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Sierra Leone

Malaria Operational Plan FY 2024

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ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AI	Active Ingredients
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
CDC	Centers for Disease Control and Prevention
CHIS	Community Health Information System
CHW	Community Health Worker
DFD TWG	District Forecast and Distribution Technical Working Group
DHIS2	District Health Information System Version 2
DHS	Demographic and Health Survey
DHMT	District Health Management Team
DPHC	Directorate of Primary Health Care
DPPI	Directorate of Policy Planning and Information
DPS	Directorate of Pharmaceutical Services
EPI	Expanded Program on Immunization
FSN	Foreign Service National
FY	Fiscal year
Gavi	The Vaccine Alliance
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GoSL	Government of Sierra Leone
HCW	Health Care Worker
HMIS	Health Management Information System
iCCM	Integrated Community Case Management
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LMIS	Logistics Management Information System
LSM	Larval source management
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
OTSS+	Outreach Training and Supportive Supervision Plus
PBO	Synergist piperonyl butoxide
PHU	Peripheral Health Unit
PMC	Perennial malaria chemoprevention

PMI	U.S. President's Malaria Initiative
RDT	Rapid diagnostic test
RA	Resident Advisor
RRIV	Report Request and Issue Voucher
SBC	Social and behavior change
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal Malaria Chemoprevention
SOP	Standard Operating Procedure
SP	Sulfadoxine-pyrimethamine
TWG	Technical Working Group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

To review specific country context for Sierra Leone, please refer to the Country Malaria Profile located on PMI's country team landing page, which provides an overview of the country's malaria situation, key indicators, the NMP strategic plan, and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, the U.S. President's Malaria Initiative (PMI) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 27 countries in Sub-Saharan Africa and three programs across the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Sierra Leone began implementation as a PMI partner country in fiscal year (FY) 2017.

Rationale for PMI's Approach in Sierra Leone

Over the past five years, Sierra Leone has significantly reduced malaria prevalence in children under five years of age, from 40 percent in 2016 to 22 percent in 2021 (Malaria Indicator Survey [MIS] 2016, MIS 2021). The provision and uptake of intermittent preventive treatment for pregnant women (IPTp) and the use of insecticide-treated mosquito nets (ITNs) by pregnant women and children under five years of age are improving; yet with over two million cases annually, challenges persist. There are gaps in qualified health care workers (HCWs) at all levels of the system, data quality issues, and stockouts of key commodities, which not only affect health system capacity, but also uptake and acceptance of malaria prevention and control efforts.

Overview of Planned Interventions

The proposed FY 2024 PMI funding for Sierra Leone is $14.5 million. PMI will support the following intervention areas with these funds:

1. Vector Monitoring and Control

PMI provides significant support to the National Malaria Control Program (NMCP) with implementing vector control activities with a focus on entomological surveillance, increasing access to effective ITNs and implementing indoor residual spraying (IRS). PMI maintains a colony of susceptible *Anopheles* (*An.) gambiae* at two insectaries in order to conduct insecticide resistance monitoring and evaluate vector bionomics from mosquitoes collected through routine, systematic entomological surveillance at sentinel sites in five districts.

Insecticide susceptibility data continues to inform NMCP's selection of ITNs procured for distribution. Together, the Global Fund and PMI will continue to purchase ITNs that are effective against Sierra Leone's *Anopheles* population which will be distributed through routine channels, specifically antenatal care (ANC) and Expanded Program on Immunization (EPI) clinic visits. PMI will expand support for continuous distribution of ITNs by assisting the Government of Sierra Leone (GoSL) in implementing a new channel to children through primary schools. In addition, PMI will continue to support IRS as an additional vector control method, especially in areas of high malaria burden. PMI will continue to build entomological laboratory analysis capacity in Sierra Leone by continuing a partnership with a local scientific institution.

2. Malaria in Pregnancy

The NMCP supports a multi-pronged approach in the prevention and control of malaria during pregnancy, including distribution of ITNs, administration of IPTp, and prompt diagnosis and case management of malaria during pregnancy. Overall, IPTp coverage has improved from 31 percent (2016 Sierra Leone Malaria Indicator Survey [MIS]) to 52 percent of women receiving three or more doses of IPTp (2021 MIS). In support of the NMCP's malaria in pregnancy (MIP) strategy, PMI will continue to support the update, dissemination and implementation of MIP policies and guidelines, ensuring they are available in all facilities and health providers are trained in their use. PMI will continue to support integrated supportive supervision in ten PMI partner districts to improve the quality of service delivery and provision of on-the-job training through mentoring and coaching of staff, including community health worker (CHW) peer supervisors to improve IPTp coverage. To ensure close collaboration between the NMCP and the Reproductive Maternal Child Health Unit, PMI supports the convening of the national MIP technical working group (TWG) with regular quarterly meetings and coordination of MIP activities. Under the new CHW Strategic Plan and establishment of the new cadre of CHWs, PMI will support the NMCP to ensure CHWs are trained in correctly administering IPTp to eligible pregnant women through training, supervision, and updating guidelines and tools.

3. Drug-Based Prevention

Seasonal malaria chemoprevention is not currently adopted or recommended in Sierra Leone per WHO guidelines. Perennial malaria chemoprevention (PMC) is implemented with support under the Global Fund grant. PMI will continue to closely monitor progress of PMC activities while focusing on strengthening other drug-based prevention interventions, such as intermittent preventive treatment during pregnancy (IPTp).

4. Case Management

PMI will build on its current support to the NMCP to ensure the treatment guidelines and standard operating procedures of all Ministry of Health and Sanitation directorates align with

the NMCP. PMI will continue to strengthen laboratory capacity for malaria microscopy at the national level as well as in a network of hospitals. PMI will also maintain support for integrated supportive supervision in ten PMI districts to improve the quality of service delivery and provision of on-the-job training through mentoring and coaching of staff including CHW peer supervisors to improve case management in ten districts. Additionally, PMI will provide support to the CHW program at the national level, helping to develop and strengthen reporting, payment, and supervisory systems. Finally, PMI will provide financial incentives to CHWs in three districts.

5. Health Supply Chain and Pharmaceutical Management

PMI will support the procurement of malaria commodities and provide technical assistance to strengthen the supply chain system including improving forecasting, supply planning, warehousing, and distribution of commodities and the logistics management information system (LMIS). PMI's interventions will build on previous activities to improve policies, guidelines, and strategies, develop end-to-end supply chain visibility, improve data availability and use, and develop an efficient distribution system focusing on the district and health facility levels. PMI will continue to strengthen the capacity of the Government of Sierra Leone by convening the Malaria Quantification technical working group to conduct annual national stock validation and quantification and district forecasting exercises. PMI will also facilitate malaria supply chain monitoring/quality control checks at selected peripheral health units (PHUs) and provide technical assistance to ensure uninterrupted functioning of LMIS, support the integration of the national District Health Information System 2 (DHIS2) and the LMIS, and reduce stockouts of malaria commodities.

6. Malaria Vaccine

As a country with moderate to high malaria transmission and high all-cause child mortality, the Sierra Leonean Ministry of Health and Sanitation (MoHS) applied to Gavi for consideration of malaria vaccine rollout support in the second application window. Gavi approved the application in April 2023 and is planning deployment beginning March 2024, but this is contingent on Sierra Leone receiving vaccine allocations from the United Nations Children’s fund (UNICEF). PMI provided technical assistance in the application process and will provide technical support for malaria vaccine social and behavior change (SBC) implementation.

7. Social and Behavior Change

PMI will prioritize three behaviors for FY 2024 funds: 1) consistent ITN use, maintenance, and care, 2) prompt care-seeking within the same or next day of fever onset, and 3) provider adherence to case management guidelines in the context of supporting social and behavior change (SBC) for the malaria vaccine introduction. Using multi-pronged approaches

(communication and non-communication based), SBC activities will be tailored to address the primary drivers that influence behavior adoption by target populations.

8. Surveillance, Monitoring, and Evaluation

PMI will strengthen malaria surveillance, monitoring, and evaluation (SM&E) activities at the national, district, chiefdom and facility level to improve data used for decision making. PMI will provide technical support to the Ministry of Health and Sanitation as they prioritize digitization of health information from patients register, diagnosis and treatment using the Electronic Medical Record system (EMR). PMI in partnership with the Directorate of Policy, Planning and Information (DPPI) and NMCP, will support the improvement of data quality and its use, by conducting quarterly data validation exercises of Health Management Information System (HMIS), LMIS and Community Health Information System (CHIS) of chiefdom with higher data inconsistency and malaria burdens. PMI will support DPPI and NMCP to strengthen both public and private hospital data management capacity, to improve high-quality data from routine HMIS, LMIS and CHIS to monitor trends of malaria morbidity and mortality at all levels to achieve informed decision-making.

9. Operational Research and Program Evaluation

Operational research (OR) is a key priority of Sierra Leone's NMCP and is a component of their Malaria Research Agenda. PMI helps to identify specific priorities for the research agenda and supports initiatives in partnership with the NMCP and other partners, where appropriate. PMI is planning to support two upcoming OR activities in FY 2022 and 2023 and therefore is not planning additional activities with FY 2024 funding.

10. Capacity Strengthening

PMI will continue to support several cross-cutting capacity strengthening activities focused on the areas described above. Also, building off the local partner landscape assessment, PMI plans to continue investing in targeted activities with local organizations to strengthen capacity to manage USAID programs.

I. CONTEXT & STRATEGY

1. Introduction

Sierra Leone began implementation as a PMI partner country in FY 2018. This FY 2024 Malaria Operational Plan (MOP) presents a detailed implementation plan for Sierra Leone, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners. The activities that PMI is proposing build on investments made by partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This document provides an overview of the strategies and interventions in Sierra Leone, describes progress to date, identifies challenges and relevant contextual factors, and provides a description of activities that are planned with FY 2024 funding. For more detailed information on the country context, please refer to the Country Malaria Profile, which provides an overview of the country's malaria situation, key indicators, the NMP strategic plan, and the partner landscape.

2. U.S. President's Malaria Initiative

The U.S. President's Malaria Initiative (PMI) is led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC). Launched in 2005, PMI supports implementation of malaria prevention and treatment measures – insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS), accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs), intermittent preventive treatment of pregnant women (IPTp), and drug-based prevention – as well as cross-cutting interventions such as surveillance, monitoring and evaluation; social and behavior change; and capacity strengthening. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 27 countries in Sub-Saharan Africa and three programs in the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Over the next five years, PMI aims to save lives, reduce health inequities, and improve disease surveillance and global health security.

Under the strategy, and building upon the progress to date in PMI-supported countries, PMI will work with NMPs and partners to accomplish the following objectives by 2026:

1. Reduce malaria mortality by 33 percent from 2015 levels in high-burden PMI partner countries, achieving a greater than 80 percent reduction from 2000.
2. Reduce malaria morbidity by 40 percent from 2015 levels in PMI partner countries with high and moderate malaria burden.

3. Bring at least ten PMI partner countries toward national or subnational elimination and assist at least one country in the Greater Mekong Subregion to eliminate malaria.

These objectives will be accomplished by emphasizing five core areas of strategic focus:

1. **Reach the unreached:** Achieve, sustain, and tailor deployment and uptake of high-quality, proven interventions with a focus on hard-to-reach populations.
2. **Strengthen community health systems:** Transform and extend community and frontline health systems to end malaria.
3. **Keep malaria services resilient:** Adapt malaria services to increase resilience against shocks, including COVID-19 and emerging biological threats, conflict, and climate change.
4. **Invest locally:** Partner with countries and communities to lead, implement, and fund malaria programs.
5. **Innovate and lead:** Leverage new tools, optimize existing tools, and shape global priorities to end malaria faster.

3. Rationale for PMI's Approach in Sierra Leone

3.1. Malaria Overview for Sierra Leone

For more detailed information on malaria indicators, please refer to the Country Malaria Profile located on PMI's country team landing page. All geographic areas of Sierra Leone are favorable to malaria transmission, which is stable and perennial. Malaria transmission has two peaks: during the rainy season in May and at the end of the season in October/November. *Plasmodium falciparum* is the most common malaria parasite, responsible for more than 90 percent of malaria cases in the country. The entire population of 8.3 million is at risk of malaria, and malaria is the leading cause of illness and death among children under five years of age.

Although case incidence remains high at 328.19 per 1,000 population at risk with more than two million cases annually, Sierra Leone has made significant gains in reducing malaria burden. From 2016 to 2021, parasitemia in children under five years of age was reduced from 40 percent to 22 percent when tested by microscopy (Sierra Leone Malaria Indicator Survey [MIS] 2016 and MIS 2021). All districts experienced reductions in parasitemia except for Western Area Urban, which increased from 6 percent to 14 percent, but still remains below the national average. According to Health Management Information System (HMIS) data, both the number of patients tested and the number of confirmed cases have also been decreasing, but the test positivity rate has mostly remained stable (60 percent in 2018 and 62.4 percent in 2022). The percentage of cases in children under five years of age has also decreased from 63 percent in 2017 to 48 percent in 2021. Malaria cases reported by community health workers (CHWs) decreased significantly (from 16 percent in 2019 to 2 percent in 2022 of total malaria cases), but this is due to a gap in CHWs service provision with the review and

re-establishment of the national CHW system. With the roll-out of CHWs now finalized, the proportion of cases reported by CHWs is expected to increase to former levels.

The all-cause under-five mortality rate decreased from 156 per 1,000 population in 2014 to 122 per 1,000 population in 2019 [Demographic Health Survey (DHS) 2019]. The number of severe malaria cases reported increased from 34,148 in 2020 to 42,070 in 2022, but according to HMIS data, mortality from malaria remained stable with 1,648 and 1,634 deaths reported in 2020 and 2022 respectively.

With respect to prevention, provision and uptake of IPTp has increased significantly, with 52 percent of women receiving three or more doses in 2021 (MIS 2021) compared to 36 percent in 2019 (DHS 2019). Additionally, while access to ITNs remains low at 43 percent (MIS 2021), the ITN use-to-access ratio is 1.08 throughout most of the country. Similarly, use of ITNs by children under five years of age and pregnant women has been steadily increasing from 44 percent for each in 2016 (MIS 2016) to 76 percent and 87 percent, respectively, in 2021 (MIS 2021). Care-seeking and testing of children under five years of age with fever have also increased, from 44 percent for both in 2016 (MIS 2016) to 75 percent and 68 percent in 2021, respectively (MIS 2021).

For more detailed information on malaria indicators, please refer to the Country Malaria Profile, located on PMI's country team landing page.

3.2. Key Challenges and Contextual Factors

The civil war, outbreaks of Ebola and COVID-19, and natural disasters have left a lasting legacy, affecting not only the health system capacity, but also uptake and acceptance of malaria prevention and control efforts. Despite significant progress in the health system, persistent challenges remain, including a shortage of qualified staff at all levels of the system. Sierra Leone has one of the world's most severe health care worker (HCW) shortages. Recent reports estimate just 0.074 physicians and 0.753 nursing and midwifery personnel per 1,000 population,[1] well below the World Health Organization (WHO)-defined index threshold of 4.45 skilled health workers per 1,000 population.[2] There are also important gaps in the capacity of the existing HCWs. For example, in the first round of outreach training and supportive supervision plus (OTSS+) across 10 districts, only 7 percent of HCWs demonstrated competence in the management of uncomplicated malaria.[3] Similarly, while reporting rates have improved, the quality of the data collected remains low in some areas, affecting the

[1] World Bank, Global Health Workforce Statistics, (Washington, D.C., 2018) https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?locations=SL

[2] Richard Scheffler, Giorgio Cometto, Kate Tulenko, Tim Bruckner, Jenny Liu, Eric L. Keuffel, Alexander Preker, Barbara Stilwell, Julia Brasileiro, James Campbell. Health workforce requirements for universal health coverage and the Sustainable Development Goals – Background paper N.1 to the WHO Global Strategy on Human Resources for Health: Workforce 2030. Human Resources for Health Observer Series No 17. (World Health Organization, Geneva, Switzerland, 2016.): https://apps.who.int/iris/bitstream/handle/10665/250330/9789241511407-eng.pdf

[3] President's Malaria Initiative Impact Malaria, FY 2022 Quarter 1 Report. (Washington, D.C., 2022)

country's ability to accurately monitor and evaluate progress and target interventions. A weak supply chain results in persistent stockouts of key commodities, particularly at the district and facility levels. For example, there are data discrepancies between the consumption reported at the health facilities and at the district level–about 40 percent for ACTs and 60 percent for rapid diagnostic tests (RDTs).[4] These discrepancies affect the ability of the NMCP to forecast, procure, and distribute appropriate amounts of commodities. These issues influence all aspects of malaria mitigation, from care-seeking behaviors to access to and quality of health services.

3.3. PMI's Approach for Sierra Leone

PMI supports the NMCP's policies and strategies in the implementation of proven antimalarial interventions. The purchase of antimalarial commodities for the diagnosis and treatment of malaria and procurement and distribution of ITNs are among the interventions that PMI is supporting throughout Sierra Leone. To reduce stockouts of malaria commodities, PMI will continue to use end-user verification surveys to gain insights into the reasons for commodity stockouts and assess gaps and challenges in inventory management, training, and supervision. PMI will provide technical assistance to strengthen the supply chain system including improving forecasting and supply planning of commodities, warehousing, distribution, and the Logistics Management Information System (LMIS).

In addition, PMI provides focused programming support in 10 (of 16 total) districts (Bo, Bombali, Falaba, Kailahun, Karene, Kenema, Koinadugu, Kono, Port Loko, and Pujehun) by implementing intensive supportive supervision and training to peripheral health units to improve the quality of malaria case management and malaria in pregnancy, systematically evaluating malaria behaviors to inform national strategy and through improvements to HMIS data collection and use by District Health Management Teams (DHMTs).

Because two of PMI's priorities in Sierra Leone are to reach the unreached and to strengthen community health systems, PMI invested in the national CHW program rolled out in 2022. The program deployed new CHWs in all districts to provide integrated community case management (iCCM), maternal, newborn, and child health, and family planning/reproductive health services to all population groups. The new program standardizes recruitment, selection, training, service provision, reporting, supervision, and compensation for all CHWs. PMI supported the National CHW Hub to develop and implement the overall program and provided financial incentives and equipment per the national policy to CHWs in three districts. The CHW Hub which sits within the Directorate of Primary Health Care (DPHC), is the primary body responsible for managing CHW activities. PMI will work with its partners and the MoHS on sustainability of the financial incentives for CHWs. PMI will support the extension of OTSS+ which is implemented at the facility level in 10 districts to the CHWs to improve their quality of care. Additionally, PMI will support the CHW Hub to develop and strengthen reporting and

[4] USAID Global Health Supply Chain Program, Procurement and Supply Chain Management FY 2022 Work Plan. (Washington, D.C., 2022)

accountability systems. PMI's investments in routine surveillance systems allows PMI to provide technical assistance and guidance to the DPPI and NMCP leadership for evidence-based decision-making, particularly in defining where changes or new tools are needed. For example, PMI supported entomological surveillance which documented widespread resistance to pyrethroids. PMI helped the NMCP analyze these data and procure new types of ITNs which are more effective and select an effective insecticide for IRS.

Similarly, PMI has strengthened the HMIS, and the NMCP is now able to stratify by chiefdom to target interventions more effectively. For example, while IRS has been implemented in Bo and Bombali Districts in 2021 and 2022, decisions about where and how to implement IRS in FY 2023 will be made through a close consultative process with the NMCP using the HMIS, entomological, and other data to tailor IRS and other interventions to the epidemiology of malaria and changing needs, likely at the chiefdom level.

The two primary donors in Sierra Leone in the malaria sector are PMI and the Global Fund, which 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 National Malaria Elimination Strategic Plan (NMESP) 2021–2025. PMI and Global Fund investments reach all areas of Sierra Leone and are divided by thematic areas rather than geography. PMI will continue to work closely with the Global Fund and other donors to leverage their investments in malaria and the overall health system.

3.4 Key Changes in this MOP

The planned budget level for FY 2024 MOP remains identical at $14.5 million to the previous year's MOP and most activities will remain largely unchanged. Key malaria interventions in support of the NMESP like improved malaria case management at health facilities and through community health workers, entomological surveillance, procurement and distribution of commodities, social and behavior change interventions, improvements to surveillance and data use, among others, remain key components of PMI investment in support of Sierra Leone. This year, PMI proposes a shift in priorities of vector control activities to use established interventions efficiently. Specifically, the program plans new investments in the distribution of ITNs to school aged children to partially offset a decrease in funding to IRS (the decrease is due to the cost of covering multiple districts). We calculate that school-based distribution of ITNs will have a greater influence on malaria prevention as more communities will be able to receive them.

II. OPERATIONAL PLAN FOR FY 2024

1. Vector Monitoring and Control

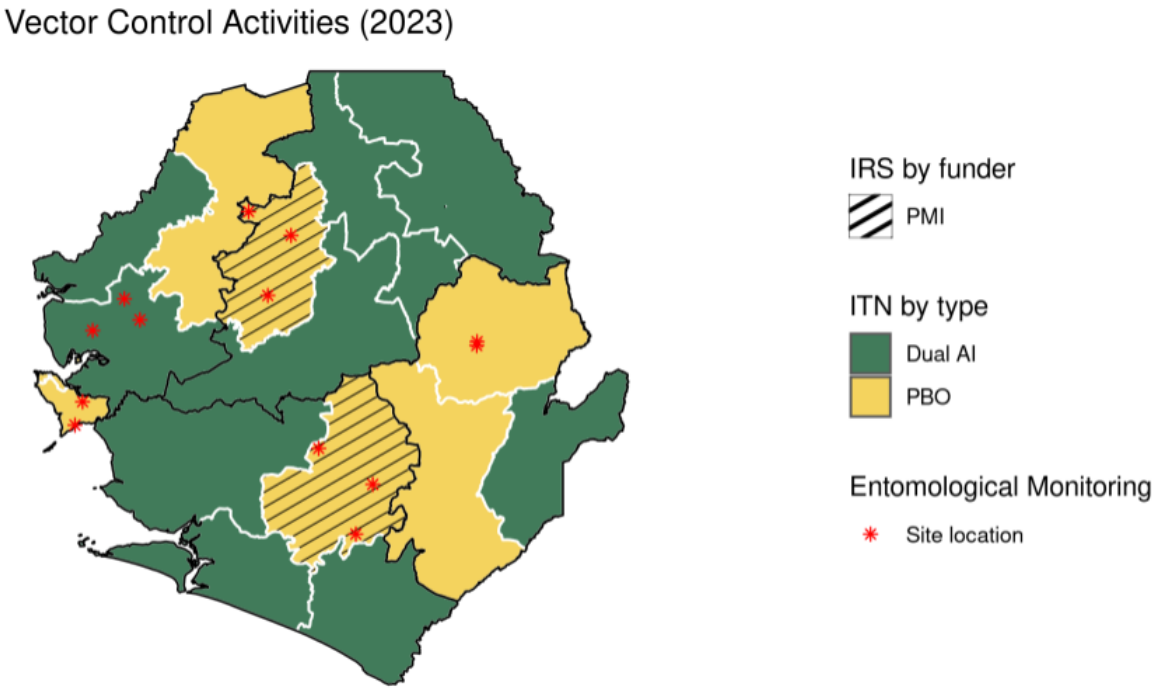
1.1. PMI Goal and Strategic Approach

The NMESP includes four vector control interventions: universal coverage of ITNs, IRS in high burden communities, larval source management, and entomological surveillance. To enhance these interventions, it promotes an integrated vector management strategy, including vector surveillance, insecticide resistance management, continuous and mass distribution of ITNs, and geographically targeted IRS. PMI presently supports the use of all of these interventions, with the exception of larval source management. PMI supports routine entomological monitoring in five districts. With PMI, Global Fund supports the implementation of mass ITN distribution campaigns every three years; the next mass campaign is planned for later in CY 2023. PMI and Global Fund procure ITNs for the continuous routine distribution of ITNs via ANC and EPI channels nationwide; PMI supports the first and last mile distribution. The program is piloting a third continuous ITN distribution channel through primary schools to children is being piloted and is likely to be expanded to additional areas. PMI currently implements IRS in two districts (Bo and Bombali). Although the NMESP supports larval source management as part of the current malaria control strategy in Sierra Leone, it has never been implemented.

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

- Implementation of the vector control strategy by ensuring sustained ITN coverage through both routine and mass campaign channels;
- Collection and use of quality entomological data for decision-making;
- Evidence-based approach to IRS that results in a more cost-effective and efficient, targeted strategy; and
- Capacity of the MoHS-led entomology, IRS, and ITN programs.

Figure 1. Map of Vector Control Activities in Sierra Leone



1.2. Recent Progress (between April 2022 and April 2023)

- Conducted mosquito and larval collections for vector bionomics and insecticide resistance monitoring from sentinel sites–two monitoring and one larval collection sites in each of five districts (Bo, Bombali, Kono, Port Loko and Koinadugu). These five districts represent the five regions in Sierra Leone and are monitored in collaboration with the MoHS, NMCP and the Directorate of Environmental Health. Monitoring activities include vector bionomics, insecticide resistance, and insecticide residual efficacy. For more information, please see the 2022 Entomological Report.
- Continued support to NMCP in strengthening 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.
- Assisted the development of a partnership between NMCP and Njala University, Sierra Leone, trained university laboratory technical staff, and have begun transitioning all entomological laboratory testing to Njala University.
- Procured 738,696 new dual active ingredient (AI) ITNs in FY2022, and also distributed 333,333 Dual AI or PBO ITNs nationwide to all ANC clinics for pregnant women attending their first ANC visit and EPI clinics for fully immunized infants.
- Conducted ITN durability monitoring, by performing the 24-month data collection used to monitor PermaNet® 3.0 in Bo district and Olyset® Plus in Moyamba from the 2020 mass distribution campaign cohort.

- Supported national- and facility-level SBC activities to improve demand for ITNs, increase appropriate use, promote care, and mitigate against misuse. These include supporting the development and implementation of SBC activities implemented by other partners through national technical working groups (TWGs) and through District SBC TWGs. Additionally, PMI trained and supported the Facility Management Committees to directly engage with communities to improve demand and use of ITNs. For more information, please refer to the SBC section.
- Conducted planning and implementation of the second year of IRS in Bo and Bombali districts, covering 143,509 structures and protecting 652,232 people during May–June 2021. For more information about IRS, please refer to the 2022 End of Spray Report.
- Provided technical assistance to the NMCP and DHMTs with the planning, training, supervision, and close-out of IRS operations in the two districts. Trained and engaged 2,823 community members, of which 29 percent were women, to support IRS mobilization and spray activities.
- PMI continues to support the NMCP in conducting a multi-year study to evaluate the impact of co-deploying of synergist piperonyl butoxide (PBO) ITNs and next-generation IRS on entomological and malaria case indicators in comparison to next-generation PBO ITNs as a stand-alone intervention. Reference the OR section for additional details.
- PMI supported and assisted with organizing the national malaria vector control and integrated vector management TWGs. Membership included representatives from Environmental Health, Environmental Protection and Agricultural representatives to assess available data and make national policy decisions about vector control efforts such as the selection of insecticides.

1.3 Plans and Justification for FY 2024 Funding

The FY 2024 funding tables contain a full list of vector monitoring and control activities that PMI proposes to support.

1.3.1. Entomological Monitoring

Sierra Leone will continue to support entomological monitoring activities as described in the Recent Progress section. PMI will provide additional training to technicians on identification of *Anopheles stephensi*. The program will incorporate additional collection sites in Freetown, Western Area Urban district. The program will determine exact expansion sites based on likely *An. stephensi* habitat, paying special attention to any *Anopheles gambiae* complex specimens that do not amplify in molecular identification assays.

Summary of Distribution and Bionomics of Malaria Vectors in Sierra Leone

As of 2022, the primary malaria vector in Sierra Leone is *An. gambiae sensu lato* (87 percent) followed by *An. funestus* group (12 percent). Peak transmission season is from May to October with a small decrease during the time period of heaviest rains in July and August. Evidence

from certain districts indicates a preference for indoor biting, as estimated using human landing catches. Vectors are highly anthropophilic as indicated by a human blood index of over 50 percent in all districts collected. The preferred resting location is inside houses, and the peak biting time varies by district but generally occurs between 11:00 pm and 5:00 am. *Anopheles stephensi*, an invasive urban vector mainly breeding in artificial containers, has been identified in four PMI countries as of 2023. Although it has not been detected in Sierra Leone at the time of writing, the program will adhere to the PMI *An. stephensi* action plan guidance for at-risk countries.

Status of Insecticide Resistance in Sierra Leone

In 2021-2022, as reported in the 2021 Annual Entomological Monitoring Report, *An. gambiae s.l.* was fully susceptible to chlorfenapyr and clothianidin, though it was resistant to all pyrethroids tested in all districts. However, PBO was able to restore partial susceptibility by 48-65 percent to alphacypermethrin, 20-55 percent to deltamethrin and 17-61 percent to permethrin, indicating that mono-oxygenases are involved in conferring pyrethroid resistance. The effect of PBO in 2021 is similar to its activity in 2020 where mortality was restored by about 27-53.6 percent. Additionally, resistance to pirimiphos-methyl was also reported in all surveillance districts. Molecular markers of insecticide resistance were observed at various frequencies; kdr-w mutation was fixed or approaching fixation (more than 80 percent), *ace-1*(G119S) 21.9 percent and N1575Y 0.5 percent.

1.3.2. Insecticide-Treated Nets (ITNs)

Sierra Leone will continue to support ITN activities as described in the Recent Progress section. PMI will continue to support procurement and distribution of ITNs through continuous distribution. PMI will provide technical support to the country's nationwide mass distribution campaign scheduled for late 2023 through participation on a national task force and direct support through implementing partners. This past year, PMI purchased an additional 405,261 dual AI ITNs to supplement similar ITNs purchased through Global Fund in order to cover the majority of rural districts in the upcoming 2023 ITN mass distribution campaign. PMI also supports SBC to improve use and care of ITNs and to mitigate against misuse. The program will continue to collect insecticide resistance data and information to inform decisions on ITN procurement. The program will procure dual AI ITNs because of their enhanced effectiveness.

Please see the SBC section for details on challenges and opportunities to improve intervention uptake or maintenance.

ITN Distribution in Sierra Leone

Sierra Leone distributes ITNs via mass campaigns every three years. The most recent one occurred in 2020 and another is scheduled for 2023. Sierra Leone distributes ITNs to pregnant women at their first ANC visit and infants at their Penta 3 EPI visit (Pentavalent vaccines

provide protection to children from life-threatening diseases such as Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib. The vaccines are given over several visits).

The Integrated Vector Management TWG reviewed entomological insecticide resistance data and has recommended a transition from PBO ITNs to Dual AI ITNs, with the active ingredient chlorfenapyr, for most current and all future procurements of ITNs–dependent on global availability and stock. Insecticide resistance data will continue to be collected and information will inform decisions on ITN procurement.

The Sierra Leone MOHS and the Ministry of Basic and Secondary Education (MBSE) are piloting an additional ITN distribution channel in 2023 with technical and financial support from PMI and Global Fund. PBO ITNs have been systematically distributed to 100,000 primary school children in Kono district. Final independent assessment of the pilot program is near completion but initial observations and program monitoring data indicate that school based distribution is a promising additional continuous distribution channel to increase the access to ITNs in multiple communities nationally in the future. PMI proposes to invest in the distribution of ITNs through a school based channel patterned after this pilot in addition to continuing to support ANC, API and mass distribution methods to increase national ITN coverage. The MoHS has included significant support for school based distribution of ITNs in the upcoming grant cycle application to supplement and complement PMI funding and increase overall ITN distribution in the country.

Please refer to the ITN Gap Table in annex for more detail on planned quantities and distribution channels.

Table 1. Standard Durability Monitoring

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

1.3.3. Indoor Residual Spraying (IRS)

Sierra Leone will continue to support IRS activities in Bo and Bombali district. PMI will provide technical assistance to the NMCP and District Health Officers with an emphasis on capacity strengthening of local staff. Future decisions about location, scale and insecticide will be made in conjunction with the MoHS. After three years of using clothianidin based insecticide from 2021 through 2023, andt after reviewing the insecticide resistance data, a new class of insecticide will be used in both the CY 2024 and CY 2025 IRS campaigns. In addition, in close consultation with the Integrated Vector Management TWG and MoHS stakeholders, decisions about the number of households and which communities where PMI will conduct IRS will be

made jointly based on malaria surveillance from national household surveys and HMIS data. If it is decided with the MoHS to withdraw IRS from some chiefdoms in the Bo and Bombali district, a set of rigorous interventions will be enacted with the support of MoHS, PMI and Global Fund. These measures will include improved entomological and HMIS surveillance for malaria burden, health systems strengthening to ensure timely treatment of severe and uncomplicated malaria and the significant expansion of ITN access within these communities through the school based distribution of highly effective dual AI ITNs in these districts. In addition, PMI will advise the MoHS to identify supplementary means to support IRS to maintain this intervention as broadly as possible through exploration of public-private partnerships, GoSL funding or partnership with other donors and organizations.

Table 2. PMI-Supported IRS Coverage

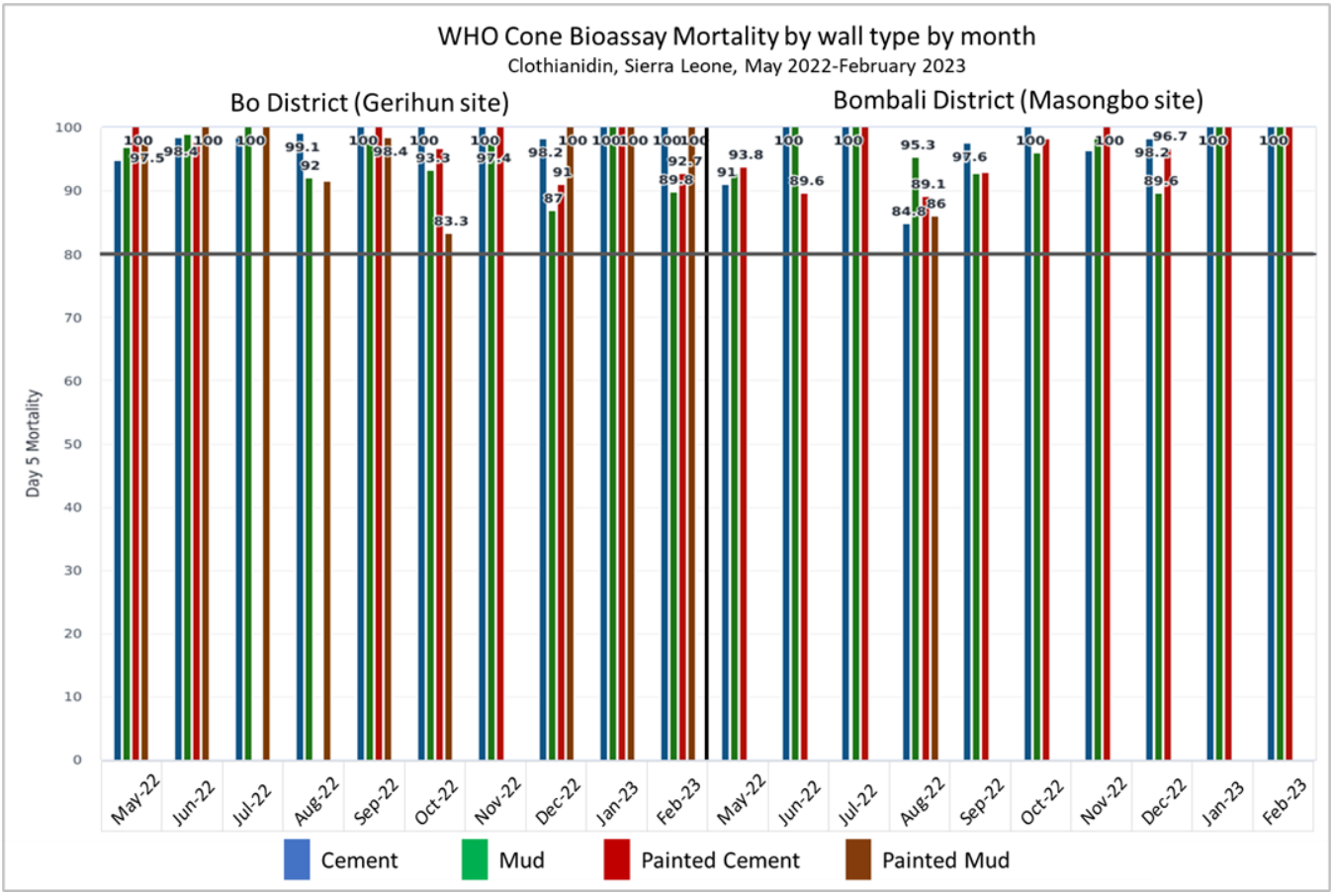
Calendar Year	Districts	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)	Insecticide
2022	Bo/Bombali	143,509	96	652,232	Neonicotinoid (Clothianidin)
2023	Bo/Bombali	143,506*	~100*	652,232	Neonicotinoid (Clothianidin)
2024	Bo/Bombali	115,000*	80*	520,000*	TBD
2025	Bo/Bombali	~144.000*	~100*	650,000*	TBD

*Targeted structures, coverage and population protected in 2023 and subsequent years estimated from MOP budgetary calculations from historical spray costs of past campaigns.

IRS Insecticide Residual Efficacy in Sierra Leone

Residual efficacy data for clothianidin was monitored monthly from May 2022 until February 2023 in two sites, one each in Bo and Bombali districts. Monitoring of residual effectiveness will continue until mosquito mortality reaches less than 80 percent for two consecutive months. SumiShield (clothianidin) effectiveness remained over the 80 percent WHO threshold at 9-month post-spray across the four wall types tested (figure 2 below).

Figure 2. Chart of Residual Efficacy Results of Clothianidin Post IRS by District 2022–23



2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

The NMCP objective for malaria prevention interventions, including IPTp and perennial malaria chemoprevention (PMC), is to reduce malaria case incidence by at least 75 percent compared to 2015 by the end of 2025. The goal of IPTp is “to ensure 80 percent of eligible pregnant women receive at least three doses of IPTp," with sulfadoxine-pyrimethamine (SP) available at all service delivery points for directly observed therapy at ANC visits.

The NMCP adopted the 2012 WHO IPTp policy recommendations, ensuring pregnant women receive IPTp-SP doses starting early in the second trimester of pregnancy (between 13 and 16 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 ANC 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 infants at their 14-week EPI visit. Currently, the national treatment policy for the treatment of uncomplicated malaria cases during pregnancy is oral quinine plus clindamycin, an antibiotic, in the first trimester and an Artemisinin-based combination therapy (ACT) in the second and third trimesters. However, the NMCP plans to

update the malaria treatment guidelines in 2023 to include the use of an ACT for the treatment of malaria cases in the first trimester of pregnancy.

Overall, IPTp coverage has improved between the most recent malaria indicator surveys. According to the 2021 MIS, 92 percent of women reported having taken one or more doses of SP, 81 percent reported taking two or more doses, and 52 percent reported taking three or more doses. In contrast, the 2016 MIS reported that 90 percent of women reported having taken one or more doses of IPTp, 71 percent of women received two or more doses, and 31 percent of women received three or more doses. Some remaining challenges in improving IPTp uptake include its intermittent stockout at peripheral health facility levels, limited implementation of IPTp at private hospitals and clinics, and pregnant women attending their first ANC visit late and not returning for additional doses of IPTp during their pregnancy.

The NMCP supports the full integration of malaria in pregnancy (MIP) within the MoHS's Reproductive, Maternal, and Child Health (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 ANC attendance in collaboration with the RMCH Unit. In 2017, the MOHS adopted the 2016 WHO ANC guidelines, including the recommended eight ANC contacts during pregnancy. With the updated ANC guidelines, the MOHS 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. Although public hospitals provide ANC services to pregnant women, training and supervision of hospital staff as well as other private health providers to ensure quality of MIP and IPTp services has been limited.

The NMCP has previously supported the provision of IPTp-SP at the community level through trained traditional birth attendants, although monitoring and supervision of the practice was limited, and traditional birth attendants reported frequent stockouts of SP supplies at the community level. In the National Community Health Worker Policy (2021), a new cadre of community health workers have been recruited, of which those working in rural, remote and hard-to-reach areas (e.g., approximately 40% of all trained CHWs) will be able to provide SP as community-administered IPTp (or c-IPTp). Sierra Leone's approach ensures the eligible pregnant woman receives her first IPTp dose during her first ANC visit by a health provider (e.g., nurse/midwife) and subsequent IPTp doses may be provided by CHWs. The CHWs help educate and promote ANC and MIP services to pregnant women, ensuring optimal timing and frequency of interventions.

2.2. Recent Progress (between April 2022 - April 2023)

PMI continued to support integrated supportive supervision at district and PHU levels in the PMI partner districts, ensuring the quality of service delivery as well as providing on-the-job training, mentoring and coaching of health facility staff.

- Conducted MIP OTSS+ field activities in ten PMI partner districts, reaching 873 (96 percent) health facilities with 2,337 health workers.
- Supported four TWG meetings to discuss and address malaria service delivery issues. The TWGs ensured close collaboration between the NMCP, the RMNCH Unit and malaria stakeholders, in coordinating MIP efforts.
- Conducted mentorship visits to over 800 PHUs in 10 PMI supported districts to address MIP gaps identified during OTSS+.
- Conducted training for 128 DHMT staff and 295 chiefdom supervisors on MiP mentorship skills.
- Supported the NMCP and the MIP TWG to assess the national IPTp3 coverage. The IPTp assessment revealed that attendance at ANC and uptake of IPTp services were below the national targets across all districts. The IPTp3 uptake across districts ranged from 86.5 percent in Pujehun district to 43.1 percent in Bo. The estimated coverage of the fourth, fifth, and sixth doses of IPTp was 39.1 percent, 22.0 percent, and 9.0 percent, respectively.
- PMI trained CHWs and their Peer Supervisors in MIP interventions to further support uptake and coverage of IPTp.
- PMI supported the NMCP with training, supervision, and updating guidelines and tools for CHWs to ensure that they are correctly administering IPTp to eligible pregnant women.
- PMI funded financial incentives for 721 CHWs based in hard-to-reach areas in three districts who are trained to provide community-administered SP-IPTp.
- PMI provided equipment (including t-shirts, torchlights, raincoats, rain boots and backpacks) to 2,905 CHWs across five districts. Additionally, PMI provided 305 bicycles and helmets to the peer supervisors in these districts.

2.3. Plans and Justification for FY2024 Funding

The FY 2024 funding tables contain a full list of malaria in pregnancy activities that PMI proposes to support.

PMI will continue to support MIP activities as described in the Recent Progress section.

NMCP is monitoring SP resistance through the PMI-supported TES study protocol with results anticipated in 2024. In addition, a multi-country perennial malaria chemoprevention study underway in Sierra Leone, will gather data on SP resistance with results shared in late 2024. The current Global Fund grant provides for sufficient quantities of SP treatments for the administration of IPTp to pregnant women through 2024. As a result, PMI does not plan to procure SP for IPTp at this time and anticipates additional SP quantities will be covered by the next Global Fund grant. PMI will monitor SP stocks closely and advocate for additional SP commodities if stockouts are reported.

Please refer to the SP Gap Table in annex for more detail on planned quantities and distribution channels.

Please see the SBC section for details on challenges related to intervention uptake.

3. Drug-Based Prevention

3.1. Other Drug-Based Prevention (as applicable)

In 2018, Sierra Leone launched perennial malaria chemoprevention (PMC) with the goal of providing all healthy infants with three doses of SP between two and nine months of age. PMC is implemented in partnership between malaria and EPI programs, and SP for PMC is delivered nationwide through routine EPI activities at health facilities in all 16 districts. The timing of PMC dosing is linked to the national immunization schedule as follows:

- PMC 1 provided at the time of dose 2 of DPT/Penta (10 weeks)
- PMC 2 provided at the time of dose 3 of DPT/Penta (14 weeks)
- PMC 3 provided at the time of first dose of measles vaccine (9 months)

According to the recent 2021 MIS, among children with a vaccination card, 86 percent received one dose of PMC, 75 percent received two doses of PMC, and 59 percent received three doses of PMC. To improve uptake and coverage of PMC doses, NMCP works with the EPI program in developing and updating guidelines for PMC implementation and training of PHU staff on the administration of SP and conducting quarterly supportive supervision of health staff at all levels. A national PMC TWG was established and functions with members from across the MOHS including Malaria, EPI and Child Health, as well as other donors and stakeholders. NMCP is also collaborating with international partners on a three-year (May 2021 to August 2024), multi-country study examining the effect on uptake and operational feasibility and acceptability of administering six doses of PMC to children through two years of age.

3.1.1. PMI Goal and Strategic Approach

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

3.1.2. Recent Progress (between April 2022 - April 2023)

PMC is implemented with support from the Global Fund and in coordination with other partners.

3.1.3. Plans and Justification for FY 2024 Funding

The FY 2024 funding tables contain a full list of activities related to other drug-based prevention that PMI proposes to support.

With FY 2024 funding, PMI will build on the NMCP's existing efforts by supporting the development of a supportive supervision checklist tool for strengthening the quality of PMC implementation at PHU level.

The current Global Fund grant provides for sufficient quantities of SP treatments for the administration of PMC to infants through 2024. As a result, PMI does not plan to procure SP for PMC at this time.

Please refer to the SP Gap Table in annex for more detail on the planned quantities and distribution channels.

4. Case Management

4.1. PMI Goal and Strategic Approach

The NMESP 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 system for malaria diagnosis; monitoring the safety and efficacy of antimalarial medicines; and improving the management of severe malaria in hospitals and community health centers. The NMCP's Guidelines for Case Management of Malaria (2020) promote a comprehensive case management strategy including universal, quality-assured parasitological testing of all cases of suspected uncomplicated malaria; prompt and effective treatment with ACTs of all cases of parasitologically-confirmed uncomplicated malaria, except for pregnant women in their first trimester who should receive oral quinine plus clindamycin (see MIP section); and pre-referral and definitive management of severe malaria.

Guidelines for Malaria Case Management include the use of rectal artesunate malaria suppositories (RAMS) as a pre-referral treatment at both the facility and community level for children under 6 years of age. The use of RAMS was introduced in 2020 at the facility level nationwide with the intent to expand to the community level. However, due to a WHO information note issued in 2022 on the use of RAMS, Sierra Leone decided not to plan expansion to the community level, but will instead maintain it as a facility-based pre-referral treatment until more information becomes available.

PMI supports all aspects of the NMCP's approach through support to national-level policy and programmatic activities, commodity procurement, capacity strengthening of the DHMTs to provide outreach training and supportive supervision plus (OTSS+), capacity strengthening for malaria microscopy in hospitals, support to NMCP's outreach efforts to private facilities, and improvement of facility and community-level health worker performance. PMI supports nationwide procurement of RDTs, ACTs, and injectable artesunate, accounting for approximately 15 percent of those commodities in CY 23; the Global Fund supports procurement of the remaining 85 percent. PMI also supports OTSS+ activities in 100 percent

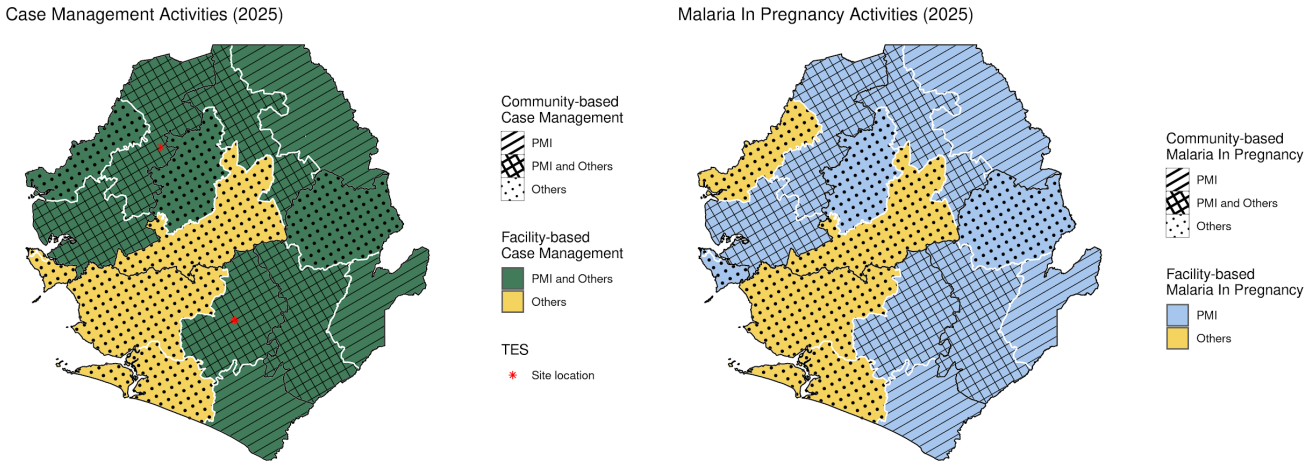
of facilities in 10 districts; the Global Fund supports the remaining districts through malaria onsite coaching and mentoring in selected facilities.

CHWs play an important role in health promotion, community-based surveillance, and direct malaria service delivery at the community level. In 2021, the CHW policy was updated to establish an integrated approach to scale up malaria diagnosis at the community level. Consequently, in June-July 2022, the new program deployed 8,159 CHWs, including 4,903 CHWs in easy-to-reach areas (three to five km from a PHU), 3,256 in hard-to-reach areas (more than five km from a PHU or three to five kilometers with difficult terrain), and 858 peer supervisors in all districts to provide an integrated package of services, including iCCM. This was primarily informed by a GF-funded CHW assessment and evaluation in 2020.

Since the initial roll-out in 2022, only the CHWs in hard-to-reach areas deliver community-based case management services that include iCCM to children under five years of age and malaria case management to all others. Once the program is more established and able to consistently quantify, forecast, and distribute commodities to CHWs, all CHWs will deliver community-based case management services to all ages. PMI's input into this policy is critical to ensure CHWs are able to test and treat in all areas.

PMI will extend the ongoing facility-based OTSS+ in 10 districts to the approximately 580 peer supervisors in those districts. PMI has worked with the MoHS to set up the systems to effectively provide routine financial incentives to CHWs and pays the financial incentives of approximately 2,000 CHWs in three districts (Falaba, Kailahun, and Pujehun). The financial incentives for the CHWs in the other districts will be covered by the Global Fund and Gavi. The most important challenges currently faced by the community health system are the quantification and distribution of commodities, the development of a reporting system, and the development and roll-out of a performance management system linked to a payment system to provide financial incentives. To address these challenges, PMI is providing technical assistance to integrate the forecasting, provision, distribution, and reporting of commodities for CHWs into the LMIS, to develop and integrate community-level indicators into the HMIS. PMI will continue close collaboration with the CHW Hub, the Global Fund, and Gavi to create a national payment system that is efficient, transparent, and reaches all CHWs.

Figure 3. Map of Case Management, Community Health and Malaria in Pregnancy Service Delivery Activities in Sierra Leone



4.2. Recent Progress (between April 2022 - April 2023)

National Level Case Management Activities

- Developed and printed a Manual for Quality Assurance on Laboratory Malaria Diagnosis.
- Strengthened the diagnostic capacity of lab personnel in malaria diagnosis through round four of lab OTSS+ in fifteen district hospitals.
- Strengthened the management of severe malaria in 16 district and tertiary hospitals by supporting the NMCP in conducting severe malaria training to 30 medical doctors.
- Strengthened quality assurance of malaria diagnostics in private health facilities and laboratories through training and professional development and laboratory supervision.
- Developed the National Archive for Malaria Slides (NAMS) slide bank. Also conducted NAMS end-user training for ten MoHS laboratory personnel and two NMCP staff.
- Collaborated and coordinated with other relevant country government officials, partners and stakeholders (e.g., Maternal and Child Health, Ministry of Population, Surveillance and Data Systems, Community Health).
- Trained 40 laboratory technologists in basic malaria diagnostic refresher training (MDRT), 11 in advanced MDRT, 9 through national External Competency Assessment of Malaria Microscopists (ECAMM) courses and 6 through the WHO ECAMM.
- Provided an embedded advisor in the Community Health Worker Hub who is strengthening the leadership and management capacity of the hub to ensure CHWs will deliver high quality malaria services.

Commodities (FY2022)

- Procured and distributed 1.4 million malaria RDTs, accounting for approximately 21.7 percent of needs.

- Procured and distributed 950,010 ACT treatments, accounting for approximately 16.8 percent of needs.
- Procured and distributed 221,000 vials of parenteral artesunate, accounting for approximately 38 percent of needs.
- Procured and distributed 20,000 rectal artesunate suppositories, accounting for close to 100 percent of needs.

Facility Level

- Trained 219 supervisors in on-site training and supportive supervision.
- Conducted OTSS+ field activities in 10 PMI partner districts, reaching 873 (96 percent) health facilities with 2,337 health workers.
- Collected key case management quality of service indicators during OTSS+ rounds. The overall competency in managing uncomplicated malaria improved from 7 percent in Round 1 to 35 percent in Round 2. HCWs demonstrating competency (Score more than 90 percent) in correctly classifying cases as not malaria, uncomplicated malaria, complicated malaria, and severe malaria improved from 95 percent in Round 1 to 99 percent in Round 2. HWs demonstrating competency in the use of mRDTs improved from 42 percent in Round 1 to 74 percent in Round 2.

Community Level

PMI supported the MoHS in launching the 2021 National CHW Policy in 2022. To support the roll-out of the revised policy, PMI coordinated and participated in the distribution of CHW training materials to 290 training sites in 16 districts. In June–July 2022, the MoHS began cascade training for all CHWs in the 16 districts. PMI completed training and deploying 1,855 CHWs and Peer Supervisors in partner districts by December 2022. CHWs were tasked with completing household registers when training ended and before service delivery activities commenced. Due to gaps in the accessibility of commodities for some CHWs, testing and treatment of malaria in the community has not been consistent in the 16 districts.

PMI provided financial compensation for the 1855 CHWs and Peer Supervisors in the three PMI partner districts – Pujehun, Falaba, and Kailahun. PMI has procured other necessary equipment–rain gear, flash lights, t-shirts–for five districts and the Global Fund for the remaining 11 districts. Plans are in place for distribution April-June 2023.

The section below presents recent progress with monitoring antimalarial efficacy and the TES approach.

4.3. Plans and Justification for FY 2024 Funding

The FY 2024 funding tables contain a full list of case management activities that PMI proposes to support.

4.3.1 National Level Case Management Activities

PMI will continue its national level support as described above, by focusing on providing TA to the NMCP, engaging in policy and materials revision, where needed, and by supporting the national TWG. PMI will also continue its support for national efforts to strengthen microscopy capacity in the country.

4.3.2 Commodities

PMI plans to continue to procure RDTs, ACTs, and severe malaria drugs as described in the Recent Progress section. There are currently gaps for all of these commodities, but discussions with the NMCP and the Global Fund indicate that these will be covered in the pending GC7 application. PMI will also strengthen equitable access and availability of malaria commodities at the community level, for CHW service delivery. PMI intends to procure the 10-pack of RDTs that will help to eliminate wastage when provided to CHWs.

Please refer to the ACT, RDT, injectable artesunate, and artesunate suppository Gap Tables in the annex for more detail on planned quantities and distribution channels.

4.3.3 Facility Level (may include private sector if relevant)

PMI will continue to support more than 800 facilities across ten districts with supportive supervision and mentoring, as described in the recent progress session. This will include continued use of OTSS+, a digital tool to strengthen supervision processes. Also, better engagement with private facilities is a growing priority for the NMCP. Therefore, PMI intends to devote resources towards supporting efforts to strengthen reporting from the private sector into DHIS2, which may inform future quality improvement activities, as well.

4.3.4 Community Level

PMI will continue to support 1,855 CHWs in three districts through supportive supervision and financial incentives, as well as supporting OTSS+ for 580 peer supervisors in ten districts. PMI will actively work with the MoHS and CHW Hub on a plan to transition financial incentive payments from donors to the GoSL over time. Additionally, PMI will work closely with the CHW Hub and other donors to share learnings and best practices from the three PMI-support districts, to ensure they can be integrated in the community health program in other districts. Finally, after supporting DPPI in developing a national digital health implementation roadmap in FY22, PMI will continue to support the Digital Community Health Initiative through roadmap activities, which are TBD upon finalization of the roadmap.

Monitoring Antimalarial Efficacy

Table 3. Ongoing and Planned Therapeutic Efficacy Studies (TES)

Ongoing Therapeutic Efficacy Studies (TES)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2022	Bo, Bombali, Kenema	AL, ASAQ	CDC Atlanta
Planned TESs (funded with previous or current MOP)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2024-2025	TBD	AL, ASAQ	TBD

AL: Artemether-lumefantrine; ASAQ: Artesunate-amodiaquine

PMI supported a TES in 2022, which will be completed in 2023 after the molecular analysis of markers associated with parasite detection. Per WHO guidelines, PMI is planning another two-arm TES for AL and ASAQ in two districts in 2024-2025. Both FY23 and FY24 resources will support this study.

Please see the SBC section for details on challenges and opportunities to improve intervention uptake or maintenance.

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

The objectives of the NMESP are to focus on the provision of diagnostic tests and effective treatment for public, private and community levels; improve malaria data collection and reporting through HMIS (public and private); and strengthen procurement and supply chain management of malaria commodities. The Test, Treat and Track approach remains a vital component of the strategic plan, and is reliant on 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 capabilities of health workers in the areas of procurement and supply chain management, both in the public and private health sectors. In addition, the NMCP is focused on improving the supply of malaria prevention and treatment commodities by strengthening forecasting and supply planning and improving warehousing, storage and distribution systems. The overall MoHS supply chain system is led by the Directorate of Pharmaceutical Services and the National Medical Supplies Agency (NMSA) responsible for procurement, warehousing and distribution of commodities to over 40 hospitals and 1,300 PHUs.

PMI supports the supply chain through both procurement and technical system strengthening and ensuring 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. PMI's vision for Sierra Leone's public health system includes the improvement and strengthening of the supply chain system, specifically focusing on data management and use at the district and facility levels in an effort to reduce stockouts, over-stocking and commodity expirations of malaria commodities.

PMI is implementing the PMI Stockout Reduction Strategy in partnership with the NMCP and the NMSA with a target of reducing stockouts to less than 10 percent. PMI supports training and supportive supervision interventions at both central level and service delivery points to improve data management and demand driven distribution of commodities. PMI supports training central and district staff to analyze and improve data quality to then use consumption data, routine stock assessment of commodities to ensure adequate commodity stocks. In addition, PMI supports routine supervision visits at facility level aimed at data validation and redistribution of malaria commodities to prevent stockouts.

5.2. Recent Progress (between April 2022 and April 2023)

- PMI supported quarterly Malaria Quantification TWGs that are critical for logistics and stock decisions. In August 2022, PMI completed a forecast for January 2023 to December 2024 using three methods and types of data: demographic, consumption, and morbidity. Beginning in March 2023, PMI supported district level malaria stock validations that will inform the planned national quantification and forecasting exercise in August 2023.
- PMI continues to support the development of guidelines for conducting national forecasting and provide technical assistance and training to Sierra Leone supply chain staff members, enabling a shift in focus to strengthening the capabilities of district level District Forecast and Distribution Technical Working Group (DFD TWG) members in forecasting at district level.
- PMI continues to assist the NMCP, DPS (Directorate of Pharmaceutical Services [DPS]), and NMSA in leading DFD TWGs in all 16 districts in Sierra Leone that have continued to conduct regular quarterly meetings.
- PMI supported the NMCP in implementing the Malaria Supply Chain Monitoring System (MSCMS) in all 16 districts. On a quarterly basis, DFD TWG members, with technical support from PMI, NMCP, DPS and NMSA, provided supportive supervision to underperforming health facilities identified during quarterly review meetings. Using standardized checklists HMIS, commodity consumption, availability, and expiry data was utilized to teach and encourage district and peripheral staff to build data-driven action plans to solve supply chain issues.
- PMI led the development of a National Health Commodities Supply Chain Standard Operating Procedure (SOP) and assisted the MOHS in validating it with input from central and district level stakeholders. This SOP integrates and harmonizes MOHS

programs' best practices and is a template for synchronized, efficient supply chain management.

- In close collaboration with the NMSA and NMCP, PMI continued to support routine distribution of ITNs from central level to district level and from district level to 1,300+ PHUs nationwide. PMI also transported 100,000 ITNs to 500 Kono district primary schools for a pilot by the GoSL of a new school-based distribution method in April 2023.
- PMI collaborated with DPS, NMSA, DPPI, and other stakeholders to improve data quality of the LMIS data in theDHIS2. Specific effort focused on ensuring that the data server "backend" output is reflecting the national supply chain principles, and provides access to LMIS dashboards to all disease and health programs. PMI also provided technical support to DPS and DPPI to complete LMIS training for district and program staff to enable capture of new Report Request and Issue Voucher (RRIV) forms in DHIS2, monthly data review and response, and increased LMIS data visibility and use.
- PMI completed training and implementation of the m-Supply health commodities warehouse management system in the final four districts (Bonthe, Pujehun, Western Area Rural, and Western Area Urban). Subsequently, all national health commodity warehouses now manage stock with the m-Supply tool as directed in the 2018 National Supply Chain Roadmap.
- PMI supported the MoHS to conduct and publish the first end use verification Survey for malaria and continuity of care in the context of COVID-19. Key findings included the percentage of service delivery points (SDP) stocked out on the day of the visit for all malaria commodities ranged from 5 percent to 25 percent; and 75 percent of SDPs had 4 presentations of AL on hand/in stock.
- PMI collaborated with the CHW Hub to revise the CHWs commodities reporting tools to ensure they are user friendly and able to capture routine data used to guide quantification and distribution planning.

5.3. Plans and Justification with FY 2024 Funding

The FY 2024 funding tables contain a full list of health supply chain and pharmaceutical management systems strengthening that PMI proposes to support.

PMI will continue to support the same activities described in the Recent Progress section. PMI will continue to support the NMCP with forecasting and supply planning. PMI's investment in supply chain strengthening will continue to evolve with greater focus at the district level to increase capacity to monitor and reduce the likelihood of stockouts at the peripheral levels. PMI will continue supporting the Malaria Supply Chain Monitoring System (MSCMS) at facilities in all districts and provide support to DPS and NMCP with analyzing MSCMS data for program improvement.

As noted in the Section 3.2, although MSCMS improves stock data and management, more needs to be done to improve LMIS. OTSS+ supportive supervision demonstrated data discrepancies when comparing the consumption data between the source registers at the

health facilities and the RRIV (monthly commodities) reports. The discrepancies were about 40 percent for ACTs and 60 percent for rapid diagnostic tests (RDTs). These discrepancies affect the ability of the NMCP to forecast, procure, and distribute appropriate amounts of commodities. PMI will continue to support the capacity strengthening of PHU personnel on LMIS and inventory control through MSCMS. PMI will also invest in the process of digitizing LMIS data collection at PHU level to improve reporting, data responsiveness and decision making. The RRIV integration into DHIS2 is the beginning of this process, but additional actions will be taken after the initial steps in digitization in certain facilities. Assessment of these pilot activities will shape future initiatives.

With the implementation of the new CHW strategy, PMI will provide technical assistance in the development of CHW LMIS reporting. In addition, PMI will conduct one end-use verification surveys to assess availability of commodities at PHU level for the MoHS and assist NMSA and DPS in improving its supply chain activities and strategies.

6. Malaria Vaccine

6.1 PMI Goal and Strategic Approach

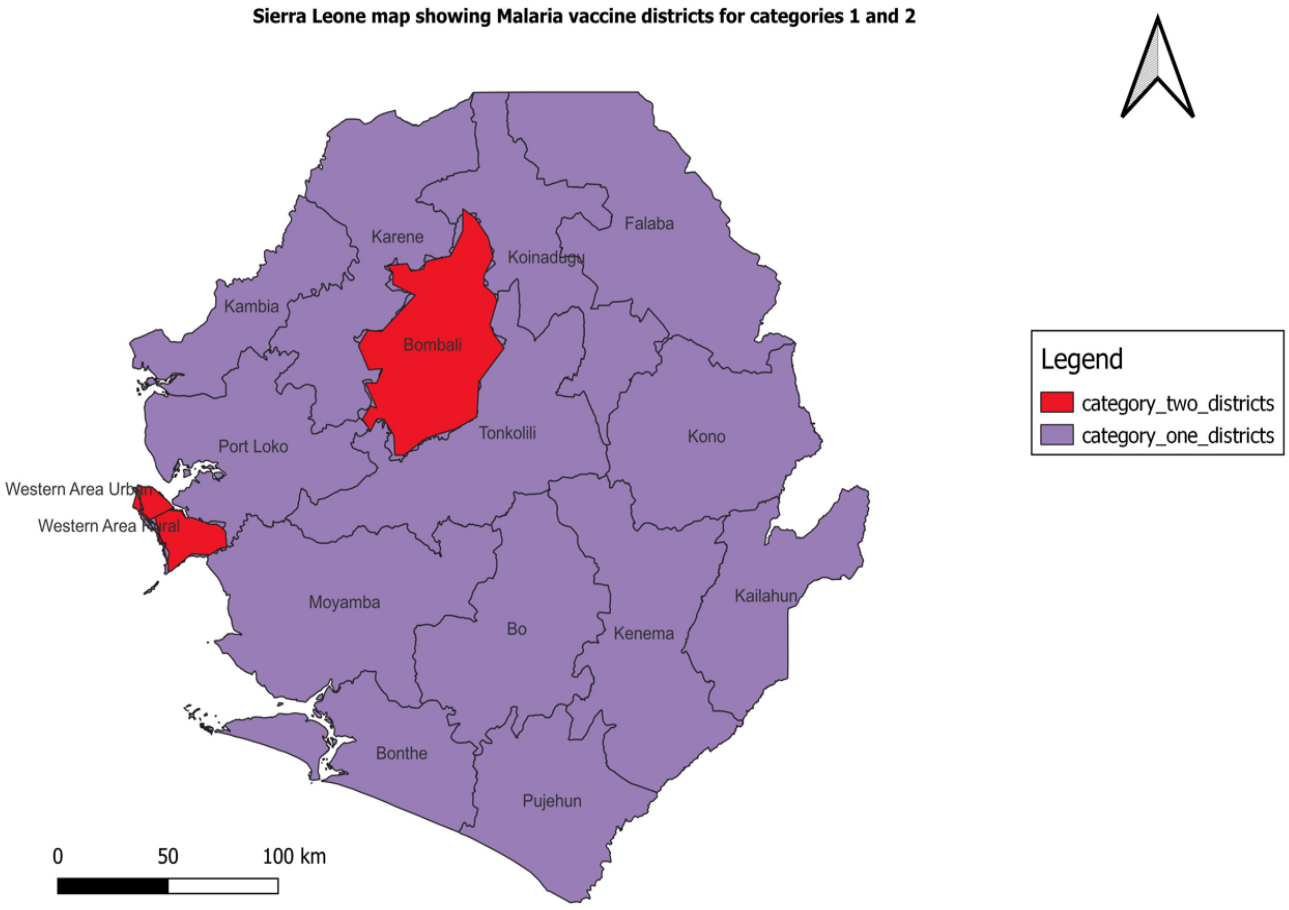
In January 2023, Sierra Leone applied for Gavi funding to support the procurement and deployment of the malaria vaccine which is planned to start in March 2024 and will be implemented in two phases (application approved April 2023). The vaccine will be deployed in health facilities to infants at six, seven, eight, and 18 months of age as a part of routine EPI service delivery and complemented by periodic intensification of routine immunization activities.

The malaria vaccine would supplement the current malaria control interventions in children between five and 24 months of age. Introducing the malaria vaccine would potentially reduce the incidence of malaria, reduce associated under-five morbidity and mortality in high burden areas, and reduce malaria related hospital admissions and severe forms of malaria in the target age group.

The malaria vaccine allocation was determined by the Gavi criteria, which prioritizes areas with Plasmodium falciparum parasite prevalence of more than 40 percent and all-cause mortality of children under five years of age between 7.5–9.5 percent as Category 1 for initial roll out. In Sierra Leone, 13 districts have a malaria prevalence ranging from 20–40 percent; however, all districts have an all-cause mortality rate among children under five years of age of 9.5 percent+. As such, Category 1 districts coincide with the high burden districts of Kailahun, Kenema, Kono, Falaba, Koinadugu, Tonkolili, Kambia, Karene, Port Loko, Bo, Bonthe, Moyamba and Pujehun. PMI focuses on malaria control interventions in nine of these districts (Kailahun, Kenema, Kono, Falaba, Koinadugu, Karene, Port Loko, Bo, Pujehun).

Beginning with FY 2022 funds, PMI funding will be used to develop a malaria vaccine SBC strategy integrated into both the national malaria SBC strategy and national immunization demand creation strategy. PMI will also work with partners and stakeholders to support the effective roll out of the malaria vaccine by building health worker capacity to effectively administer the vaccine, support demand creation among beneficiaries, and support associated surveillance, monitoring and evaluation. PMI, through its existing activities in the same districts (as noted in the CM section), will also strengthen community malaria interventions to ensure effective case management, early diagnosis and referral of malaria cases in the vaccine districts and to ensure that existing priority behaviors continue to be reinforced despite the presence of the vaccine. All malaria vaccine procurement will be supported by United Nations Children's Fund with Gavi funding.

Figure 4. Map of malaria vaccine plans in Sierra Leone



6.2. Plans and Justification for FY 2024 Funding

The FY 2024 funding tables contain a full list of activities related to other drug-based prevention that PMI proposes. PMI support with FY 2024 funds will include SBC support for the vaccine rollout and will be revised through early phases of implementation and dissemination of global malaria vaccine SBC guidance.

Please see the SBC section for details on challenges and opportunities to improve intervention uptake or maintenance.

7. Social and Behavior Change

7.1. PMI Goal and Strategic Approach

PMI's support to the implementation of the NMCP's Malaria Elimination Behavior Change Communication Strategy 2017–2022 contributes to attaining the NMESP 2021–2025 objectives. PMI provides technical assistance at the national level and in six districts (Bo, Falaba, Kailahun, Koinadugu, Port Loko, and Pujehun) for the design and implementation of evidence-informed, theory-based SBC activities to: 1) improve the capacity of partners to coordinate, design, implement, monitor, and evaluate effective SBC at the national and sub-national levels; 2) strengthen links between health facilities and communities to coordinate demand- and supply-side efforts for service delivery; and 3) improve individual and social determinants of health to facilitate individual and household adoption of priority behaviors informed by the 2019 Malaria Behavior Survey (MBS) results. PMI will provide technical support to update the national communication strategy and will contribute to the development of a malaria vaccine SBC strategy and coordination mechanism that includes representatives from across the MOH, including the NMCP and EPI programs.

7.2. Recent Progress (between April 2022 - April 2023)

- Provided technical guidance for national-level TWG meetings to support finalization of the national SBC message guide, identify SBC activities planned for the 2023 mass ITN distribution campaign, and the launch of the 2023 IRS campaign.
- Provided ongoing support to the NMCP to finalize and disseminate a comprehensive SBC message guide informed by the 2019 MBS results.
- Provided national-level technical assistance to develop and pretest SBC materials for the ITN school-based distribution pilot.
- Increased support for quarterly, district-level TWGs from six districts (Bo, Falaba, Kailahun, Koinadugu, Port Loko, Pujehun) to ten (adding Bombali, Karene, Kenema, and Kono), in collaboration with the NMCP and Health Education Division.
- Facilitated a Leadership in Strategic Communication Workshop for 30 malaria stakeholders which used the P-Process–a step-by-step roadmap to guide behavior change communication activities.

- Conducted a gender integration training for malaria stakeholders within the MOHS, HEP, CRS, World Vision, EPI and district-level representatives to strengthen SBC implementation that incorporates gender integration for audience segmentation.
- Conducted a landscape analysis to support developing the Traditional Healers Implementation Science protocol in Tonkolili and Port Loko districts. The protocol identifies strategies for operationalizing field work.
- Using results from a 2019 PMI-supported qualitative assessment measuring health provider service delivery behavior and from OTSS+ results, PMI developed new mRDT job aids for healthcare providers and CHWs.
- Facilitated six monitoring visits for facility management committees in Bo, Pujehun, Port Loko, Koinadugu, Kailahun, and Falaba to assess the status of implemented activities. These committees support links between communities and health facilities and promote malaria prevention and control measures.
- Supported the facilitation of two radio discussion programs targeting two radio stations with high listenership within Freetown during peak listening times and also supported airing radio jingles in then districts to promote malaria prevention behaviors. The radio programs and jingles reached an estimated 5,049,584 people across the country.

Despite the recent progress, challenges remain, outlined by the technical areas below. Continued SBC investment will address the determinants of uptake and/or maintenance of prevention, care-seeking, and treatment behaviors.

- **ITNs:** Access to ITNs remains low. Over the past five years, it ranged between 37 to 47 percent, with the most recent data indicating access to ITNs was 43 percent (MIS 2021), despite a mass distribution campaign 12 months prior to the survey. While access is low, Sierra Leone's ITN use to access ratio is 1.08, although this may be due to multiple household members sleeping under the same net (i.e., more than two people per net) (2021 MIS). Across entomological monitoring sites, analyses of human landing collections indicated biting times ranging from 11:00pm–5:00am (with peak times varying by site), when the majority of household members are expected to be in bed and using ITNs. However, bloodmeal analyses of captured mosquitoes indicated that 94 percent had fed exclusively on human blood, suggesting that household members are not sleeping under ITNs all night, despite the self-reported household survey data indicating high net usage. These findings may require further assessment to tailor SBC programs to address this apparent contradiction between reported and empirical data.
- **MIP:** Preliminary results from the 2021 MIS indicate high uptake for IPTp1 (92 percent) and IPTp2 (81 percent); however, uptake of IPTp3 is just 52 percent. Data from the 2019 MBS indicate that 56 percent of women in Port Loko and 53 percent in Bo knew pregnant women are more susceptible to malaria. 68 percent of women across the two districts had a positive attitude toward ANC and IPTp. However, shared decision-making between women and their spouses or partners regarding regular ANC attendance was low (45 percent in Bo, 35 percent in Port Loko).

- **Malaria Vaccine:** Anticipating a vaccine rollout in March 2024 across 13 districts, the country will be focusing on understanding behavioral factors that may support or hinder vaccine acceptance while applying what is known from the 2021 MIS and 2019 MBS. Further, leveraging rumor management systems to monitor and address mis/disinformation will be important throughout vaccine implementation.
- **Case Management:** According to preliminary results from the 2021 MIS, 69 percent of caregivers sought care for a child from a PHU and 7 percent from a CHW; however, prompt care-seeking (treatment sought the same or next day) was only 40 percent. The 2019 MBS concluded that significant influences on prompt care-seeking for fever included self-efficacy to seek such care; positive attitudes toward prompt care-seeking; and discussing malaria with a spouse/partner.
- **Provider Behavior:** There is conflicting evidence on provider adherence to RDT results. Health care workers score highly during OTSS+ visits, but a 2019 qualitative provider assessment reported that while health workers accept positive RDT results, they question the reliability of negative results, noting their training to identify malaria symptoms is more reliable than a negative RDT result. This may be clarified by confirming where there is overlap in facilities where OTSS+ is performed and the health facilities included in the qualitative assessment of provider behavior. Similarly, ACT consumption data in HMIS is higher than the data reported for confirmed malaria cases. The combination of consumption data and qualitative provider assessment together indicate that nonadherence to RDT results remains a key challenge to effective case management and surveillance.

7.3. Plans and Justification with FY 2024 Funding

The FY 2024 funding tables contain a full list of SBC activities that PMI proposes to support.

While PMI supports SBC activities that promote the uptake and maintenance of all key malaria interventions, the behaviors in Table 4 will be prioritized with FY 2024 funds.

Priorities

Within the context of the malaria vaccine implementation, PMI will continue to support the uptake of proven malaria prevention and control interventions while providing technical support for SBC for the malaria vaccine.

Table 4. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Consistent ITN use (all night) / ITN maintenance and care	All household members	All PMI partner districts	● Coordinate and develop multi-pronged (including communication and non-communication-based approaches) SBC activities which promote using ITNs all night and emphasize proper ITN care.
Prompt care-seeking within the same or next day of fever onset	Caregivers of children under five years of age, heads of households, CHWs, community leaders	All PMI partner districts	● Coordinate with the CHW Hub and other partners to increase knowledge and positive perceptions of the services CHWs provide. ● Support SBC action planning by community leaders, CHWs, and facility-based providers to promote uptake of prompt care-seeking, in coordination with service delivery partners. ● Develop multi-pronged SBC activities tailored for differences between caregivers residing in rural and urban areas. ● Promote gender transformative approaches that create space for safe spousal communication and promote spousal dialogue for prompt care-seeking.
Adherence to case management guidelines	Facility and community-based health workers	All PMI partner districts	● Develop and use provider behavior change activities addressing motivational and normative barriers to performance. ● Support design of feedback systems to facilitate strengthened connections among facilities, CHWs, and communities to promote quality service improvement.

CHW: community health worker; ITN: insecticide-treated mosquito net; SBC: social and behavior change

Across all prioritized behaviors and defined geographies, SBC activities will continue to deploy approaches to leverage PMI's strategic advantage for coordination and technical assistance given the landscape of SBC implementing partners at the community level (e.g., the Global Fund). It is anticipated that there will be gains in current PMI investments to increase financial and technical support for the CHW program which will complement community-level SBC implementation. CHWs will be leveraged to deliver community-level interpersonal communication to promote uptake and maintenance of interventions and will expand access and delivery of malaria services. Further, PMI will leverage joint investments with other health activities (e.g., MCH, nutrition) throughout supported districts.

Additional Support Activities

PMI will determine where there are gaps in evidence or shifts in ideational determinants of priority malaria behaviors among specific populations. PMI will do this by triangulating human and mosquito behavior data and using the results of the 2019 MBS, the qualitative provider assessment in Bo and Port Loko, the 2021 MIS, and the 2024 DHS. Lessons from the traditional healer implementation science approach will also be applied to strengthen

community uptake of prompt care seeking behaviors and community referrals to CHWs and health facilities.

Capacity Strengthening

Despite improvements in overall capacity for SBC in Sierra Leone, there is still a need to strengthen the NMCP and partners' ability to implement, coordinate, and monitor SBC partner activities. Building off the 2022 Leadership in Strategic Communication Workshop, PMI will build on the workshop to bolster capacity for SBC in Sierra Leone at both national and district levels. PMI will continue to support the national-level SBC TWG and quarterly meetings with SBC TWGs in ten PMI focus districts (Bo, Falaba, Kailahun, Koinadugu, Port Loko, Pujehun, Bombali, Karene, Kenema, and Kono). In 2023, PMI and other stakeholders will assist the NMCP to update the national communication strategy to align with the NMESP 2021–2025. The updated strategy will include SBC implementation activities designed to target specific audiences and behavioral determinants, and PMI will support the NMCP to implement them with FY 2024 funds. PMI will continue to strengthen the relationship between the NMCP and the Roll Back Malaria! SBC working group to ensure lessons are shared between Sierra Leone and global actors. PMI will also provide technical guidance at the national level for SBC for the malaria vaccine implementation.

8. Surveillance, Monitoring, and Evaluation

8.1. PMI Goal and Strategic Approach

In Sierra Leone, PMI collaborates with NMCP, GF, and existing health structures to provide technical assistance to SM&E activities, to strengthen malaria surveillance and the use of data to improve program performance. The NMESP's primary SM&E objective is to achieve more than 95 percent of district health facilities and CHWs to routinely report on malaria health indicators. In addition, PMI and NMCP have prioritized interventions such as:

- Support quarterly national, district and chiefdom-level data validation and review, meetings to increase data use for decision-making centrally and at the peripheral level,
- Conduct and facilitate health facility and population-based surveys,
- Produce quarterly malaria bulletins,
- Support the development and implementation of a national health digitalization roadmap and a community health information system,
- Integrate all malaria data collection and reporting tools into DHIS2.

To strengthen malaria surveillance, NMCP collaborates with DPPI to strengthen the technical capacity through mentorship during supportive supervision exercises with health workers at all levels including with CHWs, to maintain a logistic infrastructure for an effective functioning DHIS2 with improved HMIS data collection and reporting completeness, accuracy, and timeliness.

8.2. Recent Progress (April 2022–April 2023)

PMI supported the following activities at the central level:

- Developed malaria risk stratification profiles at district and chiefdom levels that guided tailoring of malaria interventions, program planning, and decision-making;
- Developed a step-by-step guide on the use of routine health facility data in the DHIS2 to define malaria risk stratification at districts and chiefdom levels;
- Reviewed and digitized the national malaria supportive supervision checklist;
- Analyzed and produced malaria data information products such as malaria fact sheets during World Malaria Day and malaria data analytics on morbidity, mortality and consumption data;
- Conducted a digital health landscape and ecosystem assessment to inform digital health roadmap development and implementation;
- Increased data utilization for better planning of malaria interventions such as ITN distribution and malaria vaccine introduction at sub-national levels.

PMI supported the following activities at the district, chiefdom, and health facility level:

- Institutionalized malaria SM&E interventions such as the malaria routine data quality assessments and malaria data review meetings at national and district levels,
- Developed district mentorship plans based on malaria SM&E needs assessments,
- Trained newly recruited & posted M&E officers (in Jan 2023) and provided a refresher training for district malaria focal persons on malaria SM&E needs,
- Accelerated capacity strengthening of the NMCP staff on emerging malaria SM&E issues and data use,
- Revised HMIS manuals and SOPs with clear roles and responsibilities of chiefdom data entry officers and district data officers and M&E Officers.

PMI supported NMCP SM&E data quality capacity strengthening and mentorship, at national and district levels to increase data utilization to improve plans for malaria interventions. This action provided an opportunity for NMCP and its partners to understand the importance of the SM&E plan and harmonized strategic interventions covering the all objectives.

Key Challenges:

- Most public and private hospitals and nongovernmental organizations are using parallel data management platforms instead of DHIS2, leading to uncoordinated, irregular malaria reporting and service delivery at these institutions,
- Limited data management and analysis capacity of new district M&E staff and heavy workload of data entry officers conducting manual inputting of chiefdom level data has affected the quality of data,
- Facilities periodically run out of data collection and reporting summary tools and this affects HMIS/LMIS data correctness, completeness and timeliness of reporting.
- Some key data elements, such as one for severe malaria, are not reported in DHIS2, thus affecting data use for decision-making,

- Irregular payment of district information officers and district M&E Officers affects the availability and timeliness of reporting,
- Community health center challenges with connecting to internet and electricity has affected the timeliness of chiefdom level data reporting,
- The MoHS has demonstrated unreliable payment for the hosting of the DHIS2 ICT platform. Additionally, DHMTs lack backup systems for data storage.

8.3. Plans and Justification with FY 2024 Funding

The FY 2024 funding tables contain a full list of SM&E activities that PMI proposes to support.

PMI support will focus on central-level, district, and chiefdom SM&E capacity development. PMI will also review and update HMIS data collection and reporting tools and supportive supervision checklists and make applications interoperable to advance data management of the DHIS2. Districts to receive direct SM&E assistance will be determined by need and analysis of DHIS2 data.

- PMI will provide technical assistance using the Malaria Routine Data Quality Assessment tool and data validation exercises to improve data quality and to assist NMCP in using HMIS to assess trends in inpatient malaria morbidity and mortality,
- PMI will provide technical assistance to support functional SM&E structures to address gaps in data management systems, improve malaria surveillance and SM&E capacity, and enhance the use of data for decision-making,
- PMI will provide digital technical assistance to NMCP and DPPI on ICT infrastructure, standards & interoperability of apps and applications for an effective functioning DHIS2 with improved HMIS data collection and reporting.

Table 5. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic Health Survey					P	
Household Surveys	Malaria Indicator Survey		X				
Household Surveys	Multiple Indicator Cluster Survey						
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment						
Health Facility Surveys	Service Availability Readiness Assessment survey						
Health Facility Surveys	Other Health Facility Survey						
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies			X			P

Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System	X	X	X	X	P*	P*
Malaria Surveillance and Routine System Support	Support to HMIS	X*	X*	X*	X	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response	X	X	X	X	P*	P*
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System	X	X	X	X	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	End use verification survey			X	P	P	P
Other	School-based Malaria Survey				X		P
Other	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey						
Other	Malaria Impact Evaluation						
Other	Entomologic Monitoring Surveys						

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

9. Operational Research and Program Evaluation

9.1. PMI Goal and Strategic Approach

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. The NMESP indicates that all malaria policies will be guided by appropriate operational research in alignment with Objective 4: 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 Research Agenda for 2018–2023. This agenda identifies all aspects of malaria control as priority areas, including epidemiology, diagnostics and treatment, prevention, vector control, monitoring and evaluation and the RTS,S vaccine (the vaccine that acts against *Plasmodium falciparum*, the deadliest malaria parasite globally). However, operationalizing this agenda has been a challenge due to resource constraints and limited bandwidth of the NMCP.

9.2. Recent Progress (between April 2022 and April 2023)

PMI is currently supporting the NMCP on a study to evaluate the effect of co-deploying PBO ITNs and next generation IRS on entomological and malaria health indicators in comparison to PBO ITNs as a stand-alone intervention. The research compares the data from the two IRS districts, Bo and Bombali, to two control districts, Karene and Port Loko. Baseline entomological data collection was completed in May 2021. Primary entomological data

collection for the study was initiated in June 2021 and was concluded in June of 2022. HMIS epidemiological data assessment for the baseline report included the time period May 2018–April 2021. HMIS data from May 2021–April 2023 is currently being analyzed. A final report will be available by August 2023.

Table 6. PMI-funded Operational Research/Program Evaluation Studies in Sierra Leone

Recently Completed Operational Research/Program Evaluation Studies	Status of Dissemination	Start date	End date
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)?	Final report available in August 2023	Sept 2020	April 2023
Ongoing or Planned OR/PE Studies	**Status**	**Start date**	**End date**
Effect of automated RDT readers at the facility level on adherence to appropriate treatment protocols (Reference FY 2023 MOP and FY 2022 MOP for more details)	Concept Note development	TBD	TBD
Can household screening serve as a complementary vector control intervention to address known challenges with ITN use? (Reference FY 2022 MOP for more details)	Concept Note development	2023	TBD

ITN: insecticide-treated mosquito net; PBO: Synergist piperonyl butoxide.

Table 7. Non-PMI funded Operational Research/Program Evaluation Studies Planned/Ongoing in Sierra Leone

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
European Union	MOHS, NMCP, College of Medicine and Allied Health Sciences - University of Sierra Leone, Barcelona Institute for Global Health	Malaria prevention with six doses of perennial malaria chemoprevention (SP)	Ongoing

SP: Sulfadoxine-pyrimethamine

9.3. Plans and Justification with FY 2024 Funding

No OR/PE activities are proposed with FY 2024 funding.

10. Capacity Strengthening

10.1. PMI Goal and Strategic Approach

It's paramount to strengthen the capacity of Sierra Leone's people and institutions—at all levels—to lead and implement evidence-based malaria control and elimination activities. It is also a key component of the NMESP, which aims to strengthen and maintain capacity for program management, coordination, and partnership to achieve malaria program performance. To improve management of malaria activities, the NMCP's strategic plan prioritizes

strengthening the national and districts' capacity to deliver malaria control services. It also prioritizes strengthening core MOHS-wide management systems such as procurement and supply chain management of malaria commodities, malaria data collection and HMIS reporting, and coordination and partnerships. The FY 2024 MOP supports skills building and system strengthening in vector control, case management, community health, and MIP, and critical support systems (i.e., supply chain, surveillance, monitoring and evaluation, and operations research). In addition, while PMI understands it will take time for Sierra Leone to fully finance its development priorities, PMI coordinates closely with the U.S. government and other donors and partners to track Sierra Leone's funding commitments across the malaria portfolio.

10.2. Recent Progress (between April 2022 and April 2023)

PMI supports several capacity strengthening activities focused within the core technical intervention areas described above (e.g., training of health workers, strengthening DHMTs in conducting supportive supervision and mentoring, supporting pharmaceutical management systems, community-level communications, etc.). These complement the existing work of other U.S. government entities and donors/partners. In addition, PMI supported an embedded technical advisor in the MOHS's Community Health Hub. This advisor is strengthening Hub capacity to ensure a coordinated approach to community health to support CHWs. PMI anticipates the following additional progress in calendar year 2023:

- The Peace Corps restarted activities with volunteers who returned to Sierra Leone in August 2022. In 2023, PMI will support small project grants for malaria activities developed by volunteers. PMI will work closely with the Peace Corps to determine whether third-year volunteers will be available in 2023 and 2024 to carry out dedicated malaria projects.
- PMI plans to support a malaria technical advisor embedded in the NMCP to assist with building skills in management, leadership, and governance with FY 2022 funding.
- PMI will support Sierra Leoneans to complete the intermediate and advanced Field Epidemiology Training Program (FETP) with FY 2022 and FY 2023 funding. PMI will work with the FETP team on selection criteria to ensure the resident(s) is/are malaria-focused and that the investment is used as a skill-building opportunity for the NMCP.
- Along with other health programs, PMI recently completed an assessment to identify Sierra Leonean organizations with whom to partner. PMI will review the analysis and identify opportunities to build the skills of promising organizations.

10.3. Plans and Justification with FY 2024 Funding

PMI will continue to support capacity strengthening activities described in the Recent Progress section. PMI expects that there will be sufficient FY 2022 funds for Peace Corps activities to continue through 2025; thus, no FY 2024 funding is planned. With FY 2024 funding, PMI will continue to invest in capacity strengthening for local partners based on the results of the assessment. In other countries, for example, similar assessments have identified needs for organizational capacity strengthening related to learning how to do business with USAID,

complying with USAID policies, report writing, monitoring, evaluation and learning, and procurement, among others. Once PMI has identified partners that are ready to partner with USAID, then PMI will use FY 2023 and 2024 funds to provide organizational development support.

Further, PMI will assess the success of capacity strengthening through FETP and identify future needs beyond FY 2022 and FY 2023 support, as applicable. Thus, there are no FY 2024 funds allocated for FETP at this time.

The FY 2024 funding tables contain a full list of capacity strengthening activities that PMI proposes to support.

11. Staffing and Administration

A minimum of three health professionals oversee PMI in Sierra Leone. The single interagency team led by the USAID Mission Director or their designee consists of resident advisors representing USAID and CDC, and two locally hired experts known as foreign service nationals. The PMI interagency team works together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting results, and providing guidance and direction to PMI implementing partners.

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	8,746,749	8,969,980	9,192,330
Total population at risk for malaria	8,746,749	8,969,980	9,192,330
PMI-targeted at-risk population	8,746,749	8,969,980	9,192,330
Population targeted for ITNs	8,746,749	8,969,980	9,192,330
Continuous distribution needs			
Channel 1: ANC	383,764	393,558	403,313
Channel 1: ANC type of ITN	Dual AI & PBO	Dual AI & PBO	Dual AI
Channel 2: EPI	314,883	322,919	330,924
Channel 2: EPI type of ITN	Dual AI & PBO	Dual AI and PBO	Unknown
Channel 3: School	101,250		500,000
Channel 3: School type of ITN	PBO	Unknown	Unknown
Channel 4: Community	0	0	0
Channel 4: Community type of ITN			
Channel 5:	0	0	0
Channel 5: Type of ITN			
Estimated total need for continuous channels	799,897	716,477	1,234,237
Mass campaign distribution needs			
Mass distribution campaigns	5,345,236		0
Mass distribution ITN type	Dual AI & PBO		
Estimated total need for campaigns	5,345,236		0
Total ITN need: Continuous and campaign	**6,145,132**	**716,477**	**1,234,237**
Partner contributions			
ITNs carried over from previous year	669,500	0	0
ITNs from Government	0	0	0
Type of ITNs from government			
ITNs from Global Fund	4,939,537	358,239	500,000
Type of ITNs from Global Fund	Dual AI & PBO	Unknown	Unknown
ITNs from other donors	0	0	0
Type of ITNs from other donors			
ITNs planned with PMI funding	405,695	257,000	650,000
Type of ITNs with PMI funding	Dual AI	Dual AI	Dual AI
Total ITNs contribution per calendar year	**6,014,732**	**615,239**	**1,150,000**
Total ITN surplus (gap)	**(130,400)**	**(101,239)**	**(84,237)**

ANC: antenatal care; AI: active ingredients; ANC: antenatal care; EPI: Expanded Program on Immunization; ITN: insecticide-treated mosquito net.

Table A-2. RDT Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	8,746,749	8,969,980	9,192,330
Population at risk for malaria	8,746,749	8,969,980	9,192,330
PMI-targeted at-risk population	8,746,749	8,969,980	9,192,330
RDT needs			
Total # of projected suspected malaria cases	7,163,587	7,346,414	7,528,518
% of suspected malaria cases tested with an RDT	85%	90%	90%
RDT needs (tests)	**5,419,254**	**5,752,242**	**5,759,316**
Needs estimated based on other			
Partner contributions (tests)			
RDTs from government	0	0	0
RDTs from Global Fund	5,414,622	5,866,308	3,031,687
RDTs from other donors	0	0	0
RDTs planned with PMI funding	900,000	900,000	810,000
Total RDT contributions per calendar year	**6,314,622**	**6,766,308**	**3,841,687**
Stock balance (tests)			
Beginning balance	1,751,750	2,647,118	3,661,184
- Product need	5,419,254	5,752,242	5,759,316
+ Total contributions (received/expected)	6,314,622	6,766,308	3,841,687
Ending balance	**2,647,118**	**3,661,184**	**1,743,555**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	2,709,627	2,876,121	2,879,658
Total surplus (gap)	**(62,509)**	**785,063**	**(1,136,103)**

RDT: Rapid diagnostic test

Table A-3. ACT Therapy Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	8,746,749	8,969,980	9,192,330
Population at risk for malaria	8,746,749	8,969,980	9,192,330
PMI-targeted at-risk population	8,746,749	8,969,980	9,192,330
ACT needs			
Total projected # of malaria cases	3,728,934	4,049,049	4,149,418
Total ACT needs (treatments)	**3,846,940**	**4,177,185**	**4,280,731**
Needs Estimated based on Other			
Partner contributions (treatments)			
ACTs from government	0	0	0
ACTs from Global Fund	3,843,652	2,079,667	3,689,449
ACTs from other donors	0	0	0
ACTs planned with PMI funding	500,000	1,500,000	750,000
Total ACTs contributions per calendar year	**4,343,652**	**3,579,667**	**4,439,449**
Stock balance (treatments)			
Beginning balance	2,022,579	2,519,291	1,921,773
- Product need	3,846,940	4,177,185	4,280,731
+ Total contributions (received/expected)	4,343,652	3,579,667	4,439,449
Ending balance	**2,519,291**	**1,921,773**	**2,080,491**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	1,923,470	2,088,593	2,140,365
Total surplus (gap)	**595,822**	**(166,820)**	**(59,874)**

ACT: Artemisinin-based combination therapy

Table A-4. Injectable Artesunate Gap Analysis Table

Calendar Year	2023	2024	2025
Injectable artesunate needs			
Projected # of severe cases	92,327	100,252	102,738
Projected # of severe cases among children	15,696	17,043	17,465
Average # of vials required for severe cases among children	3	3	3
Projected # of severe cases among adolescent	22,343	24,261	24,862
Average # of vials required for severe cases among adolescent	6	6	6
Projected # of severe cases among adults	54,288	58,948	60,410
Average # of vials required for severe cases among adults	9	9	9
Total injectable artesunate needs (vials)	**669,737**	**727,231**	**745,258**
Needs estimated based on other (specify in comments)			
Partner contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	553,486	299,472	184,455
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	500,000	220,000	200,000
Total injectable artesunate contributions per calendar year	**1,053,486**	**519,472**	**384,455**
Stock balance (vials)			
Beginning balance	96,900	480,649	272,890
- Product need	669,737	727,231	745,258
+ Total contributions (received/expected)	1,053,486	519,472	384,455
Ending balance	**480,649**	**272,890**	**(87,913)**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	334,868	363,616	372,629
Total surplus (gap)	**145,781**	**(90,726)**	**(460,542)**

Table A-5. RAS Gap Analysis Table

Calendar Year	2023	2024	2025
Artesunate suppository needs			
# of severe cases expected to require pre-referral dose (or expected to require pre-referral dose based on # of providers for the service)	7,017	7,619	7,808
Total artesunate suppository needs (suppositories)	**10,525**	**11,429**	**11,712**
Needs estimated based on other			
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	20,000	0	15,000
Total artesunate suppositories available	**20,000**	**0**	**15,000**
Stock balance (suppositories)			
Beginning balance	5,322	14,797	3,368
- Product need	10,525	11,429	11,712
+ Total contributions (received/expected)	20,000	0	15,000
Ending balance	**14,797**	**3,368**	**6,656**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	5,263	5,714	5,856
Total surplus (gap)	**9,534**	**(2,346)**	**800**

RAS: Rectal artesunate.

Table A-6. SP Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	8,746,749	8,969,980	9,192,330
Total population at risk for malaria	8,746,749	8,969,980	9,192,330
PMI targeted at risk population	8,746,749	8,969,980	9,192,330
SP needs			
# of pregnant women	393,604	403,649	413,655
% of pregnant women expected to receive IPTp1	94%	96%	98%
% of pregnant women expected to receive IPTp2	83%	85%	87%
% of pregnant women expected to receive IPTp3	54%	56%	58%
% of pregnant women expected to receive IPTp4	47%	49%	51%
Total SP needs (doses)	**1,094,218**	**1,154,436**	**1,216,145**
Needs estimated based on other (specify in comments)			
Partner contributions (doses)			
SP from government	0	0	0
SP from Global Fund	1,574,415	807,298	0
SP from other donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP contributions per calendar year	**1,574,415**	**807,298**	**0**
Stock balance (doses)			
Beginning balance	592,169	1,072,366	725,228
- Product need	1,094,218	1,154,436	1,216,145
+ Total contributions (received/expected)	1,574,415	807,298	0
Ending balance	**1,072,366**	**725,228**	**(490,918)**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	547,109	577,218	608,073
Total surplus (gap)	**525,257**	**148,009**	**(1,098,990)**

IPTp: intermittent preventive treatment for pregnant women; SP: sulfadoxine-pyrimethamine

Table A-7. IPTi Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	8,746,749	8,969,980	9,192,330
Total population at risk for malaria	8,746,749	8,969,980	9,192,330
PMI targeted at-risk population	8,746,749	8,969,980	9,192,330
SP needs			
Total # of infants under one year of age	349870	358799	367693
Proportion of infants expected to attend EPI at Penta-1	88%	90%	92%
Proportion of infants expected to attend EPI at Penta-2	77%	79%	81%
Proportion of infants expected to attend EPI at Penta-3	61%	63%	65%
Total SP needs (doses)	**395,353**	**416,207**	**437,555**
Needs estimated based on other			
Partner contributions (doses)			
SP from Government	0	0	0
SP from Global Fund	395,353	208,104	0
SP from Other Donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP contributions per calendar year	**395,353**	**208,104**	**0**
Stock balance (doses)			
Beginning balance	387,100	387,100	178,996
- Product need	395,353	416,207	437,555
+ Total contributions (received/expected)	395,353	208,104	0
Ending balance	387,100	178,996	-258,558
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	197,677	208,104	218,777
Total surplus (gap)	**189,423**	**(29,107)**	**(477,336)**

EPI: Expanded Program on Immunization; IPTi: intermittent preventive treatment during infancy; Penta: pentavalent vaccine; SP: sulfadoxine-pyrimethamine.