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Liberia

Malaria Operational Plan FY 2024

This FY 2024 Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans relies on the final FY 2024 appropriation from U.S. Congress. Any updates will be reflected in revised postings.

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ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AI	Active Ingredient
AL	Artemether-lumefantrine
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
CBIS	Community-based information system
CDC	Centers for Disease Control and Prevention
CHA	Community health assistant
CHSS	Community health services supervisor
CHT	County health team
CHV	Community health volunteer
CHW	Community health worker
CMS	Central medical store
DHIS2	District Health Information Software 2
DHS	Demographic and Health Survey
DPS	Department of Pharmaceutical Services
eLMIS	Electronic logistics management information system
EPI	Expanded Program on Immunization
EUV	End use verification
FETP	Field Epidemiology Training Program
FY	Fiscal year
G2G	Government-to-government
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GMP	Good manufacturing practice
HMIS	Health Management Information System
HSS	Health systems strengthening
iCCM	Integrated community case management
IG2	Interceptor® G2 insecticide-treated bednet
IPC	Interpersonal communication
IPCC	Interpersonal counseling and communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
JISS	Joint integrated supportive supervision
LIBR	Liberian Institute for Biomedical Research
LMA	Logistics Management Advisor
LMHRA	Liberia Medicines and Health Products Regulatory Authority
LSM	Larval source management
LTTA	Long-term technical assistance

MBS	Malaria Behavior Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
NCHP	National Community Health Program
NMCP	National Malaria Control Program
NSP	National Strategic Plan
OR	Operational Research
PE	Program Evaluation
PMI	U.S. President's Malaria Initiative
RDT	Rapid diagnostic test
SBC	Social and behavior change
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TES	Therapeutic efficacy study
TWG	Technical working group
UL	University of Liberia
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 Liberia, please refer to the [Liberia malaria profile](#), which provides an overview of the malaria situation, key indicators, the National Malaria Control Program (NMCP) 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. Liberia began implementation as a PMI partner country in fiscal year (FY) 2008.

Rationale for PMI's Approach in Liberia

PMI will continue to support the NMCP to implement and monitor the 2021–2025 National Strategic Plan (NSP) to reduce malaria incidence per 1,000 population from 380 (2016) to 95 (2025) and malaria mortality ratio per 100,000 population from 172 (2016) to 43 (2025). PMI efforts will focus on implementing proven malaria control interventions and strengthening commodity delivery to reach populations at risk wherever they live, invest locally, and use innovations to reduce intervention costs and develop national capacity for the long term. In addition, PMI will support the improvement of the surveillance monitoring and evaluation (SM&E) system, and conduct surveys and program evaluations to guide decision-making.

Overview of Planned Interventions

The proposed fiscal year (FY) 2024 PMI funding for Liberia is \$13.5 million. PMI will support the following intervention areas with these funds:

1. Vector Monitoring and Control

PMI Liberia and the NMCP will continue to support entomological and insecticide susceptibility monitoring programs to understand malaria vector prevalence, behavior, location and susceptibility to insecticides. PMI will also expand mobile digital technology for entomological collections and understanding human behaviors which inform vector control decisions. PMI Liberia will support enhanced surveillance for *Anopheles stephensi* at relevant ports (sea and land) and other suitable areas. Liberia will also continue to use a two-pronged approach to deploy insecticide-treated mosquito nets (ITNs). ITNs will be distributed through campaigns

every three years (next in calendar year [CY] 2024) and through continuous distribution channels (antenatal care [ANC], institutions, schools, and through the Expanded Program on Immunization [EPI]). With fiscal year (FY) 2024 funding, PMI will procure 500,000 dual active ingredient (AI) ITNs (Interceptor® G2 [IG2]).

2. Malaria in Pregnancy

PMI Liberia supports malaria in pregnancy (MIP) interventions for pregnant women at the facility level, which includes provision of intermittent preventive treatment for pregnant women (IPTp); ITNs during the first ANC visit and at delivery; and malaria testing for pregnant women with fever during ANC visits and providing appropriate treatment for those confirmed to have malaria. With FY 2024 funds, PMI will continue to support training on MIP guidelines and reduction of barriers to receiving ANC services, including community distribution of IPTp in partnership with the EPI outreach services. Support will also be provided for revising and disseminating updated MIP treatment guidelines and training materials. The revisions will incorporate the World Health Organization (WHO) guidance on the use of artemether-lumefantrine (AL) to treat uncomplicated *Plasmodium falciparum* malaria in the first trimester of pregnancy.

3. Drug-Based Prevention

Drug-based prevention is not implemented in Liberia.

4. Case Management

PMI supports the national case management strategies outlined in the 2021–2025 NSP by providing technical support to scale up testing for malaria with rapid diagnostic tests (RDTs) and microscopy, with the goal that all persons with suspected malaria attending public health facilities and community services are tested, and all patients who test positive are treated for malaria with an effective artemisinin-based combination therapy (ACT) according to national guidelines. With FY 2024 funds, PMI will support the NMCP's efforts to ensure universal availability of quality-assured diagnostic testing and treatment for malaria at all levels of the healthcare system, including at the community health program at all times, and limited engagement with private sector providers. PMI will also continue to support training and supportive supervision of health workers at all levels of the health system to improve the quality of care for malaria services.

5. Health Supply Chain and Pharmaceutical Management

PMI will continue to support the NMCP and Department of Pharmaceutical Services (DPS) with supply chain and pharmaceutical management strengthening activities and ensuring commodity security. The efforts will include strengthening the leadership, governance, and

ownership of the DPS; supporting malaria commodity quantification; strengthening electronic Logistics Management Information System (eLMIS) reporting and data quality; and supporting routine distribution of ITNs to health facilities for ANC and institutional delivery and schools. In recognition that Liberia needs a new approach to managing the supply chain, the Ministry of Health (MOH), U.S. Agency for International Development (USAID) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund), agreed to outsource operations of the Central Medical Store (CMS) starting in mid-2023. PMI will support the CMS operations, while Global Fund supports first and last mile distribution. With FY 2024 funding, PMI will also continue to support regulatory functions of the Liberia Medicines and Health Products Regulatory Authority (LMHRA), fund post-market surveillance to investigate possible counterfeit and substandard commodities, support an annual End Use Verification (EUV) survey, and renovate county depot warehouses.

6. Malaria Vaccine

PMI will support the NMCP and EPI to implement the malaria vaccine in selected districts across the country. As a new tool, malaria vaccine roll-out will require strengthened collaboration and coordination between NMCP and EPI. PMI's support will focus on demand generation for parents and caregivers, development and adaptation of data collection tools, support retention of children in the program, and monitoring and evaluation of the roll out.

7. Social and Behavior Change

PMI funding for social and behavior change (SBC) will continue to focus on improving ITN use; closing the gap of missed opportunities for IPTp3+; and adhering to malaria case management guidelines. PMI will also support social and behavior change (SBC) activities related to malaria vaccine rollout, and the NMCP's strategic approaches for capacity strengthening, design and implementation, coordination with service delivery, and monitoring and evaluation. PMI support for these capacity-strengthening activities will be directed toward NMCP staff and subnational health staff, implementing SBC activities at national, county, district, and community levels.

8. Surveillance, Monitoring, and Evaluation

PMI will support NMCP and MOH to monitor the implementation and progress of the 2021–2025 NSP. PMI will continue to support strengthening the national routine malaria surveillance through the District Health Information Software2 (DHIS2), especially with the introduction of the malaria vaccine. In addition, PMI will support the Demographic and Health Survey (DHS) in 2025 including malaria biomarkers, therapeutic efficacy study (TES), and evaluation of malaria vaccine implementation. The findings of the studies and evaluation will be used to guide malaria program implementation decisions and activities. With FY 2024 funding, PMI will provide technical assistance and resources to support the NMCP to strengthen staff capacity to conduct routine surveillance and surveys as a core malaria

intervention; to collect, transmit, analyze and produce high quality data; and to monitor progress overtime.

9. Operational Research and Program Evaluation

No operations research / program evaluation activities are proposed with FY 2024 funding.

10. Capacity Strengthening

PMI will continue strengthening the capacity of Liberian health officials to reduce the malaria burden for all Liberians. PMI will provide training and tools to improve daily malaria control activities and tasks, work alongside technical experts in various aspects of malaria control, support Liberian health officials at all levels of the health system. From newer ledgers for improved data entry and surveillance of malaria to participation by county and national malaria program officials in Field Epidemiology Training Programs, PMI will provide tools needed to better track this scourge. PMI will work with Peace Corps volunteers and Rotary Clubs to advocate and educate Liberians about how to seek care when malaria is suspected and ways to prevent malaria.

11. Staffing and Administration

A minimum of three health professionals oversee PMI in Liberia. The PMI interagency team works together to oversee all technical and administrative aspects of the program.

I. CONTEXT & STRATEGY

1. Introduction

Liberia became a PMI partner country in FY 2008. This FY 2024 Malaria Operational Plan (MOP) presents a detailed implementation plan for Liberia, 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 Liberia, 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 [Liberia malaria profile](#), which provides an overview of the country's malaria situation, key indicators, the NMCP strategic plan, and the partner landscape.

2. U.S. President's Malaria Initiative (PMI)

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 10 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 Liberia

3.1. Malaria Overview for Liberia

For more detailed information on malaria indicators, please refer to the [Liberia malaria profile](#). Malaria is endemic in all 15 counties of Liberia with continuous transmission throughout the year. The principal malaria parasite is *Plasmodium falciparum* (Pf) (95 percent) and the principal vectors are *Anopheles gambiae* s.l. (primary vector) and *Anopheles funestus* s.l. (secondary vector). The 2022 Malaria Indicator Survey (MIS) Key Indicator Results show a significant decrease of 60% in malaria prevalence in children under 5 years old, from 45% in 2016 to 18% in 2022 by rapid diagnostic tests (RDTs). Despite these improvements, malaria is a disease of public health importance contributing significantly to morbidity and mortality.

There were also impressive improvements in IPTp between the 2016 and 2022 MIS. Coverage of three or more doses of IPTp (IPTp3+) increased from 22% to 62%, making good progress towards the NMCP's target of 80% coverage. Insecticide treated mosquito nets (ITNs) comprise a key component of malaria prevention. In 2021, Liberia became the first country to distribute only Interceptor® G2 (IG2) ITNs in the nationwide mosquito net mass distribution campaign. In addition to distributing IG2 nets through campaigns, these nets are also distributed through routine channels at antenatal care (ANC) visits, through institutions, and through schools. In 2022 (MIS 2022), 72% of households owned at least one ITN vs 55% in 2020 (DHS 2019-2020). A total of 33% had at least one net per two household residents in 2022, versus 40% of households with at least one net in 2020.

During the last five years, through PMI's work with and support of the NMCP, Liberia has made substantial improvements in malaria case management activities, including testing suspected malaria cases using either malaria RDT or microscopy. In accordance with national guidelines, with PMI and Global Fund support, treatment of confirmed malaria cases using artemisinin-based combination therapy (ACT) in health facilities and the community has improved. In 2021, 95% of the 1,616,919 suspected malaria cases seen at health facilities benefited from a malaria diagnostic test (using RDT or microscopy). During the last four consecutive years, Liberia recorded less than a million new malaria cases per year. The estimated malaria incidence per 1,000 population decreased from 206 in 2018 to 160 in 2022 (Annual Health Management Information System [HMIS] data and population estimate),¹ and during the same period, the malaria mortality rate in the general population decreased from 16 to 8 per 100,000 population, respectively, in 2018 and 2022 (HMIS). However, the proportion of children under five years of age with a fever in the last two weeks for whom advice or treatment was sought decreased from 81% in 2019 to 60% in 2022 (DHS 2019-2020, MIS 2022 respectively).

3.2. Key Challenges and Contextual Factors

Overall, as of 2022 Liberia has made progress with malaria control, but there are geographical variations. Despite progress, Liberia still has challenges to achieving its malaria control objectives, including:

- **Supply chain challenges:** There are recurrent stockouts of malaria commodities at service delivery points across the country, despite availability of stocks at the central level. At the facility level, logistics and service delivery data oftentimes do not align, which ultimately affects re-orders and resupply. The expected quarterly distributions from the central warehouse to county depots are not occurring as planned and distributions from county depots to health facilities are also delayed.
- **Inadequate Liberia government funding of community health program:** Currently, the payment of Community Health Assistant (CHA) stipends and provision of supplies for the integrated community case management (iCCM) program is dependent on donors including USAID, Global Fund, World Bank, and Last Mile Health. The implication is disruption in CHA services when the donor programs transition or end. Recently, during the 3rd International Community Health Worker Symposium (held March 2023 in Liberia), the government pledged to fund salaries for the Community Health Services Supervisor (CHSS), but that is a future plan. Inadequate funding limits the expansion of the CHA program to areas of greatest need and prevents the achievement of the CHA program.
- **Staffing challenges:** There are shortages of qualified staff at all levels of the public health system. At the NMCP, there are gaps both in staff number and technical capacity. These staff challenges have been noted as the main reason for the delay of timely translation of global and national policies in case management and malaria in

¹ UNFPA: World Population Dashboard. (New York, New York, 2023): <https://www.unfpa.org/data/world-population/LR>

pregnancy, particularly to the private sector. At the service delivery points, insufficient staff negatively affect delivery of quality care, particularly diagnostics and reporting.

- Infrastructure challenge: Liberia faces key infrastructure and social service challenges affecting roads, offices, transportation and communication. Inadequate transportation networks have adverse effects on quality of health care service delivery, supply chain, entomological surveillance, monitoring and supervision. For example, in the southeast region of the country, bad roads make access to communities difficult during Liberia's eight-month rainy season. Communication difficulties affect the potential use of digital tools that could aid supply chain, monitoring and supervision.
- Quality of malaria diagnosis: The quality of malaria parasite diagnosis, particularly microscopy, is low. Available data in the HMIS indicates a very high test positivity rate, which could be related to low capacity of laboratory personnel as well as lack of a quality assurance program. It's essential to strengthen the quality of malaria parasite diagnosis, including microscopy and testing using RDTs.

3.3. PMI's Approach for Liberia

The goal of the Liberia National Malaria Strategic Plan (2021-2025) (NSP) is to reduce the malaria burden by 75 percent from 2016 levels by the end of 2025; that is a reduction from 45 percent prevalence in 2016 to 11 percent prevalence by 2025. The strategic interventions to reach this goal will focus on i) Improving parasite-based diagnosis at point of care throughout the health system and providing prompt and effective case management of malaria at all levels of service delivery; ii) Strengthening integrated vector management (IVM) and malaria prevention during pregnancy and in infancy; iii) Strengthening and improving surveillance systems with quality data and information products to drive decision-making; and iv) Strengthening supply chain management as well as governance and program management.

The Government of Liberia and international development partners (mainly PMI and the Global Fund) invest extensively in three core malaria control interventions and three cross-cutting interventions:

Malaria control interventions:

- distribution of insecticide-treated nets (ITNs)
- intermittent preventive treatment in pregnancy (IPTp)
- prompt and effective malaria case management

Cross-cutting interventions:

- surveillance, monitoring, and evaluation (SM&E)
- social behavior change (SBC)
- supply chain systems strengthening

Currently, of the 15 counties, PMI is supporting 12 and World Bank is supporting three to provide all core interventions except IRS and larval source management (LSM). By FY 2024, PMI will be supporting all 15 counties in coordination with the Global Fund and World Bank. Global Fund and PMI procure all malaria prevention and treatment commodities for national

distribution to all public health facilities and communities. PMI procures all RDTs and sulfadoxine-pyrimethamine (SP), as well as some of the ACTs and artesunate injectables. In addition, the Global Fund malaria grant covers procurement and distribution of ITNs for a mass distribution campaign. The Global Fund also supports some aspects of malaria case management, especially iCCM, private sector case management, malaria in pregnancy (MIP), SM&E, and supply chain.

PMI is working with the NMCP to support the following strategic focus areas:

- Reach the unreached: Achieve, sustain, and tailor deployment and uptake of high-quality interventions with a focus on people not reached through routine interventions. For example: a) to increase access to vector control interventions and to close the net access gap, PMI and NMCP in collaboration with the Ministry of Education developed and implemented a school-based ITN distribution in three counties. The strategy targets districts with a high number of schools and high attendance. NMCP is adding proposed districts for malaria vaccine implementation as a routine net channel to get more nets into households and strengthen malaria vaccine introduction and retention; b) provide support to operationalize the malaria private sector strategy which will strengthen collaboration with the private sector for quality malaria services at private health facilities, c) PMI will support the National Community Health Program (NCHP) to implement community IPTp as stated in the revised NCHP Policy (2023-2032). The support will include development of a strategy, tools and training for the CHAs. This will help improve IPTp coverage among pregnant women in hard to reach locations.
- Strengthen community health systems: PMI is supporting the community health program that includes malaria services in four counties. PMI works with the NCHP, the NMCP and Ministry of Health (MOH) to standardize indicators and reporting through the community-based information system, which is integrated into the DHIS2 platform. PMI is also supporting the assessment of quality and safety of RDTs performed by CHAs and Primary Health Care workers in selected counties. Findings from this study will guide improvements of malaria program implementation in the community.
- Keep malaria services resilient: PMI is supporting field epidemiology training program (FETP) and use of the community-based information system to ensure that future outbreaks and public health incidents are identified quickly, which will support the resiliency of malaria services.
- Invest Locally: PMI is supporting the MOH through a Government-to-Government (G2G) arrangement in eight of the 15 counties of Liberia, and will maintain coverage in these counties. Through existing partners, PMI is working to strengthen the involvement, participation and leadership of local research institutions. In the last year, University of Liberia (UL) led key aspects of malaria research/studies including the ongoing therapeutic efficacy study (TES) and the completed an IPTp barrier study, other local training institutions were engaged in the net streamline durability monitoring, the Malaria Behavior Survey (MBS), and/or the 2022 MIS survey.

- Innovate and lead: PMI has supported the Liberian government with data on mosquito vectors and insecticide resistance. Such information has been critical to phasing out standard pyrethroid treated nets and switching to new types of nets. In 2021, PMI distributed about 2.6 million dual active ingredient (AI) IG2 nets during the nationwide mass campaign. In August 2021, PMI transitioned routine ITNs to IG2 nets.

3.4. Key Changes in this MOP

PMI/Liberia is proposing the following changes for the FY 2024 MOP:

- Support for malaria vaccine: With the approval by WHO of the RTS,S/AS01 malaria vaccine (also known as “Mosquirix™”), and the successful application by the MOH, NMCP and the Expanded Program on Immunization (EPI) will introduce the malaria vaccine into Liberia. In this MOP, PMI plans to support key aspects of malaria vaccine implementation in at least 48 districts in 12 counties. The support will include demand generation, monitoring, and evaluation.
- Inclusion of an EPI channel for ITN continuous distribution: Guided by the data from the 2022 MIS on low net access and the planned introduction of the malaria vaccine, the NMCP has determined to distribute nets through EPI channels targeting children who have completed vaccination at one year, particularly measles-containing vaccine. This approach will contribute to increasing net ownership and net use and vaccine uptake.
- Expansion of technical assistance: The partnership landscape is being revised and PMI will provide technical assistance for malaria across all 15 counties. Previously, PMI provided technical assistance to 12 counties. This will require close coordination with the World Bank and Global Fund supported activities. Malaria commodities procured by PMI and Global Fund are distributed to all 15 counties.
- PMI will work closely with NMCP to implement the new NCHP strategy (updated in 2023) to expand malaria case management to children up to 13 years old. This will include revising the training curriculum, training CHAs, updating community reporting forms, and adjusting commodity supply chain and commodity quantifications.
- PMI will support the NCHP to implement community IPTp as stated in the revised NCHP Policy through outreach programs and CHAs. This will help maintain IPTp coverage among pregnant women in hard to reach locations.
- NMCP and county capacity strengthening: Support FETP front line and intermediate training programs with the goal to train at least five NMCP staff and counties per year.
- PMI has incorporated the 2022 MIS key indicator results into their approach, and the full results will inform activities once they are available (late 2023).

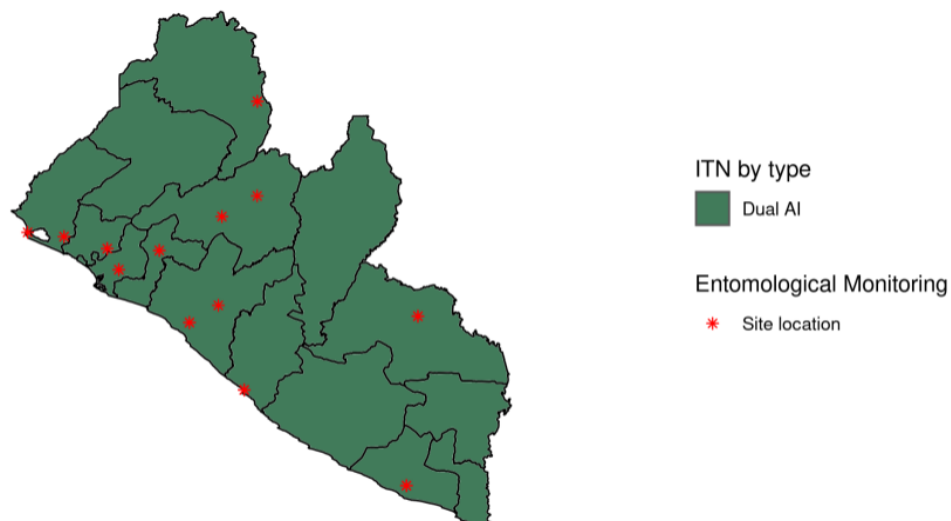
II. OPERATIONAL PLAN FOR FY 2024

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

The 2021–2025 NSP for Liberia promotes an integrated vector management strategy that includes universal access to ITNs through continuous distribution channels and mass distribution campaigns, entomological surveillance, insecticide susceptibility monitoring, IRS in targeted districts, and environmental and LSM. Currently, PMI supports all of these interventions and activities with the exception of IRS, environmental and LSM. Furthermore, as no funding is available through other donors, the NMCP does not conduct IRS or LSM. PMI has supported community-based entomological monitoring in eight established sites, in addition to ten sites for insecticide susceptibility monitoring, with sites rotated annually to allow for full coverage of counties over a 2-3 year period . PMI coordinates with other partners and NMCP to ensure entomological activities and geographies are complementary. The Global Fund is planning to expand entomological monitoring support, especially to the southeast region. The Global Fund supports procurement of all ITNs and operational costs for mass distribution campaigns every three years. PMI supports technical assistance and funding for logistics management and social and behavior change (SBC) activities for mass distribution campaigns. PMI also supports procurement of all ITNs and operational costs for continuous distribution channels via ANC and institutional delivery for all 15 counties, as well as via targeted school-based net distribution. According to the Liberia School-Based Net Distribution Strategy, distribution is during non-mass campaign years on a subnational scale with eventual scale up to seven counties, targeting grades 1, 5, and 9, teachers and school coordinators, with complementary SBC to students, school staff, and PTA groups.

Figure 1. Map of Vector Control Activities in Liberia



1.2. Recent Progress (between January 2022 and December 2022)

- Supported vector biolomics monitoring in eight sentinel sites (in seven counties) and insecticide susceptibility monitoring in 10 sites (in 10 counties). Three of the vector bionomics sites overlapped with susceptibility monitoring sites. These activities were conducted in collaboration/partnership with the University of Liberia-Pacific Institute for Research and Evaluation (UL-PIRE) and the NMCP. For more information about entomological monitoring, please refer to the [2022 Entomological Report](#).
- Supported community-based entomology activities, including training of 32 community health volunteers (CHVs), 16 field supervisors, one UL staff member, one National Public Health Institute of Liberia staff member, and four NMCP staff on adult and larval mosquito collection methods and on adult *Anopheles* mosquitoes for vector monitoring and larval morphological identification of larval collections to be used for insecticide susceptibility testing. The CHVs and NMCP staff who have been trained are able to perform field collection of larvae independently.
- Supported NMCP to determine the location most suitable for insectary relocation and supported procurement of containers to house the insectary.
- Supported developing a concept note for enhanced surveillance for *Anopheles stephensi* in one (seaport) site in coordination with NMCP, UL, and National Port Authority.
- Provided ongoing virtual technical assistance to National Public Health Institute of Liberia for laboratory protocols, particularly to enhance molecular skills and processing turnaround times, with a MOP-funded in-person TA in January 2023 by a CDC laboratorian.
- Supported prevention of MIP by providing ITNs to women at their first ANC visit, as well as at institutional deliveries.
- In FY 2022, procured 439,900 and delivered 279,000 dual AI ITNs for use nationwide through continuous distribution channels (ANC and institutional delivery) and in three counties through schools.
- Supported ITN streamlined durability monitoring, by implementing 12-month data collection, monitoring the IG2 nets from the 2021 cohort, including providing training of two NMCP staff on durability monitoring bioassays.
- Supported national- and community-level SBC activities to improve demand for ITNs, increase appropriate use, promote care, and mitigate against misuse. For more information, please refer to the SBC section.

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

PMI is maintaining support for insecticide susceptibility monitoring in ten sites and reducing the geographic footprint for longitudinal entomological monitoring from all eight established sites

(with monthly collections) to four sites (with bi-monthly collections). This shift will include rotation such that every site will be visited at least once every two years. PMI will coordinate with other partners (i.e., the Global Fund) to ensure complementary geographic coverage. Despite geographic reduction, PMI plans to expand support through (1) inclusion of periodic human behavior data collection in parallel with human landing catches conducted as part of the dual AI ITN monitoring activity, including one site with increased middle of the night human landing catches collections, and a second site with increased early morning human landing catch collections, (2) use of mobile digital technology for entomological data collections, and (3) support enhanced surveillance for *Anopheles stephensi* in relevant ports and other suitable habitats given the unique biology of this invasive species. PMI is also continuing to provide materials and technical assistance (via in-person and virtual) to strengthen the capacity of the NMCP and local research institutions to conduct field collection, insectary, laboratory and molecular testing.

Summary of Distribution and Bionomics of Malaria Vectors in Liberia

As of 2022, in line with historical data, the primary vector observed was *Anopheles gambiae* s.l. (76.1 percent) and the secondary vector was *Anopheles funestus* s.l. (23.7 percent), but *Anopheles funestus* s.l. was also dominant in some sites. Peak transmission season is from April to August. There was no observable or statistically significant difference noted for the preferred biting location (indoors or outdoors) of the primary vector based on human landing catches and CDC miniature light trap collections. Generally, *Anopheles gambiae* s.l. (both indoors and outdoors) bite between 2100 to 0600 hours, with peak biting between 2400 and 0200 hours. No data is available yet on preferred hosts.

Status of Insecticide Resistance in Liberia

Historical data has shown that *Anopheles gambiae* s.l. is highly resistant to pyrethroid insecticides at 1X, 2X, 5X, and 10X concentrations of alpha-cypermethrin, deltamethrin, and permethrin. As of 2022, insecticide resistance testing was limited to the AIs used in IG2 ITNs, alpha-cypermethrin and slow-acting chlorfenapyr. Alpha-cypermethrin resistance patterns continued to be high across all sites. Pre-exposure to piperonyl butoxide synergist only restored full alpha-cypermethrin susceptibility in one site. Chlorfenapyr was tested and provided full mortality within three days post-exposure in all but two sites.

1.3.2. Insecticide-Treated Nets (ITNs)

Liberia will continue to support ITN activities as described in the Recent Progress section, with expansion to an EPI continuous distribution channel.

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

ITN Distribution in Liberia

ITNs are distributed via mass campaigns every three years. Continuous distribution channels are distribution to pregnant women at ANC and institutional delivery, and schools, and with FY 2024 funding, plans to support EPI channel. The country completely transitioned from standard pyrethroid-only ITNs to dual AI chlorfenapyr (IG2) ITNs during its CY 2021 nationwide mass distribution campaign. IG2 ITNs are now procured for continuous distribution channels and for the CY 2024 nationwide mass distribution campaign. No ITN gaps are anticipated.

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

Table 1. Streamlined Durability Monitoring

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
June 2021	Bomi	IG2	-	June 2022	Planned	Planned
June 2021	Bong	IG2	-	June 2022	Planned	Planned

1.3.3. Indoor Residual Spraying (IRS)

PMI does not provide support for IRS in Liberia.

2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

PMI Liberia's goal is to support the national MIP strategy, which includes: provision of ITNs at the first antenatal care (ANC) visit and at time of delivery; a minimum of three doses of intermittent preventive treatment for pregnant women (IPTp) with sulfadoxine-pyrimethamine (SP) starting at 13 weeks gestational age; and effective case management of malaria in pregnancy. The strategic objective is to ensure that 80 percent of pregnant women are protected by these malaria preventive measures by 2025. These goals are supported by PMI through procurement of both SP for IPTp and ITNs for routine distribution, as well as through training of healthcare workers at all levels of the healthcare system. Currently, PMI supports facility-based MIP service delivery in 12 out of 15 counties, with the World Bank covering the remaining three counties of Gbarpolu, Sinoe, and River Cess.

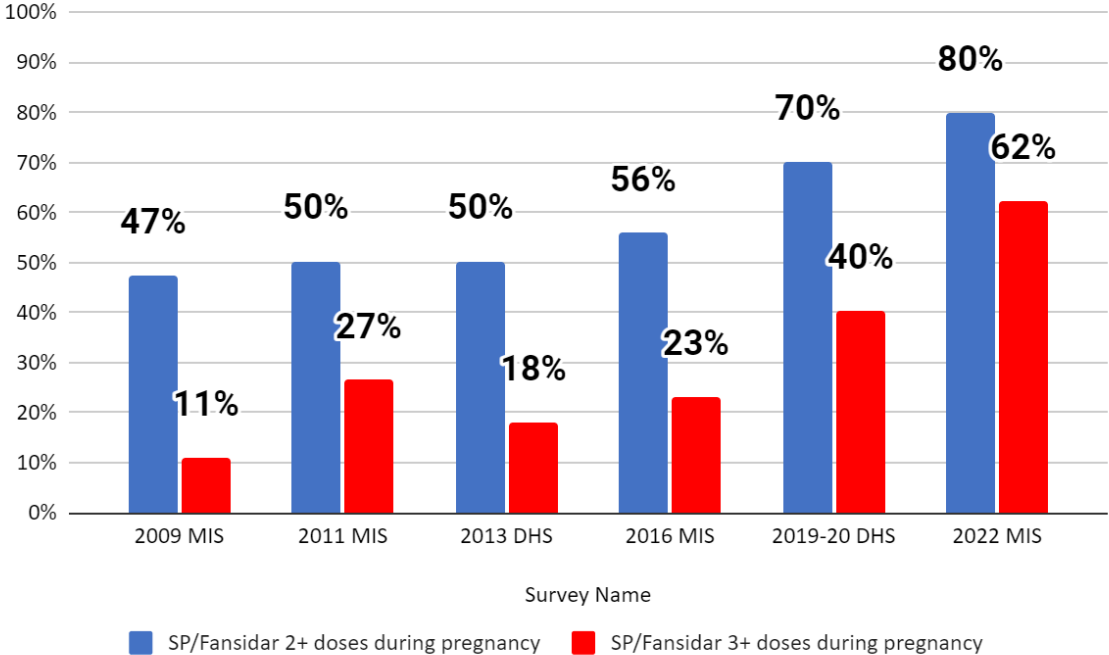
PMI collaborates with the NMCP and the EPI to conduct community outreach visits in the eight G2G counties. During outreach visits, midwives that conduct immunization outreach services provide IPTp. After these visits, IPTp data from outreach services is transferred to the ANC register. This intervention targets women in difficult to reach areas, including those that do not return for scheduled ANC visits.

Based on the 2022 updates to the WHO malaria guidance, the NMCP plans to revise training materials for providers on treating uncomplicated malaria in the first trimester of pregnancy with Artemether-lumefantrine (AL). The NMCP is also considering different approaches for using CHAs to improve IPTp coverage, either through CHAs directly distributing SP in the community or through collaboration with the EPI-supported ANC outreach. The NCHP Strategy (2023-2032) includes the opportunity for community IPTp through CHAs and trained traditional midwives, but efforts to implement this policy change have not yet begun.

2.2. Recent Progress (between January 2022 and December 2022)

- Supported training of 189 hospital based health workers on MIP technical guidelines, including providing copies of the updated MIP guidelines.
- Supported printing and distribution of 967 posters encouraging IPTp uptake across 12 counties.
- In FY2022, procured 726,133 and delivered 653,333 SP doses.
- Supported ITN distribution during ANC and at delivery. In calendar year 2022, of the 198,564 pregnant women that attended the first ANC visit, 147,686 (74 percent) received ITNs, compared to 84 percent (115,370 of 136,578) of women that received ITNs during the first ANC visit in calendar year 2021. This decrease is likely due to stockouts at the health facility level.
- Provided 143,078 IPTp1, 114,319 IPTp2, 104,095 IPTp3 and 64,287 IPTp4 or more doses to pregnant women during ANC. The data from DHS/MIS shows a steady improvement of IPTp coverage, with IPTp3+ coverage reaching 62.6 percent in 2022 (Figure 2).

Figure 2: Trends of IPTp coverage in Liberia from 2009–2022 (Source: DHS/MIS)



- Completed and validated an assessment of barriers to the uptake of IPTp, which highlighted areas that influence IPTp uptake at public health facilities: high ANC dropout rates, awareness of ANC operation hours, awareness of IPTp importance, and access to ANC sites.
- In December 2022, the MOH launched the National Respectful Maternity Care Five-Year Strategy (2023-2027), which aims to improve ANC services and will hopefully lead to increased ANC attendance.
- Supported the NMCP, County Health and District Health Teams to conduct malaria supportive supervision with a MIP component.
- Supported monthly technical working groups (TWGs) at the county level, which include county malaria focal persons and representatives from the reproductive health team.
- In collaboration with the EPI, supported IPTp outreach for difficult to reach populations in the eight G2G counties. IPTp distribution is done by the midwives that conduct immunization outreach services in the community.

Challenges:

- The MOH Reproductive Health Division only recently adopted the 2016 ANC policy that recommends pregnant women to have at least eight ANC contacts during each pregnancy at recommended intervals, which has delayed the implementation of this policy change. In addition to the late adoption, there is also a need to revise the ANC register for documentation and reporting of more than four ANC visits
- The IPTp barriers study conducted at select health facilities across three counties identified high ANC dropout rates as a key challenge to IPTp coverage, with half of women only attending one ANC visit (50.2%). Other barriers identified were a lack of directly observed therapy (DOT) supplies for IPTp, cost of attending ANC (transportation and time), and a lack of awareness of ANC clinic hours and SP recommendations.
- Another challenge is the stockouts of SP for IPTp. The November 2022 end use verification (EUV) survey shows 27 percent of health facilities were stocked out of SP on the day of the visit. The stockouts are attributed to Central Medical Stores not supplying commodities as requested. Sometimes the delay in last mile distribution results from counties delaying to account for the last mile distribution funds.
- Documentation of MIP and IPTp coverage in ANC registers are also a challenge; guidance on documentation is unclear, potentially contributing to both under- and over-reporting depending on the facility.

2.3. Plans and Justification for FY 2024 Funding

The [FY 2024 funding tables](#) contain a full list of MIP activities that PMI proposes to support.

PMI Liberia will continue to support MIP activities as described previously in the Recent Progress section and will include the full package of MIP interventions: IPTp, provision of ITNs to pregnant women during the first ANC visit and at delivery, offering testing for malaria to

pregnant women with fever and, if needed, providing appropriate treatment according to national guidelines. Currently, the NMCP does not have plans to support community IPTp, but there are ongoing conversations and the NCHP Policy includes provision of IPTp by CHAs.

The specific activities for FY 2024 funding are detailed below.

- Support for printing and distribution of malaria training materials and treatment guidelines revised in 2023, which include use of artemether-lumefantrine (AL) for treatment of uncomplicated malaria in the first trimester of pregnancy.
- Support for county trainings in MIP and case management, including on the updated guidelines, documentation, and reporting in collaboration with the NMCP.
- Support for development of a strategy for community distribution of IPTp, either through outreach clinics or by CHAs.
- Administrative support to the NMCP and county malaria focal persons for monthly malaria TWG meetings, including strengthened coordination and collaboration with Reproductive Health TWGs.
- Support county and district level Joint Integrated Supportive Supervision (JISS) and post-supervision visits to ensure staff are adhering to national guidelines.
- Support quarterly NMCP supervision to counties and health facilities.
- Use the results of the IPTp barrier study to address interventions for addressing missed opportunities for IPTp and ITN distribution at ANC and delivery.
- Facilitate meeting and coordination between MIP service delivery partners and the supply/logistics partners and the MOH to address the stockout issues at service delivery points.
- Explore SBC and other interventions for improving regular ANC attendance, IPTp3 coverage, and proper management of malaria.

Currently, PMI procures SP for the entire country. PMI will procure SP treatments, including a buffer stock of six months.

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 and opportunities to improve intervention uptake or maintenance.

3. Drug-Based Prevention

PMI does not provide support for seasonal malaria chemoprevention or other drug-based prevention.

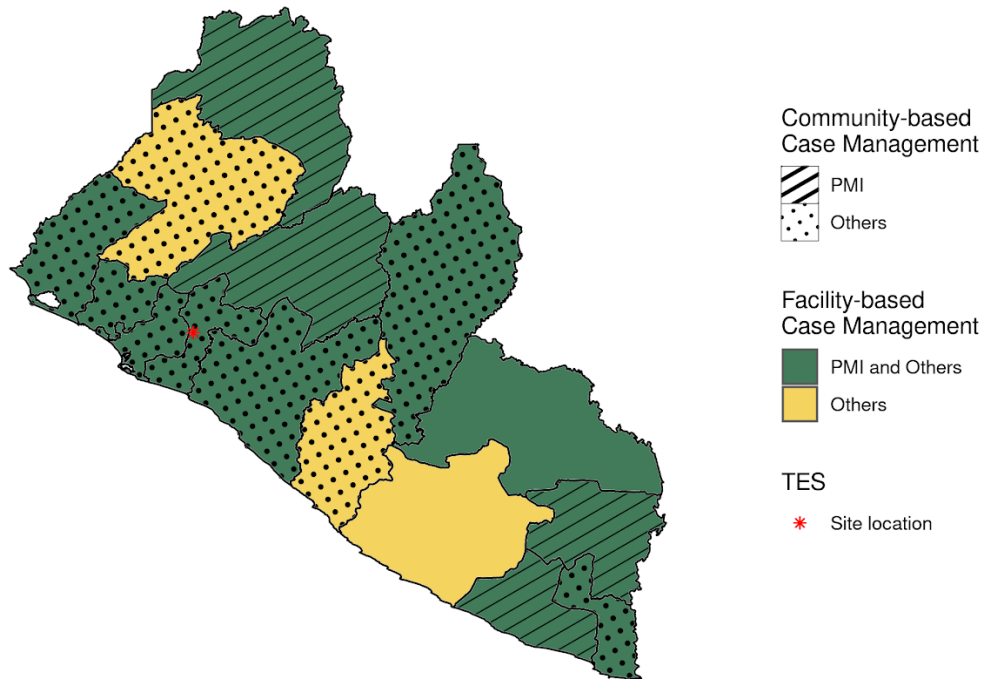
4. Case Management

4.1. PMI Goal and Strategic Approach

The 2021-2025 NSP and case management guidelines are aligned with WHO recommendations and promote a comprehensive case management strategy. This includes universal, quality-assured parasitological testing of all cases of suspected uncomplicated malaria, prompt and effective treatment with artemisinin-based combination therapies (ACT) of parasitologically-confirmed uncomplicated malaria, and emergent pre-referral and/or definitive management of severe febrile illness and severe malaria. PMI supports all aspects of this approach through support to national level policy and programmatic activities, commodity procurements, and improvement of facility and community level health worker performance. PMI supports procurements of 100% of malaria RDT needs, ACTs are split with Global Fund, and injectable artesunate split between Global Fund and GoL. PMI has supported the use of pre-referral rectal artesunate. However, roll-out has been slow due to cultural norms that prevent male CHAs from administering suppositories. PMI will continue to engage with the NMCP as they work to overcome this challenge. PMI-procured commodities are distributed nationwide to all 15 counties. PMI also supports case management activities through TA to improve health worker performance in 12 of 15 counties with the remaining three counties supported by the World Bank. As a result of the commodity and TA support, testing of suspected malaria cases nationwide is high (>80% in all counties) and adherence to treatment guidelines varies from 50% to 90% with ACT stockouts (see supply chain section) affecting treatment in several counties. The NSP aligns with WHO recommendations to conduct periodic therapeutic efficacy studies (TES) of first-line ACTs. However, MOH malaria case management guidelines do not specify a process for changing ACTs if first-line medications begin to fail. Currently, AL is the only ACT being used after the switch from procuring both AS/AQ and AL to only procuring AL in 2021.

Approximately 30 percent of the Liberian population lives in communities less than five kilometers from the nearest health facility. As a means to reach this population, PMI supports 754 community health assistants (CHAs) to deliver community-based case management services (through commodity supply, training, payment of stipend, and supervision). The support includes iCCM and will expand to malaria community case management (mCCM) to children up to age thirteen. Within the revised community health strategy, CHA activities are planned to be expanded nationwide. PMI will continue to provide direct support to CHAs in four of 15 counties, although PMI commodities will reach CHAs in all 15 counties. PMI supports monthly payment of CHAs and CHSS. In 2022, PMI funds supported monthly stipends for 1,204 CHAs and 125 CHSSs. The current most pressing challenge faced by the community health system is frequent stockouts of malaria commodities associated with supply chain bottlenecks. To address this, PMI is working with the central medical stores and other partners to improve the supply chain at both the national, county and last mile levels.

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



4.2. Recent Progress (between January 2022 and December 2022)

National Level Case Management Activities

- NMCP recently hired a malaria diagnostics focal person. This person will help strengthen malaria diagnosis, especially in facilities, and to support the planning and implementation of a robust quality assurance program. This area in malaria case management has received little attention in the past year due to the position remaining vacant.
- As part of the JISS team, NMCP conducted supportive supervision to eight of 15 counties.
- NMCP is working with training institutions to include CHSS training modules into Maternal and Child Health training programs.
- NMCP participated in the review and validation of the Standard Treatment Guidelines for Liberia. The recommended changes to the guidelines include treatment of malaria in pregnant women in the first trimester with AL, use of RDT and correct documentation of IPTp.
- Provided motorbikes, laptops and other supplies to 12 county malaria focal persons.
- Trained 24 laboratory technologists and technicians in basic malaria microscopy.

Commodities

- In FY2022, PMI supported:

- RDT procurement (750,000) and delivery (1.5 million), meeting 100% of national needs for public health facilities including additional tests to account for increased testing by CHAs.
- ACT procurement (1.5 million) and delivery (923,610), complementing Global Fund's ACT procurements, including an emergency procurement of 172,770 doses of AL to prevent national stockouts.
- Parenteral artesunate procurement and delivery (201,947 vials), complementing Global Fund's and Government of Liberia's procurements.
- Rectal artesunate delivery (12,480) suppositories for use by CHAs who had received training. However, use of rectal artesunate is not yet widespread due to cultural norms that prevent male community health workers from applying suppositories.

Facility Level

- Trained 189 health workers on malaria case management from 180 health facilities (including 11 hospitals) in eight counties.
- Conducted training of at least one health worker from each of 119 out of 323 private facilities in six counties on malaria case management.
- Supported distribution of updated case management and MIP guidelines and job aids to 180 public health facilities and 133 private health facilities in six counties.
- Conducted semi-annual supervisory visits to the six hard-to-reach counties in the southeast region covering 36 facilities.
- Conducted diagnostics supervision in eight facilities in Gbarpolu County.
- Conducted malaria diagnosis data verification in six facilities in Montserrado County.

Community Level

- Conducted on-site training and supportive supervision or mentorship visits reaching 794 community health workers (CHAs and CHSS) in four counties (Bong, Grand Kru, Lofa and River Gee). Support was provided through CHSS and the County Health Team (CHT) as well as, at the national level, through JISS.
- With Global Fund support, the MOH conducted refresher training to 1,679 CHAs and 224 CHSS in six other counties (Bomi, Nimba, Margibi, Maryland, Montserrado, and Sinoe).
- Supported integrated training of iCCM (malaria, diarrhea, pneumonia) as well as promotion of awareness for facility-based immunization services and SBC messages on malaria prevention.
- Provided in pre-packaged kits, commodities and other supplemental items to support iCCM.
- Trained 125 supervisors in on-site training and supportive supervision for CHAs.
- Printed and distributed several community-based information system forms and data tools to community health workers in four counties (Bong, Grand Kru, Lofa and River Gee).

- Developed Standard Operating Procedures for community data collection and management. Data reported by CHAs now suggest that, in these four counties, 95 percent of all RDT positive patients receive an ACT.
- CHAs and CHSS in Bong, Grand Kru, Lofa and River Gee now receive a monthly stipend; \$70 for CHAs and \$250 for CHSSs. The Government of Liberia recently committed to paying the monthly stipends of all CHSSs.
- Completed three surveys; 1) Client Satisfaction Survey, 2) CHA Assessment Improvement Matrix (AIM), and 3) Caregivers' Knowledge of Correct Malaria Treatment. The Client Satisfaction Survey indicated an 86 percent overall satisfaction with services in Bong and Lofa Counties.

Please note that recent progress with monitoring antimalarial efficacy and the TES approach is presented in the Plans and Justification for FY 2024 Funding section below.

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.

National Level Case Management Activities

For FY 2024, PMI will continue to support national level case management activities as described in the Recent Progress section. Additional activities at the national level will include:

- Update National Malaria Diagnostic guidelines and Quality Assurance Manual with global guidance. Both documents were last revised in 2020.
- Technical assistance to MOH/NMCP to plan and implement malaria diagnostics quality assurance activities. This will include training for 135 laboratory staff from county hospitals, county laboratory supervisors, and diagnostics officers. Although critical to malaria case management, this activity has not been conducted for several years due to NMCP staffing and organizational challenges.
- Conduct malaria competency assessments for county level microscopists.
- Printing and distributing 3000 diagnostic ledgers for both public and private facilities.
- Support revision and printing of malaria case management guidelines to reflect use of AL for treatment of malaria in the first trimester of pregnancy and other updates.

Commodities

For FY 2024, PMI Liberia will continue to support procurement of case management commodities guided by in-country stock status including at least a six month buffer stock of ACTs and RDTs, as well as medications for treatment of severe malaria. RDT procurements may be adjusted to account for increase in CHA testing. PMI plans to procure 1.5 million RDTs representing 100% of RDT need and 250,000 doses of ACTs (~36% of need). The remaining ACT needs will be covered with support from the Global Fund. PMI will also procure 100,000

vials of injectable artesunate for management of severe malaria at the facility level. PMI will also procure laboratory supplies and reagents to support quality assurance of facility-based malaria diagnosis. PMI Liberia does not plan to procure RAS beyond 2023, pending further discussions with the NMCP and the NCHP.

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.

Facility Level (may include private sector if relevant)

PMI will continue support for case management through its G2G partnership with the Liberia MOH. Support will include strengthening facility-based malaria case management in eight counties. With this and other support to the MOH, facilities in all 15 counties, including in the private sector, will receive direct support to improve malaria case management, including:

- Support CHTs and staff from the national level to plan and conduct onsite supervision.
- Training on adherence to case management guidelines and data reporting.
- Assessment of quality of case management services through JISS.

The World Bank will continue to provide resources for service provision to selected counties, particularly Montserrado.

Community Level

PMI will continue to support the CHA program in the four counties, with PMI-funded commodities reaching CHAs in all counties. The CHA program has been rolled out nationwide and approximately 1.2 million people (30% of the population) live in communities covered by a CHA. The community case management program remains an important source for prompt malaria testing and treatment as well as a source of SBC on malaria prevention. The 2022 revision of the NCHP Policy has increased the reach of quality community health services and provides an integrated and standardized national community health model with data captured and reported into the HMIS.

Despite the progress made on malaria case management, several challenges remain in delivering quality care. Together with the MOH, Global Fund, WHO and other partners, PMI is working to address several of these challenges which include:

- Stockout of commodities at health facilities and other service delivery points despite availability of commodities at the Central Medical Store (CMS). This is due to commodity management challenges in the country, lapses in supply schedules, leakage and inadequate communication between CMS, CHTs and facilities. PMI is working with the MOH and partners to address this challenge, including conducting data assessments and verification, and addressing supply chain bottlenecks including

pre-packaging CHA commodities into kits at the CMS (see Supply Chain section for additional details).

- Inadequate adherence to case management guidelines due to unavailability of guidelines, standard operating procedures, job aids and sub par staff training. PMI continues to invest in supporting the MOH in updating and disseminating case management guidelines and other case management tools, conducting refresher training as well as on-site training during supervision. Where appropriate, the MOH, PMI and other partners are investing in pre-service curriculum revisions for student training.
- NMCP has now hired a diagnostics point of contact and PMI will plan to support a revival of a quality assurance program to include regular supervision, proficiency testing using an existing PMI-provided slide bank as well as training for county supervisors.
- The southeast region of Liberia has the highest malaria prevalence and offers the least accessibility to health services, mostly due to bad road conditions. Although a solution will require a multi-sector approach, PMI is exploring ways to pre-position malaria case management commodities in the region, especially prior to the rainy season when road conditions are better and allow regular commodity supplies from the CMS.

Monitoring Antimalarial Efficacy

Table 2. Ongoing and Planned Therapeutic Efficacy Studies

Ongoing Therapeutic Efficacy Studies			
Year	Site name	Treatment arm(s)	Plan for laboratory testing of samples
*2022-2023	Saclepea, Nimba county	AL AS/AQ	CDC Atlanta
Planned TESs (funded with previous or current MOP)			
Year	Site name	Treatment arm(s)	Plan for laboratory testing of samples
2025	TBD	TBD	Testing in CDC or other regional/international laboratory

*TES commenced in July 2022 at two sites with the expectation that enrollment and data collection will be concluded within two months of study starting. However, due to low malaria incidence resulting in fewer cases, enrollment at one site, Saclepea, was completed in March 2023, and as of April 2023, enrollment at the second site, Sinje, is still ongoing. AL:Artemether-lumefantrine; AS/AQ: Artesunate-amodiaquine; TES: therapeutic efficacy studies.

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

PMI Liberia provides support to the Department of Pharmaceutical Services (DPS) for the implementation of Liberia’s Supply Chain Master Plan (2010–2020), which is undergoing a

revision in 2023, through commodity procurement and technical assistance, and supports the Liberia Medicines and Health Products Regulatory Authority (LMHRA) Strategic Plan (2021–2025). PMI supports the national quantification technical committee to develop national malaria commodity requirements and funding needs. PMI supports the procurement of malaria commodities and monitoring of the national pipeline to inform joint donor decisions with the Global Fund on the procurement of commodities to meet national malaria product requirements. PMI supports the CMS in Caldwell, Monrovia, in providing operational support for integrated management of health commodities at the central warehouse. Furthermore, PMI supports ITN distribution nationwide. For more information on ITNs, please refer to the Vector Monitoring and Control section.

PMI has been supporting use of the electronic Logistics Management Information System (eLMIS) to guide consumption data collection for decision-making on health product requirements. PMI also supports deployment of eight Logistics Management Advisors (LMAs) that work with the 15 CHTs to strengthen data collection and stock management at the county level.

In accordance with PMI's Stockout Reduction Strategy, which targets stockouts of less than 10 percent across PMI countries by 2023, PMI Liberia is targeting stockouts of ACTs, RDTs, and SP of less than 22, 11, and 6 percent by 2023. Baseline (2020) stockout rates for ACTs, RDTs, and SP were 40, 21, and 12 percent, respectively.

5.2. Recent Progress (January–December 2022)

Central Level

- **Long Term Technical Assistance (LTTA) at CMS:** PMI's principal supply chain investment in 2022 strengthened the operational efficiency of the CMS. PMI coordinated with other USAID health teams, Global Fund, and the MOH, to develop an approach to provide intensive technical assistance support at CMS, while continuing to support distribution. From March 2021 to September 2022, PMI (and USAID) provided comprehensive technical assistance in the form of four technical advisors embedded in CMS (management advisor, warehouse operations advisor, financial management specialist, and information technology advisor). The technical advisors supported the current CMS leadership in managing the warehouse, and the Global Fund covered the distribution of commodities to the 13 county depots, hospitals, and last-mile distribution in Montserrado and Margibi Counties, utilizing the World Food Program as their implementing partner. CHTs outside Montserrado and Margibi Counties were responsible for last-mile distribution to the health facilities through funding support from the Global Fund (except for ITNs, which were covered by PMI). The LTTA advisors focus was to strengthen the capacity of the CMS team on the appropriate operations of the warehouse while putting in place a sustainable management system that will enable the warehouse to operate efficiently. The four LTTAs departed in September 2022, but two local LTTAs (warehouse management and administrative & financial advisors) were

hired and embedded at the CMS to provide technical support to the CMS. PMI (and USAID) continues to provide logistical support to the CMS until an outsourcing agreement for CMS operations and management is in place in mid-2023.

- **Quantification and Malaria Commodity Stock Status Review:** PMI supported the quantification of malaria commodities with the NMCP and malaria stakeholders. To monitor the availability and use of malaria commodities in the country, PMI continued to work with the NMCP to review malaria commodity stock status and coordinate with the Global Fund to fill any gaps and avoid stockouts. This included working with the NMCP on the use of other AL weight bands to substitute for a missing weight band, especially when AL 6x4 is out of stock, and placing emergency ACT orders.
- **eLMIS:** Another of PMI's principal supply chain investments aimed at improving malaria commodity data reporting through eLMIS. PMI provided technical assistance to strengthen the eLMIS for supply chain data visibility, including timely reporting and improving data quality. PMI provided support to the NMCP for requisition approval on the eLMIS platform and conducting variance analysis between requisition approvals compared to commodities dispatched from CMS to counties. In conjunction with these interventions, the eLMIS reporting rate remained above 93 percent in FY 2022 (see Figure 4). Despite the high reporting rates, data quality remains a challenge. For example, discrepancies between the eLMIS data (consumption of commodities) and HMIS data (malaria services) are still observed. In Figure 5, ACT consumption was higher (1,061,249) than the number of malaria cases treated with an ACT (689,254) in 2022. Similarly, malaria RDT consumption (1,139,889) was higher than the number of patients tested (834,380). One potential reason for the discrepancies is the units used for dispensing at the health facilities (tablets versus dose). PMI is working with the NMCP to investigate.

Figure 4. Malaria Electronic Logistics Management Information System Reporting Rate FY2022

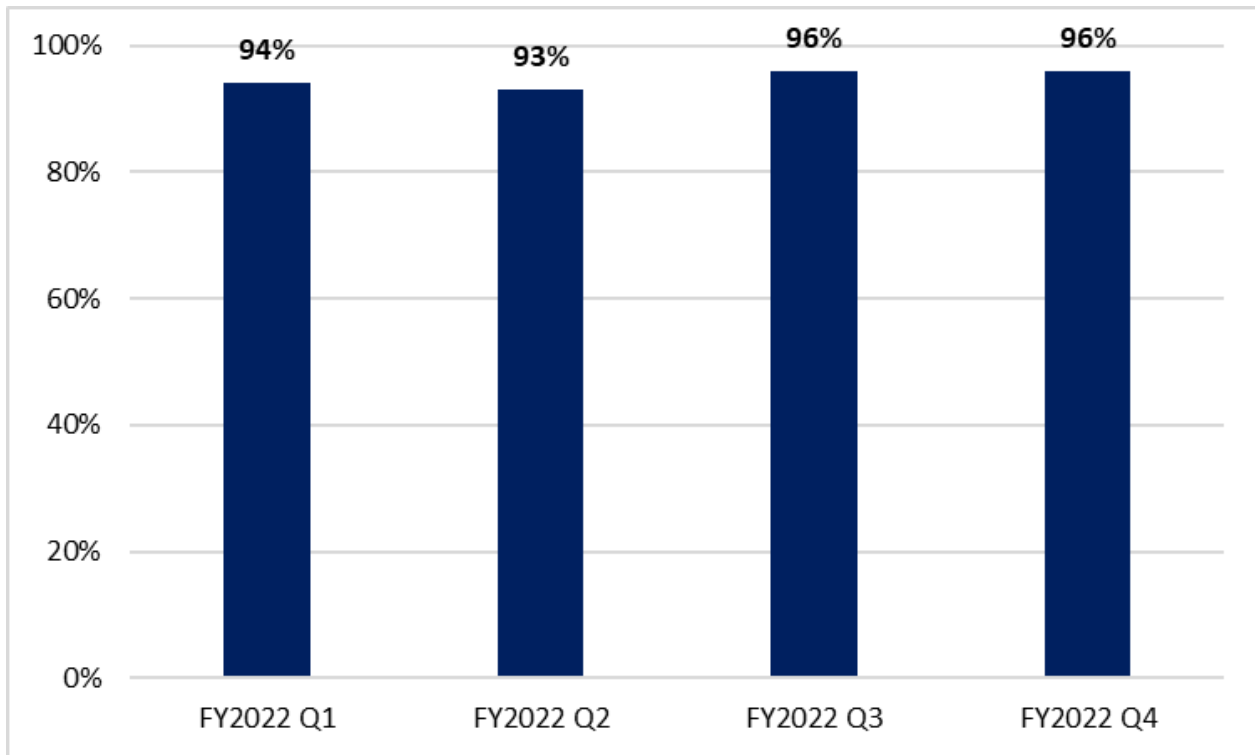
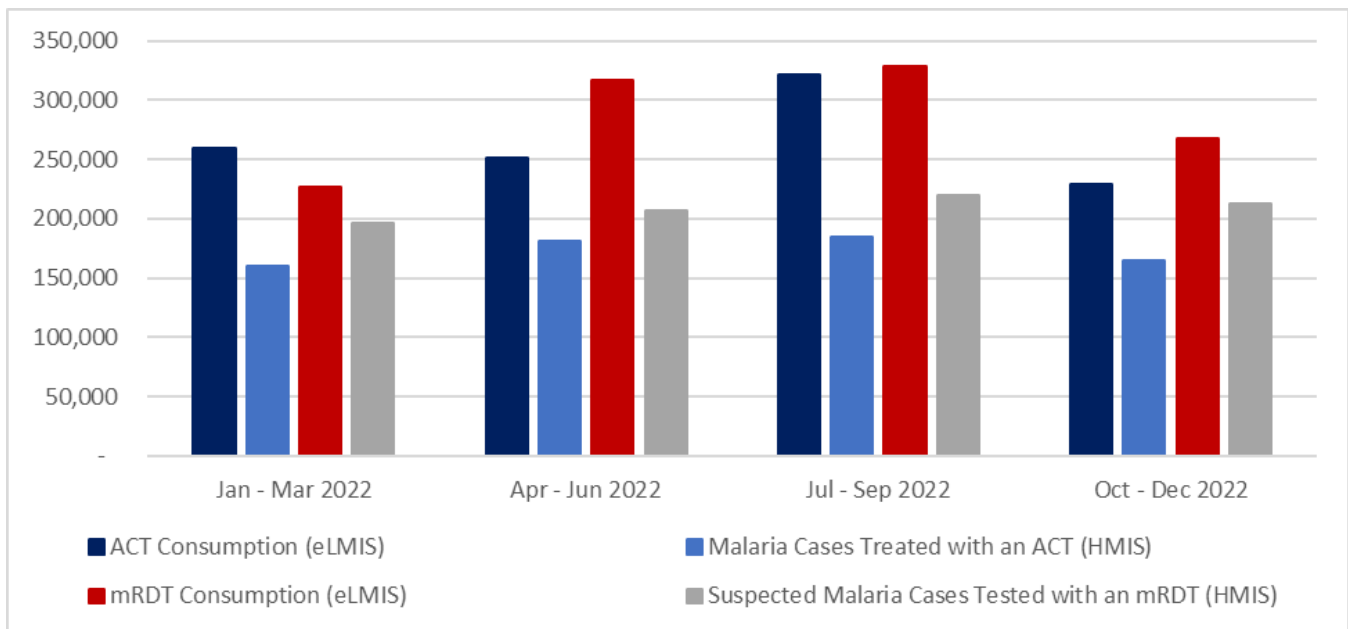


Figure 5. Reported ACT Consumption and Treated Malaria Cases and Rapid Diagnostic Test Consumption and Suspected Malaria Cases Tested in 2022



- **ITN Procurement and Distribution:** PMI continued to provide support to the NMCP for the procurement and bi-annual last-mile delivery of ITNs to health facilities across the country for continuous distribution as part of ANC and institutional delivery and storage at the General Services Agency in Monrovia. PMI supported the NMCP and Ministry of Education to plan and provide logistical support for the school-based distribution channel in Bong, Nimba, and Montserrado Counties. In 2022, 114,613 ITNs were distributed to students in 1,347 public schools.
- **LMHRA Strategy and Planning:** PMI supported the LMHRA to put into effect seven regulations,² and to draft seven additional regulations.³ PMI also supported LMHRA to conduct an assessment to determine the feasibility of adopting an integrated regulatory information management system, to purchase equipment, reagents and reference standards for the LMHRA quality control lab, and to develop a laboratory quality management system. Support was also provided to the LMHRA for dossier evaluation and to establish a technical advisory committee for medical products registration.
- **Support Medical Product Quality Assurance Curriculum:** Supported the School of Pharmacy to develop a curriculum for medical product quality assurance.
- **Support to Local Manufacturing:** PMI supported Global Pharmaceutical Manufacturing Company, a local pharmaceutical manufacturer, to obtain a manufacturing license and Good Manufacturing Practice (GMP) certification from LMHRA. One of the products they manufacture is artemether lumefantrine. This is the first GMP-certified pharmaceutical company established in Liberia, and with majority Liberian ownership. It was dedicated in March 2023.

County and Facility Levels

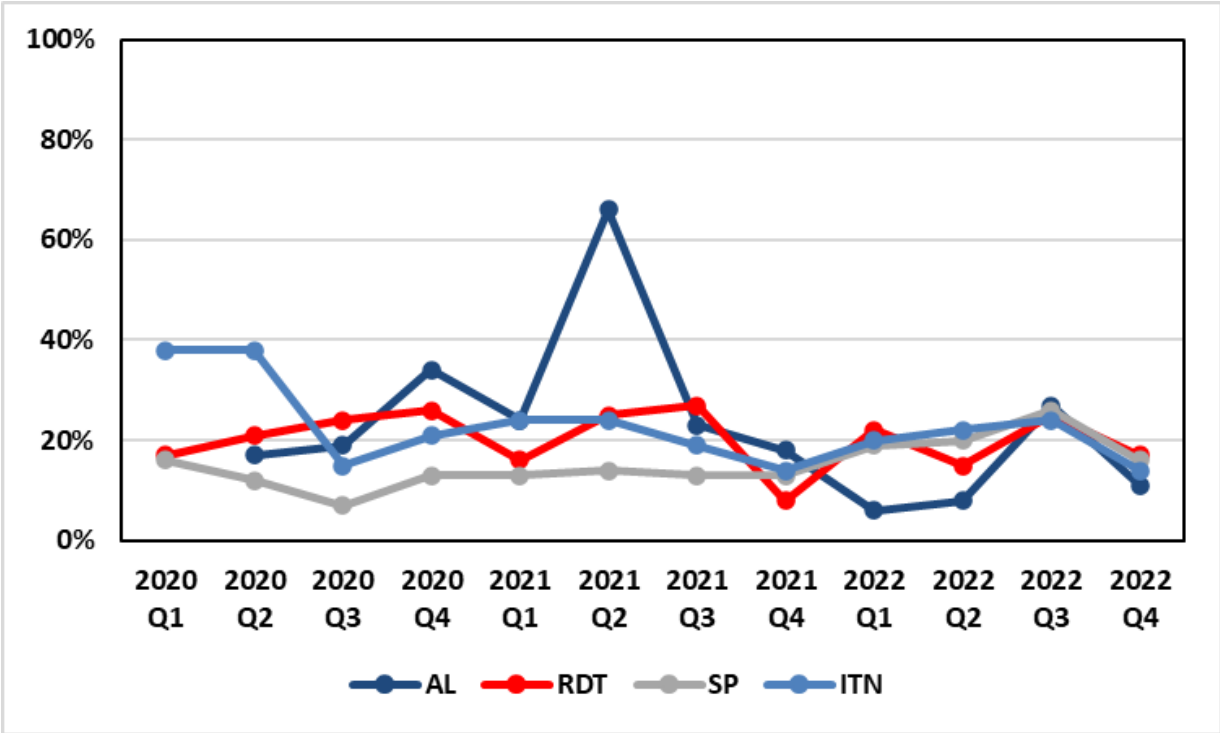
- **Mentorship and Supply Chain Data Management and Visibility:** PMI provided mentorship through the LMAs to the CHTs and health facilities to improve inventory management and reporting. PMI continued to support the LMAs to work with the CHTs and health facilities to support supply chain data visibility through the eLMIS, including mentorship support to improve the quality of the LMIS data being collected and used for decision-making. The LMAs visited 733 health facilities in 2022 and mentored 1,871 health care workers on supply chain record keeping.
- **Coordination:** The LMAs facilitated over 87 monthly supply chain TWG meetings at the county level during 2022. Of the 385 action points identified during the meetings, 184 have been resolved.
- **Improved County Depot Storage Areas:** PMI supported minor upgrades at two county depot warehouses in Nimba and Bong Counties and the Liberian Government Hospital Warehouse in Bomi County.

² Advertisement on Medicines and Health Products; Regulations on Donations of Medicines and Health Products; Regulations on Withdrawal, Recall, and Confiscation; Regulations for the Registration of Medicines and Health Products; Regulations for the Labeling of Medicines and Health Products; Regulations on Importation and Exportation of Medicines and Health Products; and Regulations on Treatment and Disposal of Medicines and Health Products.

³ Variations, reliance on registration, reliance on inspection, quarantine, subcontracting, medical device registration, and traceability.

- **Malaria Commodities Stockout Reduction Initiative:** PMI used the investment plan developed as part of the implementation of PMI’s stockout reduction initiative to improve commodity availability at service delivery points. As seen in Figure 6, commodity stockouts fluctuated over the past three years, with high stockouts (approaching 40 percent) of ITNs in 2020, which reduced to about 20 percent in 2021 and 2022. AL stockouts fluctuated due to the transition from ASAQ to AL and delays in delivery, reaching a high of over 60 percent in Q2 2021, but remained near or below 20 percent thereafter. RDT stockouts fluctuated around 20 percent and SP stockouts generally remained at or below 20 percent over the three years.

Figure 6. Stockout Rate of AL, RDTs, SP, and ITNs in Health Facilities in CY2022



Source: eLMIS data

- **End Use Verification (EUV) Survey:** PMI in collaboration with the NMCP conducted two EUVs in 2022. The EUV continues to serve as a spot-check opportunity to monitor availability of malaria commodities at the service delivery points and at county depots.
- **Post-market Surveillance and Investigation of Diversion of Malaria Commodities:** PMI supported post-market surveillance of malaria commodities in six counties, testing 348 antimalarial samples across public and private facilities in two rounds. Forty-five (13.7 percent) of the antimalarial samples failed due to issues with low content of active pharmaceutical ingredients and unregistered products. PMI supported additional activities to assess diversion of donor-procured commodities.

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.

Despite numerous advances in the supply chain, challenges remain, including frequent stockouts of commodities, large stockpiles of overstocked/expired commodities, and lack of visibility of commodities in the supply chain system. PMI will continue to support the NMCP and DPS with supply chain and pharmaceutical management strengthening activities and ensuring commodity security. PMI will continue to build off the investment plan developed as part of PMI's Stockout Reduction Strategy to reduce and maintain stockouts to less than 10 percent across malaria commodities. With FY 2024 funding, PMI will support implementation of the Supply Chain Master Plan developed in 2023 and will continue to support supply chain activities as described in the Recent Progress section, including the following activities:

- PMI will work with the MOH and DPS to improve the Supply Chain Management Unit's and CMS's leadership, governance and ownership of the supply chain as this has been identified as a clear area of need. Support will be provided for outsourcing the operations of the CMS.
- Key additional support areas will include malaria commodity quantification (including the use of the Quantification Analytics Tool), improving eLMIS data quality, and annual EUV surveys. PMI will support GS1 when the DPS is ready to move forward with this.
- PMI will continue to support last-mile distribution of continuous ITNs to health facilities for ANC visits and institutional delivery as well as school distribution and through EPI. Global Fund will continue to support first and last mile distribution of the other malaria commodities to the county depots and health facilities, respectively.
- PMI will continue to support the supply chain coordination forums (TWGs) at the county level to improve commodity data visibility and enhance supply chain decision-making that will improve commodity availability at health facilities. Support will continue to be provided for capacity-building and mentorship to health facilities on accurate use of supply chain tools for inventory management at the health facilities.
- PMI is contributing commodities to the CHA commodity kits system (through the commodities delivered to CMS) being piloted in 2023 with Global Fund co-impact funding. The pilot will take place in 2023 in Bomi and Margibi Counties. PMI will monitor the outcomes of the pilot and consider funding future work in this area if successful.
- PMI will continue to support the LMHRA to implement its strategic plan 2021–2025. PMI will continue to support LMHRA to align the LMHRA Law with the African Union Model Law on medical products regulation. PMI will continue to support the LMHRA quality control lab Quality Management System and support strengthening the LMHRA capacity for GMP inspections and improve their maturity level on the WHO Global Benchmarking Tool.
- PMI will continue to support post-market surveillance of malaria commodities in as many counties as possible; it will further investigate the scope and breadth of the diversion of malaria commodities and will establish interventions to address the

diversion of malaria commodities to the medicine stores and open markets, working with local law enforcement, and the office of the inspector general as needed.

- PMI will continue to support Global Pharmaceuticals Ltd. in GMP and dossier compilation to enhance production of quality assured medicines of public health importance, including antimalarials, obtain marketing authorization at the regional levels, and progress towards WHO prequalification.
- PMI will provide support to improve transparency and accountability in the supply chain by working with community service organizations and community radio stations to raise awareness of commodity diversion and that malaria commodities are free in public facilities.

6. Malaria Vaccine

6.1. PMI Goal and Strategic Approach

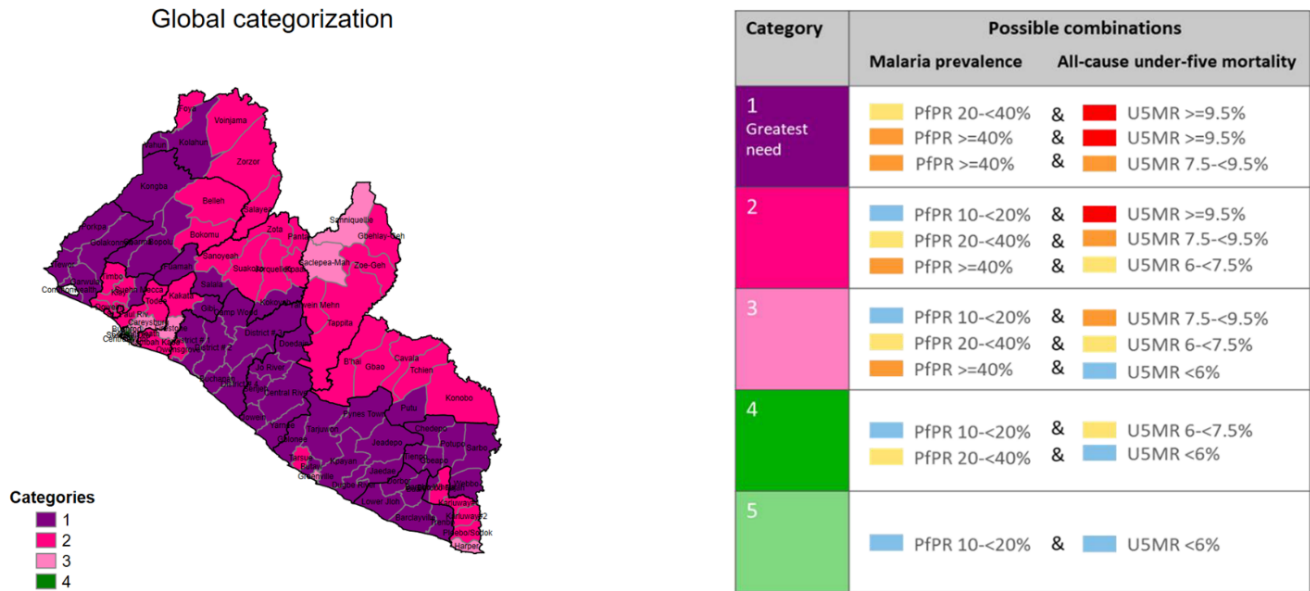
Objective two of the National Strategic Plan (NSP; 2021–2025) aims to reduce malaria case incidence by at least 75 percent (95/1,000 population) compared to 2016 level (380/1,000 population) by the end of 2025. The plan strives to ensure that at least 25 percent of children under two years using EPI services are protected with appropriate IPTi3 and malaria vaccine, where applicable. With the approval of RTS,S/AS01 by WHO in 2021, the NMCP began working with partners to achieve the result under the objective.

PMI Liberia contributes towards implementation of all strategic objectives in the NSP and has been involved in all stages of the malaria vaccine proposal application process. PMI support will be focused on demand generation and monitoring and evaluation of malaria vaccine introduction. PMI investments will complement USAID MCHN funding for EPI as well as funds from World Bank, Gavi, and the Global Fund. Malaria vaccine introduction will be led collaboratively by EPI and the NMCP with technical support from WHO, UNICEF and USAID. The roll out of the malaria vaccine is expected to commence in February 2024.

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

Following the recommendation of use of the RTS,S/AS01 malaria vaccine by the WHO in October 2021, Liberia held stakeholder consultations to gauge interest and garner support for introducing the malaria vaccine. In August 2022, Liberia submitted an expression of interest (EOI) to Gavi to introduce the malaria vaccine. The Liberia NMCP participated at the WHO-Gavi organized Malaria vaccine workshop in Accra, Ghana in September 2022. During the meeting, the country provided required routine data which guided the development of a roll out plan based on the WHO Framework for Allocation of limited vaccine supply. On January 4, 2023, Gavi invited Liberia MOH to apply for the RTS,S malaria vaccine, and the application was submitted on January 17, 2023. The application review was successful and the Independent Review Committee (IRC) approval of the RTS,S vaccine was received on April 6, 2023. The approved grant of \$100,000 will target 44,984 children to be vaccinated in 48 districts across the country.

Figure 7. Map of Malaria Vaccine Plans in Liberia



6.3. 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.

The malaria vaccine will be deployed in health facilities to infants at 5, 6, 7, and 17 months of age as a part of routine EPI service delivery and complemented by periodic intensification of routine immunization activities. Liberia plans to introduce the malaria vaccine in 48 districts that have the highest burden of malaria, beginning at the start of calendar year 2024. PMI supports malaria program implementation in all the districts. Beginning in FY 2023, PMI funding will be used on demand generation for parents and to provide supportive supervision to health care workers who provide the malaria vaccine in some districts. All malaria vaccine procurement will be supported by UNICEF with Gavi funding. New surveillance, monitoring, and evaluation (SM&E) investments will focus on monitoring malaria vaccine implementation and evaluation. Additional funding in FY 2024 will be provided for monitoring vaccine implementation including evaluation and continuing mobilization and messaging on the malaria vaccine.

Please see the SBC section for details on the challenges and opportunities to improve malaria vaccine introduction and demand generation for parents.

7. Social and Behavior Change

7.1. PMI Goal and Strategic Approach

PMI's goal is to support the NMCP's SBC to reach its stated 2021-2025 strategic plan objectives. PMI strategic approaches for this support include: 1) capacity strengthening; 2) design and implementation; 3) coordination with service delivery; and 4) monitoring and evaluation (M&E) at all levels of the health care system. PMI supports capacity-strengthening efforts related to the design, implementation, monitoring, and evaluation of SBC activities. Capacity-strengthening activities are directed toward NMCP staff and subnational health staff, implementing SBC activities at national, county, district, and community levels.

PMI's SBC support is currently achieved through data driven coordinated communication and non-communication interventions deployed across 12 of the 15 Liberian counties. The remaining three counties are supported by the Global Fund and World Bank. PMI support prioritized the three behaviors below:

1. Improving access and maintaining use and care of ITNs,
2. Addressing missed opportunities for IPTp and increasing ANC attendance, and
3. Prompt care-seeking for fever for children under five years of age.

Through partnerships with county and district health teams, local media organizations, community-based organizations, community advocacy leaders, and health facility and community-based service providers, PMI supports the NMCP's efforts for advocacy, community awareness, and community mobilization aimed at increasing correct and consistent ITN use and care, prompt care-seeking for fever, increasing malaria testing before treatment above 95 percent, and improving IPTp coverage. PMI support also targets service providers at health facilities and in the community to improve provider adherence to guidelines and protocols, including guidance on IPTp and MIP. At the county and district levels, PMI continues to support the implementation of the national SBC Strategy to address local contexts, develop work plans and materials, and support partner coordination efforts.

PMI support for SBC targets several audiences that include policy makers, county administrators, facility- and community-based service providers, community leaders, and the community as a whole. PMI supports several communication channels, including mass and social media, community dialogue, and interpersonal communication.

7.2. Recent Progress (between January 2022 and December 2022)

- Supported implementation of the SBC strategy at the national and subnational levels, including:
 - Interpersonal counseling and communication (IPCC) targeting health workers to test before treatment, complying with malaria test results, rational use of ACTs, and addressing missed opportunities for IPTp and ITNs. These activities included training 305 providers across and 36 master trainers on IPC for MIP across ten

- districts in 2022. The remaining two districts (Bong and Bomi) were trained in early 2023.
- IPCC and group health education sessions for clients at health facilities in ten districts, targeting ANC, malaria testing and treatment, and IPTp.
 - House-to-house and outreach visits by CHAs and CHVs using SBC materials (print) to engage with communities and provide health education and risk communication in 12 counties.
 - Town hall meetings with communities and monthly advocacy and sensitization meetings by the 12 CHTs targeting local leaders and change agents (youth, women, teachers, religious leaders, and traditional healers).
 - Extended airing of SBC messages on numerous nationwide radio stations and mass and social media.
- Supported the NMCP and CHTs in planning, implementation, coordination, and monitoring of SBC activities. This included support for the Malaria Communication cluster call, which includes the country malaria focal person and health promotion focal person from 12 counties.
 - In collaboration/partnership with the UL-PIRE, completed drafting the first Liberia Malaria Behavior Survey (MBS) report which includes data from six counties (Lofa, Bong, Nimba, Montserrado, Grand Bassa, and Margibi) and Greater Monrovia. This MBS report will provide baseline information and will inform the update of the SBC strategy and programming.
 - Supported the distribution of job aid posters for case management and malaria in pregnancy in the 12 counties. These SBC materials contain images and text promoting malaria indicators on the following:
 - IPTp,
 - ITN use, and
 - Testing for malaria prior to receiving treatment.
 - Supported efforts to address service providers behavior and bias in adherence to NMCP guidelines. Testimonial videos were prepared in collaboration with CHTs.
 - Supported county-led SBC component of the school-based ITN distribution in 723 schools within 12 educational districts in Nimba County (Tappita District 1 & 2, Zoe –geh, Buu-Yao District, Gbeh, Twah River, Saclepea 1 & 2, and Yarwhien-Mehnsoneh Education District, Garr 1 and 2; and Sanniquellie-mah) and 456 schools within nine educational districts in Bong County (Gbarnga 2 Sanoyea, Fuamah, Zota, Kpanta Pah, Suacoco, and Kokoyah and Salala).
 - Printed and disseminated 1,263 brochures on net use, and 1,263 student pledges, as well as 1,263 frequently asked questions (FAQ), and 2,526 mini drama case scenarios, plus six school-based net campaign banners for 317 targeted schools in Bong and Nimba Counties.
 - Completed and disseminated a costing exercise for the National Malaria SBC Strategy (2021–2025).

In addition, Liberia continues to face the following challenges that require greater SBC investments to improve the uptake and/or maintenance of priority behaviors.

- ITNs: MIS results showed improvements in access, however, access was uneven. MIS also showed some improvement in use of ITNs; however, some data showed that despite recent programming, some misunderstanding on proper care and use of nets persisted. Using SBC approaches for demand creation to improve access, consistent use, and proper care of the net through available channels will contribute to achieving national targets.
- MIP: PMI in collaboration with the University of Liberia School of Public Health assessed the barriers to IPTp3 uptake, and, from the client perspective, identified high ANC dropout rates and lack of knowledge on ANC hours of operation and the purpose/benefits of IPTp as major barriers. These barriers can be addressed in part through SBC approaches.
- Case Management: PMI is supporting the use of targeted SBC approaches for service providers and clients to promote early fever care-seeking to reduce severe cases and to reduce the probability for self-medication and risk of taking ACTs without obtaining test results. Provider adherence to treatment guidelines also remains a challenge.
- Service Delivery: The MBS data identifies issues associated with both clients and providers behavior toward care-seeking and provision of care. With PMI's support, these results will be used to support SBC activities directed to improving service provider behaviors including addressing service providers bias, improving interpersonal communication and counseling skills, improving empathy toward clients, and improving adherence to national malaria guidelines.

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.

Liberia is implementing an integrated SBC portfolio with funding from various USAID funding streams that include PMI, MCH, population and reproductive health, water, sanitation and hygiene and global health security agenda; as well as funding from other donors, especially the Global Fund and World Bank for the three World Bank-supported counties.

Priorities

PMI supports the NMCP with the planning, design, and implementation of SBC interventions that promote the uptake and maintenance of all key malaria activities, the following behaviors will be prioritized with FY 2024 funds:

1. Improving demand, care, and sustained use of ITNs for all nets distributed through mass campaigns and routine health facility-based and school-based ITN programs,
2. Improved provider adherence to malaria testing and treatment guidelines, and
3. Improving health care-seeking at community level, including demand generation for the malaria vaccine.

Activities will focus on working with service providers and with the community to address health worker attitude, practice, and missed opportunities for IPTp and ITNs for pregnant women; to improve provider adherence to malaria testing and treatment guidelines and community early health-seeking behaviors; and reduce presumptive treatment of malaria. Various communication channels will be used depending on the target audience.

With the planned introduction of the malaria vaccine in 2024, PMI will also support SBC for mobilization and messaging around vaccine roll out and demand generation.

Table 3. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Improving demand, care, and sustained use of ITNs for all nets distributed through mass campaigns and routine health facility-based and school-based ITN programs	Community, community leaders, pregnant women, teachers, students, caretakers of children, health workers at ANC, delivery, and EPI sites	All PMI partner counties	Support technical assistance for the implementation of SBC activities for ITNs distributed through various channels, including mass campaign nets and nets distributed through continuous distribution channels. This will include population specific messaging, dramas and radio clubs, and other approaches as appropriate.
Improving provider adherence to malaria testing and treatment guidelines	Health care providers, community health workers	All PMI partner counties	Support provider behavior change activities to improve provider adherence to malaria testing and treatment guidelines at all levels of the health system, especially focusing on only providing treatment to patients with confirmed malaria. This will include IPCC targeting health workers at all levels of the health system.
Improving health care-seeking at community level, including demand generation for the malaria vaccine	Community, community leaders, caretakers of children, community health workers, health workers, and other service providers	All PMI partner counties	Support CHAs and CHVs to conduct health education and communicate the risks associated with late health seeking. Technical assistance to NMCP, implementing partners, and MOH Health Promotion and Community Health Units to provide guidance and oversight for SBC activities, including support for SBC coordination meetings at the central and county levels. Support for mobilization and messaging around the malaria vaccine, which will also incorporate other malaria prevention/control messages, such as the importance of prompt care seeking and ITN use.

ANC: antenatal care; CHA: community health assistant; CHV: community health volunteer; EPI: Expanded Program on Immunization; IPCC: interpersonal counseling and communication; ITN: insecticide-treated mosquito net; NMCP: National Malaria Control Program; MOH: Ministry of Health.

Additional Support Activities:

The MBS was conducted in 2021 and the report is currently under review. The results of this survey will be used to inform strategic approaches and SBC data collection in FY 2024.

FY 2024 funding will also be used to bolster capacity for SBC design, implementation, monitoring, and evaluation through the following activities:

- Coordinate SBC activities at the national and county levels through targeted support to improve the effectiveness of the SBC Technical Working Group;
- Develop the capacity of NMCP to use data for SBC programming and streamline SBC indicators for the 2021–2025 National Strategic plan.
- Support county-specific SBC focal persons to increase coordination and ensure the effect of SBC investments; strengthening capacity of key players and stakeholders for effective SBC design, implementation, and evaluation; and capacity building for NMCP staff on the use of data from operational studies to inform SBC program priorities and strategies.
- Review the National Malaria SBC Strategy to include results from the MBS, MIS, ITN durability monitoring, and other operational research, develop and operationalize SBC materials to support priority behaviors like: ITN access and use, improve IPTp3+ coverage, testing correctly before treatment among providers, and early care-seeking for fever. PMI will support the dissemination and implementation of the National Malaria SBC Strategy at all levels.
- Support the NMCP and the Health Promotion Division to use the results from the MBS, MIS and other performance evaluations to revise malaria SBC messages and materials (audio, social media, and interpersonal communication).
- Support SBC for ITNs distributed through various channels, including mass campaign nets and nets distributed through continuous distribution channels.
- Improve service providers' behaviors, to include addressing service provider's bias before, during and after seeking care for malaria prevention and treatment services. Improve interpersonal communication and counseling skills to improve empathy towards patients.
- Support NMCP to ensure availability and proper use of malaria SBC tools (malaria counseling tools, job aids, talking points for health talks, etc.) in all supported facilities.

8. Surveillance, Monitoring, and Evaluation

8.1. PMI Goal and Strategic Approach

PMI Liberia supports Objective 3 of the Liberia NSP 2021–2025: strengthened and improved surveillance system with quality data and information products to drive decision-making, as well as operational research to bridge implementation gaps. PMI and the NMCP have prioritized interventions to strengthen routine systems that include printing of data collection tools, training and mentoring on data management, support for data collection, improving data

quality through quarterly data review meetings, and data use at each level of the healthcare system, like production of quarterly bulletins.

8.2. Recent Progress (between January 2022 and December 2022)

PMI supported the following activities at the central level:

- Targeted technical expertise by PMI Team and PMI-funded implementing partners to strengthen NMCP SM&E capacity that included training and mentoring, review and analysis of malaria data, and printing of registers.
- The 2022 MIS, including planning, protocol development, field work and preliminary reporting.
- Central coordination of all surveillance related activities for entomological monitoring, therapeutic efficacy studies at two sites, two EUV surveys, MBS, Client Satisfaction Survey for Community health programs. These guided decisions on malaria control at the subnational level.
- Technical assistance to MOH to develop the Master Facility Registry, which serves as a registry of facilities.
- Improved data availability for the stratification of districts for malaria vaccine application
- Procured seven computers to support health data management at the NMCP(5), Health Monitoring, Evaluation and Research Unit of MOH(2).

PMI supported the following activities at the County and District levels:

- 12 CHTs to conduct quarterly JISS visits to 804 health facilities.
- Quarterly Program Review Meetings in 12 counties in collaboration with G2G Team that included malaria data quality review.
- Logistics support including procurement of 23 computers to M&E units in five counties (Bomi, Bong, Grand Cape Mount, Margibi, and River Gee) and internet data bundles for data entry into DHIS2 at county and district levels.

PMI supported the following activities at the health facility level:

- Distribution of 19,704 HMIS forms to 821 health facilities in 12 counties for data collection
- Data quality assessments in 104 health facilities (25 percent) in the 12 supported counties.
- Procured five computers for strengthening data management and reporting to the JFK Hospital, a referral hospital in Montserrado County.
- Mentoring of health facility staff on challenging data reporting on ANC register and IPTp; laboratory register and mRDT/microscopy; and confirmed malaria.
- Production of job aids and algorithms to be distributed to 408 health facilities to improve triangulation of service and logistics data as part of data quality improvement.
- Provision of a reusable health facility indicator wall chart to 400 health facilities to improve data analysis and use.

Challenges

- Stockout of data tools: Due to funding gaps resulting from nearly one year of delayed implementation of Global Fund malaria and health systems grants, there were reported stockout of registers and forms at health facilities, leading other partners to conduct an emergency printing of tools.
- Weak Coordination: The internal and external coordination framework (operationalized through technical working groups and national review meetings) at the NMCP were absent for an extended period due in part to the pause in Global Fund funding resulting in gaps in program decisions.
- Funding gap: Inadequate funding for SM&E activities in three counties supported through the World Bank affected NMCP's ability to provide oversight and conduct monitoring of activities.
- Implementation gaps: Gaps in funding activities during the period of the Global Fund audit impacted timely implementation of activities planned including the recently concluded MIS.

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 Liberia will continue to support SM&E activities with the following changes:

- HMIS strengthening with a focus to improving data quality at health facilities and community levels. The revised NCHP Policy has expanded the age group for case management of malaria in the community to 13 years. This policy change will require revision/updating of the tools, re-training of data managers, and changes to the DHIS2 reporting platform. PMI will work with the NMCP and the MOH to make the changes.
- With the introduction of the malaria vaccine, and the need for HMIS strengthening activities across select districts, PMI plans to expand surveillance strengthening activities to include the three World Bank supported counties. This will require an additional budget for vaccine program evaluation.

With FY2024 funding, PMI will continue to support the following:

- Routine malaria surveillance: Ongoing routine surveillance activities and special surveys (e.g., routine data collection and transmission through DHIS2 from counties to the national HMIS, annual EUV across the country, etc.)
- Data quality assurance and supportive supervision with the MOH to improve DHIS2 data reporting. This activity will be addressed jointly with the Global Fund.
- Continue to promote data review meetings at county, district and health facility levels to promote quality data collection, recording, aggregation, presentation and data use.
- Training/retraining and mentoring M&E officers, data clerks, and malaria focal persons mainly at health facilities and districts in all 15 counties.
- Conduct the 2025 DHS. PMI will support the NMCP to include malaria biomarkers in the DHS, especially to assess the 2024 mass campaign and malaria vaccine introduction.

Table 4. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic Health Survey	X					P ⁺
Household Surveys	Malaria Indicator Survey			X			
Household Surveys	Multiple Indicator Cluster Survey						
Household Surveys	Expanded Program on Immunization survey						
Health Facility Surveys	Service Provision Assessment						
Health Facility Surveys	Service Availability Readiness Assessment survey						
Health Facility Surveys	Other Health Facility Survey		X [*]				
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies			X		P	
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System						
Malaria Surveillance and Routine System Support	Support to Health Management Information System	X	X	X	X	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response		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	X	P	P	P
Other	School-based Malaria Survey						

Other	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey			X			
Other	Malaria Impact Evaluation						
Other	Entomologic Monitoring Surveys	X	X	X	X	P	P

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

†Denotes plan to add malaria biomarkers (mRDT and microscopy) into DHS

9. Operational Research and Program Evaluation

The NMCP Surveillance, Monitoring, Evaluation, and Operational Research unit is responsible for planning and conducting studies in collaboration with other NMCP focal points and partners. The NSP emphasizes strengthening and improvement of national surveillance system data quality to drive decision making and using research to bridge implementation gaps. The NMCP aims to contribute to strengthening malaria epidemiology.

The NMCP, MOH, PMI, and other partners plan to maintain an inventory of operations research (OR)/program evaluation (PE) activities, which will be updated annually and used to set an annual research agenda. PMI will provide technical assistance to identify priority topics.

9.1. Recent Progress (between January 2022 and December 2022)

From January 2022 to December 2022, PMI and the NMCP have been supporting the following PE activities:

- Assessment of barriers to the uptake of the IPTp services in ANC settings (MOP FY 2019 funding): PMI worked with University of Liberia School of Public Health to conduct this study. This study has been completed and a final report was released in 2022.
- MBS (MOP FY 2019 funding): PMI worked with the University of Liberia-Pacific Institute for Research and Evaluation (UL-PIRE) to conduct this study. Data collection is completed and cleaning is under way. The draft report will be available in 2023.

Table 5. PMI-funded Operational Research/Program Evaluation Studies in Liberia

Recently Completed OR/PE Studies	Status of Dissemination	Start date	End date
IPTp barrier study at ANC setting	Final report validated, dissemination any time from now	10/2021	11/2022
Malaria Behavior Survey	Drafted report to be finalized any time from now	2021	TBD
Ongoing or Planned OR/PE Studies	Status	Start date	End date
Assessment of quality and safety of malaria rapid diagnostic testing performed by community health assistant and primary health workers	Currently revising the concept note for this activity and exploring the best time frame for implementation. The previously submitted concept note will be updated and resubmitted for PMI OR Committee review.	mid-2024	2025

ANC: antenatal care; IPTp: intermittent preventive treatment during pregnancy; OR: operations research.

Table 6. Non-PMI funded Operational Research/Program Evaluation Studies Planned/Ongoing in Liberia

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
N/A	N/A	N/A	N/A

9.2. 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

The Liberia NSP 2021–2025 aims to provide effective management of the malaria control program by strengthening and maintaining NMCP capacity for program management, coordination, and partnership. To achieve this objective, NMCP leadership encourages opportunities to improve the quality and performance of staff, particularly in terms of managerial, supervisory, and technical capacity.

PMI's own Strategic Plan 2021-2026 mirrors the aims and objectives of the MOH and the NMCP. PMI provides support and technical assistance at both the central level as well as to the 15 counties through support to the CHTs. The support in health systems strengthening (HSS) that PMI provides to the Government of Liberia is broad. PMI staff and partners offer an array of activities that cut across intervention areas, such as strengthening in-service training of health workers, supply chain management, health information systems, and regulation of health services and pharmaceuticals. PMI also offers opportunities for capacity strengthening of the NMCP, other relevant MOH departments, and CHTs. This includes bolstering supervisors to monitor and improve the quality of malaria interventions in the health system.

PMI supports strengthening NMCP relationships with various MOH units and agencies such as the National Public Health Institute of Liberia, and LMHRA. Other local Liberian organizations that support public health and malaria control activities, such as Liberian Institute for Biomedical Research, Mother Pattern College of Health Sciences, and the University of Liberia School of Public Health, are included. Except for the use of IRS, PMI, Global Fund, and the World Bank together support all 15 counties to include all core interventions. The World Bank currently uses performance-based financing to support CHTs in Gbarpolu, River Cess, and Sinoe Counties. In the remaining 12 counties, PMI uses implementing partners and G2G support for HSS activities, malaria case management, and MIP activities. To ensure efficiencies, PMI supports HSS and staff capacity building via integration with non-malaria health services such as family planning, maternal, neonatal, child, and adolescent health, and nutrition. The PMI team, NMCP and partners have mapped out and updated where partner and donor activities occur by county to improve coordination and avoid duplication of efforts. Through these efforts, PMI and partners will not just strengthen the capacity of health systems, but also capacitate patients and caregivers to prevent malaria and seek care promptly upon suspicion of malaria.

10.2. Recent Progress (between January 2022 and December 2022)

Over the 12-month period of January 2022 to December 2022, PMI had ensured growth in local malaria control capacity through training and supervision of staff, administrative and management skill development, and partnering with PMI staff and implementing partners in a wide array of technical assistance.

Since the 2019 CHT capacity assessment, PMI has continued to support HSS and capacity-building activities tailored to each county based. As discussed in previous sections, PMI supported training and mentoring on the use of eLMIS and the improvements in DHIS2 that resulted in updating and modifying the HMIS reporting tools and registers to address PMI and NMCP reporting needs. PMI continued to print new registers for improved DHIS2 data capture, printing updated guidelines and job aids for public and private hospitals, improved malaria case management for facility-based health care through training and supervision.

PMI and other mission funds built off previous support for the NMCP and CHTs with health financing capacity development. Management and accounting for public funds has improved, especially with funds for G2G malaria service delivery. With COVID-19 prevalence decreasing, Peace Corps volunteers focusing on health and education are expected to return to Liberia in June 2023 to work on malaria control.

PMI resident advisors have spent more time at the NMCP office space on the MOH compound given improved office space co-used by the EPI program. PMI supported the furnishing of the new office and provided information technology equipment and supplies for optimal office operation. Reprogramming of previous fiscal year funds will allow for further contribution of dedicated NMCP office space allowing for greater collaboration between PMI and NMCP staff.

PMI has continued to provide targeted technical assistance and capacity development to the NMCP and CHTs. From data collection visits for durability monitoring, to performing interviews and data collection for the therapeutic efficacy surveys, to working on the malaria indicator survey, to having virtual entomological technical support for local Liberian technicians, PMI staff has worked side by side with Liberian health officials to provide technical skill development. PMI also provided annual support for coordination meetings, site visits to all 15 counties, and annual NMCP program review meetings.

PMI funded NMCP staff attendance at the American Society of Tropical Medicine and Health conference in Seattle, Washington in November 2022 and provided technical comments on posters presented at the conference. PMI also supported meetings with both the NMCP and the Health Care Federation of Liberia to develop their capacity for coordination of the private sector under the new malaria private sector engagement strategy.

PMI staff proposed FETP opportunities for NMCP and CHT staff. These public health trainings in malaria SM&E will be at both frontline and intermediate levels for capable and interested staff. These funds will help to develop the capacities of the NMCP and CHTs in malaria SM&E.

10.3. Plans and Justification with FY 2024 Funding

The [FY 2024 funding tables](#) contain a full list of capacity strengthening activities that PMI proposes to support.

PMI will continue to support capacity-strengthening activities as described in the Recent Progress section. In addition, PMI will support training on malaria control when Peace Corps volunteers return to Liberia in June 2023. The support will target educating school-age children and teenagers on malaria prevention, mobilizing students and teachers for the school-based ITN distribution, and educating communities to use the nets properly and to search early for health care when they fall sick. PMI will support three malaria Peace Corps volunteers and provide support for malaria education activities carried out by other volunteers.

PMI will continue to provide targeted technical assistance and capacity development to the NMCP and CHTs. FY 2024 funds will be used to support the coordination meetings, site visits to all 15 counties, and annual NMCP program review meetings. PMI will also continue to fund NMCP staff technical capacity-building including attendance at international meetings, conferences, and training courses. PMI staff will continue to support collaboration in preparing posters, manuscripts, and presentations related to these conferences and journal submissions. PMI and the NMCP will also support Health Care Federation coordination to ensure greater contribution of private sector service providers. PMI will work with the NCMP to provide technical oversight and review of Rotary club proposals/projects of malaria control in Liberia.

PMI will support more FETP-frontline and intermediate courses to develop the capacities of the NMCP and CHTs in malaria SM&E. FETP intermediate is a nine-month course for those ready for this position. The FETP-frontline targets district, county and national-level health officials to strengthen epidemiologic capacity for health programs. PMI plans to support three Liberian health officials in FETP frontline training and up to two in intermediate. The selected NMCP and CHT officials will participate in a three- and nine-month training course with both in-class training and practical field opportunities. PMI proposes to train five NMCP and county health officials in FETP with FY2024 funding.

PMI will continue to ensure local participation and skills development during PMI HQ-lead technical assistance visits such as supply chain reviews at the central medical warehouse and county depots, program evaluation site visits, and entomological trainings at the Liberian Institute for Biomedical Research.

11. Staffing and Administration

A minimum of three health professionals oversee PMI. The single interagency team led by the USAID Mission Director or their designee consists of resident advisors representing USAID and CDC, and one or more 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 of 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	4,748,341	4,848,056	4,949,865
Total population at risk for malaria	4,748,341	4,848,056	4,949,865
PMI-targeted at-risk population	4,748,341	4,848,056	4,949,865
Population targeted for ITNs	4,748,341	4,848,056	4,949,865
Continuous Distribution Needs			
Channel 1: ANC	237,417	242,403	247,493
Channel 1: ANC Type of ITN	Dual AI	Dual AI	Dual AI
Channel 2: EPI	0	0	15,000
Channel 2: EPI Type of ITN	Dual AI	Dual AI	Dual AI
Channel 3: School	100,000	0	100,000
Channel 3: School Type of ITN	Dual AI	Dual AI	Dual AI
Channel 4: Community	0	0	0
Channel 4: Community Type of ITN			
Channel 5: Institutional Delivery (childbirth)	237,417	242,403	247,493
Channel 5: Type of ITN	Dual AI	Dual AI	Dual AI
Estimated Total Need for Continuous Channels	574,834	484,806	609,987
Mass Campaign Distribution Needs			
Mass distribution campaigns	0	3,093,479	0
Mass distribution ITN type	Dual AI	Dual AI	Dual AI
Estimated Total Need for Campaigns	0	3,093,479	0
Total ITN Need: Continuous and Campaign	574,834	3,578,285	609,987
Partner Contributions			
ITNs carried over from previous year	43,150	118,716	118,910
ITNs from Government	0	0	0
Type of ITNs from Government			
ITNs from Global Fund	0	3,093,479	0
Type of ITNs from Global Fund		Dual AI	
ITNs from other donors	0	0	0
Type of ITNs from other donors			
ITNs planned with PMI funding	650,400	485,000	500,000
Type of ITNs with PMI funding	Dual AI	Dual AI	Dual AI
Total ITNs Contribution Per Calendar Year	693,550	3,697,195	618,910
Total ITN Surplus (Gap)	118,716	118,910	8,924

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

Table A-2. Rapid Diagnostic Tests Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	4,748,341	4,848,056	4,949,865
Population at risk for malaria	4,748,341	4,848,056	4,949,865
PMI-targeted at-risk population	4,748,341	4,848,056	4,949,865
RDT Needs			
Total # of projected suspected malaria cases	1,540,327	1,432,504	1,332,229
% of suspected malaria cases tested with an RDT	100%	100%	100%
RDT Needs (tests)	1,540,327	1,432,504	1,332,229
Needs Estimated based on HMIS Data	1,540,327	1,432,504	1,332,229
Partner Contributions (tests)			
RDTs from Government	0	0	0
RDTs from Global Fund	0	0	0
RDTs from other donors	0	0	0
RDTs planned with PMI funding	1,050,000	1,900,000	1,500,000
Total RDT Contributions per Calendar Year	1,050,000	1,900,000	1,500,000
Stock Balance (tests)			
Beginning Balance	1,192,250	701,923	1,169,418
- Product Need	1,540,327	1,432,504	1,332,229
+ Total Contributions (received/expected)	1,050,000	1,900,000	1,500,000
Ending Balance	701,923	1,169,418	1,337,189
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	770,164	716,252	666,115
Total Surplus (Gap)	(68,241)	453,166	671,074

HMIS: health management information system

Table A-3. ACT Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	4,748,341	4,848,056	4,949,865
Population at risk for malaria	4,748,341	4,848,056	4,949,865
PMI-targeted at-risk population	4,748,341	4,848,056	4,949,865
ACT Needs			
Total projected # of malaria cases	831,777	759,227	692,759
Total ACT Needs (treatments)	831,777	759,227	692,759
Needs Estimated based on HMIS Data	831,777	759,227	692,759
Partner Contributions (treatments)			
ACTs from Government	0	0	0
ACTs from Global Fund	719,010	0	TBD
ACTs from other donors	0	0	0
ACTs planned with PMI funding	1,136,280	500,000	250,000
Total ACTs Contributions per Calendar Year	1,855,290	500,000	250,000
Stock Balance (treatments)			
Beginning Balance	272,070	1,295,583	1,036,356
- Product Need	831,777	759,227	692,759
+ Total Contributions (received/expected)	1,855,290	500,000	250,000
Ending Balance	1,295,583	1,036,356	593,597
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	415,888	379,614	346,380
Total Surplus (Gap)	879,695	656,742	247,217

ACT: Artemisinin-based Combination Therapy

Table A4. Injectable Artesunate Gap Analysis Table

Calendar Year	2023	2024	2025
Injectable Artesunate Needs			
Projected # of severe cases	58,224	45,554	34,638
Projected # of severe cases among children	46,579	36,443	27,710
Average # of vials required for severe cases among children	4	4	4
Projected # of severe cases among adults	11,645	9,111	6,928
Average # of vials required for severe cases among adults	8	8	8
Total Injectable Artesunate Needs (vials)	279,477	218,657	166,262
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government	75,000	0	0
Injectable artesunate from Global Fund	284,376	0	TBD
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	0	75,000	100,000
Total Injectable Artesunate Contributions per Calendar Year	359,376	75,000	100,000
Stock Balance (vials)			
Beginning Balance	206,601	286,500	142,843
- Product Need	279,477	218,657	166,262
+ Total Contributions (received/expected)	359,376	75,000	100,000
Ending Balance	286,500	142,843	76,580
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	139,738	109,329	83,131
Total Surplus (Gap)	146,762	33,514	(6,551)

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)	23,290	18,221	13,855
Total Artesunate Suppository Needs (suppositories)	5,000	5,000	5,000
Needs Estimated based on # of providers offering pre-referral services			
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	5,500	0	0
Total Artesunate Suppositories Available	5,500	0	0
Stock Balance (suppositories)			
Beginning Balance	192	692	0
- Product Need	5,000	5,000	5,000
+ Total Contributions (received/expected)	5,500	0	0
Ending Balance	692	(4,308)	(5,000)
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	2,500	2,500	2,500
Total Surplus (Gap)	(1,808)	(6,808)	(7,500)

RAS: rectal artesunate suppository.

Table A-6. SP Gap Analysis Table

Calendar Year	2023	2024	2025
Total Country Population	4,748,341	4,848,056	4,949,865
Total Population at Risk for Malaria	4,748,341	4,848,056	4,949,865
PMI Targeted at Risk Population	4,748,341	4,848,056	4,949,865
SP Needs			
Total # of Pregnant Women	237,417	242,403	247,493
% of pregnant women expected to receive IPTp1	100%	100%	100%
% of pregnant women expected to receive IPTp2	80%	80%	90%
% of pregnant women expected to receive IPTp3	65%	70%	75%
% of pregnant women expected to receive IPTp4	60%	66%	69%
Total SP Needs (doses)	724,122	765,993	826,628
Needs Estimated based on a Combination of HMIS and Consumption Data			
Partner Contributions (doses)			
SP from Government	0	0	0
SP from Global Fund	0	0	0
SP from other donors	0	0	0
SP planned with PMI funding	326,133	1,050,000	600,000
Total SP Contributions per Calendar Year	326,133	1,050,000	600,000
Stock Balance (doses)			
Beginning balance	433,133	35,145	319,152
- Product Need	724,122	765,993	826,628
+ Total Contributions (Received/expected)	326,133	1,050,000	600,000
Ending Balance	35,145	319,152	92,524
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	362,061	382,996	413,314
Total Surplus (Gap)	(326,916)	(63,845)	(320,789)

HMIS: health management information system; IPTp: Intermittent preventive treatment of women during pregnancy; SP: Sulfadoxine-pyrimethamine.