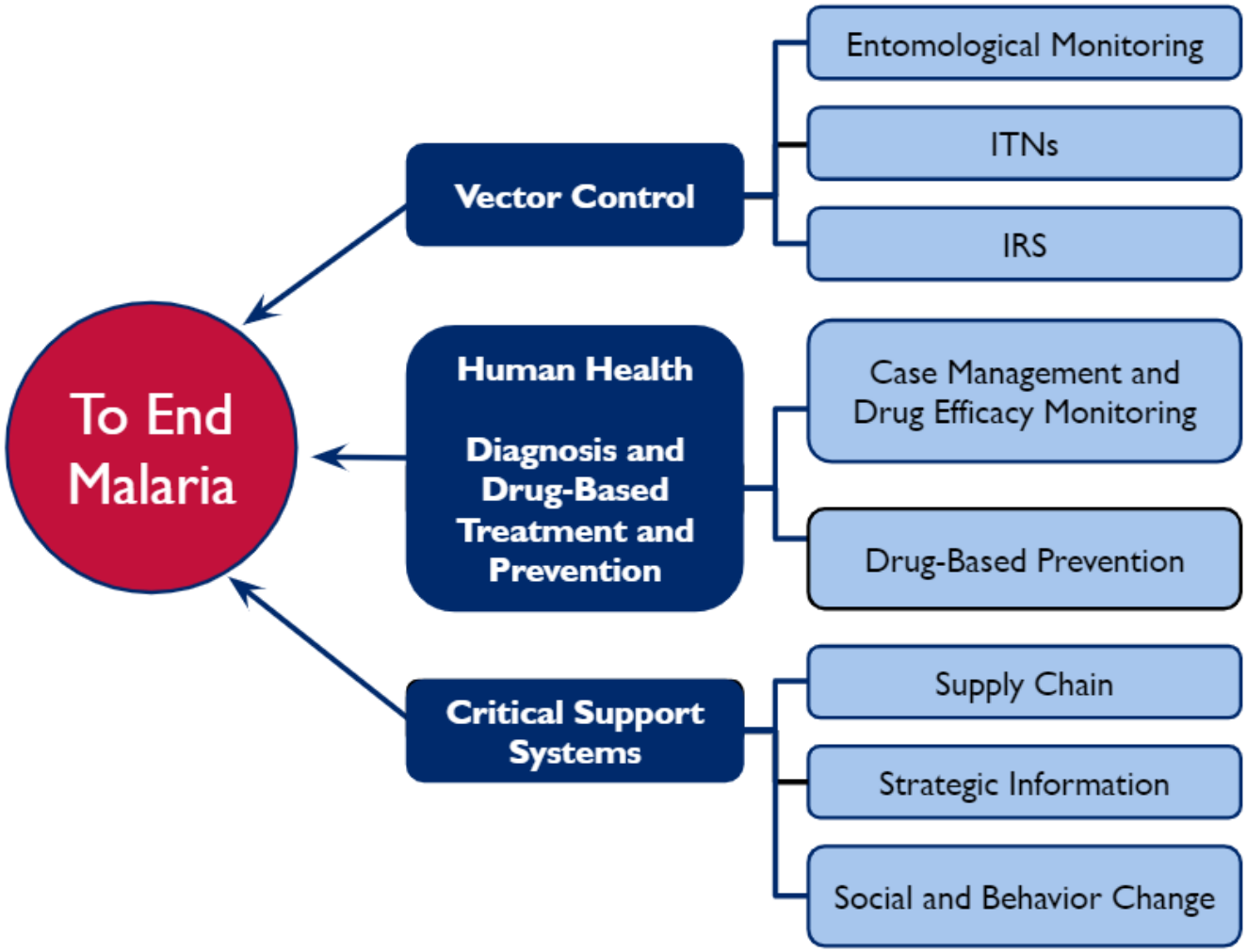
- **Geography:** Located along the Atlantic Ocean in West Africa with a land area of 71,740 square kilometers. It is bordered in the North and East by Guinea and in the South by Liberia.
- **Climate and Malaria Transmission Seasonality:** Tropical climate with two distinct seasons: dry season and rainy season. Dry season spans from November to April and the rainy season from May to October, with heavy rains in July/August. The country has an average annual rainfall of approximately 320 cm and humidity ranging from 60 percent to 90 percent. All geographic areas in Sierra Leone are favorable to malaria transmission, which is stable and perennial. The country's malaria transmission has two peaks, one at the beginning of the rainy season in May and the second toward the end of the rainy season in October/November.
- **Population in 2021:** 8.1 million (United Nations Population Fund, 2021)
- **Population at Risk of Malaria:** 100% (WHO, 2017)
- **Principal Malaria Parasites:** *P. falciparum* (WHO, 2017)
- **Principal Malaria Vectors:** *An. gambiae* s.l.*, An. funestus* (WHO, 2017; Sierra Leone National Malaria Elimination Strategic Plan [NMESP] 2021–2025, 2021)
- **Malaria Case Incidence per 1,000 Population:** 297 (Sierra Leone NMESP 2021–2025, 2021)
- **Under-Five Mortality Rate:** 122 deaths per 1,000 live births (Sierra Leone Demographic and Health Survey [DHS] 2019, 2020)
- **World Bank Income Classification and Gross Domestic Product (GDP):** Low-income country with a per capita GDP of $527.50 (The World Bank, 2019)
- **Government Health Budget:** $168 million (Global Fund, 2020)
- **Trafficking in Persons Designations, 2018–2020:** Tier 2 (U.S. Department of State, 2020) (https://www.state.gov/reports/2020-trafficking-in-persons-report/sierra-leone/)
- **Malaria Funding and Program Support Partners Include:**

- U.S. President's Malaria Initiative (PMI)
- Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund)
- World Health Organization (WHO)
- UK Foreign, Commonwealth, and Development Office (FCDO)
- Catholic Relief Services (CRS)
- United Nations Children's Emergency Fund (UNICEF)
- The World Bank

- **PMI Support of National Malaria Control Strategy:** PMI supports the National Malaria Control Program (NMCP) policy and strategy in the implementation of proven antimalarial interventions. The purchase of antimalarial commodities for the diagnosis and treatment of malaria, insecticide-treated nets (ITN) distribution, and prevention of malaria in pregnancy are among PMI-supported interventions implemented throughout Sierra Leone. In addition, PMI provides focused programming support in 10 (of 16 total) high-burden districts (Bo, Bomboli, Falaba, Kailahun, Karene, Kenema, Koinadugu, Kono, Port Loko, and Pujehun) by implementing intensive supportive supervision and training to peripheral health units and CHWs for malaria case management and malaria in pregnancy, systematically evaluating malaria behaviors to inform national strategy and through improvements to health management information system (HMIS) data collection and use by district health management teams (DHMTs). PMI supports monthly entomological surveillance and analysis in five sentinel districts to inform vector control initiatives. (See III. Overview of PMI's support of Sierra Leone's Malaria Control Strategy for additional details.)
- **PMI Investments:** Sierra Leone began implementation as a PMI-focus country in FY 2017. The proposed FY 2022 PMI budget for Sierra Leone is $14.5 million; this brings the total PMI investment to nearly $74.5 million.

PMI organizes its investments around the activities below, in line with the Sierra Leone national malaria strategy [2021–2025].

Figure 1. PMI's approach to end malaria[1]



Building and strengthening the capacity of Sierra Leone's people and institutions—from the central level to communities—to effectively lead and implement evidence-based malaria control and elimination activities is paramount to PMI. The majority of PMI's planned support for FY 2022, across the areas of vector control, human health, and critical support systems such as supply chain, contains elements of skills-building and system strengthening. PMI/Sierra Leone will continue to rely on and engage with local partners such as Clinton Health Access Initiative, Concern Worldwide, Crown Agents Sierra Leone, CRS, and UNICEF and is expanding its local partner base to reach new districts and atypical members of the health sector like traditional healers. Finally, PMI/Sierra Leone will continue to rely on private sector partnerships such as nongovernmental health providers like private hospitals and pharmacies.

[1]A number of actions are cross-cutting in nature. For example, social and behavioral change (SBC) is embedded in all vector control and human health work; program evaluation (PE) and operational research (OR) are relevant in all of the fieldwork; finance and management support and the introduction of new tools/interventions are critical for all programs; and elimination requires work across the full spectrum of transmission.

The activities proposed in this MOP are tailored to draw on these strengths and address weaknesses; activities will be monitored to evaluate the effectiveness of capacity-building efforts. In addition, while PMI understands it will take time for Sierra Leone to fully finance its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Sierra Leone's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND PROGRESS

All geographic areas of Sierra Leone are favorable to malaria transmission, which is stable and perennial. *Plasmodium falciparum* is the most common malaria parasite, responsible for more than 90 percent of malaria cases in the country. Although all age groups are at risk of malaria, pregnant women and children under five years of age (constituting 4.4 percent and 17.2 percent of the total population, respectively) are the most vulnerable groups (NMESP 2021–2025). Malaria is considered a major impediment to socioeconomic development, leading to poverty. The malaria parasitemia prevalence estimates in children under five years of age were 53 percent and 40 percent using rapid diagnostic test (RDT) and microscopy, respectively (Figure 2, Malaria Indicator Survey [MIS] 2016). All areas of Sierra Leone except for Western Area Urban district (Freetown) have high levels of malaria prevalence (Figure 3).

Figure 2. Trends in malaria prevalence

Children 6 to 59 months of age who tested positive for malaria by microscopy/RDT [MIS/2016]

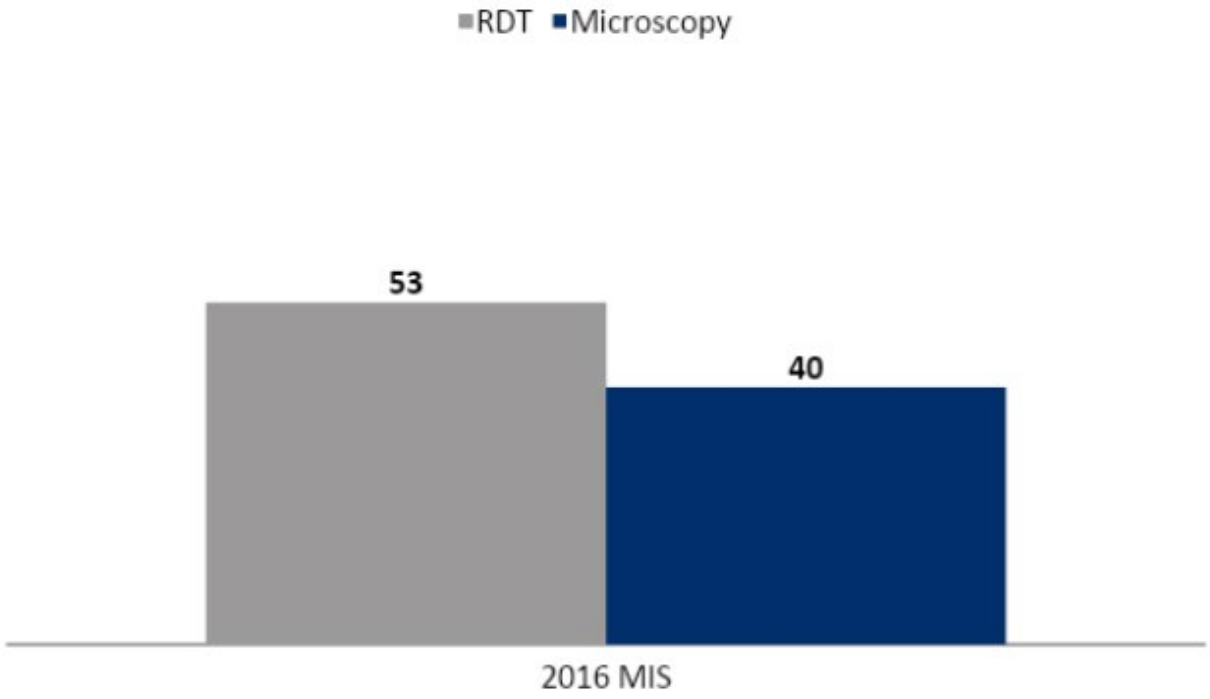


Figure 3. Malaria prevalence by geographic area

Children 6 to 59 months of age who tested positive for malaria by microscopy [MIS/2016]

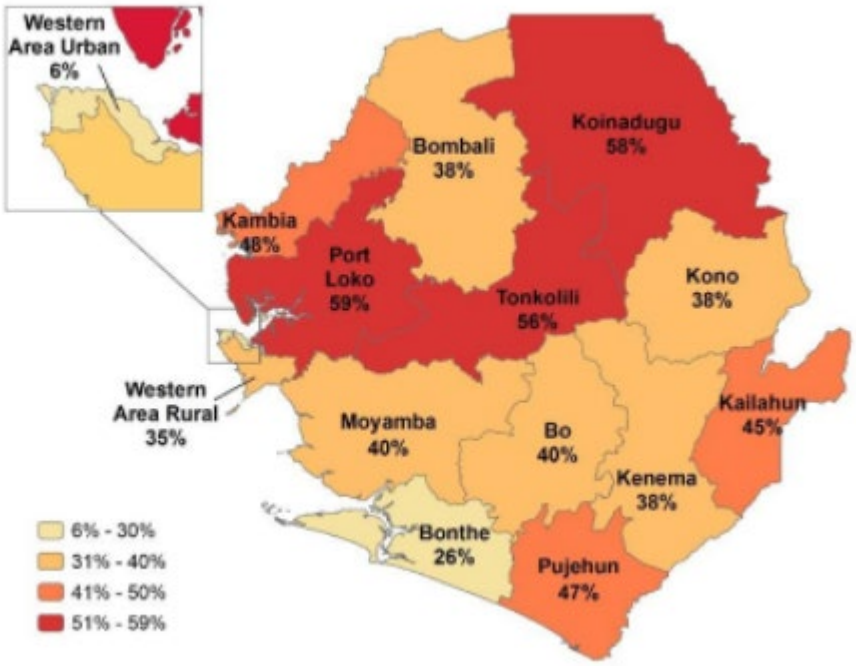


Table 1. Key indicators from demographic health surveys (DHS) and malaria indicator surveys (MIS)

Indicator	2016 MIS	2019 DHS
% Households with at least one ITN	60	60
% Households with at least one ITN for every two people	16	21
% Population with access to an ITN	37	47
% Population that slept under an ITN the previous night	39	51
% Children under five years of age who slept under an ITN the previous night	44	59
% Pregnant women who slept under an ITN the previous night	44	64
% Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought	71	75
% Children under five years of age with a fever in the last two weeks who had a finger or heel stick	51	61
% Children receiving an ACT among children under five years of age with a fever in the last two weeks who received any antimalarial drug	97	32
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	71	74
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	31	36
Under-five mortality rate per 1,000 live births	N/A	122
% Children under five years of age with parasitemia by microscopy	40	N/A
% Children under five years of age with parasitemia by RDT	53	N/A
% Children under five years of age with severe anemia (Hb<8gm/dl)	10	7

Table 2. Evolution of key malaria indicators reported through routine surveillance systems

Indicator	2016	2017	2018	2019	2020
# Suspect malaria cases[1]	3,633,275	3,807,161	4,011,921	3,939,150	3,501,655
# Patients receiving diagnostic test for malaria[2]	3,596,227	3,760,405	3,996,065	3,905,728	3,427,391
Total # malaria cases[3]	2,416,035	2,258,498	2,436,413	2,450,764	2,147,976
# Confirmed cases[4]	2,260,056	2,234,230	2,400,159	2,391,708	2,078,749
# Presumed cases[5]	155,979	24,268	36,254	59,056	69,227
% Malaria cases confirmed[6]	94%	99%	99%	98%	97%
Test positivity rate (TPR)[7]	63%	59%	60%	61.2%	60.7%
Total # under five years of age malaria cases[8]	1,523,262	1,416,356	1,395,797	1,419,554	1,136,306
% Cases in children under five years of age[9]	63%	63%	57%	58%	53%
Total # severe cases[10]	27,221	13,315	34,834#	41,939	34,148
Total # malaria deaths[11]	1345	1298	1348	1,476	1,565
# Facilities reporting[12]	1242	1262	1279	1365	1430
% Data completeness[13]	98%	99%	99%	94%	93%

1. Number of patients presenting with signs or symptoms possibly due to malaria (e.g., fever). 2. RDT or microscopy, all ages, outpatient and inpatient. 3. Total reported malaria cases; all ages, outpatient and inpatient, confirmed and unconfirmed cases. 4. Diagnostically confirmed; all ages, outpatient and inpatient. 5. Clinical/presumed/unconfirmed; all ages, outpatient and inpatient. 6. # confirmed cases divided by total # cases. 7. Confirmed cases divided by # patients receiving a diagnostic test for malaria (RDT or microscopy). 8. Outpatient and inpatient, confirmed and unconfirmed. 9. Total # under five years of age cases divided by total # of cases. 10. Total # malaria cases, inpatient. 11. All ages, outpatient, inpatient, confirmed, and unconfirmed. 12. Total # of health facilities reporting data into the HMIS/DHIS2 system that year. 13. # monthly reports from health facilities divided by # health facility reports expected

III. OVERVIEW OF PMI'S SUPPORT OF SIERRA LEONE'S MALARIA STRATEGY

The NMESP 2021–2025 supports improvement of the health status of the population and the fight against poverty by reducing the country's burden due to malaria. The NMCP's overall vision is "access to malaria control interventions for all" with the mission to "direct and coordinate efforts toward a malaria-free Sierra Leone through effective partnerships." By the end of 2025, the NMESP's goal is to contribute significantly to the improvement of the wellbeing of the population by reducing the malaria burden. To reach this goal the NMESP includes the following objectives:

Objective 1: By end of 2025, reduce malaria mortality rates by at least 75 percent from 2015 rates.

Objective 2: By end of 2025, reduce malaria case incidence by at least 75 percent from 2015 rates.

Objective 3: By 2025, 90 percent of the population practice at least three recommended malaria prevention and control behaviors.

Objective 4: Strengthen malaria surveillance and use of malaria information to improve decision-making for program performance.

Objective 5: Ensure timely and adequate supply of quality-assured malaria commodities to public and private health facilities at all levels by 2025.

Objective 6: By 2025, strengthen and maintain capacity for program management, coordination, and partnership to achieve malaria program performance at all levels.

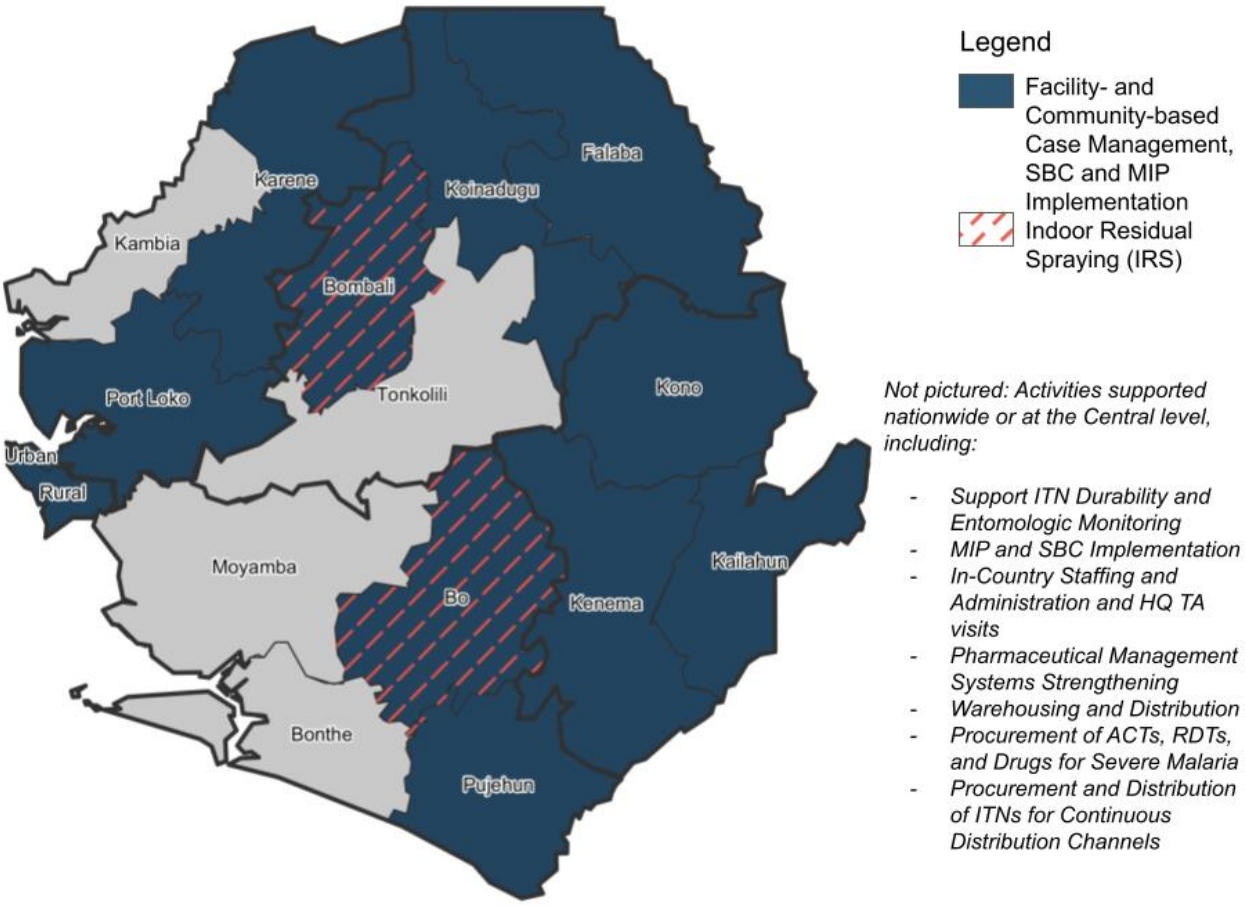
Objective 7: Improve mobilization of resources and maximize the efficient use of available resource for greater public health impact by 2025.

The two primary donors in Sierra Leone in the malaria sector are PMI and Global Fund, who coordinate closely with the NMCP and each other. Contributions are made to fill identified gaps and to share costs in support of the NMCP and the objectives of the NMESP 2021–2025. Investments by PMI and Global Fund reach all areas of Sierra Leone and are generally divided by thematic areas as opposed to geographic splitting. In consultation with NMCP, some PMI activities have focused in certain districts, but over time, engagement and investment has expanded to an increasing number of districts. The table below shows the PMI and Global fund coverage by district for select malaria interventions. These include the direct support to DHMTs in 10 of the 16 districts for the improvement of malaria control activities. These 10 districts are Bo, Bomboli, Falaba, Kailahun, Karene, Kenema, Koinadugu, Kono, Port Loko, and Pujehun. On a monthly basis routine entomological surveillance and insecticide resistance monitoring take place in five districts: Bo, Bomboli, Kono, Port Loko, and Western Area Rural. A new major vector control intervention of IRS began implementation in Bo and Bomboli districts in 2021. Decisions about where to invest and implement are made through a close consultative process with the NMCP and will shift over time based on epidemiology and changing needs.

Table 3. PMI and Global Fund coverage by district for select malaria interventions, 2020

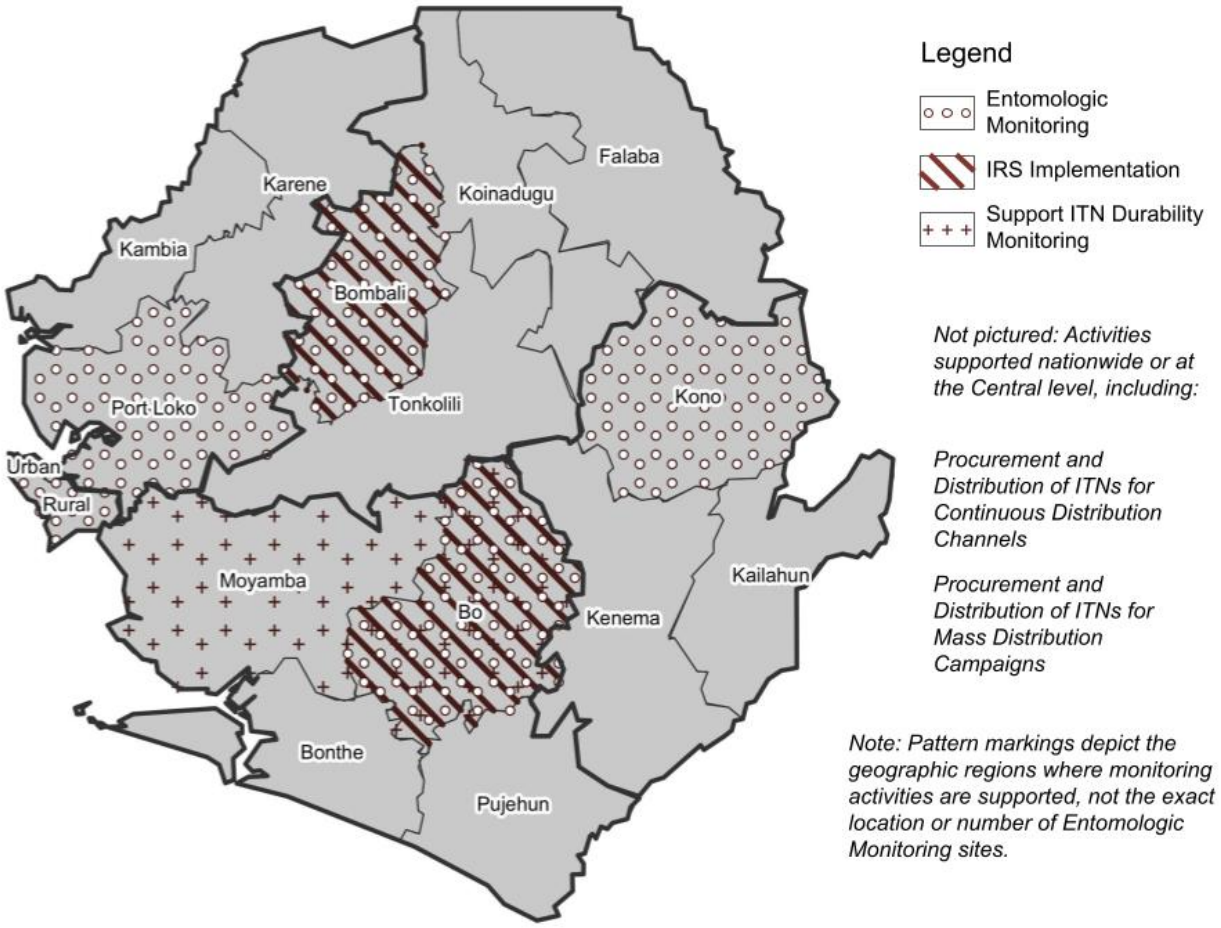
District	Routine Entomological Surveillance	ITN Distribution	DHMT Service Delivery and MIP	Malaria Commodities	Malaria SBC Activities
Bo	PMI	Global Fund/PMI	PMI	Global Fund/PMI	Global Fund/PMI
Bombali	PMI	Global Fund/PMI	PMI	Global Fund/PMI	Global Fund
Bonthe		Global Fund/PMI		Global Fund/PMI	Global Fund
Falaba		Global Fund/PMI	PMI	Global Fund/PMI	Global Fund
Kailahun		Global Fund/PMI	PMI	Global Fund/PMI	Global Fund
Kambia		Global Fund/PMI		Global Fund/PMI	Global Fund
Karene		Global Fund/PMI	PMI	Global Fund/PMI	Global Fund
Kenema		Global Fund/PMI	PMI	Global Fund/PMI	Global Fund
Koinadugu		Global Fund/PMI	PMI	Global Fund/PMI	Global Fund/PMI
Kono	PMI	Global Fund/PMI	PMI	Global Fund/PMI	Global Fund
Moyamba		Global Fund/PMI		Global Fund/PMI	Global Fund
Port Loko	PMI	Global Fund/PMI	PMI	Global Fund/PMI	Global Fund/PMI
Pujehun		Global Fund/PMI	PMI	Global Fund/PMI	Global Fund/PMI
Tonkolili		Global Fund/PMI		Global Fund/PMI	Global Fund
Western Rural	PMI	Global Fund/PMI		Global Fund/PMI	Global Fund
Western Urban		Global Fund/PMI		Global Fund/PMI	Global Fund

Figure 4. PMI-supported activities in Sierra Leone



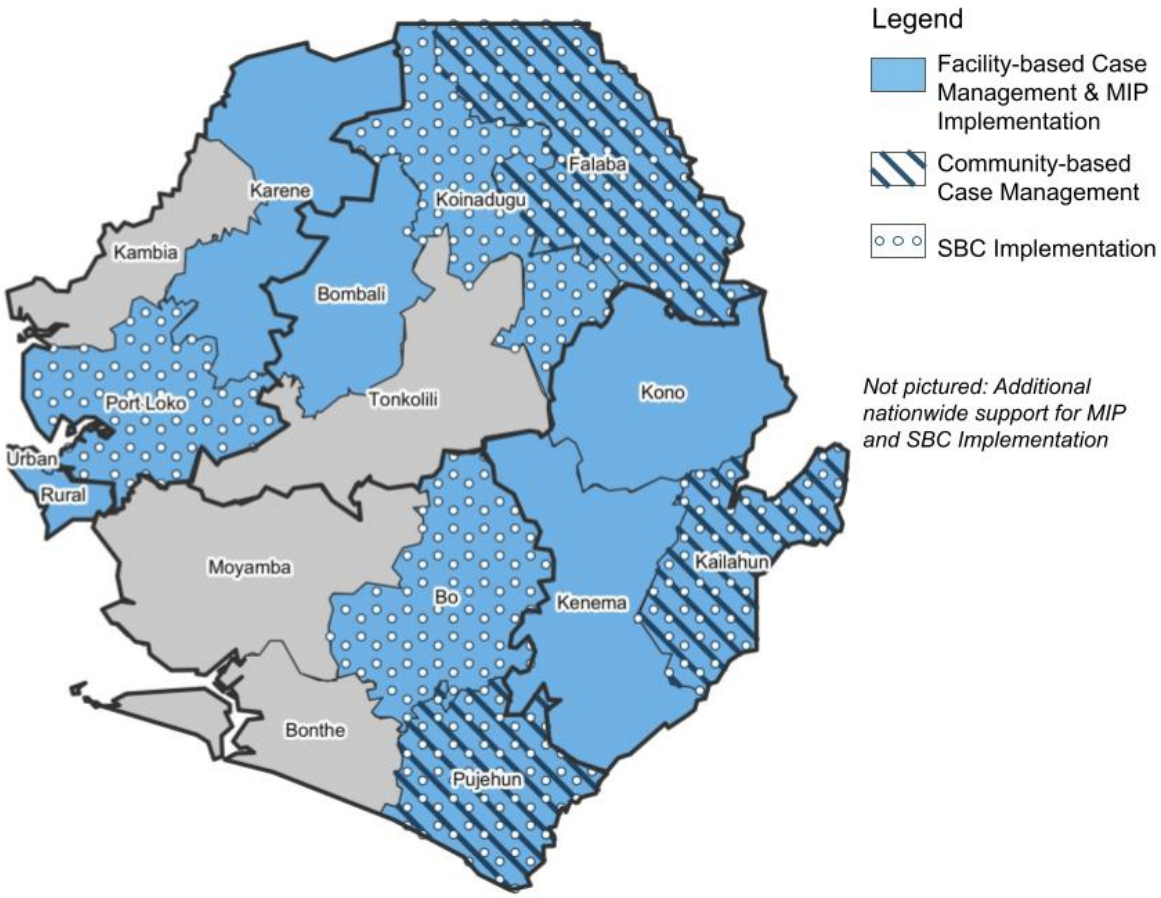
Source: Sierra Leone MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

Figure 5. PMI-supported vector control activities in Sierra Leone



Source: Sierra Leone MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

Figure 6. PMI-supported service delivery and social and behavior change activities in Sierra Leone



Source: Sierra Leone MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

IV. PARTNER FUNDING LANDSCAPE

PMI emphasizes the importance of partner alignment for malaria control, recognizing that different partners bring complementary expertise and resources. In recent years, PMI, the Global Fund, and the Bill & Melinda Gates Foundation (BMGF) have harmonized financial, supply chain, and programmatic data. In particular, PMI and the Global Fund agreed to a harmonized financial taxonomy to aid comparison of our investments to better identify potential overlap or gaps.

Due to the U.S. Government fiscal year budget cycle and approximate timing of annual appropriations, PMI MOP resources fund activities that largely occur during the following fiscal year. For example, this FY 2022 MOP is anticipated to largely fund implementation of activities starting in 2023. Global Fund resources are based on the calendar year (CY) and planned for a three-year grant cycle. Most partner country governments and other partners also budget based on the calendar year.

The tables below summarize contributions by key external partners and partner country governments in calendar years 2020–2022, providing insight into total country investments. Because new grants funded through the Global Fund 2021–2023 grant cycle are just beginning, or will begin later in 2021, Global Fund country investments may still evolve in some countries. The partner country government invests substantial funding into the national-to-local infrastructure and service delivery that benefits malaria programs and many others. However, it is not always possible to attribute funding for malaria specifically from the partner country government without a standardized method. There may be similar challenges for attributing other partner funds.

Table 4a. Annual budget by Level 1 category for FY 2019/CY 2020

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$8.0M	$3.7M	$0.5M	$0.6M	$0.5M	$1.7M	$15.0M
Global Fund	$0	$0	$0	$0	$0.0M	$1.3M	$1.3M
Total Per Category	$8.0M	$3.7M	$0.5M	$0.6M	$0.5M	$3.0M	$16.3M

Table 4b. Annual budget by Level 1 category for FY 2020/CY 2021

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$6.8M	$4.0M	$0.6M	$0.9M	$0.6M	$2.2M	$15.0M
Global Fund	$0	$0	$0	$0	$0.0M	$0.5M	$0.5M
Total Per Category	$6.8M	$4.0M	$0.6M	$0.9M	$0.6M	$2.7M	$15.5M

Table 4c. Annual budget by Level 1 category for FY 2021/CY 2022

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$6.3M	$3.9M	$0.5M	$0.8M	$0.6M	$2.5M	$14.5M
Global Fund	$0	$0	$0	$0	$0	$0	$0.0M
Total Per Category	$6.3M	$3.9M	$0.5M	$0.8M	$0.6M	$2.5M	$14.5M

1. Drug-based prevention, including seasonal malaria chemoprevention (SMC) and MIP where applicable. 2. Covers management of in-country warehousing and distribution of malaria commodities, except for ITNs, which are separately captured under Vector Control. 3. HSS = health systems strengthening.

Table 5a. Annual budget, breakdown by commodity, FY 2019/CY 2020

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$0.9M	$0	$6.0M	$0.2M	$0.6M	$0.8M	$0	$0	$8.5M
GF[3]	$0	$0	$0	$0	$0	$0	$0	$0	$0.0M
Total	$0.9M	$0.0M	$6.0M	$0.2M	$0.6M	$0.8M	$0.0M	$0.0M	$8.5M

Table 5b. Annual budget, breakdown by commodity, FY 2020/CY 2021

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$0.4M	$0	$2.5M	$0.8M	$0.7M	$0	$0	$0	$4.3M
GF[3]	$0	$0	$0	$0	$0	$0	$0	$0	$0.0M
Total	$0.4M	$0.0M	$2.5M	$0.8M	$0.7M	$0.0M	$0.0M	$0.0M	$4.3M

Table 5c. Annual budget, breakdown by commodity, FY 2021/CY 2022

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$1.2M	$0	$1.9M	$0.6M	$0.7M	$0.9M	$0	$0	$5.3M
GF[3]	$0	$0	$0	$0	$0	$0	$0	$0	$0.0M
Total	$1.2M	$0.0M	$1.9M	$0.6M	$0.7M	$0.9M	$0.0M	$0.0M	$5.3M

Note: Categories reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative but may continue to evolve. 1. IRS insecticide: for PMI, commodity costs may be inextricable from IRS implementation costs in historical data – field identified as ND where this is the case. 2. PMI commodity costs are fully loaded, including costs for the ex-works price of the commodity, quality control, freight, insurance, and customs. 3. Global Fund commodity costs in the table above only include ex-works commodity value.

V. ACTIVITIES TO BE SUPPORTED WITH FY 2022 FUNDING

The FY 2022 budget tables contain a full list of activities that PMI proposes to support in Sierra Leone with FY 2022 funding. Please visit www.pmi.gov/resource-library/mops for these FY 2022 budget tables. Key data used for decision-making for this MOP planned investments is provided in Annex A of this document.

ANNEX A: INTERVENTION-SPECIFIC DATA

This section outlines key data that helped inform decision-making around FY 2022 MOP funding allocations to PMI-supported activities.

1. VECTOR CONTROL

NMCP Objective

- The Sierra Leone National Malaria Elimination Strategic Plan (NMESP) 2021–2025 includes four vector control interventions: universal coverage of insecticide-treated nets (ITNs), indoor residual spraying (IRS) in high-burden communities, larval source management, and the conduct of entomological surveillance. These interventions will be deployed according to the current risk stratification context in Sierra Leone.
- Although larval source management is part of the current malaria control strategy in Sierra Leone, it has never been implemented or supported by PMI.

NMCP Approach

ITNs:

- The NMCP endeavors to provide universal ITN access through mass campaigns conducted every three years, following WHO guidelines of one ITN for every two people, with up to three ITNs per household (World Malaria Report 2020). Mass campaigns are the main distribution method, reinforced by routine distribution of ITNs to pregnant women during their first ANC visit and to children during their Penta-3 EPI visit.
- To supplement existing ITN distribution channels, the NMCP will maintain high coverage of ITN through school-based distribution. There will be annual distribution of ITNs through primary schools for targeted classes (except years when mass campaigns are implemented). Following WHO normative guidance, school-based distribution shall be planned, managed and implemented in synergy with other continuous distribution programs, and not designed or managed in isolation.
- The NMCP has conducted five rounds of mass ITN distribution campaigns (2006, 2010, 2014, 2017, and 2020). In 2006, the NMCP distributed 1.1 million ITNs in a mass campaign for children under one year of age alongside a measles vaccination campaign. In 2010, the NMCP distributed a total of 3.3 million ITNs for scaling up to achieve universal coverage. In 2014, the NMCP distributed a total of 3.5 million ITNs to maintain and achieve universal coverage as part of the malaria response to the Ebola virus outbreak. In 2017, the NMCP distributed 4,186,517 ITNs for scaling up to achieve universal coverage. In 2020, during the COVID-19 pandemic, the NMCP was able to complete a universal distribution campaign of 4.6 million ITNs, the world's first universal ITN mass campaign of 100 percent pyrethroid + PBO synergist ITNs.
- In spite of the ITN mass campaigns and routine distribution, some key challenges remain to achieving and maintaining universal coverage and use, including periodic stockouts of ITNs for the routine distribution channels and conflicting data on net access vs. use, which suggest continuing challenges with consistent net use.
- To promote proper ITN use, the NMCP supports SBC efforts on the use and maintenance of ITNs in households, which are conducted prior to the mass campaigns and continuously for routine distribution.
- PMI is supporting the NMCP in conducting the systematic annual collections and assessment of the PBO ITNs that were distributed during the 2020 mass distribution campaign. Baseline data was collected in two districts in 2020 and subsequent monitoring activities will occur in 2021, 2022, and 2023.

IRS:

- Sierra Leone has a history of IRS trials from as early as 1940 and a modest IRS program that was carried out until the 1950s.
- More recently, a WHO-funded pilot of IRS was conducted in selected chiefdoms of four districts (Bo, Bombali, Kono, and Western Rural) in two phases between 2010 and 2012. The aim of the pilot was to assess feasibility and community acceptability and to generate evidence for scaling up IRS in Sierra Leone as a key component of the NMCP's Integrated Vector Management strategy. Spraying was carried out by the NMCP and the Department of Environmental Health and Sanitation of Sierra Leone, with the involvement of the four districts. Pilot results were described in PMI Sierra Leone FY 2018–2019 MOP.
- With PMI support, NMCP began implementing annual IRS activities in 2021. In May–June, 2021, IRS was conducted in two districts, Bo and Bombali. Following completion of the initial IRS campaign, data regarding its performance will be assessed (see Section 3.3 Operational Research), after which expansion of the number of districts or communities receiving IRS will be considered. Criteria for the selection of districts for IRS will complement the use of ITNs in areas with high malaria prevalence (Policy Guidelines for Integrated Vector Management 2019, Government of Sierra Leone).

Entomology:

- Key pillars within NMCP's vector control strategy are to strengthen capacity in entomological surveillance, to conduct insecticide resistance monitoring, and to characterize vector bionomics.
- According to the strategy, routine entomological surveillance is conducted in five districts (Bo, Bombali, Port Loko, Kono, and Western Rural Area) representing four of the five geographic regions of Sierra Leone (Western, Eastern, Northern, and Southern regions but not including the newest region, Northwestern). One rural and peri-urban sentinel site in each district are sampled on a monthly basis for routine entomological surveillance purposes to provide annual information on vector composition, vector behavior, entomological inoculation rates, and vector susceptibility to insecticides. Additional sites in each of the five districts are used to collect larvae for insecticide resistance monitoring activities or for specific, protocol defined and time limited study purposes. In future years, the NMCP may expand entomological surveillance to at least six districts.

PMI Objective in Support of NMCP

PMI's objectives align with the NMCP's vector control strategy and PMI is helping to build capacity to equip the NMCP with the knowledge and skills needed for implementing an informed, evidence-based vector control program. PMI aims to do the following:

- Support the implementation of the vector control strategy by ensuring sustained ITN coverage through both routine and mass campaign channels.
- Support collection and use of quality entomological data for decision-making.
- Support an evidence-based approach to IRS that results in a more cost-effective and efficient, targeted strategy and an impact on malaria burden.
- Strengthen the capacity of the MOHS-led entomology, IRS, and ITN programs.

PMI-Supported Recent Progress (during CY 2020–2021)

- PMI procured approximately 530,000 PBO ITNs to contribute to the annual ITN need for routine distribution channels in 2020 and procured an additional 2.5 million PBO ITNs for the 2020 mass campaign.
- PMI continued to provide support to NMCP in building entomological capacity by managing the insectaries established in Makeni (Bombali District) in 2018 and in Freetown (Western Urban Area) in 2019 and by maintaining a colony of susceptible *An. gambiae*, Kisumu strain mosquitoes.
- PMI continued to support NMCP in the vector bionomics and insecticide resistance monitoring in the original four districts (Bo, Bomboli, Kono, and Western Area Rural) established in 2018 and added Port Loko District for routine entomological monitoring.
- PMI is currently supporting the NMCP to conduct a study to evaluate the impact of co-deploying next-generation PBO ITNs and IRS on entomological and malaria case indicators in comparison to next-generation PBO ITNs as a stand-alone intervention. The research is planned in Bo and Bombali. From mid-2020 to mid-2021 the protocol was developed in preparation for execution and submitted for necessary institutional review board approvals. Baseline entomological data collection (after the deployment of PBO ITNs but before deployment of IRS) began in summer 2020 and will continue through spring 2021.
- PMI conducted the technical training of 26 Environmental Health Officers from Bo, Bombali, Port Loko, Karene, and Moyamba districts on entomological monitoring that included *Anopheles* collection, identification, and insecticide susceptibility testing.
- PMI continued to support the establishment of the malaria vector control and integrated vector management TWGs.
- PMI supported the NMCP in conducting insecticide resistance monitoring. The results from the insecticide resistance monitoring informed PMI and Global Fund's ITN procurement decisions and for insecticide selection for the IRS campaign.

PMI-Supported Planned Activities (during CY 2021–2022)

- Conduct insecticide resistance monitoring in five districts.
- Conduct vector bionomics monitoring monthly in five districts.
- Provide TA to support entomological training, planning, monitoring, and implementation in Bo, Bombali, Kono, Port Loko, and Western Area Rural Districts, with additional focus on entomological laboratory capacity-building.
- Fill the ITN commodities gap calculated for the next year; PMI will procure 627,631 PBO ITNs for 2021 with FY 2019 (530,000) and FY 2020 (97,631) MOP funding for routine, continuous distribution and will support the distribution through these channels. Going forward in 2022 and beyond PMI will contribute approximately half of Sierra Leone's routine distribution needs of 333,000 ITNs per year.
- Distribute 640,715 PBO ITNs via EPI and ANC routine clinic distribution channels.
- Conduct 12-month ITN durability monitoring data collection.
- Support the evaluation and program monitoring of ITNs that are planned to be distributed in 2022 through schools (from Global Fund) in eight districts.
- Conduct IRS in two districts in May–June 2021, including operational support to the NMCP and MOHS for planning, procurement of insecticides, payment of spray operators, environmental compliance,

community mobilization, epidemiological and entomological monitoring, and community mobilization activities. IRS implementation will be guided by best practices and expertise in the field.

- Conduct assessment of malaria and vector control impact of co-deployment of IRS in setting of universal PBO ITN distribution.
- Work with NMCP and the MOHS to develop and implement SBC activities that promote consistent use of ITNs and acceptance of IRS informed by findings from the Malaria Behavior Survey (MBS).

1.1. ENTOMOLOGICAL MONITORING

Key Goal

Determine the geographic distribution, bionomics, and insecticide resistance profiles of the main malaria vectors in the country to inform vector control decision-making.

Key Question 1

Where is entomological monitoring taking place, what types of activities are occurring, and what is the source of funding?

Supporting Data

Table A-1. Entomological monitoring activities

Site	District	Activities	Supported by
Lagon (Rural)	Bo	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Gerihun (Peri-urban)	Bo	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Gbaima Songa (Rural)	Bo	Co-deployment study surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Jaiama Bongor (Rural)	Bo	Routine surveillance – insecticide resistance monitoring	PMI
Gbo (Rural)	Bo	Routine surveillance – insecticide resistance monitoring	PMI
Kamaranka (Rural)	Bombali	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Masongbo (Peri-urban)	Bombali	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Bombundain (Rural)	Bombali	Co-deployment study surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI

Site	District	Activities	Supported by
Gbanti Kamaranka (Rural)	Bombali	Routine surveillance – insecticide resistance monitoring	PMI
Biriwa (Rural)	Bombali	Routine surveillance – insecticide resistance monitoring	PMI
Bakolo (Rural)	Port Loko	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Maforki (Peri-urban)	Port Loko	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Massesseh (Rural)	Port Loko	Co-deployment study surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Lokomassama (Rural)	Port Loko	Routine surveillance – insecticide resistance monitoring	PMI
Bureh (Rural)	Port Loko	Routine surveillance – insecticide resistance monitoring	PMI
Sori Town (Peri-urban)	Kono	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Teikor (Rural)	Kono	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Nimyama (Rural)	Kono	Routine surveillance – insecticide resistance monitoring	PMI
Sand Water (Rural)	Western Rural Area	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Tombo (Peri-urban)	Western Rural Area	Routine surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Koya (Rural)	Western Rural Area	Routine surveillance – insecticide resistance monitoring	PMI
Macorba Loko (Rural)	Karene	Co-deployment study surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Kamawonie (Peri-urban)	Karene	Co-deployment study surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI
Rogbin (Rural)	Karene	Co-deployment study surveillance – vector bionomic monitoring using HLC, CDC light trap, and PSC	PMI

Site	District	Activities	Supported by
Sanda Tendaran (Rural)	Karene	Co-deployment study surveillance – insecticide resistance monitoring	PMI
Sanda Loko (Rural)	Karene	Co-deployment study surveillance – insecticide resistance monitoring	PMI

Note: HLC = Human Landing Catch; PSC = Pyrethrum Spray Catch.

Table A-2. Distribution and bionomics of malaria vectors

Site/ District	Site Type	Vector*	Season (month)	Preferred Biting Location	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR†
Lagon/Bo	Rural	***An. gambiae s.l.*** *An. funestus*	June–October	Indoor/ outdoor (58%/42%)	11 p.m.–5 a.m.	Indoor	Human	258.2 Ind 330.5 out
Gerihun/ Bo	Peri-urban	***An. gambiae*** **s.l.** *An. funestus*	June–October	Indoor/ outdoor (49%/51%)	11 p.m.–5 a.m.	Outdoor	Human	452 Ind 625.5 Out
Gbaima Songa/Bo Co-deployment Study Site	Rural	***An. gambiae*** **s.l.**	June–October	Indoor/ outdoor (51%/49%)	11 p.m.–5 a.m.	Indoor	N/A	N/A
Kamaranka/ Bombali	Rural	***An. gambiae*** **s.l.**	June–October	Indoor/ outdoor (52%/48%)	midnight–4 a.m.	Indoor	Human	216 Ind 123.6 Out
Masongbo/ Bombali	Peri-urban	***An. gambiae*** **s.l.**	June–October	Indoor/ outdoor (40%/60%)	midnight–4 a.m.	Outdoor	Human	410.9 Ind 479.7 Out
Bumbandain/ Bombali Co-deployment Study Site	Rural	***An. gambiae*** **s.l.**	June–October	Indoor/ outdoor (50%/50%)	midnight–4 a.m.	None	N/A	N/A
Teikor/ Kono	Rural	***An. gambiae*** **s.l.**	June–October	Indoor/ outdoor (55%/45%)	midnight–5 a.m.	Indoor	Human	283.1 Ind 382.3

Site/ District	Site Type	Vector*	Season (month)	Preferred Biting Location	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR†
		An. funestus s.l.						Out
Sorie Town/ Kono	Rural	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (49%/51%)	midnight–5 a.m.	Outdoor	Human	223.5 Ind 239.2 Out
Sand Water/ Western Rural	Rural	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (72%/28%)	midnight–4 a.m.	Indoor	Human	410.9 Ind 287.5 Out
Tombo/ Western Rural	Peri-urban	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (48%/52%)	midnight–4 a.m.	Outdoor	Human	139.3 Ind 108.6 Out
Bakolo/ Port Loko	Rural	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (53%/47%)	N/A	Indoor	N/A	N/A
Maforki/ Port Loko	Peri-urban	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (52%/48%)	N/A	Indoor	N/A	N/A
Massesseh/ Port Loko Co-deployment Study Site	Rural	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (50%/50%)	N/A	None	N/A	N/A
Kamawonie/ Karene Co-deployment Study Site	Peri-urban	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (58%/42%)	N/A	Indoor	N/A	N/A
Rogbin/ Karene Co-deployment Study Site	Rural	***An. gambiae* s.l.**	June–October	Indoor/ outdoor (47%/53%)	N/A	Outdoor	N/A	N/A
Macorba	Rural	***An.***	June–	Indoor/	N/A	Indoor	N/A	N/A

Site/ District	Site Type	Vector*	Season (month)	Preferred Biting Location	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR†
Loko/ Karene Co-deployment Study Site		***gambiae* s.l.**	October	outdoor (51%/49%)				

*Primary vector listed first, in bold, followed by secondary vectors.

** Marked as N/A if simultaneous indoor and outdoor collections are not conducted.

†EIR = Entomological inoculation rate.

Key Question 2

What is the current insecticide resistance profile of the primary malaria vectors?

Supporting Data

- In 2019–2020, *An. gambiae* s.l. was fully susceptible to pirimiphos-methyl, chlorfenapyr, and clothianidin, whereas analysis showed a high level of resistance to the pyrethroids: deltamethrin, permethrin, and alpha-cypermethrin. After pre-exposure to piperonyl butoxide (PBO), an increase in mortality of at least 40 percent was observed for the three pyrethroids tested at all sites except for one site, Gbanti Kamaranka in Bombali District, where the increase for deltamethrin was 29 percent which still constituted an 80 percent increase in susceptibility.
- In 2020–2021, *An. gambiae* s.l. was resistant to all the pyrethroids tested in all districts. Mortality ranged from 14.5 percent to 26.3 percent for deltamethrin, 24.3 percent to 30.8 percent for permethrin, and 13.2 percent to 30.9 percent for alpha-cypermethrin. After pre-exposure to PBO, the mortality rate increased from 50 to 73.5 percent for deltamethrin, from 62.14 to 68.3 percent for permethrin, and from 54.5 to 69.9 percent for alpha-cypermethrin for mosquitoes collected at all sites. Therefore, the results indicate that a monooxygenase-based resistance mechanism is partially involved, but is not fully responsible for the pyrethroid resistance observed.

Conclusions for Entomologic Monitoring Investments

- *An. gambiae* s.l. is the main malaria vector in Sierra Leone, although some *An. funestus* were collected in Bo and Kono districts. Entomological inoculation rates were high in all surveillance sites and the highest rate was recorded in Gerihun, the Bo District peri-urban site, at 452 and 625.5 infective bites/person/year indoor and outdoor respectively.
- Given the preference of the vectors to bite late at night, high coverage and sustained use of ITNs is expected to reduce human–vector contact and provide protection from malaria infection. Moreover, the PBO synergist assay data indicate that the deltamethrin- and permethrin + PBO ITNs distributed in May 2020 might have a greater impact than conventional nets in reducing mosquito populations and prevent malaria transmission.
- IRS just before the peak mosquito and malaria transmission season with a long-lasting insecticide also might help to reduce the malaria burden.

- In most of the sentinel sites, the malaria vector bites preferentially inside than outside, so both ITN use and IRS might significantly reduce indoor mosquito populations. However, outdoor biting and outdoor transmission does exist and might require further monitoring and assessment.
- The main malaria vector remains susceptible to clothianidin, chlorfenapyr and pirimiphos-methyl and therefore IRS with pirimiphos-methyl or clothianidin and the use of dual active ingredient ITNs containing chlorfenapyr should be considered for insecticide resistance management in Sierra Leone in the future.
- To measure any additional malaria prevention impact that IRS will have in the setting of universal PBO ITN coverage, the NMCP with support from PMI is conducting an enhanced mosquito collection activity. This co-deployment assessment is being conducted in the two districts where IRS is being deployed, Bo and Bombali, and in two comparison districts, Karene and Port Loko, for a period of two years. In these four districts, three sentinel sites are being used for entomological surveillance (see Section 3.3 Operational Research). Once the assessment of the co-deployment of IRS and PBO ITNs is complete, the current plan is to revert to the routine entomological surveillance in the five districts.
- Biochemical laboratory analysis of mosquitoes have been conducted in foreign laboratories. PMI will explore the possibility of developing the capacity and technical skills in Sierra Leone at an existing laboratory to begin doing all laboratory analysis in-country in the future.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.2. INSECTICIDE-TREATED NETS (ITNs)

Key Goal

Achieve high ITN coverage and use targets with effective nets, based on insecticide resistance data, in PMI-supported areas; and maintain high coverage and use with consistent ITN distribution (via campaigns and/or continuous channels).

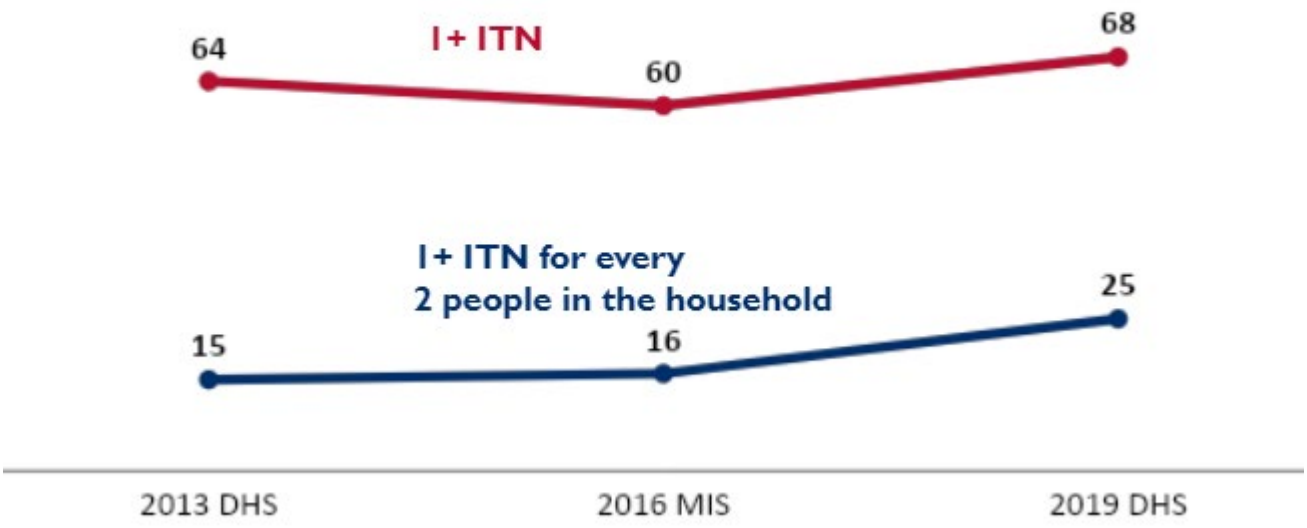
Key Question 1

How has net ownership evolved since the start of PMI in the country?

Supporting Data

Figure A-1. Trends in ITN ownership

Percentage of households that own ITNs



- According to the MIS 2016 results, 60 percent of households owned an ITN, but only 16 percent of households owned enough ITNs (defined as at least one ITN for every two people) to cover all household members. Due to concerted efforts by NMCP and partners like PMI to increase distribution of ITNs, there was a notable increase in ITN access as measured in the 2019 DHS: there was a 13 percent relative increase in the number of households owning at least one ITN (68 percent up from 60 percent) and a 56 percent relative increase (25 percent up from 16 percent) in the number of households with at least one ITN per two members of the household. Nevertheless, with only a quarter of households reporting enough ITN coverage for all household members, it is clear that sufficient net access remains a challenge.

Key Question 2a

What proportion of the population has access to an ITN? Of those who have access, what proportion of the population reports using an ITN?

Figure A-2. Trends in ITN access and use

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

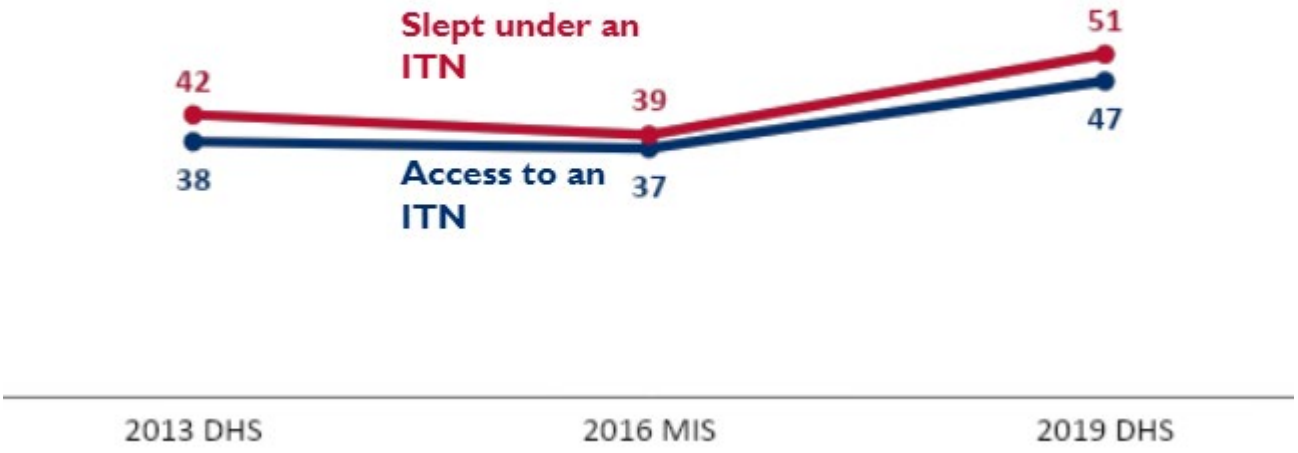
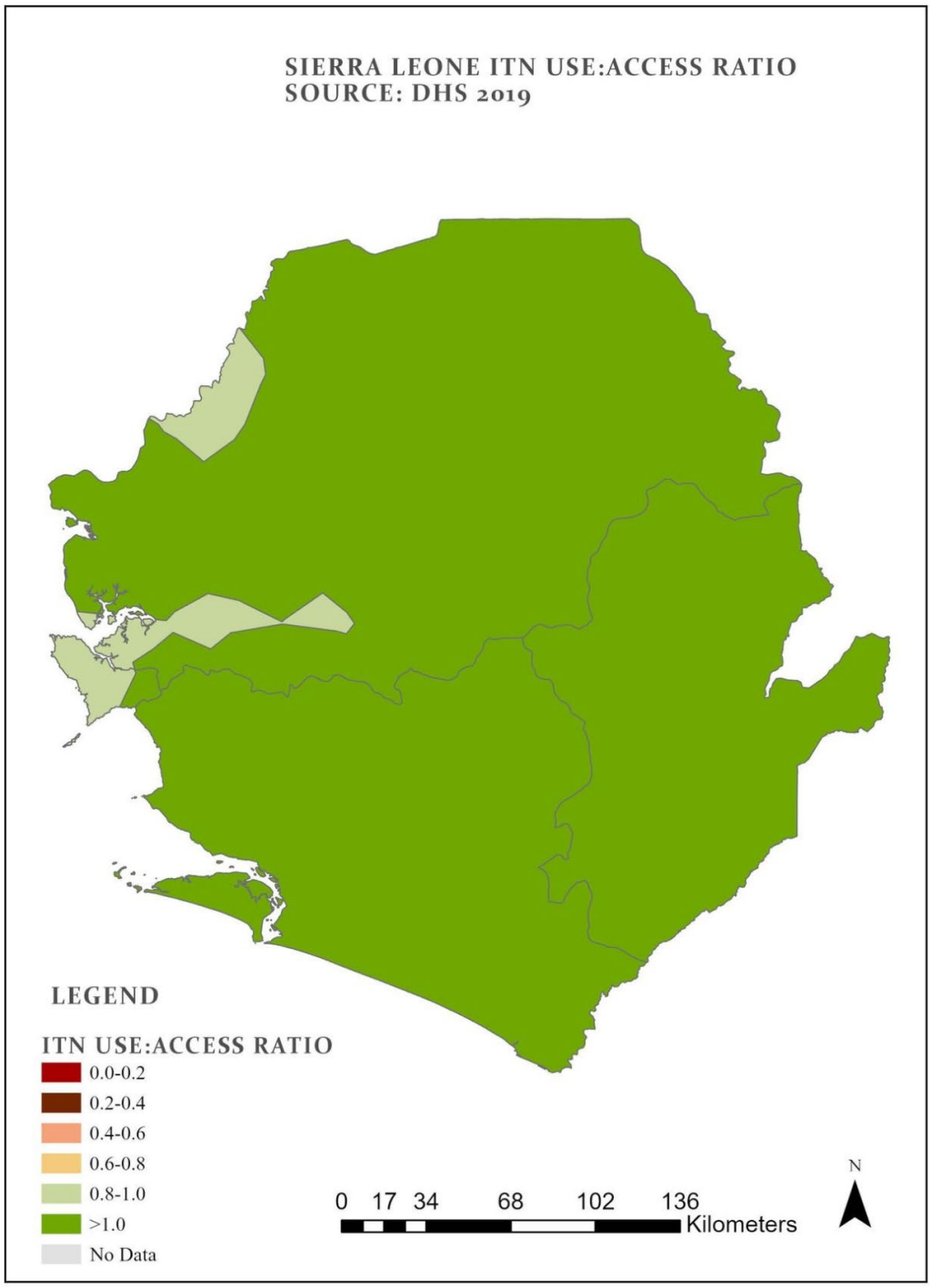


Figure A-3. Sierra Leone ITN use:access ratio



- The 2019 DHS showed marked increases in ITN use indicators since the previous household survey in 2016. There was an increase in the percentage of individuals reporting sleeping under an ITN the night before from 39 percent in 2016 to 51 percent in 2019, a 12 percent increase. Furthermore, 47 percent of the population had access to an ITN, according to the 2019 DHS, which was an increase from 37 percent in the 2016 MIS. This results in an ITN use:access ratio of 1.08, indicating that households do use

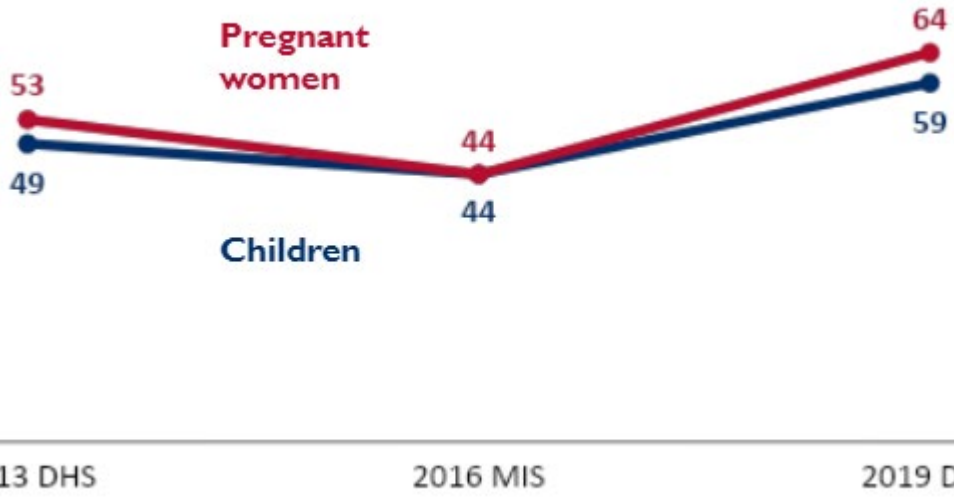
an ITN when they have access to one. As can be seen from the map, the ITN use:access ratio is greater than 1.0 for the majority of the country.

Key Question 2b
What percent of pregnant women and children under five years of age report sleeping under an ITN?

Supporting Data

Figure A-4. Trends in ITN use among children and pregnant women

Children under age five years of age and pregnant women 15 to 49 years of age who slept under an ITN the night before the survey



- Children under five years of age and women of reproductive age are prioritized for ITN use in households that have some but not enough ITNs. Children of school age have the lowest ITN use when households have insufficient ITNs, while populations in rural areas have slightly higher ITN use:access ratios than those in urban areas, but both groups are considered to have moderate-to-high use.
- From the 2019 DHS, national percentages of ITN use among children under five years of age and pregnant women in all households (with and without an ITN) were 59 percent and 64 percent, respectively. These numbers indicate an increase in overall net use by children under five years of age and pregnant women in Sierra Leone from 44 percent for both groups when compared with the 2016 MIS.
- However, ITN use by children under five years of age decreases with increasing age, from 68 percent among those less than 12 months of age to 53 percent among those 48 to 59 months of age. By district, the percentage of children who slept under an ITN is highest in Bonthe (86 percent) and lowest in Western Area Rural (37 percent).
- With respect to wealth quintiles, children and pregnant women from the lowest wealth quintile were more likely to sleep under an ITN than those in the highest wealth quintile.

Key Question 3

If ITN access is high but use is low, what significant structural and/or behavioral challenges affect the adoption and maintenance of ITN use and care behaviors?

Supporting Data

The ITN access to use ratio is above 100 percent in Sierra Leone indicating a need to support activities targeting maintenance of net use behaviors and promoting net care to increase the durability of nets. However, data from other sources indicates that net use may not actually be as high as reported. Bloodmeal analysis of mosquitoes collected within homes at all entomology sites show human blood indices ranging from 80 percent to 93 percent, suggesting that self-reported net use practices may not represent actual net use practices warranting further investigation of available data. Furthermore, according to data analyzed from the 2019 MBS, there are several factors identified as barriers to ITN use. Among sociodemographic and household characteristics, completing primary education was negatively correlated with nightly ITN use. Specifically, survey respondents who had attained at least a primary level education had 33 percent reduced odds of using an ITN every night compared with participants with no formal education. The odds for nightly ITN use among participants with secondary education or higher followed a similar direction (20 percent reduced odds) but was not significantly different from participants with no formal education. Increasing household size was negatively correlated with nightly net use. Each one-person increase in household size was associated with a 5 percent reduction in the odds of participants reporting consistent net use. Factors that were predictors of net use included response efficacy, perceived self-efficacy, and perception of net use as a community norm.

With respect to net care, MBS respondents were asked about their knowledge of and attitudes toward practices to prevent their nets from tearing or getting holes. Results showed that most participants (95.5 percent) knew at least one method of preventing nets from tearing or getting holes with the most commonly cited ways to prevent holes in nets was tying them up daily when not in use (73 percent), handling the net with care (46.7 percent), and keeping children from playing with the net (40.3 percent).[2] With respect to attitudes toward net care, most participants (95.0 percent) believed there are steps that can be taken to maintain their nets. And most respondents (94.2 percent) endorsed the statement that they could protect their family from malaria by taking care of their nets. While knowledge and attitudes toward net care were high, roughly a quarter of respondents reportedly washed their nets with powdered or liquid soap (26.7 percent) and 82 percent dried their nets outside in the sun after being washed.

Key Question 4

What type of nets are being distributed via which channels?

[2] Multiple responses could be selected for knowledge of net care practices.

Supporting Data

Table A-3. Insecticide-treated net (ITN) distribution in Sierra Leone, 2020

Level Nationwide/Region/ State/Province	Mass Campaign [May/June 2020]	ANC	EPI	School	Community	Other
Nationwide	4,610,419*	353,499**	270,343**			
Bo, Bombali, Falaba, Kailahun, Koinadugu, and Moyamba districts				12,600***		

*All mass campaign ITNs were PBO ITNs with primarily PermaNet 3.0 brand in Bo, Bomboli, Bonthe, Koinadugu, Kono, Port Loko, Pujehun, and Tonkolili districts and primarily Olyset Plus brand in Kailahun, Kambia, Kenema, Moyamba, Western Area Rural, and Western Area Urban districts.
**Mixed distribution of standard pyrethroid ITNs and PBO ITNs.
***Standard pyrethroid ITNs distributed by NMCP with partner organization (Child Fund).

Key Question 5

What is the estimated need for ITNs during CY 2021–2023? How many, and what types, of ITNs will be procured, and by what partners? Through what channels will ITNs be distributed? Are there any projected ITN gaps?

Supporting Data

The gap analysis table shows current and projected needs and contribution of ITNs by PMI and Global Fund.

- To prevent stockouts of ITNs caused by global supply chain disruption, a six-month estimation of annual routine ITN needs has been calculated at approximately 350,000 ITNs per year and additional procurement of this number of ITNs will be used by the NMCP to maintain a six-month stock buffer.
- PMI projects to procure 333,000 ITNs with FY 2022 MOP funding to contribute to routine ITN distribution channels. Using ongoing insecticide resistance monitoring data, the NMCP could recommend a change to alternative ITNs to the current PBO ITNs so the FY 2022 MOP budget takes into account the pricing for Interceptor G2 ITN in case of that eventuality.
- The Global Fund NFM3 grant is projected to provide funding for the procurement of all ITNs necessary for the 2023 ITN mass distribution campaign.

Table A-4. ITN Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	8,320,978	8,529,615	8,746,749
Total population at risk for malaria	8,320,978	8,529,615	8,746,749
PMI-targeted at-risk population	8,320,978	8,529,615	8,746,749
Population targeted for ITNs	8,320,978	8,529,615	8,746,749
Continuous Distribution Needs			
Channel 1: ANC	374,444	383,833	393,604
Channel 2: EPI	266,271	290,007	314,883
Channel 3: School	60,000	90,000	0
Channel 4:	0	0	0
Additional ITNs required to avoid ITN stockouts	350,358	381,920	354,243
Estimated Total Need for Continuous Channels	1,051,073	1,145,759	1,062,730
Mass Campaign Distribution Needs			
Mass distribution campaigns	0	5,345,236	0
Estimated Total Need for Campaigns	0	5,345,236	0
Total ITN Need: Continuous and Campaign	***1,051,073***	***6,490,995***	***1,062,730***
Partner Contributions			
ITNs carried over from previous year	4,200	350,358	350,358
ITNs from Government	*0*	*0*	*0*
ITNs from Global Fund	223,354	5,766,480	878,647
ITNs from other donors	0	0	0
ITNs planned with PMI funding	627,631	333,000	333,000
Total ITNs Contribution Per Calendar Year	***855,185***	***6,449,838***	***1,562,005***
Total ITN Surplus (Gap)	***(195,888)***	***(41,157)***	***499,275***

Key Question 6

What is the current status of durability monitoring?

Supporting Data

Table A-5. Timing of durability monitoring

Campaign Dates	Site	Brand	Baseline	12-month	24-month	36-month
May 22–31, 2020	Moyamba District	Olyset Plus	Nov–Dec 2020	May 2021*	May 2022*	May 2023*
May 22–31, 2020	Bo District	PermaNet 3.0	Nov–Dec 2020	May 2021*	May 2022*	May 2023*

*Planned implementation months.

- During the baseline survey, 370 households were visited and 711 ITNs from the 2020 ITN mass distribution campaign were registered in the study cohort (379 PermaNet 3.0 and 332 Olyset Plus). Of those 711 nets, 652 (92 percent) were recorded as still present in the household after seven months (358 in Bo and 294 in Moyamba) with the 8 percent missing campaign ITNs reported as having been discarded, given away, lost, or being used by family members elsewhere. In addition to the 2020 mass campaign ITNs, 45 percent of households possessed at least one other mosquito net and details were recorded for 208 non-cohort nets.
- For each of the two brands of PBO ITNs that was distributed during the mass campaign, one monitoring district was randomly selected for the study.
- Monitoring ongoing and conclusions will be presented at the end of the monitoring activity.

Conclusions for ITN Investments

- To address the ITN access gap, PMI and NMCP will continue to support continuous distribution channels without substantive changes. Global Fund grant will provide all ITNs and distribution costs for the 2023 ITN mass campaign.
- NMCP will receive support from the Global Funds to implement school-based ITN distribution in Port Loko, Pujehun, Kailahun, Tonkolili, Moyamba, Koinadugu, Kenema, and Kambia districts. A total of 60,000 and 90,000 PBO ITNs are planned to be distributed in 2021 and 2022, respectively. PMI will provide technical support in the implementation, evaluation, and program monitoring.
- Insecticide resistance monitoring activities should continue in Sierra Leone to inform the selection of which ITNs to use and distribute.
- PMI and other donors like the Global Fund should consider rotating the type of ITN that is distributed through the mass distribution campaign and all other distribution channels. One potential candidate might be the Interceptor® G2 ITN with the insecticide combination of chlorfenapyr and alpha-cypermethrin.
- Because ITN access/use ratio is reported to be above 100 percent in Sierra Leone, SBC outreach should include education on maintenance of net use behaviors and promoting net care to increase the durability of nets. However, according to entomological data as well as data analyzed from the 2019 Malaria Behavior Survey, ITN use may not actually be as high as reported and several factors have been identified as barriers to ITN use. The NMCP with support from PMI should adjust its SBC activities to increase ITN use and utilize data from the MBS to target specific activities and groups. To address this gap, through a planned program evaluation (see OR section below) PMI will also explore the potential of using alternate vector control measures, such as housing modification.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.3. INDOOR RESIDUAL SPRAYING (IRS)

Key Goal

Ensure high spray quality and coverage, with an appropriate insecticide, in targeted endemic PMI-supported areas, in alignment with the national insecticide resistance management strategy.

Key Question 1

What areas are targeted for IRS and why?

Supporting Data

- IRS activities were implemented in Bo (Southern Province) and Bombali (Northern Province) districts. The NMCP, in consultation with PMI, chose two out of the 15 (of 16 total) districts in Sierra Leone with a high burden of malaria. These two districts are geographically diverse and also have monthly entomological monitoring and insecticide resistance data available.
- 91,032 eligible structures in Bo and 56,960 eligible structures in Bombali were targeted for the 2021 IRS campaign.

Key Question 2

In PMI-supported areas, what spray coverage rates have been achieved in the past three years and what are the plans for 2021?

Supporting Data

- The IRS campaign was completed in June 2021. Initial spray coverage rates and other factors are still being worked out as of this writing, and will be reported in the future.

Key Question 3

What is the residual efficacy of the insecticides used for IRS in PMI-supported areas?

Supporting Data

- The IRS campaign was completed in June 2021. Initial residual efficacy data are not yet known but will be reported in the future.

Key Question 4

What is the insecticide rotation plan in PMI-supported areas?

Supporting Data

Table A-6. Insecticide rotation plan

Target Spray Area	2020	2021	2022*	2023*
Bo	NA	Neonicotinoid (Clothianidin)	Neonicotinoid	Combination Pyrethroid/Neonicotinoid
Bombali	NA	Neonicotinoid (Clothianidin)	Neonicotinoid	Combination Pyrethroid/Neonicotinoid

*Denotes proposed and planned insecticide classes.

Conclusions for IRS Investments

- Initial IRS activities began in 2021, including an evaluation on the impact of IRS co-deployment in the context of universal coverage with PBO ITNs. Until the results from the co-deployment assessment are available, no expansion of IRS activities to additional districts is advised.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2. HUMAN HEALTH

2.1. CASE MANAGEMENT

NMCP Objective

- The revised 2021–2025 National Malaria Elimination Strategic Plan (NMESP) is focused on accelerating the implementation of Malaria Control Interventions toward a Malaria-free Sierra Leone; and it highlights three main objectives:
    1. By the end of 2025, reduce malaria mortality rates by at least 75 percent from 2015 rates.
    2. By the end of 2025, reduce malaria case incidence by at least 75 percent from 2015 rates.
    3. By 2025, ensure that 90 percent of the population to practice at least three recommended malaria prevention and control behaviors.
- The overall strategy adopted by the NMCP is the confirmation of all suspected cases of malaria using microscopy or Rapid Diagnostic Tests (RDTs) prior to treatment, and providing prompt and effective treatment of positive cases with quality assured artemisinin-based combination therapy (ACT).
- The 2021–2025 NMESP builds on the previous strategy and is targeted toward ensuring the provision of diagnostic services at public, private and community levels, ensuring the provision of effective treatment through the public sector, the private sector, and the community level; building human and institutional capacity for a quality assurance/quality control (QA/QC) system for malaria diagnosis; monitoring the safety and efficacy of antimalarial medicines; strengthening the capacity for and monitoring the safety and efficacy of antimalarial medicines; and improving the management of severe malaria in hospitals and community health centers.
- Another strategic objective of the NMCP is to scale up and strengthen community case management of malaria, as part of an integrated (or iCCM) platform. The NMCP contributes to the iCCM strategy by supporting the production of CHW training materials, coordinating supervision efforts of CHWs, and ensuring supply of RDTs, ACTs, equipment, registers, treatment algorithms, and job aids in collaboration with the CHW hub, implementing partners, DHMTs, and PHU staff. This strategy aligns with PMI's objective to strengthen and improve the quality of community-based efforts in malaria case management, specifically through standardized training and supervision.

NMCP Approach

- The malaria Test, Treat, and Track policy was introduced in 2010, with a focus on RDT use in most health facilities and in the community. Over the years the NMCP has had a successful implementation of this policy until 2020. Due to the COVID-19 situation, CHWs were no longer provided RDTs to ensure

there was adequate stock at the facility level. The utilization rate of health facilities dropped significantly hence there was an increase in presumptive malaria cases. The NMCP, along with the Health Education Department have reinforced messages on care-seeking behavior and for all suspected malaria cases to receive a parasitological confirmation before treatment. However, this was only a temporary approach, and the CHW hub is finalizing a new strategy to begin implementing in mid-2021 that includes access to RDTs for CHWs.

- The Government of Sierra Leone introduced free diagnosis and treatment of malaria in the public and private sectors and in 2019, expanded free healthcare through the universal health coverage initiative.
- NMCP actively promotes diagnosis of suspected malaria cases using microscopy based on the diagnostic capacity of the health facility, and RDT at the facility level as well as at the community level through community health workers (with the temporary exception due to COVID-19 described above) and private health facilities.
- Though there is limited capacity for malaria microscopy, the NMCP is working with PMI and partners to strengthen malaria microscopy in all hospitals and selected community health centers. In 2019, PMI supported the NMCP to conduct a training of trainers for laboratories across the country. A total of 53 microscopists were trained, of which 20 underwent the advanced malaria diagnostic refresher training. These 20 microscopists will train additional microscopists in all 16 districts with the support of PMI.
- The NMCP promotes the use of RDTs for malaria diagnosis in all health facilities and at the community level. This ensures that suspected malaria cases are promptly diagnosed and treated in instances where malaria microscopy is not available or not feasible.
- According to the national policy, antimalarial treatment should be limited to only cases that test positive, and patients with negative test results should be reassessed for other conditions and treated appropriately. However, in recognition of the challenges with diagnosis, presumptive treatment can be considered when a parasitological diagnosis is not possible.
- The 2015 Guidelines for Case Management of Malaria as amended in 2018 outline the recommended first-line drug for uncomplicated malaria is artemether-lumefantrine (AL), except for pregnant women in their first trimester who should receive oral quinine clindamycin. For severe malaria cases, the NMCP advises treatment with parenteral artesunate as a primary treatment option and artemether injection as secondary treatment option; rectal artesunate suppositories (RAS) are used for pre-referral treatment for children six years of age and under.

Training and Supervision:

- The NMCP's target is to train two health workers per primary healthcare unit (1,300 PHUs) totaling 2,600 health workers in malaria case management and prevention (including MIP); train 240 health workers drawn from all hospitals in Freetown, both private and public, in malaria case management and prevention (including MIP); train 60 health workers drawn from all hospitals outside of Freetown in malaria case management and prevention (including MIP) every two years and provide annual refresher training.
- The NMCP supports regular supportive supervision visits to health workers (at facility and community levels) to provide hands-on coaching and mentoring of health workers to fill knowledge and skill gaps.
- The NMCP conducts quarterly on-site supportive supervision of selected (30 percent) health facilities and is supported monthly by DHMTs to complement off site training.

Other Quality Assurance Activities:

- The MOHS has limited capacity to conduct external quality assurance of malaria diagnostic testing in the country. The NMCP and partners are working to establish a malaria reference laboratory constructed with USG support, equipped with a slide bank and accredited microscopists to support QA/QC activities of malaria diagnosis.

Community Health Workers (CHWs):

- CHWs play an important role in health promotion and community-based surveillance in addition to their existing roles in direct malaria service delivery at the community level. In 2020, the CHW policy was updated to establish an integrated approach to scale up malaria diagnosis (and other services) at the community level. A recent evaluation of the CHW program, funded by the Global Fund, showed that only half of the approximately 14,500 current CHWs are needed for national coverage. Based on this evaluation, the number of CHWs has been cut down to 8,700, including peer supervisors to help reduce fragmentation and better integrate quality services. These CHWs will be deployed in all districts to provide an integrated package of iCCM; maternal, newborn, and child health, and family planning/reproductive health services in the community to all population groups (not only to children under five years of age).
- In line with the iCCM strategy, NMCP supports the CHW hub under the primary healthcare directorate to train and equip CHWs to test and treat malaria cases in the community. Newly deployed CHWs will be provided with ACTs and RDTs to test and treat malaria in all ages (except for pregnant women and infants).
- While CHWs will not be salaried government employees, they will receive financial incentives based on their location (easy to reach vs. hard to reach), through partners' support.
- According to the revised policy, CHWs will also be provided non-financial incentives (e.g., awards and promotions) as a component of their compensation package.
- CHWs are trained on management of malaria, IPTp and sulfadoxine-pyrimethamine (SP) administration, pneumonia, diarrhea, emerging disease prevention and control, health education, EPI, mental health awareness, and other services.
- In 2019, a national CHW program assessment was conducted that was used to inform the updating of the national CHW policy. Filling of non-malarial commodity gaps remains a major challenge as key donors funding this support have recently had funding cuts and changes in programmatic scope. The support to iCCM is limited to hard to reach areas with possible expansion to easy to reach areas in the future.

Private Sector:

- According to the 2016 MIS, 8 percent of the population seek treatment for fever management from private service providers (private health facilities and private pharmacies/drugstores). These establishments are important points of malaria service delivery, especially in urban settings. The majority of the private sector uses RDTs for malaria testing and ACTs for treatment of confirmed cases. However, the quality of some ACTs provided by private practitioners is questionable, and MOHS has limited capacity to conduct pre - and post-entry market quality monitoring. The NMCP is partnering with private facilities/pharmacies to ensure they have the right knowledge and support to provide quality

malaria services. In 2018, the NMCP signed a Memorandum of Understanding (MOU) with 36 private facilities with the objective of targeting the proportion of the population who seek treatment for fever management in private facilities with good quality malaria diagnostic tests and treatment. In addition, the NMCP provided these private health providers (pharmacies and health centers) with job aids and registers, and had planned to hold training opportunities. However, due to the 2020 COVID-19 situation in-country, the MOU with private health providers was put on hold.

- In the absence of an MOU, private hospitals continue to test suspected malaria cases, and provide treatment to positively confirmed cases. There are no fees for RDT tests supplied by NMCP/MOHS.

PMI Objective in Support of NMCP

- In 2017, PMI began its partnership in Sierra Leone with the MOHS through the NMCP to support its efforts to reduce malaria morbidity and mortality, help close the gaps in malaria service delivery, and strengthen malaria health systems. PMI's objective focuses on supporting the NMCP to bolster appropriate testing and treatment of malaria cases in facilities and at the community level, strengthen MIP, as well as pilot and scale up new drug-based approaches where appropriate.
- The aim of PMI's funds is to continue to work toward achieving a targeted 75 percent reduction in malaria morbidity and mortality, as outlined in the NMESP 2021–2025. In 2020, PMI's geographic scope for case management activities expanded to an additional three districts and expanded to two more in 2021, for a total of 10 districts. PMI's approach targets the districts with high malaria endemicity as well as hard to reach areas, bringing malaria service delivery to the population at the most risk.

PMI-Supported Recent Progress (during CY 2020–2021)

- PMI supported the NMCP to conduct a nationwide laboratory assessment, which identified a low capacity of microscopists throughout the country who can conduct quality malaria microscopic work. The assessment results enabled the procurement of 20 microscopes and slides, which will be used to train a core group of laboratory scientists who will conduct laboratory Outreach, Training, and Supportive Supervision Plus (OTSS+) in all hospitals nationwide.
- With support from PMI, the NMCP developed all training materials and supported the national training of trainers of 20 personnel from the NMCP and partners. In addition, PMI supported a district training of trainers for 96 DHMT members.
- With support from PMI, the NMCP successfully submitted a presentation to the American Society of Tropical Medicine and Hygiene symposium to highlight the feasibility of rolling out RAS and will support the NCMP case management focal point to deliver the symposium remarks.
- PMI supported the NMCP and other stakeholders in coordinating the introduction of a critical and life-saving intervention—the administration of rectal artesunate capsules in children under six years of age—when appropriate.
- PMI supported digitized supportive supervision tools (clinical OTSS+, lab and severe malaria OTSS+ tool) in a Health Network Quality Improvement System application to promote timely analysis and use of supportive supervision data to target support to facilities with lower quality malaria service delivery.
- PMI supported DHMTs to conduct paper-based OTSS+ in 210 (49 percent) facilities for 471 providers across four districts. A key finding of this activity was the general lack of malaria training of health workers because 41 percent of health workers have never been trained on MIP. OTSS+ teams visiting supported

facilities for follow-up included a clinician with a background in MIP to provide quality mentorship on facility MIP challenges.

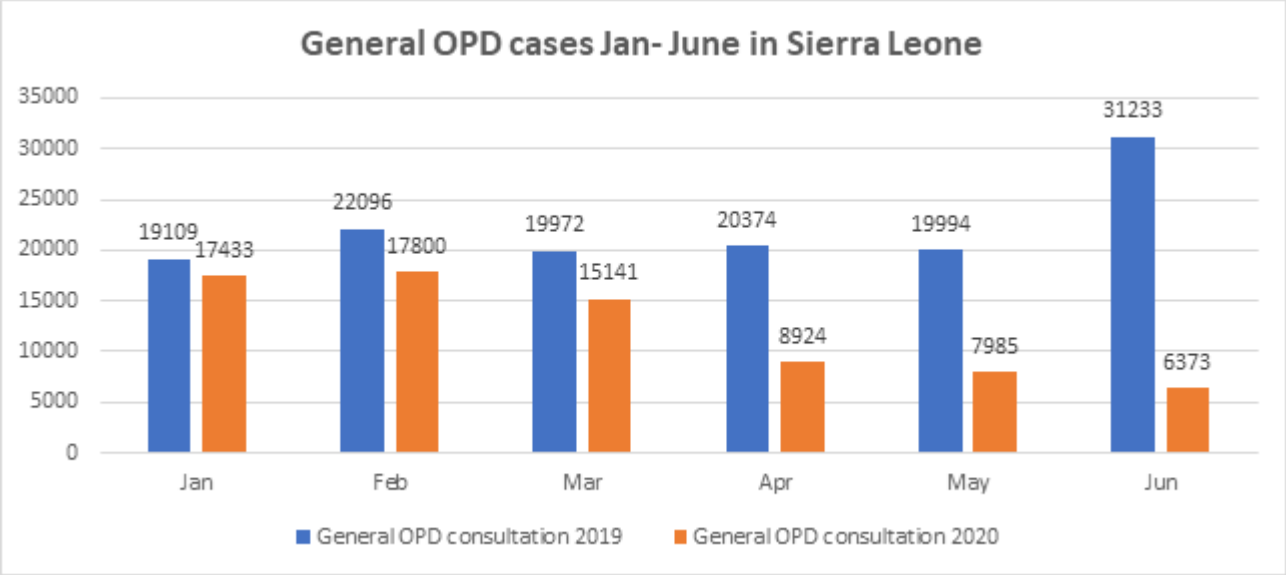
- Supported district in-charges and subdistrict meetings in all operational districts. These meetings are used as a medium to provide feedback to PHU staff, further discuss malaria service delivery challenges, and offer solutions.
- Supported NMCP and DHMTs to distribute and disseminate case management guidelines to 428 facilities.
- With the support of PMI, DHMTs conducted case management mentorship in 297 facilities, reaching 784 healthcare workers. Facilities that had received OTSS+ visits (210) were targeted for mentorship, but visits were expanded to additional facilities within focus districts. As a result, 141 percent of planned facilities were reached.
- PMI provided TA to the NMCP to develop four facility-based wall charts for key malaria indicators (IPTp, ACT adherence, and outpatient) to facilitate data driven decision-making at the facility level.

PMI-Supported Planned Activities (during CY 2021–2022)

- PMI will build upon its current support to the NMCP at the national level in several critical ways. First, to alleviate the heavy technical burden of activities on the NMCP, PMI will support the hiring of a devoted technical advisor who will work with the MIP and case management focal points to provide mentoring, technical guidance and support on issues of national level coordination.
- Building off the successes of reinvigorating the MIP TWG and establishing a RAS working group, PMI will support the revival of the case management TWG and promote malaria diagnosis through the existing MOHS diagnosis TWG.
- PMI will also support the NMCP to work with health training institutions in Sierra Leone like the nursing, midwifery, and paramedical schools, to update training materials and provide training on MIP, case management and diagnosis guidelines to lecturers.
- PMI will continue supporting the NMCP, DHMTs, and other stakeholders by instituting its quality assurance approach, which is composed of three key interventions: OTSS+, mentorship, and training. OTSS+ is a key intervention for quality assurance, and it is a process by which Clinical Training Officers and members of DHMTs travel to PHUs to provide in-facility support for key competencies in the service provision of malaria.
- With the support of PMI, facility digital data collection will continue via the Health Network Quality Improvement System application. This data will continue to be utilized to identify specific issues for Clinical Training Officers to focus on during mentorship visits between OTSS+ rounds.
- Based on feedback from the NMCP and DHMTs, PMI will continue supporting subdistrict meetings among health facility in-charges on a quarterly basis. This forum enables data reviews, the sharing of ideas, new tools, and updated guidelines and generally provides a conducive platform for in-depth discussions regarding challenges to malaria service delivery that are unique to their locality. These highly localized fora enable DHMTs and providers to respond effectively to specific challenges. Due to the beneficial impact of this activity, PMI will increase support of this activity from quarterly to bimonthly. These meetings will be inclusive of in-charges of other facility-based staff.
- PMI will increase its assistance to the CHW program by supporting the development of malaria-specific training materials and efforts to train the newly forming CHW cadre to be able to provide iCCM. This will ensure OTSS+ activities include CHWs in all districts of operations.

- Based on recent data showing approximately 20 percent more ACTs consumed (in the LMIS) than total malaria cases treated (in the HMIS, see Section 3.1 Supply Chain), PMI will support the NMCP in investigating the root causes of this difference. This will include understanding the factors related to poor RDT adherence and evaluating potential solutions to these issues, including an automated RDT reader at the facility and community levels.
- In Sierra Leone, just like in other countries, case management activities have suffered from the impact of COVID-19 and its rippling effects on malaria morbidity and mortality. In January 2020, outpatient department (OPD) attendance in Sierra Leone was roughly on par with 2019 OPD attendance. By April 2020, OPD attendance had decreased by about 55 percent from April 2019 (see Figure A-5). PMI is working closely with the NMCP and other partners to improve this situation, including CHW internships and OTSS+ for Peer Mentors, to ensure that quality malaria service delivery is readily available at all levels of the health system, particularly the community level. Additional data on care-seeking and testing trends can be seen in questions 1a and 1b below.

Figure A-5. Impact of COVID-19 on outpatient department (OPD) consultations



This graph shows a sharp decline in OPD attendance from 2019 to 2020 due to COVID-19, which also impacted the total number of confirmed malaria cases. There was an increase in presumptive malaria cases and over-prescription of ACTs.

Key Goal

Improve access to and use of timely, quality, and well-documented malaria testing and treatment by providing facility- and community-based health workers with training, supervision, and malaria commodities to provide quality, effective care.

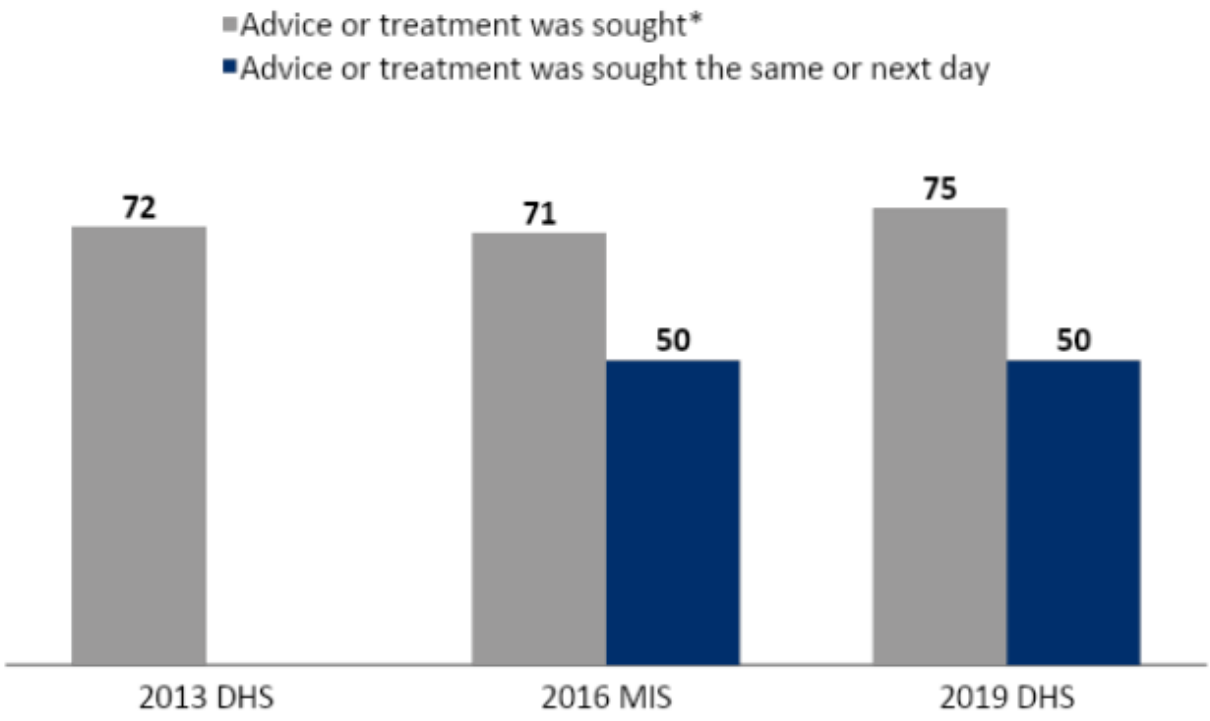
Key Question 1a

What is the status of care-seeking and/or access to care for children under five years of age with fever?

Supporting Data

Figure A-6. Trends in care-seeking for fever

Among children under five years of age with fever in the two weeks before the survey, percentage for whom advice or treatment was sought



**Note that this indicator has been recalculated according to the newest definition, care or treatment from any source, excluding traditional practitioners.*

Household survey results from 2013 and 2016 suggest that advice or treatment is sought for around 70 percent of children under five years of age with a fever; however, this increased to 75 percent according to the 2019 DHS. Early care-seeking is still an area to improve upon to minimize opportunity for progression to severe disease. Prompt care-seeking remained unchanged from 2016 at 50 percent according to the 2019 DHS.

Key Question 1b

What significant structural and/or behavioral challenges affect prompt care-seeking?

Supporting Data

Prompt care-seeking continues to be a challenge in Sierra Leone. According to the 2019 MBS, the behavioral determinants most strongly correlated with prompt care-seeking for fever included perceived self-efficacy to seek care for fever in a child promptly, positive attitudes toward prompt care-seeking, and discussing malaria with a spouse in the past six months. Specifically, women who were confident in their ability to get their child with fever to the health facility promptly were 4.3 times more likely to seek prompt care and those with positive attitudes toward prompt care-seeking were 3.6 times more likely to report they sought care promptly at a health facility for a sick child with fever. In addition, women who reported recently discussing malaria with a spouse were more

than three times more likely to report that they had sought care promptly at a health facility the last time their child had a fever. Prompt care-seeking was reported significantly less frequently among women in urban settings compared to respondents in rural settings and in Bo District.

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Key Question 2a

What proportion of patients are being tested and appropriately treated for malaria?

Table A-7. Proportion of patients being tested and treated for malaria

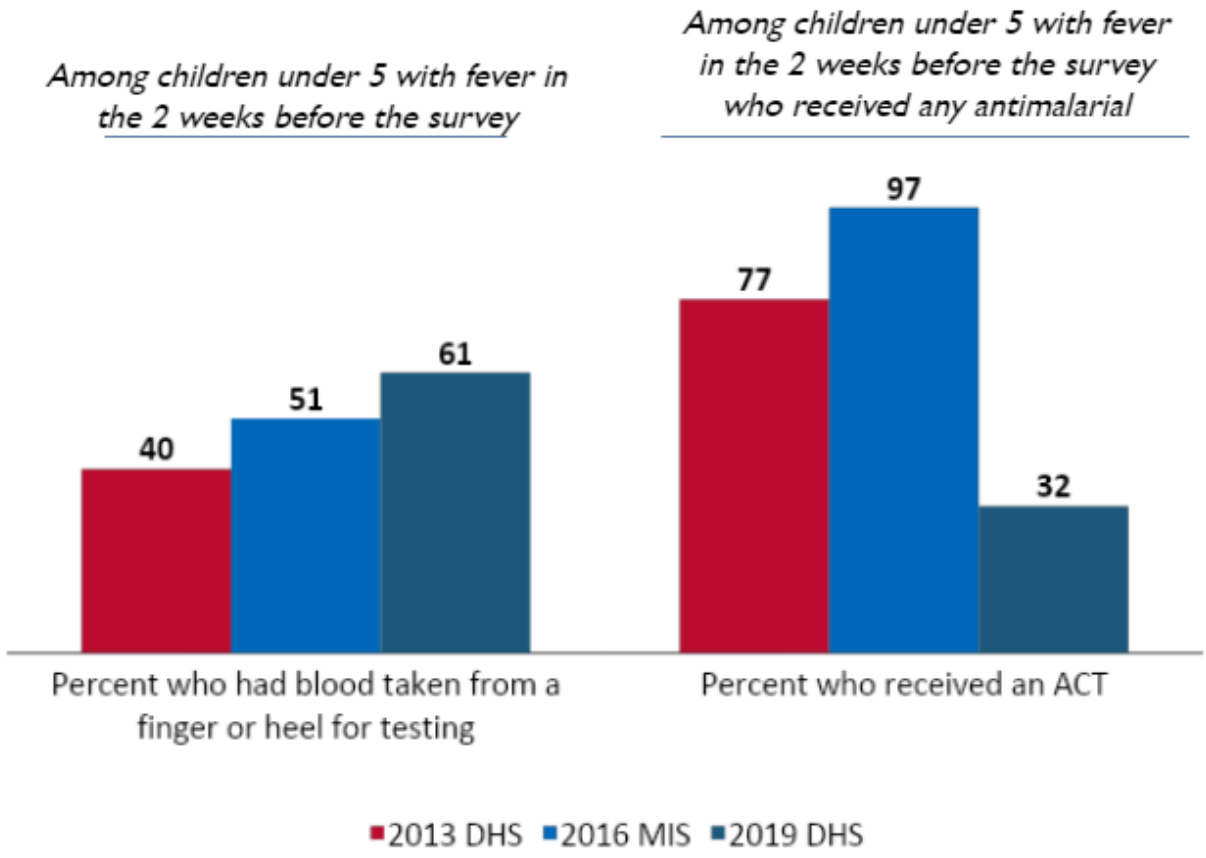
Indicator	2016	2017	2018	2019	2020
Suspect malaria cases	3,633,275	3,807,161	4,011,921	3,939,524	3,471,797
Patients who received a diagnostic test for malaria	3,596,227	3,760,405	3,996,065	3,906,096	3,417,306
Malaria diagnostic testing ratio	95%	98%	99%	98%	97%
Confirmed malaria cases	2,260,056	2,234,230	2,400,159	2,391,880	2,072,607
Presumed malaria cases	155,979	24,268	36,254	59,056	69,227
Total # malaria cases	2,416,035	2,258,498	2,436,413	2,450,936	2,141,834
Malaria cases (presumed and confirmed) given ACT	2,338,045	2,132,299	2,337,413	2,309,543	1,999,340
Proportion of malaria cases given ACT	97%	94%	96%	94%	93%

According to the 2020 HMIS data, 97 percent of suspected malaria cases received a diagnostic test and 93 percent of all tested and confirmed malaria cases received an ACT treatment. In comparison to the previous years there was a decline in 2020 due to the impact of COVID-19 and the reduction in health facility utilization.

Supporting Data

Figure A-7. Trends in diagnosis and treatment of children with fever

On the left, Figure A-7 shows the evolution over time among children under five years of age with fever who were surveyed and the proportion who had a finger or heel prick for testing. To the right is the proportion of children under five years of age with fever surveyed who reported receiving an ACT.



Household survey data from 2019 indicates that around 60 percent of children under five years of age with a fever reported receiving a diagnostic test for malaria. However, 32 percent of those tested received an ACT. This is a steep decline from the 2016 MIS, which reported nearly all children under five years of age received an ACT following a diagnostic test.

Key Question 2b

What significant structural and behavioral challenges affect testing and treatment practices among providers?

Supporting Data

Available data from the 2017 Service Availability and Readiness Assessment (SARA) survey shows that roughly 75 percent of health providers adhere to case management guidelines and 81 percent of health facilities have the available commodities to provide services. To better understand the socio-behavioral determinants of provider behaviors, PMI supported a qualitative study in October 2019 in Bo and Port Loko districts to assess malaria

prevention and treatment behaviors of 40 facility-based health workers across health facilities in five target constituencies.

Health workers offered insight into their perceptions of facility-level factors that negatively impact their work to provide quality diagnosis and treatment services. Factors identified included:

- Lack of financial compensation – Respondents cited this as an issue for facility- and community-based health workers noting that some staff receive no compensation for their work, and those who do receive financial incentives are sometimes unable to claim it.
- Lack of resources and support for staff – Health workers believe there are not enough resources (e.g., labor rooms and diagnostic and treatment supplies) and professional development support for refresher training activities. Without needed equipment, health workers then use other less effective methods to check for malaria symptoms and rely on clinical diagnosis for malaria.
- Lack of accommodation for staff – At some health facilities, staff are provided accommodation, and this is generally considered a positive benefit; however, this is not standard and in facilities where this is not available, it is a challenge for health workers who must travel long distances to and from the health facility on a daily basis.
- Lack of commodity supplies – Many health workers noted challenges with a lack of malaria treatment commodities citing the supplies are not always aligned with the caseload and needs of the facility. Further, health workers reported feeling that their requests for specific quantities of commodities are not always heard.
- Mistrust of the RDT – Some health workers do not trust the RDT's ability to identify all malaria because it only works for one type of parasite. To this end, health workers noted they accept positive test results but question the reliability of negative results. Additionally, health workers noted their training to identify malaria symptoms is more reliable than a negative RDT result.

Key Question 3

What is the current and planned support for case management at health facilities and in the communities by CHWs?

Supporting Data

PMI will continue to support ongoing activities targeted at health facility workers. PMI's case management services vary by district, as can be seen in the table below. The full package of interventions is ongoing in five districts (#1–5 in Table A-8), with plans to expand this package to five additional districts by FY 2022 (#6–10 below). The two Western Area Districts will be receiving outreach support on two interventions: Malaria in Pregnancy and treatment of severe malaria in children under six years of age with RAS in selected hard-to-reach communities beginning in FY 2021.

Table A-8. Existing PMI service delivery districts and newly expanded districts

#	District	Category	Province	Key interventions
1	Port Loko	Existing PMI-supported district	North West	Full Support • Staff embedded at the District Health Management Team (DHMT) • Clinical and Diagnostic OTSS+ • Routine mentoring and coaching • MIP/CM refresher training • RAMS rollout activities
2	Koinadugu	Existing PMI-supported district	Northern	
3	Falaba	Existing PMI-supported district	Northern	
4	Bo	Existing PMI-supported district	Southern	
5	Pujehun	Existing PMI-supported district	Southern	
6	Bombali	New PMI district	Northern	
7	Kono	New PMI district	Eastern	
8	Kailahun	New PMI district	Eastern	
9	Kenema	New PMI district	Eastern	
10	Karene	New PMI district	North West	
11	Western Rural	New "outreach district"	West	MIP/CM, RAMS
12	Western Urban	New "outreach district"	West	
13	Tonkolili	Other districts	North	Laboratory OTSS+ MIP/CM training RAMS rollout activities
14	Kambia	Other districts	North	
15	Bonthe	Other districts	South	
15	Moyama	Other districts	South	

Additionally, PMI is expanding its support for RAMs to all 16 districts and will continue to provide for routine monitoring and data collection. However, severe malaria data (confirmed severe malaria cases) are not captured in the revised MOHS tools, so proxy data elements (admitted malaria cases) are assumed to be confirmed severe malaria. This is a huge challenge because it impacts the quantification of severe malaria medicines. Also, there are no data elements to differentiate the classification of malaria cases confirmed by microscopy. With regard to treatment, the data elements account for malaria cases treated with ACT and there are no data elements that capture severe malaria treatment regimens. PMI's support will be focused on improving data collection, particularly on severe malaria cases.

To support community case management, PMI will increase its support to the new CHW strategy to ensure CHWs are able to deliver malaria services to the community. From the 2019 OTSS+ data, 52 percent, 18 percent, and 4 percent of CHWs observed demonstrated competence to perform mRDT, prevent malaria in pregnancy, and perform case management of uncomplicated malaria. PMI will utilize its three-pronged QA approach of OTSS+, mentorship, and training to address this issue, ensuring CHWs are included in these activities in all PMI districts.

However, community-level case management is currently suspended pending the implementation of the newly updated CHW policy. The CHW hub, under the Directorate of Primary Health Care, is focused on finalizing the recruitment of the new CHWs by June 2021. PMI will continue to engage with the CHW hub and the NMCP to identify opportunities to support the operationalization of the CHW policy. Specifically, with FY 2022 resources, PMI will support the continued scale-up of iCCM across 10 districts by contributing resources for training and supervision of CHWs.

Key Question 4

What is the estimated need for RDTs during CY 2021–2023? Are there any projected RDT gaps based on anticipated partner contributions compared to estimated needs?

Supporting Data

PMI and the Global Fund plan to cover all of the country's estimated RDT needs for CY 2021–2023, as seen in the table below. Note that there is an expected gap at the end of 2022, which will result in a five-month end-of-year stock instead of the desired six. However, this is unlikely to pose a stockout risk and PMI will work closely with the NMCP and Global Fund to ensure it does not impact testing activities.

Table A-9. RDT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	8,320,978	8,529,615	8,746,749
Population at risk for malaria	8,320,978	8,529,615	8,746,749
PMI-targeted at-risk population	8,320,978	8,529,615	8,746,749
RDT Needs			
Total number of projected fever cases	6,814,881	6,985,755	7,163,587
Percent of fever cases access to diagnosis	75%	80%	85%
Percent of fever cases tested with an RDT	93%	91%	89%
RDT Needs (tests)	**4,753,379**	**5,085,629**	**5,419,254**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tests)			
RDTs from Government	*0*	*0*	*0*
RDTs from Global Fund	5,074,291	3,130,739	5,414,622
RDTs from other donors	0	0	0
RDTs planned with PMI funding	1,715,000	1,400,000	1,400,000
Total RDT Contributions per Calendar Year	***6,789,291***	***4,530,739***	***6,814,622***
Stock Balance (tests)			
Beginning Balance	648,960	2,684,872	2,129,981
- Product Need	4,753,379	5,085,629	5,419,254
+ Total Contributions (received/expected)	6,789,291	4,530,739	6,814,622
Ending Balance	2,684,872	2,129,981	3,525,349
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	2,376,690	2,542,815	2,709,627
Total Surplus (Gap)	***308,182***	***(412,834)***	***815,722***

Key Question 5

What is the estimated need for ACTs during CY 2021–2023? Are there any projected ACT gaps?

Supporting Data

PMI and the Global Fund plan to cover all of the country's estimated ACT needs for CY 2021–2023, as seen in the table below. There are no expected gaps, as an ACT surplus is planned for all three years.

Table A-10. ACT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	8,320,978	8,529,615	8,746,749
Population at risk for malaria	8,320,978	8,529,615	8,746,749
PMI-targeted at-risk population	8,320,978	8,529,615	8,746,749
ACT Needs			
Total projected number of malaria cases	3,130,075	3,422,461	3,728,934
Total ACT Needs (treatments)	3,229,129	3,530,768	3,846,940
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	*0*	*0*	*0*
ACTs from Global Fund	2,762,292	2,977,407	3,843,652
ACTs from other donors *[specify donor]*	0	0	0
ACTs planned with PMI funding	1,306,860	950,000	880,612
Total ACTs Contributions per Calendar Year	***4,069,152***	***3,927,407***	***4,724,264***
Stock Balance (treatments)			
Beginning Balance	1,743,080	2,583,103	2,979,742
- Product Need	3,229,129	3,530,768	3,846,940
+ Total Contributions (received/expected)	4,069,152	3,927,407	4,724,264
Ending Balance	2,583,103	2,979,742	3,857,066
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	1,614,565	1,765,384	1,923,470
Total Surplus (Gap)	***968,538***	***1,214,358***	***1,933,596***

Key Question 6

What is the estimated need for definitive treatment and pre-referral treatment for severe malaria during CY 2021–2023? Are there any anticipated gaps?

Supporting Data

- The estimated needs for injectable artesunate during 2021–2023 are 464,995, 508,431, and 553,959 vials per year, respectively. Contributions from PMI and Global Fund are projected to meet this need, but in both CY 2021 and CY 2022 it is planned to have a buffer stock of slightly more than one month, versus the desired six months. However, the estimate for injectable artesunate needs is very conservative, as the model to estimate severe disease is being improved by the NMCP, but they are confident there will not be stockouts due to the central stock history. PMI will assist in refining the model and consistently

monitoring the commodity levels going forward. Additional doses will be procured in 2023 from Global Fund grant funding to build the desired six-month buffer.

- In 2022 to 2023, planned procurement of 20,000 RAS pre-referral treatments will cover the projected needs in these years. For the first part of 2021, there is a RAS commodities gap in Sierra Leone caused by the expiration of the original RAS order from previous procurements. Replacement orders have been placed but the gap analysis table shows this commodity gap during 2021.

Table A-11. Inj. Artesunate Gap Analysis Table

Calendar Year	2021	2022	2023
Injectable Artesunate Needs			
Projected number of severe cases	77,499	84,738	92,327
Projected number of severe cases among children	13,175	14,406	15,696
Average number of vials required for severe cases among children	6	6	6
Projected number of severe cases among adolescent	18,755	20,507	22,343
Average number of vials required for severe cases among adolescent	6	6	6
Projected number of severe cases among adults	45,569	49,826	54,288
Average number of vials required for severe cases among adults	6	6	6
Total Injectable Artesunate Needs (vials)	***464,995***	***508,431***	***553,959***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	164,995	287,431	553,486
Injectable artesunate from other donors [specify donor]	0	0	0
Injectable artesunate planned with PMI funding	300,000	221,000	221,000
Total Injectable Artesunate Contributions per Calendar Year	***464,995***	***508,431***	***774,486***
Stock Balance (vials)			
Beginning Balance	49,665	49,665	49,666
- Product Need	464,995	508,431	553,959
+ Total Contributions (received/expected)	464,995	508,431	774,486
Ending Balance	49,665	49,666	270,193
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	232,497	254,215	276,980
Total Surplus (Gap)	***(182,832)***	***(204,549)***	***(6,787)***

Table A-12. RAS Gap Analysis Table

Calendar Year	2021	2022	2023
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose	5,301	5,796	6,315
Total Artesunate Suppository Needs (suppositories)	***7,951***	***8,694***	***9,473***
Needs Estimated based on Other (please specify in comment section)			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	0	0	0
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	2,000	20,000	20,000
Total Artesunate Suppositories Available	***2,000***	***20,000***	***20,000***
Stock Balance (suppositories)			
Beginning Balance	0	0	11,306
- Product Need	7,951	8,694	9,473
+ Total Contributions (received/expected)	2,000	20,000	20,000
Ending Balance	-5,951	11,306	21,833
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	3,976	4,347	4,736
Total Surplus (Gap)	***(9,927)***	***6,959***	***17,097***

Key Question 7

What is the estimated need for any other standard antimalarial drug used in the country (e.g., primaquine for *P. vivax*) during CY 2021–2023? Are there any anticipated gaps?

Supporting Data

N/A

Key Question 8

Are first-line ACTs effective and monitored regularly?

The most recent therapeutic efficacy study in Sierra Leone, done in 2016, found a high (100 percent) rate of efficacy of AL, artesunate-amodiaquine (ASAQ), and dihydroartemisinin-piperaquine (DP) for the treatment of uncomplicated malaria infection in all study areas: Bo, Kenema, and Makeni. Therapeutic efficacy studies (TES) are not conducted regularly in Sierra Leone; there is a need for efficacy studies to take place in country at more routine intervals, preferably at least every two years.

Supporting Data

Table A-13. Recently completed and ongoing antimalarial therapeutic efficacy studies

Sierra Leone				
Most Recent Study Year	**Sites**	**PMI Funded (Y/N)**	**Treatment Arms**	**PCR-Corrected Efficacy>90%**
2016[1]	Bo	N	ASAQ, DP	Y
2016[1]	Makeni	N	ASAQ, DP	Y
2016[1]	Kenema	N	AL	Y

Ongoing TES: None Ongoing TES: None

[1]Smith, S.J., Kamara, A.R.Y, Sahr, F., Samai, M., Swaray, A.S., Menard, D., & Warsame, M. Efficacy of artemisinin-based combination therapies and prevalence of molecular markers associated with artemisinin, piperaquine, and sulfadoxine-pyrimethamine resistance in Sierra Leone. Acta Trop. 2018 Sep;185:363-370. doi:10.1016/j.actatropica.2018.06.016

Key Question 9

Are there other areas (e.g., lab strengthening, private sector support, etc.) that should be considered for PMI support?

Malaria diagnosis, especially microscopy capacity, and the capacity to conduct external quality assurance of malaria diagnostic testing is very low in Sierra Leone. PMI will support the NMCP and partners to build the capacity of microscopists through refresher trainings, internal and external QA exercises, preparing a cohort of microscopists to Level 1 and 2 WHO accreditation, and provision of quality equipment, supplies, and consumables for malaria diagnosis. With the ongoing support for building malaria diagnostic capacity in the country, PMI will scale up malaria microscopy to all hospitals and community health centers and scale up quality supervisory visits to all laboratories.

The construction of a malaria reference laboratory is underway with support from USG. PMI plans to equip the reference lab with a slide bank and accredited microscopists to support QA/QC activities of malaria diagnosis.

Supporting Data

N/A

Conclusions for Case Management Investments

As described above, PMI is committed in its efforts to support the NMCP in its objectives to reduce malaria morbidity and mortality. PMI's service delivery activities in Sierra Leone will continue to focus on supporting the NMCP to bolster appropriate testing and treatment of malaria cases, to strengthen MIP, and to pilot and scale up new drug-based approaches where appropriate. Upcoming highlights include the following:

- Expanding the full package of case management activities from 5 to 10 districts by FY 2022.
- Increasing support to the new CHW strategy to ensure CHWs are able to deliver quality malaria services.
- Expanding support for RAS implementation to all 16 districts.

- Adding Western Area Rural and Western Area Urban as outreach districts with targeted support for MIP and RAS implementation.
- Completing TES in three districts in 2021.
- Conducting SBC activities around prompt care-seeking and opportunities to strengthen provider behavior, including RDT adherence at the facility and community levels.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2. DRUG-BASED PREVENTION

NMCP Objective

- According to the National Malaria Elimination Strategic Plan (2021–2025), the NMCP's objectives for drug-based prevention interventions are addressed under Objective 2: By the end of 2025, reduce malaria case incidence by at least 75 percent compared to 2015. Intermittent preventive treatment in pregnancy (IPTp) and in infants (IPTi) are supported under this objective. For IPTp, the goal is "to ensure increased coverage among eligible pregnant women" with SP available at all service delivery points for directly observed therapy at ANC visitations. For intermittent preventive treatment for infants (IPTi), SP will be delivered through routine EPI activities at health facilities. The NMCP will work closely with the Reproductive, Maternal, and Child Health (RMCH) Unit and its composite programs notably the EPI Program to develop and/or update guidelines and staff training on administering SP during the course of this strategic plan.
- Seasonal malaria chemoprevention (SMC) is not a strategy currently adopted or recommended in Sierra Leone per WHO guidelines.

NMCP Approach

- The NMCP adopted the 2012 WHO IPTp policy recommendations, ensuring pregnant women receive IPTp-SP doses starting early in the second trimester of pregnancy (13 weeks) and continue to receive IPTp-SP until delivery with a minimum interval of one month between doses.
- ITNs and IPTp are provided to pregnant women as part of the antenatal care package of services at health facilities aimed at making pregnancy safer. ITNs are provided for free to pregnant women at their first ANC visit and to the fully immunized child through EPI. The national treatment policy for the treatment of uncomplicated malaria cases during pregnancy is oral quinine plus clindamycin in the first trimester and an ACT in the second and third trimesters.
- The NMCP supports the full integration of MIP within the MOHS's RMCH Unit. The NMCP is responsible for updating guidelines and job aids on IPTp, orienting health workers on updated IPTp guidelines, producing integrated data collection tools for MIP, procuring SP for the public and private sector and mobilizing communities on antenatal care attendance in collaboration with the RMCH Unit.
- In 2017, the MOH adopted the 2016 WHO ANC guidelines including the recommended eight ANC contacts during pregnancy. With the updated ANC guidelines, the MOH recommends an additional ANC contact early in the second trimester (between 13 and 16 weeks) to administer SP as early as possible to pregnant women.
- The NMCP has supported the provision of IPTp-SP at the community level through trained traditional birth attendants (TBAs). Although this approach has been scaled up nationally, the monitoring and

supervision of this practice has been limited and TBAs have reported frequent stockouts of SP supplies at the community level. However, a new CHW strategy is currently being finalized that will integrate all community workers, including TBAs, into a single CHW cadre. The strategy includes community administration of IPTp-SP as a component of the CHW package of services.

- Although the public hospitals provide ANC services to pregnant women, training and supervision of hospital staff as well as other private health providers in ensuring quality of MIP and IPTp services has been limited.

PMI Objective in Support of NMCP

- PMI supports the NMCP in implementing the multi-pronged approach to MIP including strengthening MIP services (ITNs and IPTp) at ANC and ensuring prompt diagnosis and effective treatment of malaria during pregnancy.
- PMI supports the NMCP's plan to ensure updated MIP policies and guidelines are available in all facilities and peripheral health providers have been trained in their use including health facility staff, CHWs, midwives, and public and private sector hospital staff. PMI supports integrated supportive supervision in focus districts to ensure the quality of service delivery as well as support the implementation of the NMCP's approach to on-the-job training, through mentoring and coaching of staff including CHW peer supervisors for improving IPTp coverage.
- TBAs are being incorporated into a single CHW cadre as part of the new CHW strategy. CHWs help identify pregnant women in the community and accompany pregnant women to attend ANC visits and deliveries at the health facility. NMCP encourages CHWs in remote communities to provide SP for IPTp to pregnant women after the first dosing at a health facility; however, this practice has not been systematically supported nationwide. National scale is, however, a component of the new CHW strategy and PMI will support the NMCP in developing policies and guidelines in support of this.
- PMI will work with NMCP and stakeholders to technically assist with the training curriculum for the integrated CHW cadre.
- PMI supports the close collaboration between NMCP and RMCH Unit; to this end, PMI supports the NMCP and RMCH unit with convening the national MIP TWG, ensuring regular quarterly meetings and coordination of MIP efforts among the two national programs and key malaria stakeholders.
- Based on initial findings from a pilot study completed in June 2019, the NMCP rolled out IPTi nationwide to all districts through the national EPI program platform. PMI recognizes other partners engaged in supporting IPTi activities; therefore, PMI's primary focus is on strengthening MIP and IPTp implementation.

PMI-Supported Recent Progress (during CY 2020–2021)

- PMI supported efforts with the NMCP and RMCH Unit to reinvigorate the MIP technical working group (TWG), including the development of a comprehensive terms of reference for the TWG which was amended and adopted by the group.
- PMI supported strengthening of supervisory visits using the OTSS+ MIP checklist among facility level providers, which includes an assessment of ANC and MIP services at facility level in three districts (Bo, Port Loko, and Falaba). The tool supports the NMCP's plan to train health providers in the updated MIP

guidelines including health facility staff, CHWs and TBAs, midwives, and public and private sector hospital staff.

- PMI implemented the MBS, a cross-sectional household survey designed to measure malaria-related behaviors and their behavioral determinants across intervention areas, in October 2019. A full report was disseminated in 2020 with findings of behavioral factors related to IPTp uptake (among other behavioral determinants).
- PMI supported comprehensive MIP refresher training for 2,705 health workers from public facilities, hospitals, and private clinics (representing approximately 96 percent of all health workers).

PMI-Supported Planned Activities (during CY 2021–2022)

- PMI will scale up MIP activities to 10 districts in 2021 providing a comprehensive package of training in the updated MIP guidelines and ongoing supportive supervision to health providers including health facility staff, CHWs, midwives, and public and private sector hospital staff. Supportive supervision using the OTSS MIP checklist is augmented by on-site training, mentoring, and coaching of health providers to assess and strengthen the quality and delivery of MIP interventions including uptake of IPTp. PMI will review and support revisions to the ANC registers ensuring standardized, quality routine reporting of IPTp and ANC indicators in the HMIS.
- PMI will provide support for strengthening MIP activities in Western Rural and Western Urban Areas with refresher training for health facility staff on ANC and MIP and ongoing supportive supervision and mentoring for public and private sector facilities.
- PMI will continue supporting the MIP TWG, co-chaired by NMCP and RMCH unit, to meet, update policies and guidelines, review and use data for decision-making, and address bottlenecks and challenges.

2.2.1. MALARIA IN PREGNANCY (MIP)

Key Goal

Support the national strategy for MIP, which includes provision of ITNs at the first antenatal care (ANC) visit, a minimum of three doses of intermittent preventive treatment for pregnant women (IPTp) in malaria endemic areas starting at 13 weeks gestational age, and effective case management of malaria per WHO guidelines.

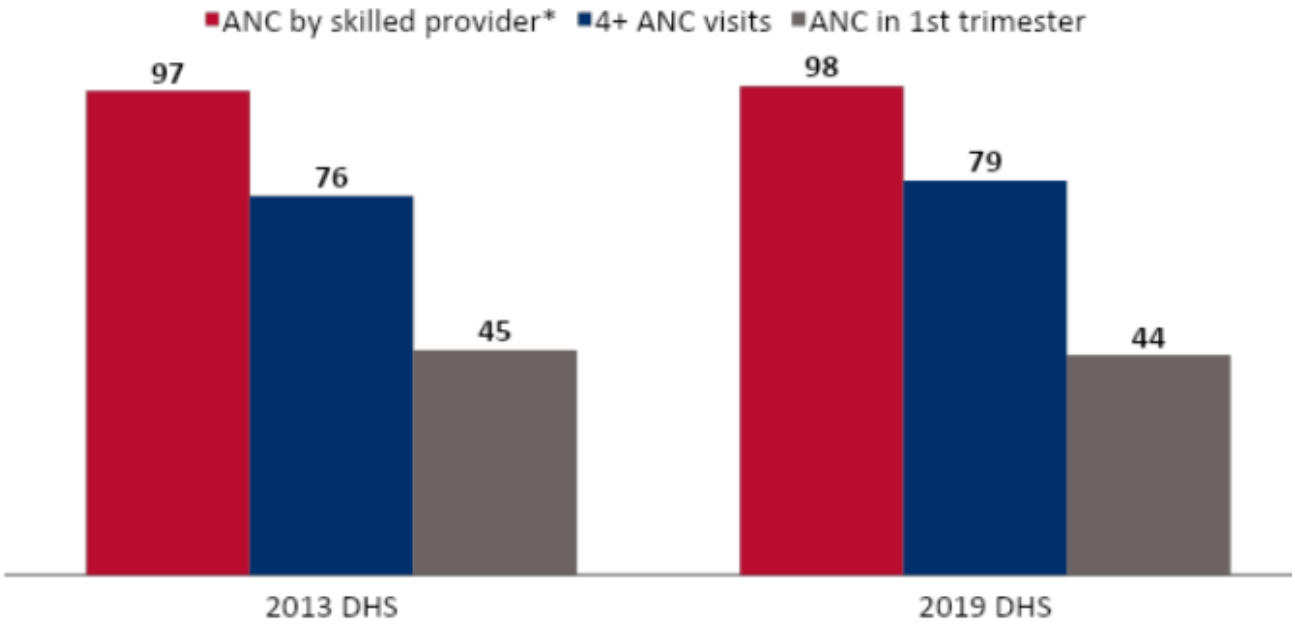
Key Question 1a

What proportion of pregnant women are accessing ANC early and frequently (as recommended by national and/or WHO strategies) during their pregnancy?

Supporting Data

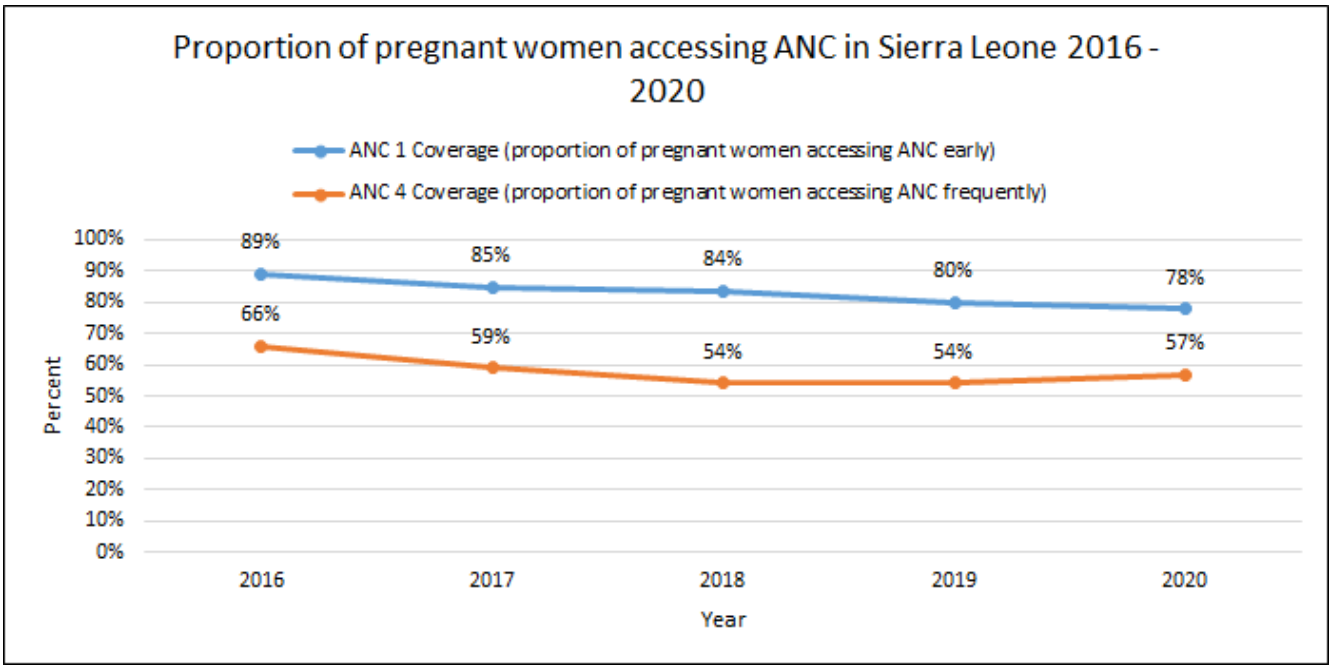
Figure A-8. Trends in ANC coverage [DHS]

Women 15 to 49 years of age with a live birth in the five years before the survey (most recent birth)



*Skilled provider includes doctor, nurse, midwife, or MCH aide.

Figure A-9. Trends in accessing ANC services [HMIS]



Key Question 1b

Are there important health system and/or behavioral barriers to ANC attendance at health facilities?

Supporting Data

ANC attendance is generally high in Sierra Leone; the 2013 DHS reported 97 percent of women attended at least one ANC visit during their pregnancy and 76 percent completed all four recommended ANC visits. However, 45 percent of women made their first ANC visit in the first trimester of pregnancy. Similar results were reported in the 2019 DHS with 98 percent of women attending at least one ANC during their pregnancy, 79 percent completing all four recommended ANC visits, and 44 percent of women made their first ANC visit in the first trimester of pregnancy. To achieve optimal IPTp3 coverage, the early initiation of ANC is an important programmatic consideration for the NMCP. In 2017, the MOH adopted the 2016 WHO ANC guidelines including the recommended eight ANC contacts during pregnancy. With the updated ANC guidelines, the MOH recommends an additional ANC contact early in the second trimester (between 13 and 16 weeks) to administer SP as early as possible to pregnant women. During the COVID-19 pandemic, facility services were disrupted and halted for a period of time in mid-2020 including ANC, although the effects of which are not completely known at this time. HMIS data indicates a slight decrease in the proportion of pregnant women attending ANC services between 2016 and 2020 (the proportion of pregnant women attending their first and fourth ANC visits declined over the period from 89 percent to 78 percent, and 66 percent to 57 percent, respectively). The 2020 HMIS data may signal the impact of COVID-19 facility closures on care-seeking and availability of ANC and MIP services.

Data from the 2019 MBS across districts indicates two-thirds (66.7 percent) of the surveyed population had knowledge about the timing of the first ANC visit during pregnancy, with significant differences in knowledge between men and women. However, knowledge of the recommended number of ANC visits during pregnancy varied significantly by district (Bo: 70.3 percent, Port Loko: 51.1 percent) and sex (male: 45.3 percent, female: 76.8 percent). Compared to knowledge regarding ANC timing and recommended number of visits, knowledge of the recommended number of doses of SP to be taken during pregnancy to prevent malaria was substantially low. Overall, only one-third (33.7 percent) of respondents knew women should receive three doses of SP during pregnancy. Knowledge was significantly higher among respondents in Port Loko (39.4 percent) than in Bo (28.9 percent). Shared decision-making with spouses regarding ANC attendance among women who were pregnant or had given birth in the last two years was suboptimal. Fewer than half (45.4 percent) indicated that the final decision on their ANC attendance was made jointly with their spouse/partner; however, women in Bo (55.6 percent) were significantly more likely to endorse shared decision-making than women in Port Loko (35.1 percent). Overall, a majority of respondents perceived that more than four ANC visits (75.6 percent) and taking medicine to prevent malaria during pregnancy (80.6 percent), are norms in their communities.

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

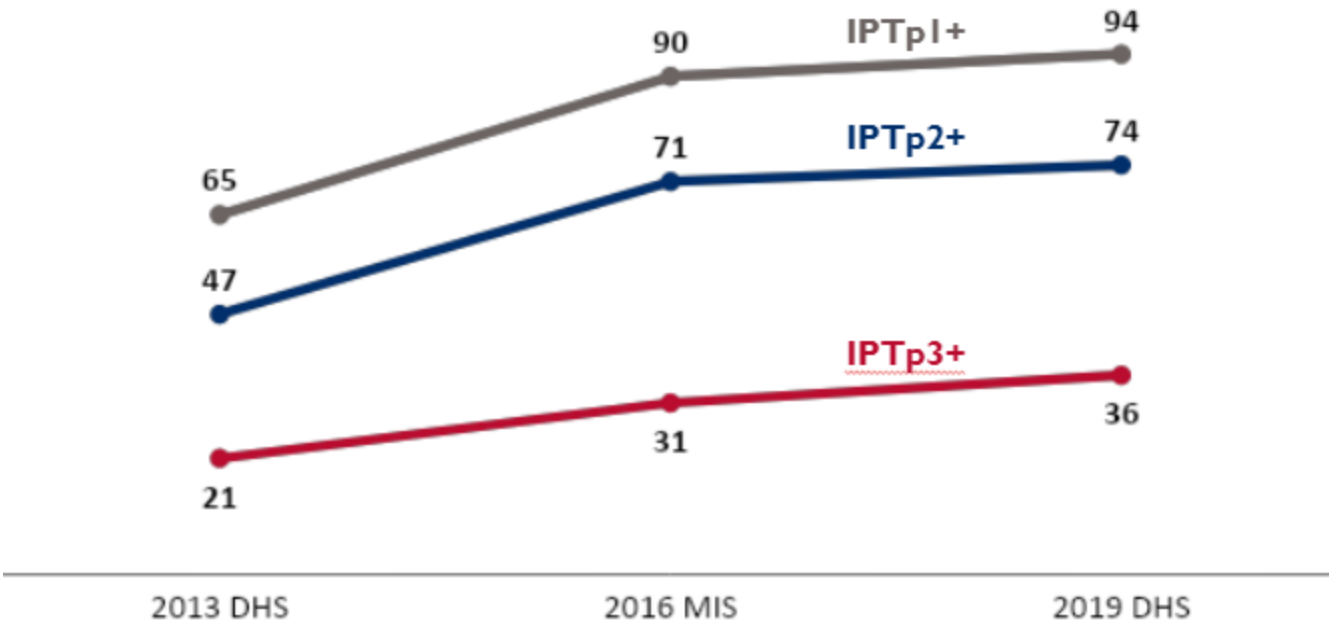
Key Question 2

What proportion of pregnant women are receiving the recommended doses of IPTp?

Supporting Data

Figure A-10. Trends in IPTp

Women 15 to 49 years of age with a live birth in the two years before the survey who received the specified number of doses of SP/Fansidar during their last pregnancy



Note that these indicators have been recalculated according to the newest definition, at least the specified number of doses of SP/Fansidar from any source.

Note: IPTp3 baseline uses the first survey available after the recommendation was updated to three or more doses.

- According to the DHS 2019, IPTp2 and IPTp3 coverage is 74 percent and 36 percent, respectively. The 2016 MIS reported IPTp2 and IPTp3 at 71 percent and 31 percent, respectively, which indicates a slight improvement in IPTp uptake over the past three years.
- While coverage of the first and second dose of IPTp is generally high, improvements are needed in achieving high coverage of the third dose of IPTp. Most pregnant women initiated ANC after their first trimester, contributing to low IPTp3 uptake.

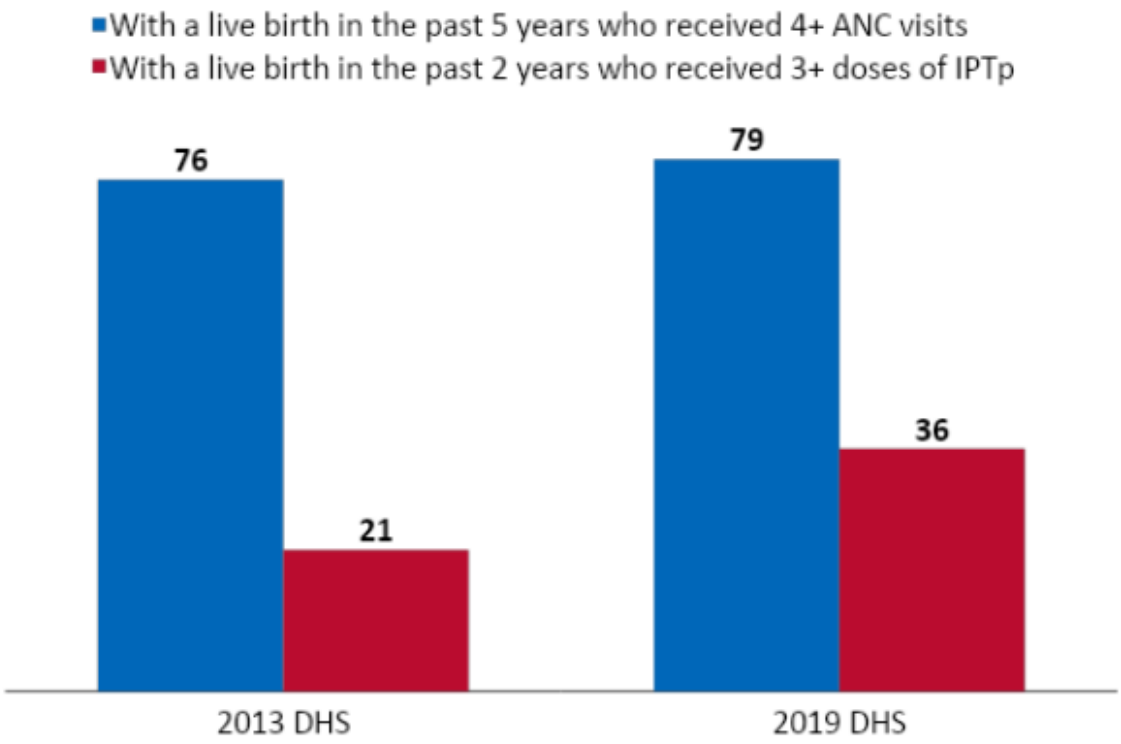
Key Question 3a

What is the gap between ANC attendance and IPTp uptake (i.e., missed opportunities for giving IPTp at ANC)?

Supporting Data

Figure A-11. Trends in missed opportunities for IPTp

Percentage of women 15 to 49 years of age



Key Question 3b

What significant health system and/or behavioral challenges affect provider delivery of MIP services (e.g., IPTp and ITN distribution at ANC)?

Supporting Data

Systems challenges remain in supporting MIP implementation. Data from the 2017 SARA reported specific provider behavior challenges including the need to train all health facility staff and TBAs in the updated ANC and IPTp policy guidelines, occasional SP stockouts at peripheral health facilities due to poor supply chain management practices, the lack of private sector engagement in MIP and IPTp administration, and inadequate monitoring and supervision of IPTp at the community level. Findings from the 2019 qualitative provider behavior assessment confirmed barriers identified in the 2017 SARA and provided some additional insight. For example, health workers discussed administration of IPTp in the context of malaria prevention measures for pregnant women who visit the health facility for ANC services. All health workers interviewed recognized that pregnant women were vulnerable to malaria and providers generally felt positive about using IPTp to prevent malaria. Results indicated they were knowledgeable about the dose and administration of IPTp according to the malaria in pregnancy guidelines and they reported that they proactively and routinely offer SP to pregnant women using the direct observation approach to ensure the doses are taken. While most of the health workers had positive attitudes toward malaria prevention services provided through routine ANC, some noted that an additional

challenge with IPTp administration is client perceptions that SP is not effective in preventing malaria during pregnancy.

Findings from the 2019 MBS provide information to further understand the community-level factors that influence IPTp uptake. Behavioral factors associated with uptake of at least three doses of IPTp include knowledge of the recommended number of doses of IPTp during pregnancy, self-efficacy to take at least three doses of SP, perception of IPTp as a community norm, and attending at least four ANC visits.

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Key Question 4

Does the national ANC program or health information system collect data and track the proportion of pregnant women with fever, those tested for malaria, those found to have malaria infection, and those who are treated?

Supporting Data

Table A-14. Number of malaria cases treated in pregnancy, 2016–2020 (HMIS)

Indicator	2016	2017	2018	2019	2020
Malaria in 1st trimester (treated with oral quinine)	29,064	21,850	16,917	16,442	22,865
Malaria in 2nd or 3rd trimester (treated with ACT)	106,257	104,813	122,682	113,746	114,167
Total malaria cases treated in pregnant women	135,321	126,663	139,599	130,188	137,032

The HMIS tracks and reports on the number of malaria cases treated among pregnant women and indicates treatment according to trimester per the national treatment guidelines. The number of malaria cases treated appears fairly consistent over the past five years. PMI is working with NMCP to ensure all pregnant women are provided with early diagnosis and correct treatment following national guidelines.

Key Question 5

What is the estimated need for SP during 2021–2023? Are there any anticipated SP gaps? Are there gaps in other IPTp commodities?

Supporting Data

The Global Fund is the primary contributor to SP procurement for pregnant women, and plans to fill the SP need in CY 2021–2023. PMI currently does not have plans to procure SP.

Table A-15. SP Gap Analysis Table

Calendar Year	2021	2022	2023
Total Country Population	8,320,978	8,529,615	8,746,749
Total Population at Risk for Malaria	8,320,978	8,529,615	8,746,749
PMI Targeted at Risk Population	8,320,978	8,529,615	8,746,749
SP Needs			
Total Number of children under 1 y/o	332,839	341,185	349,870
Proportion of infant expected to attend EPI at Penta-1	100%	100%	100%
Proportion of infant expected to attend EPI at Penta-2	100%	100%	100%
Proportion of infant expected to attend EPI at Penta-3	100%	100%	100%
Total SP Needs (treatments)	***998,517***	***1,023,554***	***1,049,610***
Total SP Needs (tablets)	***499,259***	***511,777***	***524,805***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tablets)			
SP from Government	0	0	0
SP from Global Fund	398,298	1,023,554	1,049,610
SP from Other Donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Contributions per Calendar Year	***398,298***	***1,023,554***	***1,049,610***
Stock Balance (tablets)			
Beginning balance	429,100	328,139	839,916
- Product Need	499,259	511,777	524,805
+ Total Contributions (Received/expected)	398,298	1,023,554	1,049,610
Ending Balance	328,139	839,916	1,364,721
Desired End of Year Stock (months of stock)	8	8	8
Desired End of Year Stock (quantities)	665,678	682,369	699,740
Total Surplus (Gap)	***(337,539)***	***157,547***	***664,981***

Conclusions for MIP Investments

PMI will continue to support the NMCP in implementing the multi-pronged approach to MIP including strengthening MIP services (ITNs and IPTp) at ANC and ensuring prompt diagnosis and effective treatment of malaria during pregnancy. PMI will continue to support MIP activities in 10 districts providing a comprehensive package of training in the updated MIP guidelines and ongoing supportive supervision to health providers including health facility staff, CHWs, midwives, and public and private sector hospital staff.

PMI will continue to support strengthening MIP activities in Western Rural and Western Urban Areas with refresher training for health facility staff on ANC and MIP and ongoing supportive supervision and mentoring for public and private sector facilities.

PMI will continue to support the MIP TWG, co-chaired by NMCP and RMCH Unit, to meet, update policies and guidelines, review and use data for decision-making, and address bottlenecks and challenges. With Global Fund procuring all SP commodity needs for pregnant women, PMI does not plan to procure SP for IPTp.

Please see FY 2022 MOP budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2.2. SEASONAL MALARIA CHEMOPREVENTION (SMC)

SMC is not a recommended intervention for this country.

2.2.3. ADDITIONAL DRUG-BASED PREVENTIVE STRATEGIES

Country Goal

By 2025, the NMCP strategy aims to reduce malaria case incidence by at least 75 percent compared to 2015. To support this objective, Sierra Leone launched in 2018, implementation of IPTi aiming to reach all healthy infants with three doses of SP between two and nine months of age. IPTi is implemented in partnership between malaria and EPI programs and SP for IPTi is delivered through routine EPI activities at health facilities in all 16 districts. The timing of IPTi dosing is linked to the national immunization schedule as follows:

- IPTi1 provided at the time of dose 2 of DPT/Penta (10 weeks)
- IPTi2 provided at the time of dose 3 of DPT/Penta (14 weeks)
- IPTi3 provided at the time of 1st dose measles vaccine (9 months)

PMI Goal

IPTi is implemented with support under the Global Fund grant. As such, PMI will continue to closely monitor progress of IPTi activities while focusing on strengthening other drug-based prevention interventions, namely IPTp.

PMI-Supported Recent Progress (during CY 2020–2021)

N/A

PMI-Supported Planned Activities (during CY 2021–2022)

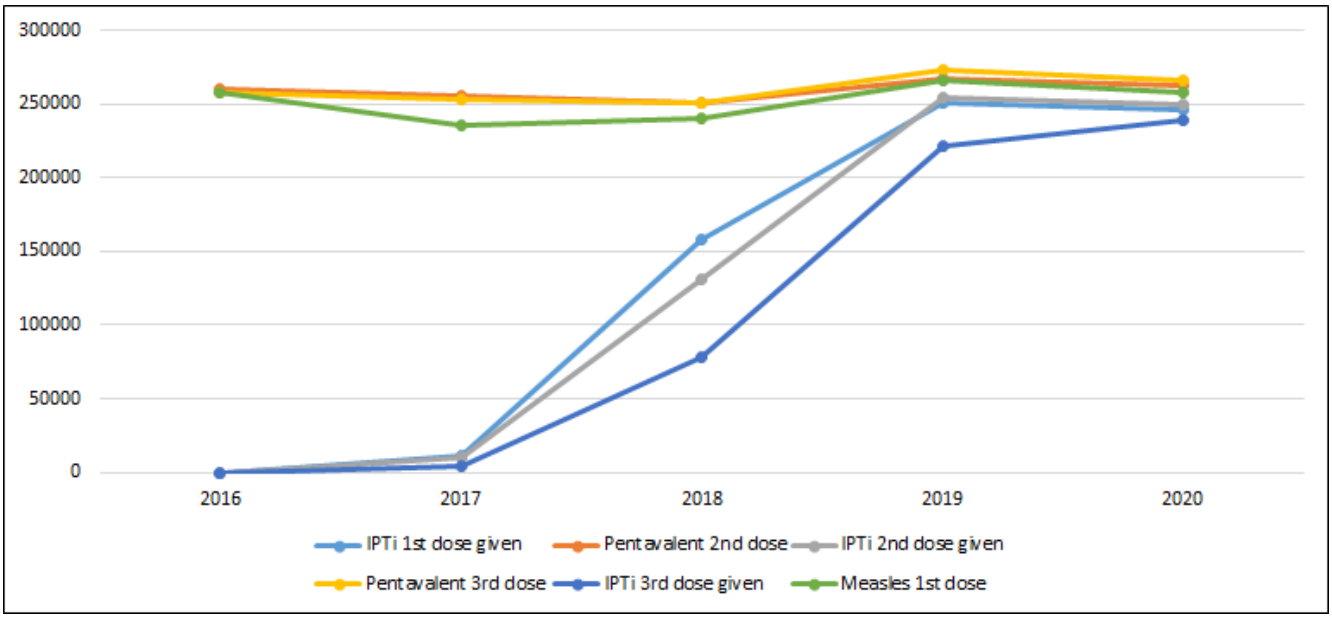
N/A. IPTi is supported under the Global Fund; PMI will closely monitor IPTi but does not plan to support implementation.

Key Question 1

What specific drug-based preventive or proactive strategies are directed toward pre-elimination and/or elimination in the near term? Which of these merit PMI support for FY 2022 funding with consideration of existing or planned national or other partner funding?

Supporting Data

Figure A-12. Annual IPTi doses compared to corresponding EPI vaccines in Sierra Leone, 2016–2020



Conclusions for Other Preventive Drug-Use Investments

Since its initiation in 2017, the Sierra Leone MOHS has expanded IPTi to all districts in Sierra Leone. By 2020, the number of IPTi doses provided mirrored its corresponding EPI vaccine visits without a perceptible decrease in IPTi third dose given by 2020.

PMI does not plan to support IPTi with FY 2022 funding; instead PMI will closely monitor implementation of IPTi while focusing on strengthening and improving the delivery of IPTp for pregnant women.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.1. SUPPLY CHAIN

NMCP Objective

- The objective of the Sierra Leone National Malaria Elimination Strategic Plan (2021–2025), focuses on the provision of diagnostic tests and effective treatment for public, private and community levels; improving malaria data collection and reporting through HMIS (public and private); and strengthening procurement and supply chain management of malaria commodities. The Test, Treat, and Track approach remains a vital component of the new strategic plan as well as the availability of quality assured malaria commodities in public, community and private health facilities at all points in time.
- The NMCP seeks to strengthen the capacity of health workers both in the public and private health sectors by providing training to all health workers at least twice a year. In addition, the NMCP seeks to

improve the supply of malaria prevention and treatment commodities by proactively engaging the private sector in malaria control, and strengthening community participation in diagnosing, treating, and reporting malaria cases.

NMCP Approach

- The Directorate of Drug and Medical Supplies (DDMS), now known as the Directorate of Pharmaceutical Services (DPS), was charged with the responsibility of the entire supply chain of the MOHS pending the functioning of the newly created National Medical Supply Agency (NMSA) that was established by an Act of Parliament in August 2017.
- The DPS served as a caretaker pending the transition of NMSA, which happened in July 2020. DPS is now responsible for all other supply chain functions with the exception of procurement, warehouse and distribution which are the primary role of NMSA. However, integration of these two organizations is important for the proper functioning of the supply chain.
- DPS continues to develop policies that guide the supply chain. The 2012 National Medicine Policy and Standard Treatment Guidelines for all levels and treatment chart for lower-level health facilities were reviewed in 2020 and DPS will be digitizing these documents through a mobile application.
- The Pharmacy Board of Sierra Leone has the primary role of regulating pharmaceutical drugs and thus oversees quality and pharmacovigilance activities.
- The MOHS is currently at the verge of developing the first Supply Chain Strategic Plan (2021–2025) and a Supply Chain Monitoring and Evaluation Plan, which will guide the country's supply chain interventions and system strengthening approaches. NMSA is now fully operational with technical and administrative personnel in place and has fully taken up the distribution of malaria, tuberculosis, and HIV commodities in addition to the free healthcare, reproductive health and family planning, and nutrition commodities. NMSA has begun discussions on the integration of the supply chain of vaccine commodities.
- An informed push distribution is carried out for all commodities with the exception of malaria commodities, which use a pull type of distribution, to district warehouses (first mile) on a quality basis. NMSA carries out first mile distribution with the use of its own fleet and trucks with Global Fund support. Third-party logistics transportation is currently ongoing for last mile distribution to health facilities; however, plans of transitioning to NMSA in the near future are underway. NMSA chairs the Supply Chain TWG and sub-groups to guide supply chain decisions and policy.
- NMSA manages the storage of all commodities (with the exception of vaccines) in government and rented, private warehouses. The construction of a modern warehouse space that can house all commodities including vaccines and emergency commodities has been started, but is delayed indefinitely until full funding is obtained.
- The country has a functional National Quantification Committee with seven programmatic TWGs, including a malaria TWG. DPS supports the process of forecasting malaria commodities and other health program commodities and is fully responsible for forecasting the free healthcare and cost recovery programs. A series of capacity-building on quantification has been supported in the past by various partners, including PMI, to ensure sustainability. The DPS has a unit responsible for quantification-related activities and gives regular support to the district level. DPS has reviewed and updated the paper-based Report, Request, and Issue Voucher (RRIV) that captures all health commodities and is used by health facilities to report stock on a monthly basis. Quality of data reported by facilities through RRIVs is still a challenge and capacity-building of health facilities personnel remains a key priority. The country has fully

migrated from the Channel software stock management system in all districts to the use of the eLMIS reporting through DHIS2 since September 2020. With visibility into LMIS data, the MOHS has seen an improvement in the reporting rate, with a recorded average of 83 percent in 2020 for malaria commodities. The rollout of mSupply, a warehouse management software system, is still ongoing and will be completed in all districts in 2021.

- DPS is also monitoring the rational use of drugs in compliance with policies and guidelines. There are plans to set up a Drug Information Center to this end.

PMI Objective in Support of NMCP

PMI has been supporting the supply chain through both procurement and technical system strengthening. The goal of PMI as it relates to the supply chain is to ensure uninterrupted supplies of health commodities at all levels of service delivery. PMI supports the NMCP with commodity procurement and logistics, system strengthening, and collaboration to improve the long-term availability of health commodities as aligned with the national strategies and priorities in line with the Sierra Leone National Malaria Elimination Strategic Plan (2021–2025) that seeks to provide access to quality malaria control interventions, including malaria commodities, for all. PMI's vision for Sierra Leone's public health system includes the improvement and strengthening of the supply chain system in Sierra Leone, specifically focusing on data management and use at the district and facility level in an effort to reduce stockouts of malaria commodities as well as commodity over-stocking, which often leads to commodity expirations.

In collaboration with other partners, PMI has provided TA for the integration of LMIS into DHIS2 for accurate quantification and distribution of malaria commodities. PMI continues to give support to eLMIS through capacity-building of both public and private personnel, and use of the data for the decision-making process. PMI continues to support national level coordination meetings and work plan alignment with the NMCP, DPS, and NMSA to improve coordination and the strengthening of health system activities among all key stakeholders and thus reduce redundancies and increase collaboration.

PMI's interventions build off of previously implemented activities and are based on the current country's supply chain challenges and priorities, best practices, and innovative approaches that have the potential to transform the supply chain. These interventions will continue to support the Sierra Leone health supply chain system with availability of policies, guidelines and strategic documents, automated data capture, and end-to-end visibility and an efficient distribution system focusing on all levels of the health system. In deploying these interventions, PMI will continue to foster collaboration and coordination with all in-country stakeholders involved in supply chain management, including the Ministry of Health and Sanitation (MOHS), the District Health Management Team (DHMT), the Global Fund, Clinton Health Access Initiative, UNICEF, the WHO, and others.

PMI-Supported Recent Progress (during CY 2020–2021)

- Supported operation of Malaria Quantification TWG.
- Led formation of quarterly District Forecast and Distribution TWG in all the 16 districts.
- Supportive supervision in seven districts including Tonkolili and Kailahun.
- Trained district teams on LMIS-HMIS data analysis for decision-making.

- Supported district teams during the implementation of the 2020 LLIN campaign, including distribution of campaign LLINs in Western Area Urban and Rural, and redistribution of unused LLINs for routine distribution.
- Distributed ITNs for routine channel distribution to all PHUs.
- Supported the LMIS/DHIS implementation/integration. The integration of DHIS2 and eLMIS has been completed in all 16 districts and facilitated monthly LMIS data analysis.
- Facilitated early delivery of ACTs, and RDTs to prevent stockout that became an acute issue during the coronavirus pandemic.
- Supported the review of the existing Integrated Logistics Management SOP manuals and conducted a capacity development training based on the revised SOPs.
- Supported quarterly supply chain monitoring at PHU levels in seven districts (Bo, Pujehun, Port Loko Koinadugu, Tonkolili, Kailahun, and Falaba) with the objective of reducing stockout and/ or overstocking, mentoring facility staff.
- Facilitated reverse logistics of antimalarial commodities.
- PMI supported three personnel to attend an international training on the use of the National Supply Chain Assessment 2 tools and knowledge gained was used to develop and adapt the data collection checklist for the development of the supply chain strategy.

PMI-Supported Planned Activities (during CY 2021–2022)

- PMI will continue to support the NMCP with forecasting and supply planning.
- PMI will support the rollout of the Malaria Supply Chain Monitoring System (MSCMS) at facilities in all districts, and provide support to DDMS and NMCP for the analysis of MSCMS data for research.
- PMI will support the provision of an electronic (internet-based) temperature monitoring device in central and regional warehouses and train personnel on its use and monitoring.
- PMI will provide operational support to NMSA during the transition caused by the reduction of FCDO funding.
- PMI will continue to support the capacity-building of peripheral health facilities personnel on paper-based LMIS and inventory control, but PMI will also invest in the process of digitizing LMIS data collection at PHU to improve reporting, data responsiveness and decision-making.
- With the implementation of the new CHW strategy, PMI will provide TA in the development of CHW LMIS reporting. PMI will support the development of a revised logistics integrated SOP and a supply chain monitoring and evaluation (M&E) plan following the development of the strategic plan and will continue to measure the level of data quality through data quality assessments (DQA) on a quarterly basis to guide the use of data for decision-making at central and district levels.

Key Goal

Ensure continual availability of quality products needed for malaria control and elimination (ACTs, RDTs, SP, Art. Inj., and ITNs) at health facilities and the community level.

Key Question 1

Has the central level, (or subcentral level, if appropriate) been stocked according to plan for ACTs, RDTs, SP and Art. Inj. over the last year (2020)? If not, have they been under, over, or stocked out?

Stock status varies across the years by commodity type.

- ACTs: 6x2, 6x3, and 6x4 were understocked for half of the year, and 6x1 packs were understocked the entire year.
- RDTs: Understocked for half of the year.
- SP: Was stocked out completely (due to global shortage) for a portion of 2020 but currently stocked according to plan.
- Art. Inj.: Understocked for the entire year.

Key Question 2

What are the trends in service delivery point stockout rates for ACTs (including ability to treat), RDTs, and SP over the last year (if tracked)? Is there a seasonal or geographic difference in stockout rates?

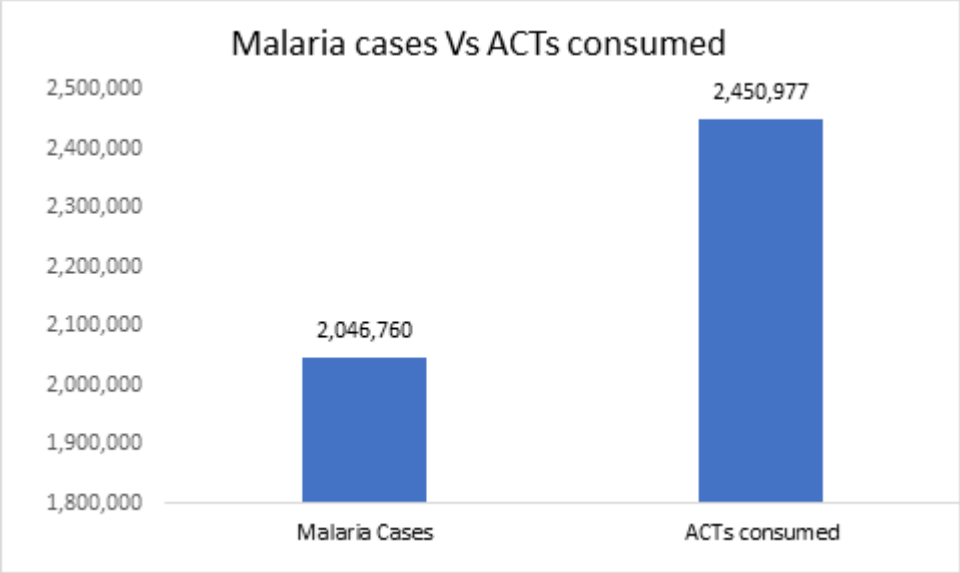
Service delivery point stockout rates also varied during the past year. ACTs, RDTs, and SP showed similar trends of stockouts at the peripheral health units. There was a large increase in the rate of stockouts during the FY 2020 Q4 for all three commodities. The primary driver for these similar trends are the disruptions to supply chains and health systems caused by the COVID-19 pandemic.

Key Question 3

What is the difference between quantities for ACTs consumed and malaria cases, and RDTs consumed and numbers tested? What is driving any differences seen?

Supporting Data

Figure A-13. 2020 Reported malaria cases vs. ACTs consumed [eLMIS]

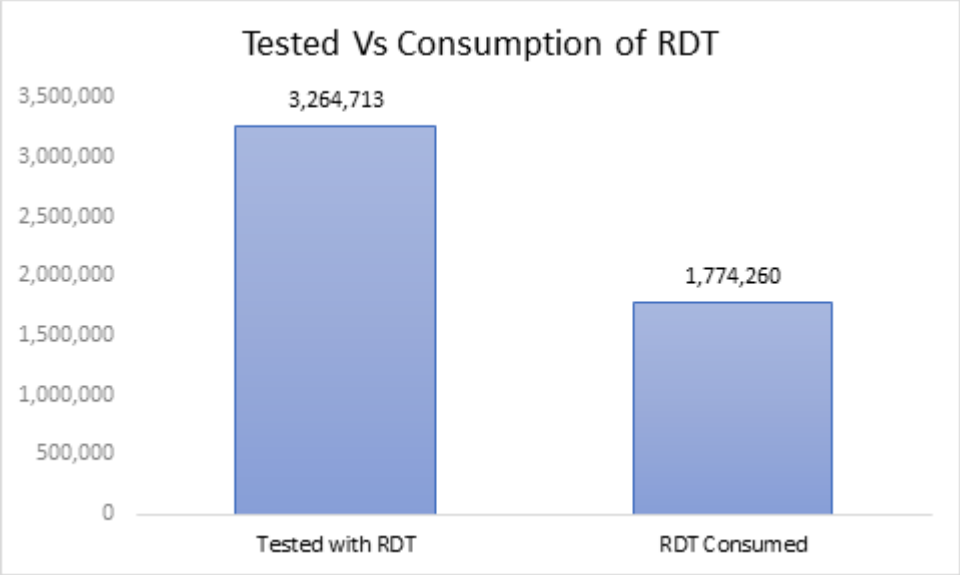


Data in the eLMIS shows that ACTs consumed were nearly 20 percent higher than the number of confirmed malaria cases (Note: These numbers do not fully align with HMIS numbers presented in Table A-7. PMI continues

to work with the NMCP on improved data quality). There are a number of potential drivers for the difference in ACTs used compared with recorded malaria cases, but it is unclear as to the primary reasons for the difference:

- Treatment of non-malaria cases with ACTs
- Nonadherence to RDT results
- Health facilities might over-report the number of ACTs consumed on the RRIV forms
- Health facilities also might report the number of tablets prescribed as opposed to complete doses

Figure A-14. 2020 Reported RDT tests vs. RDTs consumed [eLMIS]



Data from the eLMIS also shows the number of completed RDT tests was approximately 84 percent higher than the number of RDTs consumed in 2020. Although the exact information is unknown, a primary driver of the large difference between number of RDTs consumed as reported in the new eLMIS system, and the number reported through HMIS reporting, is the falsification of HMIS reporting when malaria is treated presumptively without a positive RDT. To mitigate data falsification, PMI plans to scale up MSCMS, mentorship of health facility staff inputting data into the RRIV, and discussion of data issues during the monthly in-charges meeting.

Key Question 4

To what extent does a functional LMIS provide visibility into timely and quality logistics data from various levels of the system? To what extent is commodity data visibility dependent on surveys or supervisory data rather than routine data reported by an LMIS?

Supporting Data

At the facility level, paper-based LMIS tools are used and are recorded in the treatment registers and the monthly RRIV. The RRIVs are delivered to the DHMT and entered into the DHIS2 eLMIS system on a monthly basis. This system became fully functional in 2020 and has allowed for visibility to district and central levels. For commodity data at district warehouses, there is visibility (real time) at the central level through the use of mSupply, although there continues to be data inconsistency and five districts (Karene, Falaba, Western Area Rural, Bonthe, and Pujehun) do not use mSupply yet. At the district level, there is visibility to commodities data in 11 out of the 16

districts with the use of mSupply. At the facility level, commodities data are recorded in a paper-based inventory control card that is visible only to facility personnel or during supervision visits by district or central level staff. There was a gradual improvement in eLMIS reporting by facilities during 2020.

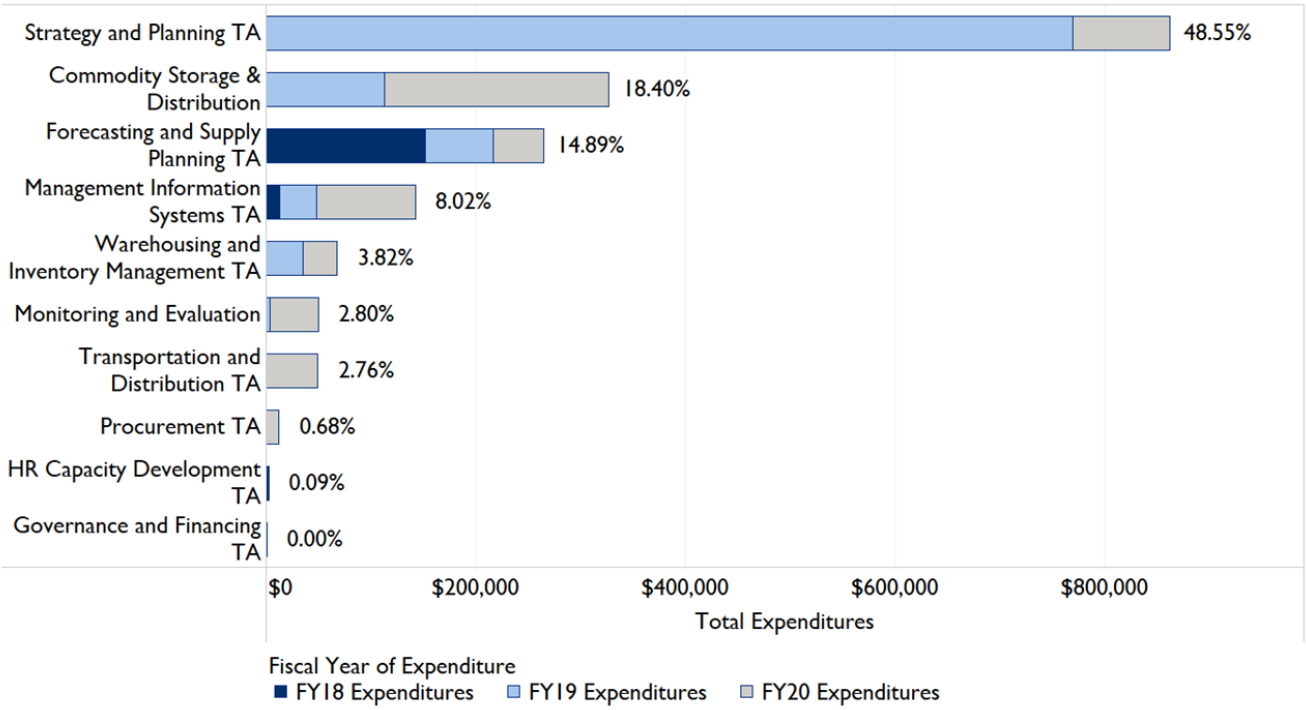
Key Question 5

What are the main supply chain TA functions supported by PMI? Are there additional investments that PMI should make (e.g., increasing visibility of demand at health facilities) to ensure continual availability of quality products needed for malaria control and elimination at health facilities and the community level? In areas performing well, is it dependent on PMI/donor funding (e.g., PMI and Global Fund pay for warehousing and distribution)? Should more be done to foster self-reliance in domestic systems and, if so, what approaches should be considered?

- Providing support to national quantification committee of antimalarial commodities.
- Providing support to malaria TWG.
- Implementation of District Forecast and Distribution TWG in all the 16 districts.
- Support to LMIS: data cleaning, assessing, and updating of mSupply.
- Data review and data analysis from LMIS to DHIS2.
- Training on data cleaning and data analysis.
- Provision of TA to warehouses: revision and integration of logistic SOP manual.
- Development of supply chain M&E plan.
- Implementation of MSCMS in seven districts.
- Short-term technical assistance to implement monitoring of storage conditions with installation of monitoring device at central level (NMCP and Fawaz warehouse) and four regional warehouses (Bo, Port Loko, Bombali, and Karene).

Supporting Data

Figure A-15. PMI supply chain investment by technical area



Continued investment should be made to improve the timeliness, completeness, and accuracy of eLMIS reporting. New tools and concepts should be considered in order to improve the proper consumption of health commodities to prevent stockouts. Investments should be made at the central, district, health facility, and community levels. Improved eLMIS data will improve program decision-making and save lives.

Key Question 6

Are there any other considerations that impact funding allocation in this category? If there is a specific budget line item in Table 2 that is not covered by the above questions, address here.

Supporting Data

N/A

Conclusions for Supply Chain Investments

It would be highly beneficial for PMI to expand the Malaria Supply Chain Monitoring System (MSCMS) supportive supervision to all the 16 districts (which is currently being implemented in Bo, Port Loko, Pujehun, Koinadugu, Falaba, Tonkolili, and Kailahun) for the following reasons:

- Uniformity of commodity monitoring tools across the country
- Capacity-building of facility personnel on LMIS
- Visibility of eLMIS data at facility level

- Development of a community-based adapted RRIV

The current reporting and data collected during MSCMS shows that there is a need to expand on these activities in order to improve quality of data for effective and efficient information for decision-making.

PMI will continue to support the warehousing and distribution of RDTs, ACTs, and severe malaria commodities. Additionally, PMI will continue its support for national and district-level forecasting, eLMIS strengthening and TA across all 16 districts. In the next 12 months, PMI will provide temporary support to NMSA's operational costs due to changes in FCDO's budget.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.2. SURVEILLANCE, MONITORING, AND EVALUATION (SM&E)

NMCP Objective

NMCP's SM&E interventions aim to strengthen malaria surveillance and information use to improve decision-making for program performance. This objective focuses on achieving at least 95 percent of health facilities and all districts reporting routinely on malaria program performance. To achieve this objective, the NMCP identifies the following key strategies:

- Strengthen malaria surveillance.
- Increase use of malaria data for decision-making.
- Conduct and facilitate health facility surveys.
- Conduct and support population-based survey.
- Facilitate operational research for policy making.
- Conduct entomological surveillance.
- Monitor efficacy and effectiveness of vector control tools and technologies.

NMCP Approach

The NMCP's SM&E activities fit within the national M&E strategy under the Directorate of Policy, Planning, and Information (DPPI), MOHS. As described in the Standard Operating Procedures for the Health Management Information System (HMIS) Manuals, HMIS in Sierra Leone is organized into four levels: community, health facility, district, and national. At the community and health facility level, malaria data is generated, compiled, and reported in aggregate using the monthly paper-based, summary data forms to the DHMT. At the district level, DHMT staff input all submitted data forms on a monthly basis to the DHIS2 data repository. MOHS at the central level is responsible for data validation and granting user right access to DHIS2. Generation of data demand for use in program planning is the core responsibility of the NMCP although the NMCP advocates the use of data for decision-making at all administrative levels.

To strengthen malaria surveillance, NMCP collaborates with DPPI and Directorate of Health Security and Emergencies to enact measures to strengthen the technical capacity of health workers at all levels and maintain a logistic infrastructure for an effective functioning of DHIS2 with primary goals of attaining the highest level of routine, HMIS data completeness, accuracy, and timeliness of data collection and reporting. As part of the new

strategic plan, NMCP aims to strengthen systemic surveillance capacity with a focus on potential pre-elimination areas.

NMCP coordinates partners' work in the area of SM&E intervention. Global Fund and PMI are the major donors supporting the NMCP in SM&E intervention.

PMI Objective in Support of NMCP

PMI support to the NMCP's SM&E strategy will complement Global Fund support and will help provide key malaria data (e.g., diagnostics, treatment, and prevention) for monitoring malaria program implementation. PMI will focus on improving malaria data quality and timeliness by strengthening the capacity and infrastructure at the district and chiefdom levels, including appropriate use of data for decision-making, and supportive supervisions from districts to health facilities. At the national level, PMI will support the NMCP SM&E team in conducting supportive supervision to the peripheral level. Initially, district level support will be concentrated on the PMI-focus districts.

Specific objectives include the following:

- Strengthen collection, analysis, and use of routine health data.
- Improve country-level capacity to manage health information systems, resources, and staff.
- Improve methods, tools, and approaches to address health information challenges and gaps.
- Increase capacity for data evaluation and analysis.

PMI-Supported Recent Progress (during CY 2020–2021)

- PMI supported the development of the Standard Operating Procedures for the Health Management Information System Manuals I & II.
- Based on the findings from the Monitoring and Evaluation Capacity Assessment Toolkit survey and in consultation with NMCP, PMI procured and distributed information and communications technology (ICT) equipment (laptops, printers, and projectors) for both NMCP and district malaria units to improve access to ICT and strengthen malaria data for decision-making.
- PMI supported the NMCP and DPPI to update the malaria data elements and promoted their improved use for decision-making during malaria SM&E meetings.
- PMI provided continuous malaria SM&E technical support to the NMCP and DHMTs. PMI conducted a malaria SM&E needs assessment that identified gaps that included inadequate understanding by health staff of malaria data elements following the national revision of revised health facility registers and monthly HMIS summary data forms.
- At the district level, PMI began introducing malaria performance indicators for monitoring malaria service delivery to health facilities in three districts. To accomplish this endeavor, PMI staff worked with district and national MOHS staff to conduct trainings and mentorship.
- PMI supported the Malaria SM&E subgroup meetings and the larger M&E/HMIS TWG meeting with the aim to promote improved malaria SM&E interventions and data use and performance.
- During the ITN mass campaign in 2020, PMI systematically assessed the implementation of COVID-19 infection prevention and control measures. An abstract detailing this assessment was presented at the

American Society of Tropical Medicine and Hygiene conference 2020. Findings might be used to guide future preventive interventions in public health emergencies in Sierra Leone.

- PMI contributed toward the development of the National Malaria Elimination Strategic Plan (NMESP) 2021–2025. PMI also provided technical guidance to NCMP for the development of the National Malaria SM&E Plan 2021–2025, which was aligned to the NMESP.
- PMI supported quarterly malaria data review meetings at national and district levels. The purpose of the data review meetings was to provide an opportunity to bring together the NMCP and subnational stakeholders and provide feedback on the quality of routine malaria data and the use of data to improve service delivery. Two national and two district quarterly malaria data review meetings have been conducted with 370 health staff from NMCP, DPPI/ MOHS, PMI implementing partners, local Roll Back Malaria partners, DHMTs, and selected health facilities participating.
- PMI supported the orientation of NMCP staff on the M-DIVE platform and malaria data element mapping.
- PMI is supporting the use of the malaria Routine Data Quality Assessment (RDQA) for quarterly routine data quality assessment.

In general, COVID-19 restrictions affected the implementation of SM&E activities. Later in 2020, with the lifting of restrictions, implementation has improved. The quarterly malaria data review meetings, quarterly bulletin and TA to improve surveillance, analysis, and data use are ongoing and will be implemented at normal rates as long as the public health environment continues to be stable.

PMI-Supported Planned Activities (during CY 2021–2022)

- The majority of activities will be continuing in 2022 with an emphasis on extending SM&E activities and capabilities to the additional district and facility levels.
- Continue support to NMCP and PMI implementing partners in improving data collection and use with greater focus on district and facility level use including training of national and subnational health staff.
- Continue malaria SM&E technical support to NMCP and DHMTs (with an initial focus on PMI-intervention districts) and routinely work with NMCP, DHMTs, and other partners to identify gaps and priority areas for capacity-strengthening and to meet emerging malaria information needs.
- Support Malaria SM&E TWG.
- Revitalize reporting of the Malaria Surveillance Quarterly Bulletin.
- Develop step-by-step, context-specific, DHIS2 Data Analysis and Use Guide with the aim to refine data use for strategic decision-making at central, district, and peripheral levels.
- Develop a data dictionary for malaria data elements and indicators in DHIS2.
- Develop malaria wall charts in conjunction with NMCP, implementing partners, and other stakeholders.
- Continue quarterly malaria data review meetings at national and district levels as an additional means to strengthen malaria data decision-making.
- With MOHS staff, conduct quarterly and systematic RDQAs of HMIS data.
- Maintain adequate technical staff for all SM&E activities.

Key Goal

To support the NMCP to build their capacity to conduct surveillance as a core malaria intervention using high-quality data from both surveys and routine health information systems.

Key Question 1

Which data sources are available to inform estimates of intervention coverage, service availability and readiness, and morbidity and mortality?

Supporting Data

Table A-16. Available malaria surveillance sources in Sierra Leone

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Household Surveys	Demographic Health Survey (DHS)	X					P (w/bio-markers
Household Surveys	Malaria Indicator Survey (MIS)			X			
Household Surveys	Multiple Indicator Cluster Survey (MICS)						
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment (SPA)						
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey			X			
Health Facility Surveys	Other Health Facility Survey						
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)			X			P
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System	X	X	X	P		
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System (eLMIS)	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	EUV						
Other	School-based Malaria Survey						
Other	Malaria Behavior Survey	X					
Other	Malaria Impact Evaluation						
Other	Entomologic Monitoring Surveys						

*Asterisk denotes non-PMI funded activities, X denotes completed activities, and P denotes planned activities.

Key Question 2

What HMIS activities have been supported? What current priorities will be supported with FY 2022 MOP funding?

Supporting Data

- In line with the MOHS's goal to improve health SM&E and data use for decision-making, Global Fund has invested heavily on improving the HMIS infrastructure and capacity especially centrally. PMI in close coordination with NMCP, Global Fund and other stakeholders, has begun to supplement and complement these investments to improve the capabilities and output of the NMCP SM&E team and to assist with improvements peripherally with districts and facilities.
- Over the past year, PMI has conducted in-country SM&E trainings with national and district- level staff. After completion of the M&E Capacity Assessment Toolkit assessment, PMI has incorporated its findings into the ongoing training curriculum. Refresher training will continue for national staff, but the focus will shift to expanding SM&E capacity to the districts and peripheral health units. The initial focus will be on districts where PMI investment has been targeted previously (Bo, Koinadugu, Port Loko, and Pujehun) with expansion to other districts as activities become refined.
- To improve data use, a planned PMI initiative is the development of a Malaria Measurement Task Force led by NMCP to serve as a hub to improve data use for all malaria interventions like case management and MIP.
- PMI will continue to work with NMCP to publish quarterly malaria bulletins and conduct regular meetings for systematic data review.
- PMI is developing an improved DQA tool to assist NMCP with supportive supervision and as a means for DHMT staff to improve data use at the facility level.
- A new PMI initiative has been the organization and support of chiefdom level in-charges meetings so that health clinics can improve capabilities and share information including better SM&E.

Key Question 3

Are there specific outcomes of past/current HMIS strengthening efforts that can be identified?

Supporting Data

Table A-17. Outcomes of HMIS strengthening efforts

	Indicator	2019	2020
Timeliness	% of reports received on time	75%	81%
Completeness	"Confirmed malaria cases for children under five years of age" was reported in 16,389 facility-months	79%	81%
Accuracy	Comparison of DHIS2 and clinic registries for indicators of the number of patients tested with an RDT; number of patients confirmed malaria receiving ACT; and number of pregnant women receiving IPTp1	Not systematically collected	76%

- Timeliness and Completeness: MOHS has fully adopted DHIS2 platform for all HMIS use at government clinics with an initial focus on timeliness and completeness and the tracking of monthly reporting metrics. Over the previous few years, reporting rates have consistently improved and the MOHS reports timeliness and completeness consistently over 90% during this past year (2019).
- HMIS reporting rates are currently only tracked from government (public) health clinics and the NMCP has instituted a temporary, parallel malaria data reporting system for government and private hospitals. The timeliness and completeness rates are much lower at these facilities. As hospitals are integrated into DHIS2, effort will be taken to improve their data collection and reporting systems. NMCP's parallel reporting database for hospitals was not used to calculate these metrics because the denominator of this temporary system is not stable.
- Accuracy: PMI has developed a draft RDQA tool by adapting the openly available tools from WHO, and it was administered as a proof-of-concept data quality assessment pilot in three randomly selected clinics in Bo districts. Data from the third quarter, July–September 2020, was examined, and this result is reported here. In 2021 the NMCP with PMI support will improve on and begin administering the RDQA routinely in 2021 in additional districts.

Conclusions for Surveillance, Monitoring, and Evaluation Investments

PMI will support the continuation of current SM&E activities that are strengthening data collection and use with an increase in funding to ensure that activities and technical support is active especially as activities shift to the districts. PMI will support the collection, reporting, and use of routine malaria data at the district and chiefdom levels through capacity-building of malaria focal persons, SM&E teams, and community health officers and ensuring that sufficient infrastructure capacity exists to collect, analyze, and report quality malaria data using DHIS2. District-level efforts will also strengthen data from the supply chain to ensure that commodity consumption is reported to minimize stockouts. The activity will provide TA at the district level for improved supportive supervision activities.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.3. OPERATIONAL RESEARCH

NMCP Objective

The Sierra Leone National Malaria Elimination Strategic Plan 2021–2025 indicates that all malaria policies will be guided by appropriate operational research. The NMCP intends to develop an operational research agenda and create a forum for results dissemination in collaboration with its research partners.

NMCP Approach

The NMCP's plan to facilitate operational research for policymaking is a component of its objective to strengthen malaria surveillance and use of malaria information to improve decision-making for program performance. In June 2018, the NMCP, in collaboration with several academic institutions and other partners, defined their first malaria operational research agenda for the period 2018–2023. As a component of the NMESP 2021–2025 the Malaria Research Committee intends to update the research agenda periodically, establish and maintain a database of studies, and hold a biennial research conference with policymakers to inform decision-making. Regulatory review of human subjects research studies and research determination is conducted by the MOHS Institutional Review Board.

PMI Objective in Support of NMCP

PMI works with the NMCP to help define opportunity areas for OR and, where appropriate, supports the NMCP, other donors and implementing partners on specific research initiatives.

PMI-Supported Recent Progress (during CY 2020–2021)

PMI is supporting the NMCP on a study to evaluate the impact of co-deploying next-generation PBO ITNs and IRS on entomological and malaria health indicators in comparison to next-generation PBO ITNs as a stand-alone intervention. The research will compare the data from the two IRS districts, Bo and Bombali, to two control districts, Karene and Port Loko. The protocol was developed in 2020 and early 2021 in preparation for execution and submitted for necessary institutional review board approvals. Baseline entomological data collection (after the deployment of PBO ITNs but before deployment of IRS) began in summer 2020 as a component of routine data collection and will continue through spring 2021.

Additionally, PMI is supporting an evaluation of the success of deploying RAS as a pre-referral treatment of severe malaria in children. Data collection occurred in January–February 2020 and PMI continues to support the NMCP with data analysis. The assessment is intended to understand the factors that led to better prescription and uptake of RAS. Upon availability of the final results, PMI will determine appropriate next steps.

PMI-Supported Planned Activities (during CY 2021–2022)

Beginning in summer 2021 (after IRS deployment), data collection during the PBO ITN and IRS co-deployment period will commence and continue for 12 months.

PMI Goal

PMI will conduct PE/OR that helps to evaluate coverage of population at-risk, intervention quality, or delivery efficiency; study reducing malaria transmission and disease burden; test effectiveness of new or evolved priority interventions and strategies; or explore new metrics and mechanisms to assess intervention impact.

Key Question 1

In consultation with the NMCP, have technical challenges or operational bottlenecks in program interventions been identified that require PE/OR? How have they been prioritized?

Supporting Data

Within the NMESP 2021–2025, the NMCP has identified evaluating the effectiveness and operational feasibility of alternative vector control interventions to complement LLINs as a priority. Due to this priority and the net durability monitoring results in Section 1.2 on ITNs, PMI is planning to restart a screening project that was initially planned for with FY 2019 funding, but had been deprioritized due to other vector control needs. Additionally, while the 2019 MBS and DHS indicate high net use where there is access, NMCP monitoring data across four districts from March 2020 to August 2020 showed a Human Blood Index of approximately 90 percent, indicating that net use may not be as high as the surveys suggest. Furthermore, recent data from the durability monitoring baseline data collection in November 2020, indicated that less than 60 percent of distributed mass campaign ITNs were ever used in the first six months after the campaign in the two districts where data was collected (Bo and Moyamba). Further investigation is needed, but this additional net-use data indicates the potential need for a complementary vector control aside from ITNs and targeted SBC intervention.

PMI is currently funding a housing modification study in Uganda that started in 2020 and includes house screening in combination with PBO ITNs, along with use of eave tubes and eave ribbons. However, this program evaluation pilot project will focus exclusively on the Sierra Leonean context, where housing structures are different, as they are larger, rectangular, have open eaves, and often host several families. The NMCP continues to be supportive of this study to inform new possible vector control interventions.

Table A-18. Ongoing program evaluation and operational research

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
PMI MOP Funds	VectorLink	Does co-deployment of two next-generation vector control interventions (PBO ITNs and SumiShield® IRS) significantly reduce entomological and malaria case indicators as compared to a single next-generation vector control intervention (PBO ITNs)?	Baseline data collection (ITN only) began summer 2020, protocol finalized winter 2020, institutional review board approval spring 2021, co-deployment data collection begins summer 2021, co-deployment data collection ends summer 2022
PMI MOP Funds	Impact Malaria	How successful and which factors contributed to the successful deployment of and proper usage of RAS as a pre-referral treatment of severe malaria in children under five years of age	Data collection occurred in January–February 2020, data analysis is ongoing by NMCP and Impact Malaria

Key Question 2

Are there specific challenges in any intervention areas that merit further exploration or research with the potential of establishing strategies or interventions applicable in the near future?

Reference Key Question 1 above for priority research areas. However, it is expected that additional areas will be identified as the NMCP develops and iterates its research agenda as specified in the NMESP 2021–2025.

Supporting Data

Reference Key Question 1 above.

Key Question 3

Are there any other considerations that impact your funding allocation in this category?

N/A

Supporting Data

N/A

Conclusions for Program Evaluation and Operational Research Investments

Operational Research to evaluate the effectiveness of co-deploying PBO ITNs with IRS in Bombali and Bo began in mid-2020 with protocol development and implementation will progress over the next 12 months. When results are available, PMI will analyze them in partnership with the NMCP to determine if there are implications on the current vector control strategy.

With FY 2022 funding, a new project will begin to evaluate the potential impact of house screening as an alternative vector control intervention. The impetus for this screening evaluation is due to the conflicting data on net use/access and existing data on durability monitoring. We propose to evaluate whether the installation of screened eaves/ceilings, windows, and doors where necessary, reduces entomological indicators of malaria transmission. Human biting and feeding rates will be measured using HLCs, CDC light traps, and PSCs at baseline and for one year following screening implementation. Homes in some villages will receive full screening (using local materials) and will serve as evaluation sites while homes in an equal number of villages will not receive screening and will serve as control sites. The results will help determine whether vector control activities in Sierra Leone could be improved by using a method such as screening that is less dependent on human behavior than ITNs (no equivalent "net use" component with a screening intervention).

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.4. SOCIAL AND BEHAVIOR CHANGE (SBC)

NMCP Objective

Social and behavior change (SBC) falls under one of the core objectives in Sierra Leone's 2021–2025 national malaria control strategy. This objective is to provide knowledge to the population such that 90 percent of the population practice at least three recommended malaria prevention and control behaviors.

NMCP Approach

In 2017, through support from the Global Fund, the NMCP developed a Malaria Elimination Behavior Change Communication Strategy 2017–2022. The goal of the strategy is to serve as a guide for the design and implementation of malaria SBCC interventions at national, district, chiefdom and other malaria donors, partners and stakeholders.

While Sierra Leone has done immense work over the past several years promoting positive behaviors as they relate to malaria control, the NMCP wishes to shift from a vast information, education, and communication approach to one that encompasses comprehensive behavior change activities to deliberately create enabling environments where new behaviors can be established and sustained using the health belief model and theory of change. Based on this desire to shift to a comprehensive approach, the NMCP has identified the following behavioral objectives:[3]

- Objective 1A: All suspected malaria cases should have access to confirmatory diagnosis.
- Objective 1B: All malaria cases should achieve effective treatment.
- Objective 2A: Provide access to 100 percent of the population at risk with preventive measures.
- Objective 2B: Protect at least 80 percent of pregnant women and children with IPTp3 by 2020.
- Objective 3: Provide knowledge to the population such that at least 80 percent practice malaria prevention and treatment measures by 2018.

[3] The behavioral objectives included in text are those that are based on the previous National Malaria Strategic Plan for 2016–2020. The communication strategy will be updated to align behavioral objectives with the new strategic plan through 2025.

- Objective 4: By 2020, at least 95 percent of health facilities report routinely on malaria program performance.
- Objective 5: By 2020, maintain and strengthen capacity for program management, coordination, and partnership to achieve malaria program performance at all levels.

Critical to achieving the goals of the strategic plan is the willingness and capacity of partners to dedicate resources toward the development and implementation of succinct, accurate, and effective behavior change activities through a variety of channels. The NMCP chairs a national malaria SBCC task force composed of many stakeholders and public and private sector partners implementing SBCC activities. As a part of the iCCM platform, SBCC messaging is also an important component of CHW training.

PMI Objective in Support of NMCP

The NMCP and PMI are aligned in their goals to provide theory informed, evidence-based SBC activities that target behaviors such that at least 90 percent of the target population practice malaria prevention and treatment behaviors. PMI contributes to Sierra Leone's communication strategy with support for national coordination and capacity-building and district-level focus in Bo, Pujehun, Koinadugu, Falaba, and Port Loko for direct implementation of SBC activities. In 2019 PMI supported the implementation of a qualitative provider behavior assessment and the MBS[4] in Bo and Port Loko districts to provide a better understanding of the determinants of malaria-related behaviors and strengthen the evidence base for malaria control program activities. Both data collection activities added to the formative data that has been collected by other partners and provides detailed insight into additional behavioral factors at the provider and community level. These data are being used to supplement information needed to prioritize program needs and develop appropriate evidence-informed key recommendations and strategic interventions.

The NMCP plans to update the communication strategy in 2021 and findings from the MBS and other data resources will be used to facilitate a comprehensive communication strategy and implementation plan that identifies priority behaviors of focus by district.

A partner mapping exercise was conducted in 2016 to identify the number of partners implementing malaria activities throughout Sierra Leone. A total of 28 partners were identified as conducting malaria activities, with each district having between 8 and 17 total partners present. The results of this exercise suggested that 22 of the 28 partners implement malaria SBC-related activities. Some SBC activities supported by non-PMI implementing partners are briefly described below.

- Catholic Relief Services: As the Global Fund's Principal Recipient for SBC communication implementation, CRS supports in all 16 districts. Their strategy encompasses community mobilization through interactive mass media programs (radio and TV), negotiated behavior change through community engagement meetings and household visits, and concerted response by primary health unit staff through a community action against malaria approach that is intended to facilitate community member ownership of and partnership with basic health facilities (PHUs) to monitor performance, promote prompt care-seeking, and ultimately reduce malaria.

[4] The MBS is a household survey that will provide information on factors related to uptake of key malaria behaviors.

- ChildFund International: Provides SBC support to increase knowledge for the uptake of prompt care-seeking, ANC attendance, and IPTp uptake through community engagement in Koinadugu, Bombali, and Tonkolili districts (community health clubs and school health clubs).
- Concern Worldwide: The overall objective of activity implementation is to improve health outcomes, particularly malaria morbidity and mortality among pregnant women and children under five years of age by training influential women, traditional healers, and facility management committees to improve prompt care-seeking and service delivery. Key activities have included SBC activities focused on training, monthly experience sharing, and action planning to improve the quality of service delivery and promote prompt care-seeking for pregnant women and children under five years of age.

While there are numerous partners implementing SBC activities, PMI provides technical support to all SBC partners through the SBC TWG to facilitate cohesiveness in key communication and mobilization efforts.

PMI-Supported Recent Progress (during CY 2020–2021)

- Continued capacity-building and technical support through the National Malaria SBC TWG.
- Supervised and built capacity of the newly established district-level SBC TWGs in Bo, Koinadugu, Falaba, Port Loko, and Pujehun in close collaboration with the NMCP.
- Provided ongoing support to the NMCP in developing a comprehensive SBC message guide informed by the 2019 MBS results that highlight actionable takeaways from key malaria health behaviors.
- Developed training guides targeting health facility management committees and CHWs to promote service communication to promote the uptake of malaria prevention and treatment activities.
- Finalized and disseminated the quality provider behavior assessment and MBS results with malaria stakeholders (SBC and non-SBC malaria partners).
- Participated in and provided TA to the Vector Control TWG for the development of targeted SBC materials that addressed response efficacy, positive attitudes toward ITNs that address continued maintenance of ITN use behaviors, and perceived self-efficacy to use ITNs correctly and consistently for the 2020 mass net distribution campaign.
- Provided TA to the PMI-supported vector control partner for the development of SBC materials for the 2021 IRS campaign based on findings and recommendations for factors influencing IRS acceptance measured in 2019 MBS.

PMI-Supported Planned Activities (during CY 2021–2022)

- Continue to support the national-level SBC TWG and reinvigoration of district-level SBC TWGs in PMI-focus districts.
- Work with NMCP to revise and disseminate the malaria SBC strategy, such that SBC findings from multiple data sources are used in the development of a comprehensive implementation plan highlighting prioritized behaviors based on malaria epidemiology and behavioral determinants.
- Develop a message guide in coordination with the NMCP and service delivery partner for provider behavior change.
- Facilitate and host a Leadership in Strategic Communication Workshop for malaria SBC stakeholders (e.g., NMCP and CRS) to build implementation capacity.

- Evaluate the extent to which use of traditional healers and medicine vendors as referral channels to health facilities promotes early diagnosis and treatment of malaria and health outcomes, and secondarily, healthcare.
- Support SBC action planning by traditional healers, CHWs, and heath facility providers to improve uptake of prompt care-seeking, IPTp, and ANC attendance in communities in PMI districts in coordination with service delivery partners.
- Conduct a training on gender in malaria programming for malaria stakeholders that will focus on integrating gender into malaria SBC interventions for the NMCP and malaria stakeholders and include reviewing the gender component of existing materials and/or introducing a gender integration checklist for SBC stakeholders to refer to as part of SBC campaigns.
- Continue to use sponsored posts on Facebook to promote malaria prevention and treatment behaviors, including IRS acceptance, net use, and prompt care-seeking.
- Work with NMCP and the MOHS to develop and implement community-based SBC activities that promote consistent use of ITNs and acceptance of IRS informed by findings from the MBS.

Key Goal

Through the use of SBC interventions and in alignment with a country's national malaria control communication strategy, PMI supports the uptake and correct and consistent use of malaria interventions, thereby improving the overall quality of malaria control efforts that will contribute to reductions in malaria.

Key Question 1

What behaviors is PMI proposing to prioritize through its SBC programming? What data support this prioritization? Will support be geographically targeted or national?

Supporting Data

Table A-19. Prioritized behaviors with FY 2022 funds

Behavior	Target Population	Geographic Focus	Justification
Prompt care-seeking within the same or next day of fever onset	Caregivers of children under five years of age, heads of households, CHWs	Subnational – Bo, Bombali, Falaba, Pujehun, Port Loko	Household survey results from the 2019 DHS indicate advice or treatment is sought for 75% of children under five years of age with a fever; however, prompt care-seeking remained at 50%. This represents a 25% difference between those who sought care and those who did so promptly. Thus, there is a continued need for increased SBC activities promoting prompt care-seeking for fever.
Early ANC attendance	Pregnant women, male partners, CHWs, community leaders	Subnational – Bo, Bombali, Falaba, Pujehun, Port Loko	Four or more ANC visits were reportedly 79% in the 2019 DHS; however, early ANC attendance (within the first trimester) was 44%. This represents roughly no change in early ANC attendance compared with 45% reported in the 2013 DHS. Through early ANC attendance, pregnant women have more opportunities to take SP, which could improve overall demand for and uptake of IPTp3+.
Uptake of IPTp3+	Pregnant women, male partners	Subnational – Bo, Bombali, Falaba, Pujehun, Port Loko	According to the DHS 2019, IPTp2 and IPTp3 coverage is 74% and 36%, respectively. While coverage of the first and second dose of IPTp is generally high, improvements are needed in achieving high coverage of the third dose of IPTp. Most pregnant women initiated ANC after their first trimester, contributing to low IPTp3 uptake. The 2019 MBS reported similar findings in Port Loko and Bo districts. For example, A majority of women who had been pregnant in the past two years (91.8%) reported attending at least four ANC appointments, but fewer than two-thirds (60.7%) of women who had been pregnant in the past two years had gotten at least three IPTp doses.

Key Question 2a

For prompt care-seeking, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

The behavioral determinants that predicted prompt care-seeking for fever, according to the 2019 MBS, include perceived self-efficacy to seek care for fever in a child promptly, positive attitudes toward prompt care-seeking, and discussing malaria with a spouse in the past six months. Women who were confident in their ability (i.e., self-efficacy) to get their child with fever to the health facility promptly and who favored positive attitudes toward prompt care-seeking were 4.33 and 3.58 times more likely to report they sought care promptly at a health facility for a sick child with fever, respectively. In addition, women who reported recently discussing malaria with a spouse (i.e., joint decision-making) were 2.98 times more likely to report that they had sought care promptly at a health facility the last time their child had a fever. Prompt care-seeking was reported significantly less frequently

among women in urban settings than respondents in rural settings and Bo. Additional insight for the predictors of prompt care-seeking are presented below.

- Self-efficacy: Almost all respondents (92 percent) reported they could take their child to the health center the same day or the day after onset of fever; however, only 68.9 percent believed they could access money needed to take a child with a fever to the health center.
- Attitudes toward prompt care-seeking: The majority of respondents believed that health workers are the best consultation sources when children develop symptoms of malaria (95 percent), and that children should be taken to health workers the same day that they develop a fever (91.3 percent). Similarly, the majority agreed that a blood test was necessary to confirm that the fever was caused by malaria (92.8 percent) and that the full course of prescribed antimalarial drugs should be taken by the patient (96.8 percent). Nevertheless, some negative attitudes about self-medication and seeking care at the health facility as a last resort were noted.
- Joint decision-making: Overall, 78 percent of women stated that they had participated in the decision-making process to take their child with fever to a health facility and to buy medicine for their child with fever. However, significant differences were apparent across districts and level of education. Differences were observed across Bo and Port Loko. For example, a higher proportion of women in Bo, and those who had at least completed secondary education, stated that they participated in these key decisions regarding malaria care-seeking than those who were in Port Loko and who had primary or no education.

With respect to knowledge gaps, the MBS and DHS data provide a good sense of how SBC activities to promote prompt care-seeking should be designed. Further, as the new CHW policy is rolled out, there are opportunities to further promote prompt care-seeking and referrals in rural and hard-to-reach areas. As the activities are refined and implemented, robust monitoring is needed to ensure that messages are reaching and resonating with the target population.

Key Question 2b

For early ANC attendance, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

Recent household level data from the 2019 DHS indicate 98 percent of women attended at least one ANC visit during their pregnancy and 79 percent completed four visits. While this is relatively high, only 45 percent of women reported they completed the first ANC visit during the first trimester of pregnancy. To achieve optimal IPTp3 coverage, early initiation and continuation of ANC is recommended.

According to the 2019 MBS:

- Knowledge: There are existing knowledge gaps around the timing and recommended number of ANC visits, and this differed by district and sex. Specifically, knowledge of the recommended number of ANC visits during pregnancy was higher in Bo (70.3 percent) than Port Loko (51.1 percent). Similarly, females surveyed had greater knowledge of the recommended ANC visits (76.8 percent) than men (45.3 percent).

- Attitudes toward ANC: Over one-third of respondents (36.0 percent) indicated it is okay for a woman to wait a few months before seeing a health provider when she thinks she may be pregnant, although this belief was reported by a significantly higher proportion of women (46.5 percent) than men (24.6 percent). Similarly, 36.5 percent of women and 16.4 percent of men believed women who have given birth before do not need to immediately see a health provider when they believe they may be pregnant.
- Self-efficacy:
    - Women: Just over two-thirds of women indicated they could attend at least four ANC appointments during their pregnancy (69.2 percent), while 78.8 percent of women reported they could attend at least eight ANC appointments during their pregnancy, and over half (60.2 percent) believed they could find the money to subsidize transportation or other costs to go to the clinic as soon as they thought they were pregnant.
    - Men: Over 90 percent of men indicated that they could encourage their pregnant spouse/ partner to seek care once pregnancy was suspected, take medicine to prevent malaria at least three times during the pregnancy, and make a request for the medicine that helps to prevent malaria during their ANC visit.
- Joint decision-making: Forty-five percent of female respondents indicated that the final decision on their ANC attendance was made jointly with their spouse/partner; however, women in Bo (55.6 percent) were significantly more likely to endorse shared decision-making than women in Port Loko (35.1 percent). There were inequities in estimates for shared decision-making at the district level across sociodemographic factors, including place of residence (urban versus rural) and education (little or no education and secondary or greater).
- Community norms: Overall, 76 percent of all residents perceived that more than four ANC visits was a community norm. However, across districts, a significantly lower proportion of women in Bo (69.1 percent) than Port Loko (82.9 percent) perceived attending more than four ANC appointments to be a norm.

There is an opportunity for a variety of actors to support early and consistent ANC attendance by pregnant women in Sierra Leone, including male partners and community leaders to promote joint decision-making and community norms supportive of early and regular attendance for ANC. Health workers, including CHWs, will also play an important role in encouraging early uptake and continued attendance for ANC visits. PMI will support the implementation of a coordinated SBC campaign targeted to community members and health workers to increase ANC attendance in PMI-focus districts.

Key Question 2c

For the uptake of three or more doses of IPTp, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

According to the MBS, demographic factors associated with the uptake of at least three doses of IPTp include education level, urban-rural residence, and wealth. Primary education was associated with a 32 percent decrease in the odds of taking three doses of IPTp, and secondary education was associated with a 38 percent reduced odds of taking three doses of IPTp. Women in the highest wealth quintile were two times more likely to have at

least three doses of IPTp than women in the lowest wealth quintile. Behavioral factors that predicted use of IPTp include the following:

- Knowledge of recommended number of IPTp doses: Overall, only 34 percent of all respondents knew women should receive three doses of SP during pregnancy. Knowledge was significantly higher among respondents in Port Loko (39.4 percent) than in Bo (28.9 percent). On average, a significantly higher proportion of women (49.8 percent), demonstrated knowledge of recommended SP dosing during pregnancy than men (16.1 percent).
- Self-efficacy to use at least three doses of SP: Roughly 87 percent of women reported that they could take medicine to prevent malaria at least three times during their pregnancy.
- Community norms for IPTp: Respondents in Bo were significantly more likely to agree that IPTp uptake is a community norm (83.1 percent) than Port Loko residents (77.6 percent); however, endorsement of more than four ANC visits as a community norm was relatively similar across the two districts (73.9 percent in Bo and 78 percent in Port Loko). A higher proportion of women agreed that IPTp use during pregnancy was a community norm (84.8 percent) than men (76.2 percent).

Finally, attending at least four ANC visits was also associated with the uptake of at least three doses of IPTp.

These data, coupled with that from the provider-behavior qualitative assessment provide strategic areas of focus to target community and provider-level factors that influence demand for and provision of IPTp. Similar to activities to support early and regular ANC attendance, there is an opportunity for a variety of actors (e.g., male partners, community leaders, CHWs, and facility-based providers) to support the uptake of three or more doses of IPTp. PMI will support the implementation of a coordinated SBC campaign targeted to community members and health workers to increase IPTp uptake in PMI-focus districts.

Key Question 3

What is the country's capacity to design, implement, and monitor SBC interventions at the national and subnational level?

Supporting Data

PMI has made important recent investments to bolster capacity for SBC in Sierra Leone at both national and district levels. For example, PMI supported the reinvigoration of the national-level SBC TWG and supports quarterly meetings with newly instituted SBC TWGs in five PMI-focus districts (Pujehun, Port Loko, Bo, Falaba, and Koinadugu). Subnational working groups include MOH representatives at district level and their respective SBC implementing partners. Given recent updates to the national malaria control strategy, the NMCP will also revise and update the national communication strategy with support from donors and stakeholders in 2021. This updated strategy will incorporate findings from the MBS, epidemiology, and global best practices for SBC to outline robust SBC implementation strategies designed to target specific audiences and behavioral determinants. The NMCP has also continued to engage in the RBM SBC working group, including participation in discussions to promote continued care-seeking for fever during the COVID-19 pandemic. Although there have been improvements in overall capacity to implement SBC in Sierra Leone, there is still a need to build NMCP capacity to coordinate and monitor SBC partner activities.

Conclusions for SBC Investments

- PMI has supported the collection of robust formative data on community and facility-level behaviors and influencing factors to improve programming for SBC and implementation activities will be based on data collection findings and recommendations from the MBS and qualitative provider assessment. Thus, with FY 2022 funds, PMI will support the development and implementation of SBC programming and materials that promote uptake for the prioritized behaviors of prompt care-seeking, early and regular ANC attendance, and IPTp. To address these behaviors and their associated behavioral determinants, multiple audiences will be engaged through various channels deemed most appropriate. PMI-supported SBC activities will also capitalize on community engagement structures such as community health committees and CHWs to reinforce appropriate behaviors.
- No additional formative research is planned; rather the focus is now on interpreting findings from formative research to design and implement impactful programs and monitor outcomes.
- PMI will continue to support capacity-building at national and district levels through continued engagement with the global RBM SBC working group; provide support for national and district SBC coordination mechanisms; and participate in conferences and workshops.
- There is an increase in the support level for SBC activities from FY 2020. This increase was determined by an increase of geographic coverage for one additional district.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.5. OTHER HEALTH SYSTEMS STRENGTHENING

NMCP Objective

- By 2025, the NMCP strategy aims to strengthen and maintain capacity for program management, coordination, and partnership to achieve malaria program performance at all levels. To improve ownership and management of malaria activities, the NMCP's strategic plan prioritizes capacity-building as a cross-cutting intervention by strengthening the national and districts' capacity to deliver malaria control services at all levels.
- The NMCP aims to conduct capacity needs assessments to identify staffing gaps and to address infrastructure gaps (office space and equipment).
- The NMCP prioritizes strengthening core MOHS-wide management systems that are essential for effective delivery and management of malaria services, such as strengthening procurement and supply chain management of malaria commodities, improving malaria data collection and reporting through HMIS, and strengthening coordination and partnerships in malaria.

NMCP Approach

- The Sierra Leone health system has significant challenges, including a shortage of qualified staff at all levels of the system. The 2014–2015 Ebola Virus Disease outbreak further stressed the system. The MOHS has prioritized human resources for health, health financing, the health management information system, and logistics management as the priorities for strengthening health systems. Based on lessons learned from the Ebola outbreak, the government and partners initiated measures and systems in the health sector to be better able to respond to both routine and emergency needs of the population. Following the Sierra

Leone Health Sector Recovery Plan 2015–2016, emphasis was placed on mobilization of resources to build a strong and resilient health system that would be able to provide quality and timely healthcare to the population. The establishment of a Health System Unit under the MOHS, restructuring and strengthening of the national laboratory directorate, the medicine and commodity supply chain directorate, and the free healthcare policies are all evidence of this response.

- At district level, the NMCP supports holding monthly coordination meetings with partners implementing malaria control activities and DHMTs where feedback is provided and key issues relating to malaria control are discussed. The NMCP also supports annual district integrated health sector planning to include key malaria interventions in their work plans, and conduct regular integrated supportive supervision.
- The NMCP has targeted donor investment toward building the capacity of technicians across various areas, including support for training in entomology and monitoring and evaluation, but more resources are needed for these activities to improve both the quantity and quality of technicians at national and district levels.

PMI Objective in Support of NMCP

- PMI is aligned with and supports the NMCP objectives for capacity-building and cross-cutting needs. From 2015 to 2019, USAID supported a long-term technical advisor embedded in the NMCP to assist with building capacity in management, leadership, and governance. The advisor developed a capacity-building and training plan for key staff on SM&E and other technical areas to help build overall leadership and capacity at the national level. The advisor also assisted with the coordination and development of Global Fund grants and concept notes including analysis of commodity gaps. With the start-up of PMI activities in Sierra Leone, the long-term technical advisor position was phased out and PMI staff and implementing partners have stepped in to support NMCP in capacity-building needs. However, with an identified need for additional support at the NMCP, PMI plans to support an embedded advisor who will assist with building capacity of program staff.
- PMI also coordinates closely with other USG partners in these HSS and capacity-building efforts. For example:
    - CDC-Sierra Leone offers a short-term training, Frontline Course, on basic epidemiology through the Field Epidemiology Training Program (FETP). The three-month Frontline Course consists of three workshops with two fieldwork periods. Nine cohorts (201 participants) of Sierra Leone health professionals have been trained so far, and an additional cohort will be trained in 2021. In addition, three cohorts (39 trainees) of FETP-Intermediate (9–12 months in duration) epidemiologists completed the Intermediate program each year between 2018 and 2020. A fourth FETP Intermediate cohort of 15 epidemiologists is currently in the midst of field assignments. CDC's FETP contributes toward the WHO ratio goal for countries of one field epidemiologist per 200,000 population. Currently, the FETP-Intermediate trained epidemiologists are completing their epidemiology practicum projects in collaboration with MOHS programs to include NMCP.
    - CDC is also a main stakeholder in strengthening the country's laboratory capacity and specifically at the Central Public Health Reference Laboratory, the national reference laboratory in Freetown. Their investment supports training laboratory technicians and providing equipment and supplies.
    - The U.S. Peace Corps had reestablished its presence in Sierra Leone after the Ebola outbreak with 61 health and education volunteers based in 16 districts. The volunteers provided key malaria

messages in their communities. However, with the global COVID-19 pandemic, all volunteers were evacuated in March 2020. Peace Corps plans for a return of volunteers in late 2021.
    - Through the Health Resources and Services Administration, the U.S. Department of Health and Human Services is supporting HIV direct service delivery and prevention across four high-burden districts, with a focus on key populations. Sierra Leone became a President's Emergency Plan for AIDS Relief (PEPFAR) country in FY 2021 and has a significantly expanded PEPFAR budget for FY 2022 which will support saturation of highest burden districts and expanded differentiated testing modalities, including self-testing, as well as a significant expansion in prevention activities with key populations. CDC will become a PEPFAR implementing agency in FY 2022 in Sierra Leone, providing technical support for lab and strategic information.

PMI-Supported Recent Progress (during CY 2020–2021)

- PMI supports several cross-cutting HSS activities focused within the core technical intervention areas described in the MOP above (e.g., training of health workers, strengthening district health management teams in conducting supportive supervision and mentoring, supporting pharmaceutical management systems, community-level communications, etc.) that complement the existing work of other USG entities and other donors/partners. In addition, PMI supported the following specific activities:
    - PMI supported Peace Corps education and health volunteers to work in malaria prevention and control and to assist the NMCP in identifying programmatic gaps in community malaria interventions. With FY 2019 funds, PMI supported small project grants developed by health and education volunteers for malaria-related programming with a focus on early case detection and health-seeking behaviors for malaria care, reinforcing prevention measures such as sleeping under an ITN, and promoting IPTp for pregnant women.

PMI-Supported Planned Activities (during CY 2021–2022)

- Assuming that the Peace Corps restarts activities with volunteers returning to Sierra Leone in fall 2021, PMI will support the small project grants for malaria-related activities developed by volunteers. In addition, PMI will work closely with Peace Corps to determine whether there are third-year volunteers available in 2023 to carry out dedicated malaria projects that might need support.
- PMI will support a technical advisor embedded in the NMCP to support capacity-building of the national staff.

Key Goal

PMI supports the NMCP objectives for capacity-building and cross-cutting needs, as relevant.

Key Question 1

How does PMI support NMCP capacity-building objectives in Sierra Leone?

Supporting Data

In FY 2022, PMI is planning to support three residents from the MOH to complete the CDC Intermediate FETP, which includes 9–12 months of training. PMI will work with the FETP team on selection criteria to ensure residents are malaria-focused and that the investment is utilized as a skill-building opportunity for the NMCP.

Conclusions for Additional Health Systems Strengthening Investments

- Assuming Peace Corps restarts activities in 2021, PMI will support Peace Corps Volunteers in community-based malaria programming activities through the provision of small project grants. Additionally, if available, third-year volunteers will be identified to assist with carrying out dedicated malaria projects working closely with PMI implementing partners.
- PMI supports capacity-building of the NMCP staff with an embedded technical advisor to support mentoring and coaching activities.
- Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.