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Liberia

Malaria Operational Plan FY 2022

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

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

CONTENTS

ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AI	Active ingredient
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BMGF	Bill & Melinda Gates Foundation
CDC	U.S. Centers for Disease Control and Prevention
CHA	Community health assistant
CHSS	Community health services supervisor
CHT	County health team
CHW	Community health worker
CMS	Central Medical Stores
CY	Calendar year
DHIS2	District Health Information System 2
DHS	Demographic and Health Survey
DOT	Directly observed therapy
DPS	Department of Pharmaceutical Services
EPI	Expanded Program on Immunization
EUV	End Use Verification survey
FARA	Fixed Amount Reimbursement Agreement
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GOL	Government of Liberia
HMIS	Health management information system
HSS	Health system strengthening
iCCM	Integrated Community Case Management
IRS	Indoor residual spraying
JISS	Joint Integrated Supportive Supervision
IPTi	Intermittent preventive treatment in infants
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
IVM	Integrated vector management
KAP	Knowledge, attitude, and practice
LIBR	Liberian Institute of Biomedical Research
LLIN	Long-lasting insecticide-treated net
LMA	Logistics management advisor
LMHRA	Liberia Medicines and Health Products Regulatory Authority
LMIS	Logistics management information system
M&E	Monitoring and evaluation
MBS	Malaria Behavior Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey

MOH	Ministry of Health
MOP	Malaria Operational Plan
NMCP	National Malaria Control Program
NPHIL	National Public Health Institute of Liberia
NSP	National Strategic Plan
OR	Operational research
PCR	Polymerase chain reaction
PE	Program evaluation
PMI	U.S. President's Malaria Initiative
RDT	Rapid diagnostic test
SBC	Social and behavior change
SDP	Service delivery point
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal malaria chemoprevention
SMEOR	Surveillance, monitoring, evaluation, and operational research
SP	Sulfadoxine-pyrimethamine
TA	Technical assistance
TES	Therapeutic efficacy study
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Liberia to end malaria. PMI has been a proud partner of Liberia since 2008, helping to decrease child mortality rates by 21 percent from 42 to 33 deaths per 1,000 live births from 2013 to 2019–2020, respectively (Demographic and Health Survey [DHS] 2019–2020) through investments totaling almost $203 million.

The proposed PMI fiscal year (FY) 2022 budget for Liberia is $13.5 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Liberia using FY 2022 funds. Developed in consultation with the National Malaria Control Program (NMCP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on investments made by the Government of Liberia as well as other donors and partners.

Malaria is endemic in Liberia with continuous transmission throughout the year. In 2020, the principal malaria parasite was *Plasmodium falciparum (Pf)* at 95 percent of human *Plasmodium* collected. The principal vector is *Anopheles gambiae s.l.* The 2018 Health Facility Survey found that malaria remained the leading cause of morbidity and mortality, accounting for 34 percent of all outpatient consultations and 48 percent of all inpatient cases. Children under five years of age accounted for 35 percent of all malaria cases and 34 percent of inpatient deaths. The Malaria Indicator Survey 2016 (MIS) showed a malaria prevalence of 45 percent among children aged 6-59 months, with regional variations from 12 percent in Greater Monrovia to 69 percent in South Eastern B region. During the last two years (2019 & 2020) the total number of reported confirmed malaria cases fell below one million. The estimated malaria incidence per 1,000 population decreased from 281 in 2016 to 164 in 2020 respectively (Health Management Information System [HMIS] data and United Nations [UN] population estimate), and during the same period, the malaria mortality rate in the general population decreased from 35 to 7 per 100,000 population respectively in 2016 and 2020.

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

PMI will maintain the course of planned entomological monitoring activities in 2021 and also include monitoring activities not performed in 2020 due to COVID-19. Given widespread resistance to pyrethroids, the Interceptor® G2 dual active ingredient (AI –alpha-cypermethrin and chlorfenapyr) next-generation net was selected for the upcoming mass insecticide-treated mosquito net (ITN) campaign in June 2021 and will be used for routine distribution from 2021 onwards. Mosquito vectors in Liberia are currently fully susceptible to chlorfenapyr. FY 2022 funding will be used to continue entomological monitoring, durability monitoring of nets distributed in the 2021 campaign, and procure 575,000 Interceptor® G2 dual AI ITNs for routine distribution at antenatal care (ANC), institutional deliveries, and schools.

Liberia has seen many improvements in malaria case management activities. Through PMI's work with and support of the NMCP, private sector, and local partners, prompt testing and treatment of positive cases with a quality assured artemisinin-based combination therapy (ACT) in the health facilities and the community has

grown. However, there is still a need to build and strengthen the capacity of healthcare workers through training/mentoring, especially related to full implementation of the new national strategic guidelines and new tools. FY 2022 funding will continue to build off and monitor case management activities. In calendar year (CY) 2020, Liberia adopted one first-line ACT treatment using artemether-lumefantrine (AL), and will use only AL when the current artesunate-amodiaquine (ASAQ) stock runs out in August 2021. This transition process started at least a couple years ago and has been supported by the finding of ACT adherence study and therapeutic efficacy study (TES) conducted by the NMCP. PMI will support the next TES study.

Available data shows an increasing trend of IPTp1, IPTp2, and IPTp3 coverage. The logistics management information system (LMIS) shows that SP is occasionally stocked out in some health facilities and the buffer stock at central medical stores is below the recommended nine months. The 2020 end-use verification (EUV) survey shows an average stockout of 12 percent for SP, above the target of 5 percent. PMI and the Ministry of Health (MOH) are developing a two- to three-year country-level investment plan that will meaningfully improve stockout rates for malaria products, including sulfadoxine-pyrimethamine (SP). With FY 2022 funding PMI will continue to support ANC attendance through community messaging and continued administration of intermittent preventive treatment for pregnant women (IPTp) by health workers.

Liberia still suffers from stock management challenges, particularly around ensuring timely and adequate supply to the health facilities. There are often commodities at the central level or county depots, but stockouts at the health facilities. However, on a positive note, the eLMIS has been rolled out and reporting for malaria commodities is above 90 percent. The stock data is being used to inform the resupply quantities. In recognition that the country needs a new approach to managing the supply chain, the MOH and the two major donors (USAID [including PMI] and the Global Fund) have agreed to a two-year intensive investment in mentoring and capacity-building at Central Medical Stores (CMS) from March 2021 through February 2023. PMI and the Mission health team are discussing what approach to take following the two-year period, which will be when the FY 2022 funding is available. PMI will continue funding post-market surveillance with FY 2022 funding and investigate possible diversion of commodities.

PMI support has been critical to strengthen and build national capacity (human resources and tools) to improve malaria routine surveillance (e.g., data quality, report completeness, and timeliness through District Health Information System 2 [DHIS2]/HMIS), eLMIS, and the EUV surveys. In the 12 counties receiving PMI direct technical support, routine quarterly data review meetings were organized to promote data use to guide program implementation. The number of reported confirmed malaria cases decreased from 2016 to 2020 and fell below the million cases per year during the last two years (2019 and 2020). Using FY 2021 funding, PMI will continue its support to strengthen routine surveillance and surveys, and monitoring activities at all levels of the healthcare system of Liberia. PMI will support Liberia to conduct a Malaria Indicator Survey in 2022.

PMI will continue to provide assistance to the NMCP in conducting operational research as requested and will establish working relationships with the University of Liberia School of Public Health to promote development of local capacity in program evaluation. With FY 2022 funding, PMI will support the NMCP to develop a concept note for an evaluation of the reasons for consistent low ITN access in Liberia.

PMI FY 2022 funding for social and behavior change (SBC) will focus on the prioritized three behaviors of maintaining ITN use; closing the gap of missed opportunities for IPTp3; and adhering to malaria case management guidelines. PMI will develop the capacity of the NMCP to plan, implement, and monitor SBC activities at national

and subnational level, including supporting the SBC coordinating structures at national and county level. PMI is planning to conduct a national Malaria Behavior Survey (MBS) in 2021 with FY 2019 funding. With FY 2022 funding, PMI will implement program evaluation activities including the annual knowledge, attitude, and practice (KAP) study and an assessment of low ITN access and disparities in ITN access in CY 2023.

Health systems strengthening (HSS) activities are tailored for each county based on the results of the county health team (CHT) assessment. As discussed in other sections, PMI supported training and mentoring on the use of eLMIS and supported improvements in DHIS2, including modifying registers, and supported the printing of the new registers to better capture malaria data in DHIS2. With FY 2022 funding PMI will maintain support for strengthening the program management capacity of the NMCP and PMI also plans to provide technical assistance (TA) to the MOH Health Promotion and Community Health Units to strengthen SBC messaging.

I. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Liberia to end malaria. PMI has been a proud partner of Liberia since 2008 helping to decrease the child mortality rate by 21 percent from 42 in 2013 to 33 in 2019–2020 (DHS 2019–2020) through investments totaling almost $203 million.

The proposed PMI fiscal year (FY) 2022 budget for Liberia is $13.5 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Liberia using FY 2022 funds. Developed in consultation with the national malaria control program (NMCP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Liberia (GOL) as well as other donors and partners.

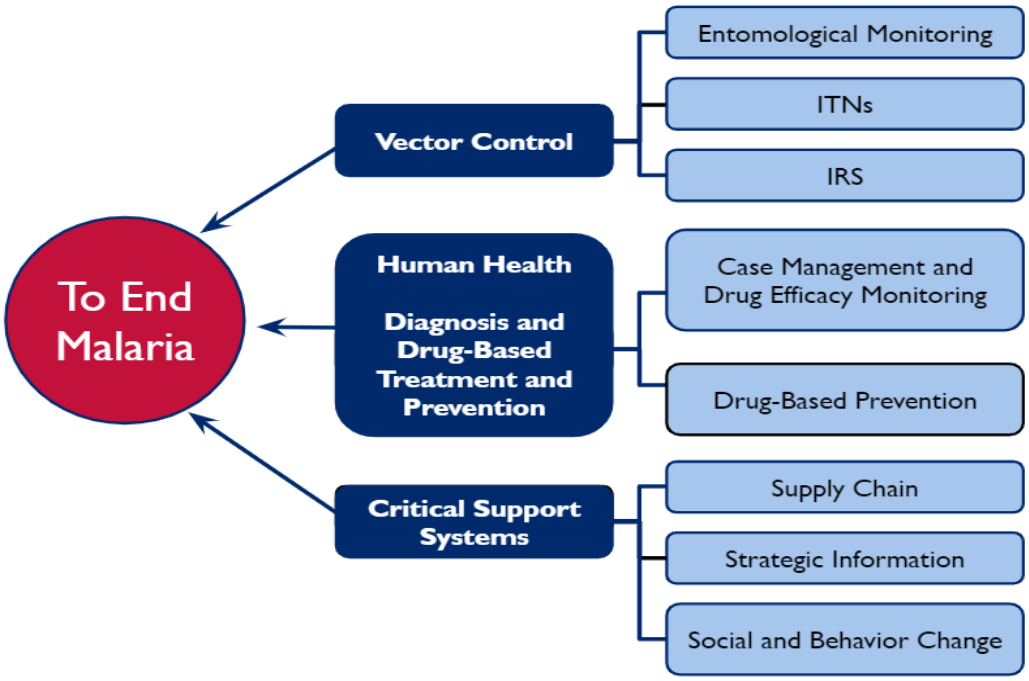
Liberia at a Glance

- **Geography:** Liberia covers 43,000 square miles in West Africa, and it is bounded by nearly 350 miles of Atlantic Ocean off the southwest and by the neighboring countries of Sierra Leone (northwest), Guinea (north), and Côte d'Ivoire (east and southeast). Most of the country lies at altitudes below 500 meters.
- **Climate and Malaria Transmission Seasonality:** The coastal areas are characterized by mangrove swamps, which give way to tropical rain forest that gradually thins out northwards to be replaced by deciduous forest. All geographic areas of Liberia are favorable to malaria transmission.
- **Population in 2021:** The current population of Liberia is 5,147,429 (https://www.worldometers.info/world-population/liberia-population/#:~:text=The%20current%20population%20of%20Liberia,year%20according%20to%20UN%20data).
- **Population at Risk of Malaria:** Malaria is endemic in Liberia with continuous transmission throughout the year. The entire population is at risk of the disease, accounting for approximately 34% and 48% of all outpatient and inpatient cases, respectively, presented at health facilities in 2018 (National Strategic Plan [NSP] 2021–2025).
- **Principal Malaria Parasites:** *Plasmodium falciparum (Pf)* (95%) (Liberia NSP 2021–2025)
- **Principal Malaria Vectors:** *Anopheles gambiae s.l.* (major vector*), Anopheles funestus s.l. and An. melas* (secondary vectors) (VectorLink Report 2020).
- **Malaria Confirmed Case Incidence per 1,000 Population:** 164 in general population and 406 in Under 5 (HMIS 2020 and UN population estimates at: www.worldometers.info)
- **Under-Five Mortality Rate:** 93/1,000 (DHS 2019–2020)
- **World Bank Income Classification and Gross Domestic Product:** Liberia is a low-income country with a GDP per capital of $622 (New World Bank country classifications by income level: 2020–2021 accessed 04/11/2021)

- **Government Health Budget:** $70,422,369 (2020–2021; https://www.mfdp.gov.lr/index.php/docs/the-national-budget)
- **Trafficking in Persons Designations, 2018–2020:** Upgraded to Tier 2 in 2020. The GOL did not fully meet the minimum standards for the elimination of trafficking but made significant efforts to do so. The GOL demonstrated overall increasing efforts compared to the previous reporting period (U.S. Department of State: 2020 Trafficking in Persons Report: Liberia, https://www.state.gov/reports/2020-trafficking-in-persons-report/liberia/)
- **Malaria Funding and Program Support Partners Include:**
  - U.S. President's Malaria Initiative (PMI)
  - Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund)
  - World Bank
  - World Health Organization (WHO)
  - Partners in Health
  - Last Mile Health
- **PMI Support of National Malaria Control Strategy:** In 12 of the 15 counties, PMI provides two tiers of technical support for malaria case management, prevention, and monitoring: (1) wrap- around technical assistance for the six counties receiving government-to-government support to the MOH and, (2) enhanced service delivery technical assistance in the remaining six counties. In addition PMI procures all the rapid diagnostic tests (RDTs) for the entire country. PMI and Global fund procure all of the malaria treatments needed for public health facilities in the 15 counties. PMI has invested extensively in four key malaria control interventions: (a) insecticide-treated nets (ITNs), (b) intermittent preventive treatment in pregnancy (IPTp), (c) prompt and effective malaria case management, and (d) Surveillance, Monitoring, and Evaluation (SM&E).
- **PMI Investments:** Liberia began implementation as a PMI-focus country in FY 2008. The proposed FY 2022 PMI budget for Liberia is $13.5 million; this brings the total PMI investment to nearly $203 million.

PMI organizes its investments around the activities below, in line with the Liberia 2021–2025 national malaria strategy.

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



Building and strengthening the capacity of Liberia's people and institutions—from the central level to communities—to effectively lead and implement evidence-based malaria control and elimination activities is paramount to PMI. The majority of PMI's planned support for FY 2022, across the areas of vector control, human health, and critical support systems such as supply chain, contains elements of capacity-building and system strengthening. PMI/Liberia will continue to collaborate with and engage with local partners such as the National Public Health Institute of Liberia (NPHIL), Liberia Institute of Biomedical Research (LIBR), Last Mile Health, Plan Liberia, Partners in Health, VillageReach, University of Liberia-Pacific Institute of Research and Evaluation, Development Education Network–Liberia, Rural Community Empowerment Project, Community Safety Initiative, Special Emergency Action Restore Children's Hope, and EQUIP. PMI/Liberia is expanding its local partner base to reach more counties with health facility and community malaria programs, including SBC activities.

Finally, PMI/Liberia will continue to rely on private sector partnerships, like the Healthcare Federation of Liberia, to coordinate the private sector players with the GOL, as well as Liberia-based concessions such as Firestone, to contribute toward malaria control interventions in Liberia. Additionally, PMI is supporting a private sector landscaping exercise and the Global Fund is supporting the MOH and NMCP to conduct an assessment of the private sector to identify areas of private sector investments and service delivery and funding gaps for malaria. The assessment was delayed because of COVID-19 lockdown and restrictions. The PMI private sector

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

landscaping and Global Fund assessment will inform the development of a malaria private sector strategy for Liberia and areas for PMI and Global Fund investment.

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

II. MALARIA SITUATION AND PROGRESS

Malaria is endemic in Liberia with continuous transmission throughout the year. In 2020, the principal malaria parasite is *Plasmodium falciparum (Pf)* (95 percent) and the principal vectors are *Anopheles gambiae s.l.* (major vector), *Anopheles funestus s.l.* and *An. melas* (secondary vectors). The 2018 Health Facility Survey found that malaria remains the leading cause of morbidity and mortality, accounting for 34 percent of all outpatient consultations and 48 percent of all inpatient cases. Children under five years of age accounted for 35 percent of all malaria cases and 34 percent of inpatient deaths. The Malaria Indicator Survey 2016 (MIS) showed a malaria prevalence (using malaria RDT) of 45 percent among children 6 to 59 months of age, with regional variations from 12 percent in Greater Monrovia to 69 percent in South Eastern B region (which includes River Gee, Grand Kru, and Maryland). During the last two years (2019 and 2020) the number of reported confirmed malaria cases fell below one million. The estimated malaria incidence per 1,000 population decreased from 281 in 2016 to 164 in 2020 (HMIS data and UN population estimate), and during the same period, the malaria mortality rate in the general population decreased from 35 to 7 per 100,000 population.

Figure 2. Trends in malaria prevalence

Children 6 to 59 months of age who tested positive for malaria by microscopy/RDT [MIS 2009, 2011, and 2016]

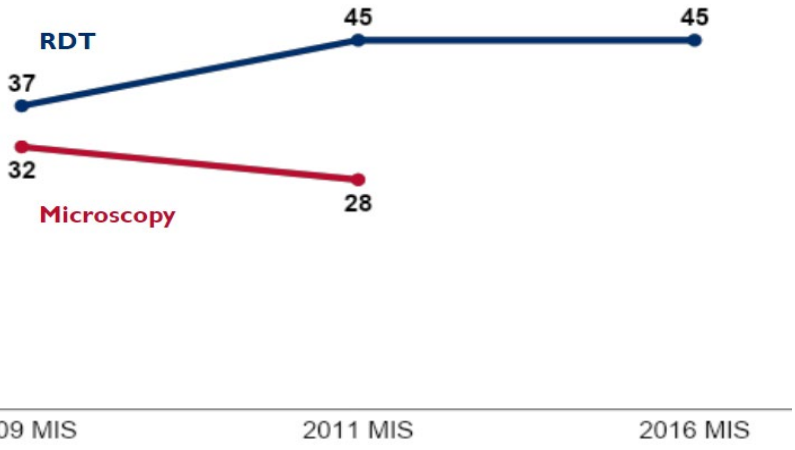


Figure 3. Malaria prevalence by geographic area, MIS 2016

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

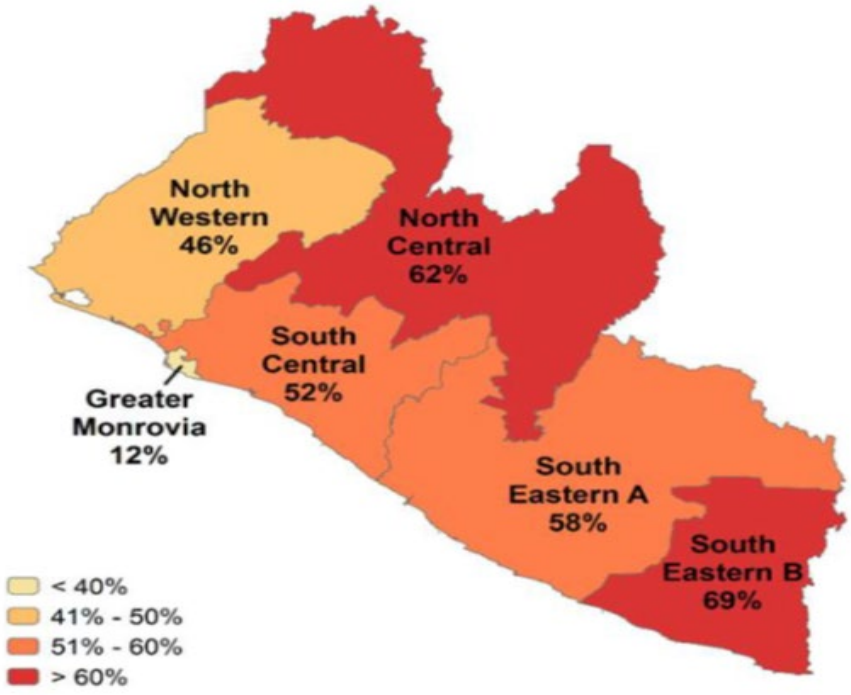


Figure 4. Trends in prevalence of hemoglobin in children 6 to 59 months of age with severe anemia (hemoglobin <8.0 g/dl), Liberia 2009–2020

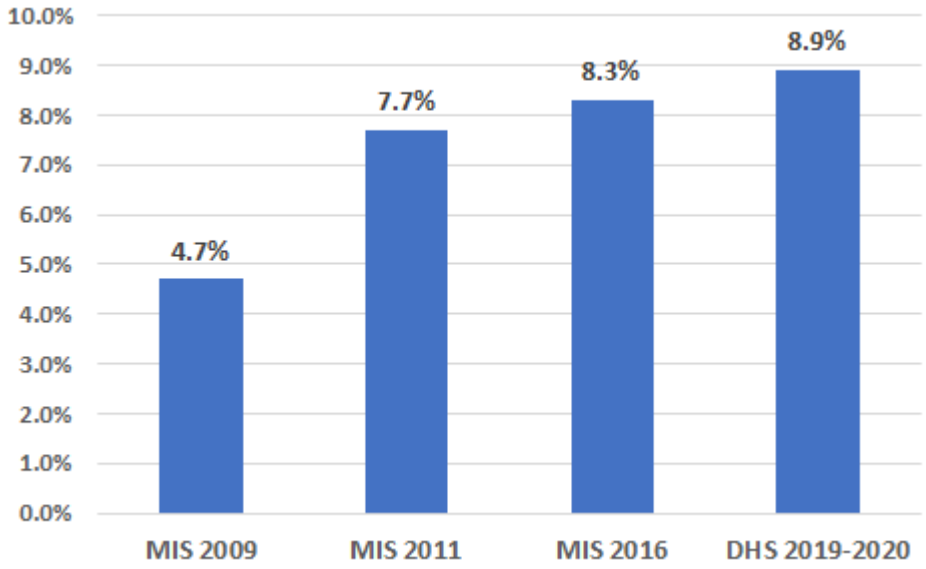


Table 1. Key indicators from demographic health surveys (DHS) and malaria indicator surveys (MIS)

Indicator	MIS 2009	MIS 2011	DHS 2013	MIS 2016	DHS 2019
% Households with at least one ITN	47%	50%	55%	62%	55%
% Households with at least one ITN for every two people	N/A	17%	22%	25%	25%
% Population with access to an ITN	N/A	31%	37%	42%	40%
% Population that slept under an ITN the previous night	N/A	32%	32%	39%	N/A
% Children under five years of age who slept under an ITN the previous night	27%	37%	38%	44%	44%
% Pregnant women who slept under an ITN the previous night	34%	39%	37%	40%	47%
% Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought	44%	60%	71%	78%	81%
% Children under five years of age with a fever in the last two weeks who had a finger or heel stick	23%	33%	42%	50%	40%
% Children receiving an ACT among children under five years of age with a fever in the last two weeks who received any antimalarial drug	67%	70%	43%	81%	81%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	47%	50%	48%	55%	70%
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	N/A	N/A	N/A	22%	40%
Under-five mortality rate per 1,000 live births	N/A	N/A	94	N/A	93
% Children under five years of age with parasitemia by microscopy	32%	28%	N/A	N/A	N/A

Indicator	MIS 2009	MIS 2011	DHS 2013	MIS 2016	DHS 2019
% Children under five years of age with parasitemia by RDT	37%	45%	N/A	45%	N/A
% Children under five years of age with severe anemia (Hb<8gm/dl)	4.7%	8%	N/A	8%	8.9%

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

Indicator	2016	2017	2018	2019	2020
# Suspect malaria cases[1]	2,343,290	2,212,799	1,924,414	1,638,798	1,473,349
# Patients receiving diagnostic test for malaria[2]	1,953,014	1,761,100	1,628,353	1,512,843	1,378,699
Total # malaria cases[3]	1,581,297	1,421,925	1,290,902	1,041,800	922,163
# Confirmed cases[4]	1,191,021	1,070,226	994,849	915,854	827,513
# Presumed cases[5]	390,276	451,699	296,061	125,955	94,650
% Malaria cases confirmed[6]	75%	70%	77%	87%	89%
Test positivity rate (TPR)[7]	60%	60%	61%	60%	60%
Total # under five years of age malaria cases[8]	628,481	608,977	514,991	405,082	349,195
% Cases in children under five years of age [9]	39%	40%	39%	38%	37%
Total # severe cases[10]	152,870	161,585	210,979	190,783	159,405
Total # malaria deaths[11]	1475	914	565	439	363
# Facilities reporting[12]	8,316	8,892	9,756	10,332	10,716
% Data completeness[13]	88%	82%	79%	78%	77%

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

III. OVERVIEW OF PMI'S SUPPORT OF LIBERIA'S MALARIA STRATEGY

Between 2005 and 2021, the program developed four strategic plans, all aligned with national and international goals and targets, and geared toward reducing the burden of malaria on the population. The GOL and several international development partners (mainly the Global Fund and PMI) have invested extensively in four key malaria control interventions: (a) insecticide-treated nets (ITNs), (b) intermittent preventive treatment in pregnancy (IPTp), (c) prompt and effective malaria case management, and (d) Surveillance, Monitoring, and Evaluation (SM&E).

The goal of the 2021–2025 national malaria strategic plan 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.

By the end of 2025, the NMCP hopes to achieve the following objectives as described in the 2021–2025 National Strategic Plan (NSP):

1. Reduce malaria mortality rates by at least 75 percent (43/100,000 population) from 2016 rate (172/100,000 population).
2. Reduce malaria case incidence by at least 75 percent (95/1,000 population) from 2016 rate (380/1,000 population).
3. Promote and maintain a culture of evidence-based decision-making to achieve malaria program performance at all levels.
4. Strengthen and maintain capacity for program management, coordination, and partnership to achieve malaria program performance at all levels.

The strategic interventions to reach this goal will focus on the following:

- Improve parasite-based diagnosis at all levels of point of care and provide prompt and effective case management of malaria at all levels of the healthcare system.
- Strengthen integrated vector management (IVM) and malaria prevention during pregnancy and in infancy.
- Strengthen and improve surveillance systems with quality data and information products to drive decision-making.
- Strengthen supply chain management as well as governance and program management.

The PMI team worked with the NMCP, MOH, and partners to map partner and donor activities by county (Figure 5) to improve coordination and avoid duplication of efforts. PMI and the World Bank together provide technical support covering all 15 counties of Liberia, including all core interventions except indoor residual spraying (IRS). The Global Fund program is national in nature and overlaps with PMI and World Bank supported counties. In addition, the Global Fund malaria grant covers procurement and distribution of ITNs for a mass distribution campaign, as well as some aspects of malaria case management, especially integrated community case management (iCCM), private sector, malaria in pregnancy (MIP), SM&E, and supply chain. The World Bank uses performance-based financing to support County Health Teams (CHTs) in Gbarpolu, River Cess, and Sinoe counties. The PMI support to the remaining 12 counties is through a government-to-government (G2G) Fixed Amount Reimbursement Agreement (FARA) and implementing partner TA. PMI provides two tiers of technical

support for malaria case management, MIP, prevention, and SM&E: (1) wrap-around TA for the six FARA counties (Bong, Lofa, Nimba, Grand Cape Mount, Grand Gedeh, and River Gee) and, (2) enhanced service delivery TA in the remaining six counties that are without direct support of CHTs (Bomi, Montserrado, Margibi, Grand Bassa, Grand Kru, and Maryland). Starting in 2021, the MOH and partners have agreed to provide G2G and performance-based financing G2G support in all 15 counties. The PMI G2G support will be in the eight counties of Bong, Lofa, Nimba, Grand Cape Mount, Grand Gedeh, River Gee, Margibi, and Grand Bassa while the World Bank performance-based financing will be in the remaining seven counties (Gbarpolu, River Cess, Sinoe, Bomi, Montserrado, Grand Kru, and Maryland). The Global Fund support will overlap with PMI and World Bank support for malaria. PMI will support the NMCP to provide guidance and supervision to the seven World Bank-supported counties, and ensure uniformity, standardization, and quality implementation of malaria interventions across the country.

Figure 5. Map of target areas for PMI interventions

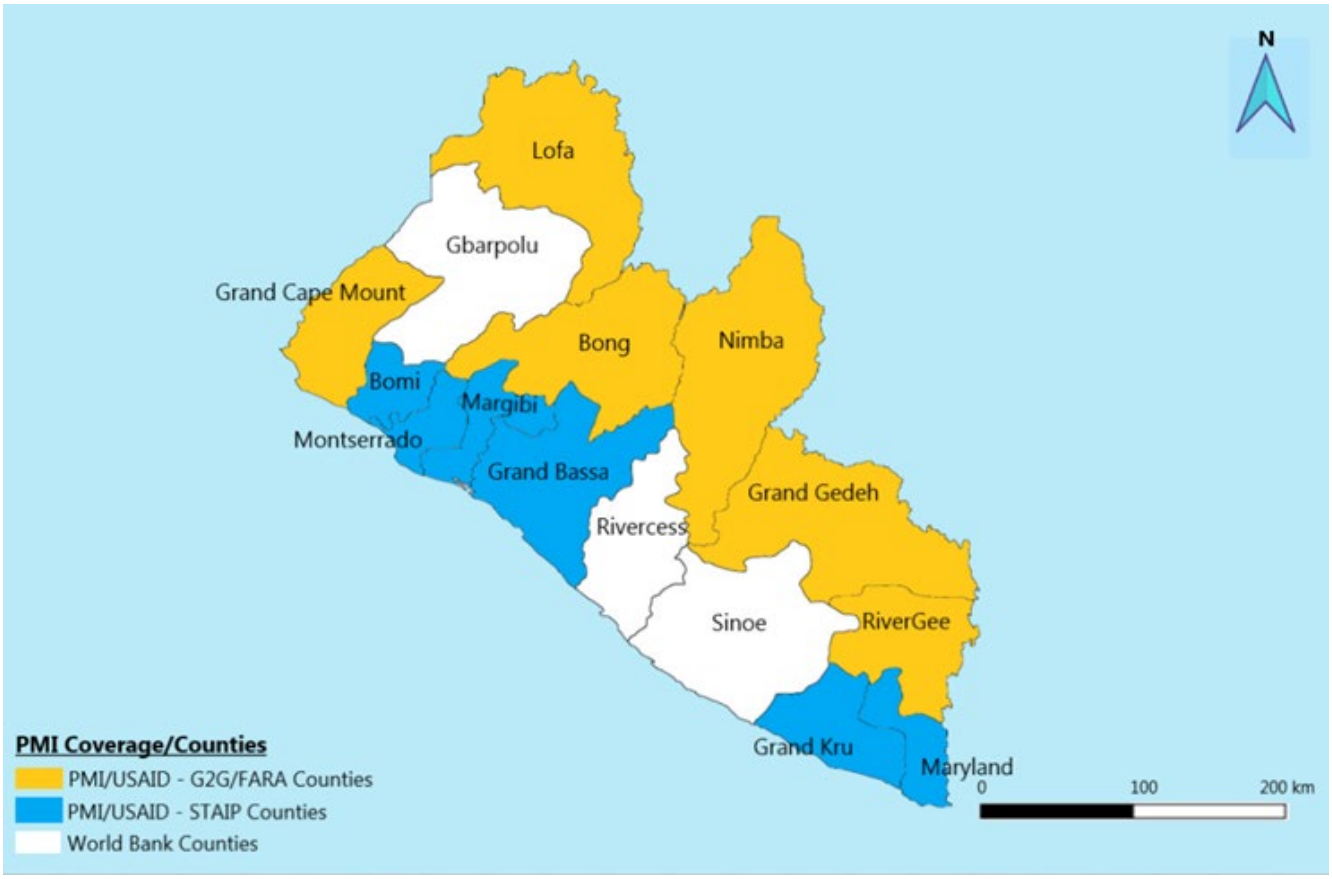
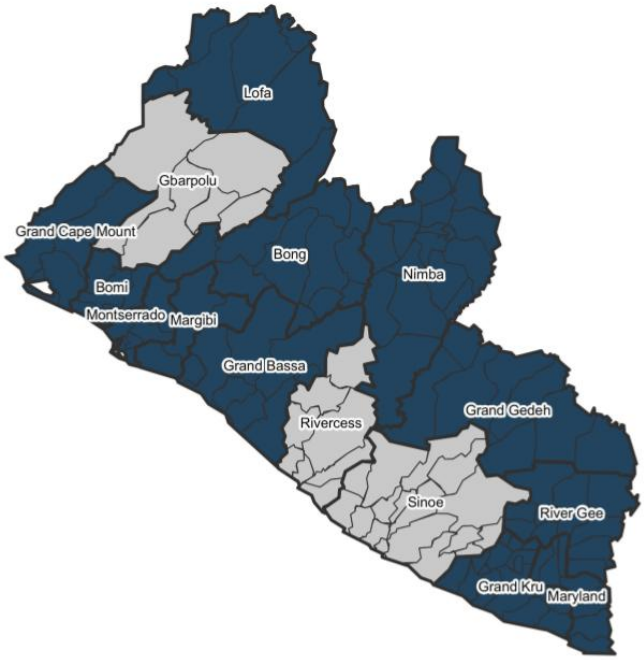


Figure 6. PMI-supported activities in Liberia



Legend

Facility-based, Community-based, and Private Sector Case Management, MIP Implementation

Not pictured: Activities supported nationwide or at the Central level, including:

Procurement of ACTs, RDTs, Drugs for Severe Malaria, IPTp Related Commodities, and Other Diagnosis-Related Commodities

Procurement and Distribution of ITNs for Continuous Distribution Channels

Pharmaceutical Management Systems Strengthening, Other Treatment-Related Commodities

SBC, Health Systems Strengthening, and SM&E Implementation

In-Country Staffing and Administration and HQ TA visits

Support Routine Surveillance

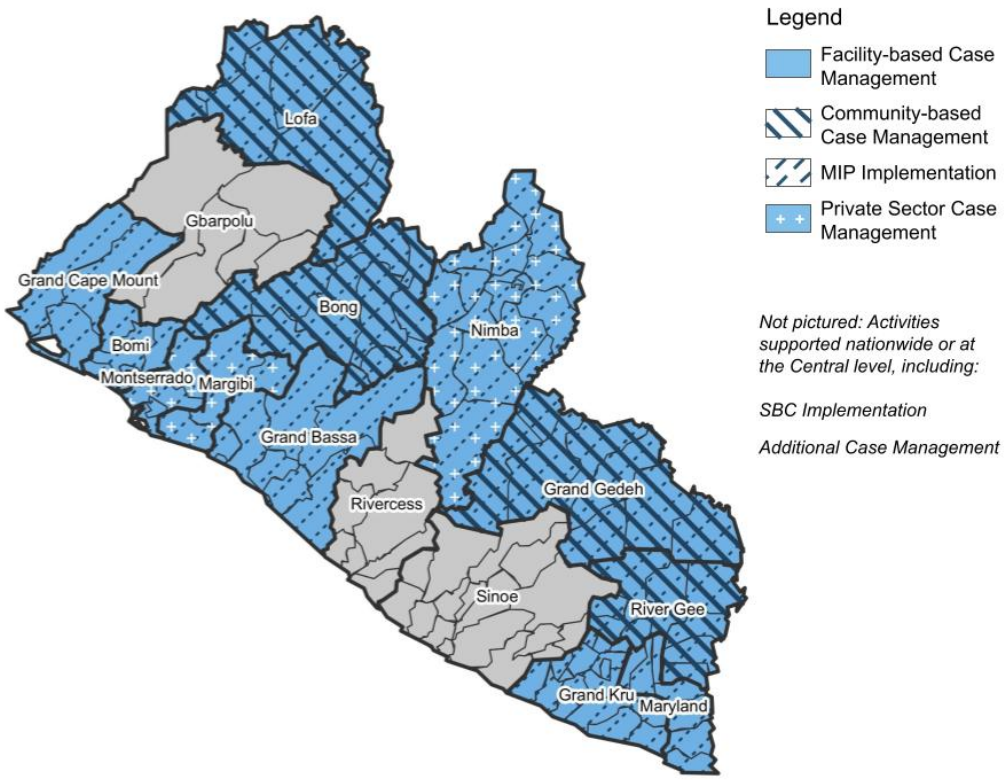
Ensuring drug and other health product quality

National Level Support for Case Management

Warehousing and Distribution

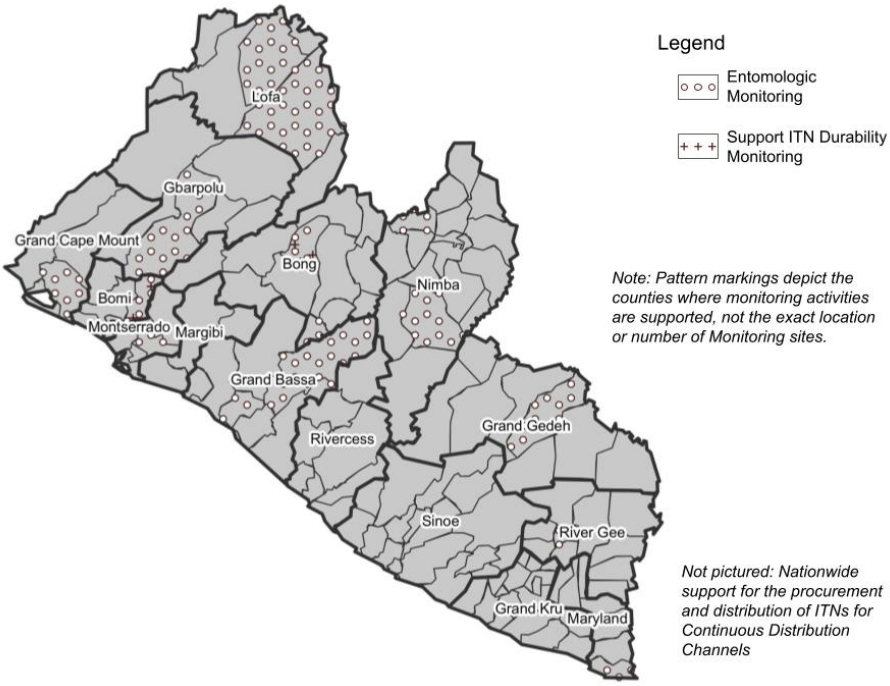
Source: Liberia MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

Figure 7. PMI-supported service delivery and social and behavior change activities in Liberia



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

Figure 8. PMI-supported vector control activities in Liberia



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

III. PARTNER FUNDING LANDSCAPE

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

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

The tables below summarize contributions by key external partners and partner country governments in calendar years 2020–2022, providing insight into total country investments. The Global Fund has extended the end date for the current malaria grant from June 2021 to December 2021 to allow more time to negotiate for the new malaria grant now scheduled to start in January 2022 and also to respond to the Global Fund Office of Inspector

General recommendations from the ongoing investigation. In 2019, Global Fund provided $4,602,831 as COVID-19 Response Mechanism (C19-RM) fund to respond to COVID-19 and prevent the impact of COVID-19 on malaria investments. The funds were used mainly to support a modified strategy for the 2021 ITN mass distribution campaign as well as addressing COVID-19 compliant measures during the campaign. The funding included purchase of personal protective equipment and integration of malaria prevention messaging in COVID-19 response activities. The partner country government invests substantial funding into the national-to-local infrastructure and service delivery that benefits malaria programs and many others. However, it is not always possible to attribute funding for malaria specifically from the partner country government without a standardized method. There may be similar challenges for attributing other partner funds. Note that World Bank funding for child health, including malaria, is not included in the tables below. PMI is following up to obtain this information for future MOPs.

Table 3a. Annual budget by Level 1 category for FY 2019/CY 2020

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$1.8M	$4.6M	$0.7M	$2.5M	$1.5M	$2.8M	$14.0M
Global Fund	$7.5M	$1.7M	$0.2M	$0.1M	$0.8M	$6.5M	$16.8M
Total Per Category	$9.4M	$6.3M	$0.9M	$2.6M	$2.3M	$9.3M	$30.8M

Table 3b. Annual budget by Level 1 category for FY 2020/CY 2021

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$1.2M	$3.8M	$0.6M	$3.0M	$2.6M	$2.8M	$14.0M
Global Fund	$4.2M	$0.1M	$0.0M	$0.0M	$0.1M	$2.8M	$7.3M
Total Per Category	$5.4M	$4.0M	$0.6M	$3.0M	$2.7M	$5.6M	$21.3M

Table 3c. Annual budget by Level 1 category for FY 2021/CY 2022

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$2.7M	$4.6M	$0.8M	$2.0M	$0.6M	$2.9M	$13.5M
Global Fund							$0.0M
Total Per Category	$2.7M	$4.6M	$0.8M	$2.0M	$0.6M	$2.9M	$13.5M

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

Table 4a. Annual budget, breakdown by commodity, FY 2019/CY 2020

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$0.4M			$0.5M	$0.9M	$0.2M			$2.1M
Global Fund[3]		$5.9M		$0.5M	$0.0M	$0.4M			$6.8M
Total	$0.4M	$5.9M	$0.0M	$1.0M	$0.9M	$0.6M	$0.0M	$0.0M	$8.9M

Table 4b. Annual budget, breakdown by commodity, FY 2020/CY 2021

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$0.0M			$0.5M	$0.4M	$0.4M			$1.4M
Global Fund[3]									
Total	$0.0M	$0.0M	$0.0M	$0.5M	$0.4M	$0.4M	$0.0M	$0.0M	$1.4M

Table 4c. Annual budget, breakdown by commodity, FY 2021/CY 202

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$1.6M			$0.7M	$1.1M	$0.3M			$3.7M
Global Fund[3]									$0.0M
Total	$1.6M	$0.0M	$0.0M	$0.7M	$1.1M	$0.3M	$0.0M	$0.0M	$3.7M

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

IV. ACTIVITIES TO BE SUPPORTED WITH FY 2022 FUNDING

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

ANNEX A: INTERVENTION-SPECIFIC DATA

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

1. VECTOR CONTROL

NMCP Objective

Integrated vector management (IVM) falls under objective 2 of reducing malaria case incidence by at least 75 percent (95/1,000 population) from the 2016 rate (380/1,000 population) through:

- Sustained universal access to ITNs.
- Insecticide resistance monitoring.
- Entomological surveillance.
- IRS in targeted districts (currently not supported by PMI).
- Environmental and larval source management (currently not supported by PMI).

The expected results by for IVM by 2025 are:

- At least 90 percent of the population have one net for every two persons.
- At least 80 percent of the population slept under a long-lasting insecticide-treated net (LLIN) the previous night before the survey.
- At least 80 percent of pregnant women (disaggregated by age) slept under LLIN the previous night before the survey.
- At least 80 percent of children under five years of age slept under a LLIN the previous night before the survey.
- At least 50 percent of the population in targeted districts will have been protected by IRS.
- At least 50 percent of the population residing in areas with few, findable, and targeted breeding sites will have been protected by larval source management.

NMCP Approach

Liberia's national strategy aims to improve net access and achieve universal coverage, strengthen entomological monitoring of malaria vector bionomics and insecticide resistance profiles, and implement targeted IRS and larval source management. To achieve universal access and use of ITNs, Liberia targets at least 90 percent of the population to have one net for every two persons and at least 80 percent of the population, pregnant women, and children under five years of age to sleep under an ITN the previous night before the survey.

Liberia's strategy for deployment of ITNs is two pronged: (1) a continuous routine distribution through institutions such as health facilities, schools, and orphanages, and (2) an intermittent community-based distribution through mass distribution campaigns every three years. Health facility distribution includes providing a net to pregnant women at the first ANC visit and at delivery. The recent 2019 DHS shows that the mass distribution campaign is the main source of ITNs with 83 percent of ITNs having been obtained through such campaigns, while 5 percent were obtained during prenatal care visits, 2 percent during immunization visits, 6 percent from a shop/market, 3 percent from street sellers, and 2 percent from a neighbor/friend/relative or other sources. The NMCP and partners will conduct durability monitoring that will further inform the timing for mass LLIN distribution campaigns.

Key goals of the entomological and insecticide resistance monitoring programs are to understand malaria vector prevalence and associated insecticide resistance profiles that highlight vector behavior, location, and susceptibility to insecticides, which ultimately inform vector control decisions throughout the country.

Although currently not supported by PMI in Liberia, the NMCP has expressed the desire to conduct IRS in targeted areas that have high malaria transmission. Such IRS operations would use only insecticides on the WHO prequalified list that show acceptable susceptibility for Liberia. At least 90 percent of structures in the targeted areas would be sprayed.

Larval source management is intended to be additive and complementary measures to increase the effectiveness of an integrated vector control program. However, given disease vector ecology in Liberia, year-round transmission of malaria, logistical challenges, and country capacity constraints, these activities are not practical or sustainable. In addition, effective larviciding as a vector control measure is intended for scenarios where breeding sites are few, fixed, and findable. It is recognized that Liberia does not meet the criteria for an effective larviciding program.

PMI Objective in Support of NMCP

PMI supports all primary vector control objectives of the National Malaria Strategic Plan (NMSP) for 2021–2025 with the exception of IRS and larval source management, which are currently not funded nor implemented by any internal or external partners to the NMCP. Historically, PMI supported IRS in one to five districts annually from 2009 to 2013, and provided insecticide and TA to private companies implementing IRS in additional counties from 2010 to 2012. Due to widespread pyrethroid resistance and increased costs of new insecticides, PMI in collaboration with the NMCP made the decision to suspend support for IRS in Liberia. Since that time, PMI has increased support for entomological monitoring and concentrated on improving ITN access and achieving universal ITN coverage.

PMI-Supported Recent Progress (FY 2020)

- Procured and distributed 239,400 ITNs through routine channels, including ANC services and institutional deliveries.
- In 2020, of 173,572 pregnant women who attended the first ANC visit, 127,283 (73 percent) received ITNs at an ANC visit and at delivery at the health facility. This is an increase from 66 percent and 56 percent in 2019 and 2018, respectively.
- Initiated planning for the 2021 ITN mass campaign.
- Supported routine (monthly) vector bionomics monitoring in eight sentinel sites and six counties for insecticide resistance monitoring to guide further interventions.
- Built the medical entomology capacity of NMCP staff and one University of Liberia entomologist.
- Refined partnership with the Liberian Institute of Biomedical Research (LIBR) and the National Public Health Institute of Liberia (NPHIL) for mosquito sample processing and molecular work.
- Trained 48 (33 male, 15 female) community health volunteers in vector monitoring, including mosquito collection methods and genus identification.
- Reared wildtype mosquitoes in the field insectary.

- Supported sample processing at LIBR to assess sporozoite rates of mosquitoes.
- Supported the 24th month of durability monitoring in two sites for ITNs distributed in the 2018 mass campaign.
- Initiated the planning for monitoring of the new Interceptor® G2 nets (IG2) that will be distributed during the 2021 ITN mass campaign.
- Continued to support the insectary established at the NMCP.

Challenges to implementation activities:

- The most significant challenge was the interruption of field activities due to COVID-19 restrictions.
- Limited capacity-building occurred for molecular identification of mosquitoes due to delayed polymerase chain reaction (PCR) supplies and training to LIBR personnel.
- There were stockouts of ITNs in some health facilities due to low performance of last mile distribution of the nets from the county depots to the health facilities.
- Lack of an insectary for resistance strain mosquito rearing to assess the new dual AI Interceptor® G2 nets for the next mass campaign.
- Poor roads and lack of transportation infrastructure (particularly during the rainy season) preclude or significantly slow down access to entomological monitoring sites.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

- Conduct insecticide resistance monitoring at eight sites.
- Conduct vector bionomics monitoring monthly at ten sites.
- Procure and distribute 475,000 ITNs through the routine distribution channels of health facilities (ANC and institutional delivery).
- Support ITN mass distribution in June 2021 in all 15 counties. PMI support will be in the form of TA for the planning and management of the campaign, logistics support for distribution of the nets, and SBC activities.
- Conduct community mobilization activities in conjunction with the ITN distribution campaign and to promote net access, use, and care.
- Conduct baseline/12-month streamlined durability monitoring data collection for nets distributed in the 2021 campaign.
- Continue planning for school-based distribution, which will begin in CY 2022.
- Establish a new insectary at LIBR for resistant strain rearing and assessment of next generation nets to be distributed in June 2021.
- Purchase reagents and supplies for a molecular training at LIBR.

1.1. ENTOMOLOGICAL MONITORING

Key Goal

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

Key Question 1

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

Supporting Data

Table A-1. Entomological monitoring activities

Site	District	Activities	Supported by
Fissebu	Lofa	PSC/CDC-LT/HLC & ITN DM	PMI
Koryah	Bong	PSC/CDC-LT/HLC	PMI
Zeanzue*	Bong	PSC/CDC-LT/HLC & Resistance	PMI
Tubmanburg	Bomi	NP	
Suehn Town*	Bomi	PSC/CDC-LT/HLC & RESISTANCE	PMI
Gbedin Camp 3*	Nimba	PSC/CDC-LT/HLC & Resistance	PMI
LAC Plantation (Compound 3)^	Grand Bassa	Resistance	PMI
Saint John	Grand Bassa	PSC/CDC-LT/HLC	PMI
Jackson Farm*	Margibi	PSC/CDC-LT/HLC & RESISTANCE	PMI
15 Gate (Number 7)^	Montserrado	Resistance	PMI
Medina	Grand Cape Mount	PSC/CDC-LT/HLC	PMI
Zwedru	Grand Gedeh	ITN DM	PMI
Harper	Maryland	NP	
Fish Town	River Gee	NP	
Cestos City	River Cess	Resistance	PMI

*New sites added in January 2020 to increase entomological data before mass campaign distribution of new nets (IG2s) planned for June 2021. ^ = LAC Plantation was replaced by Site Compound 3 and 15 Gate with Site Number 7, which were the nearest sites where larvae were available. PSC = Pyrethrum Spray Catch; CDC-LT = CDC Light Trap; HLC = Human Landing Catch; NP = Not performed due to COVID-19 restrictions, but will be conducted in 2021.

Table A-2. Distribution and bionomics of malaria vectors in Liberia

Site/ District	Vector*	Season (month)	Preferred Biting Location Indoor/Outdoor	Peak Biting Time	Preferred Resting Location	Preferred Host**	Annual EIR**
Fissebu/Lofa	***An. funestus* s.l.**/ *An. gambiae* s.l.	Jan–March/ Aug–Sept	0.42/0.58	10:00 p.m.–05:00 a.m.	Outdoors	NP	NP
Gbedin/Nimba	***An. gambiae* s.l.**/ *An. funestus* s.l.	Jan–March/ Aug–Sept	0.50/0.50	08:00 p.m.–05:00 a.m.	Outdoors	NP	NP
Jackson Farm/Margibi	***An. gambiae* s.l.**/ *An. funestus* s.l.	Jan–March/ Aug–Sept	0.50/0.50	08:00 p.m.–06:00 a.m.	Indoors	NP	NP
Koryah/Bong	***An. gambiae* s.l.**	Jan–March/ Aug–Sept	0.80/0.20	10:00 p.m.–05:00 a.m.	Indoors	NP	NP
Madina/Grand Cape Mount	***An. gambiae* s.l.**	Jan–March/ Aug–Sept	0.80/0.20	10:00 p.m.–05:00 a.m.	Outdoors	NP	NP
Saint John/Grand Bassa	***An. gambiae* s.l.**/ *An. funestus* s.l.	Jan–March/ Aug–Sept	0.50/0.50	10:00 p.m.–05:00 a.m.	Outdoors	NP	NP
Suehn Town/Bomi	***An. gambiae* s.l.**/ *An. funestus* s.l.	Jan–March/ Aug–Sept	0.40/0.60	10:00 p.m.–05:00 a.m.	Outdoors	NP	NP
Zeanzue/Bong	***An. funestus* s.l.**/	Jan–March/ Aug–Sept	0.26/0.74	09:00 p.m.–05:00 a.m.	Outdoors	NP	NP

Site/ District	Vector*	Season (month)	Preferred Biting Location Indoor/Outdoor	Peak Biting Time	Preferred Resting Location	Preferred Host**	Annual EIR**
	An. gambiae s.l.						

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

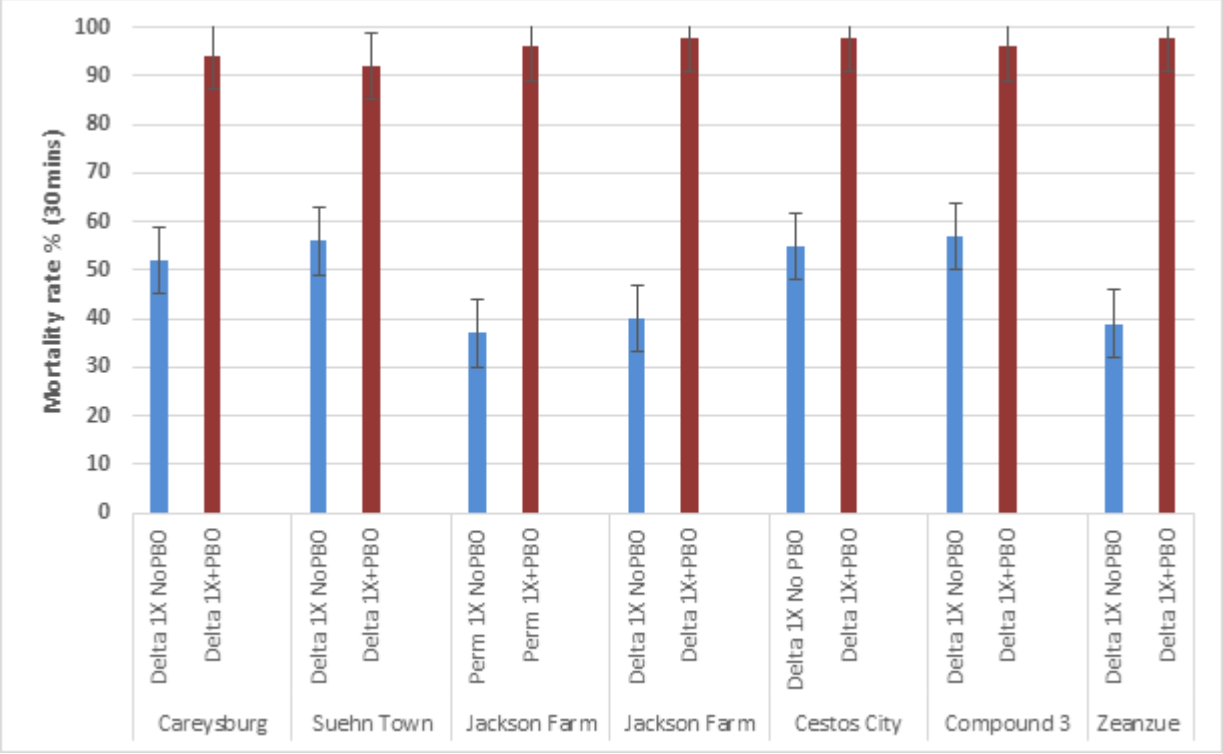
** NP = Not Performed. These molecular activities were not performed in 2020 due to COVID-19 related factors, and will be performed in 2021.

Key Question 2

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

The primary mosquito vector is resistant to deltamethrin and permethrin, with mortality rates ranging between 37 and 57 percent across all sites. Pre-exposure of *An. gambiae* s.l. samples to the synergist 1x PBO increased susceptibility to both deltamethrin and permethrin. For deltamethrin, susceptibility was fully restored (98 percent mortality) in three of the six sites. At the Jackson Farm site, for permethrin after pre-exposure to PBO, mortality increased from 37 percent to 96 percent. Chlorfenapyr (100µg) was tested using *An. gambiae* s.l. mosquitoes and 100 percent mortality was recorded at all the sites.

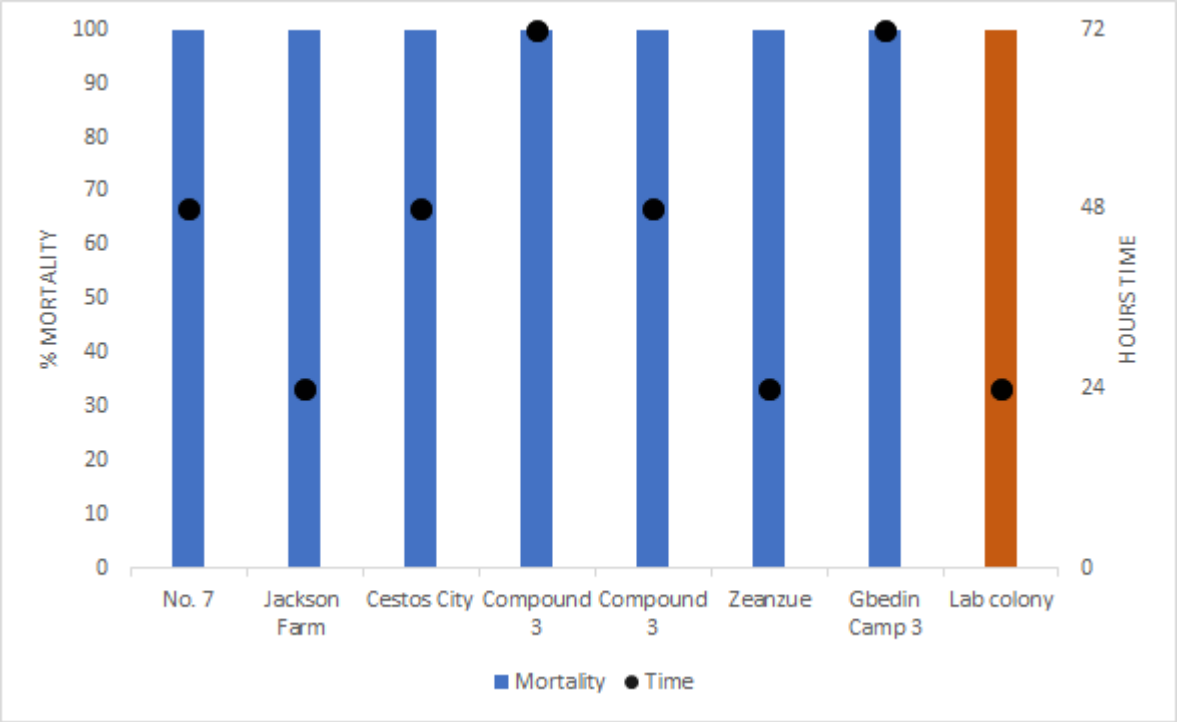
Figure A-1. Percentage mortality of *An. gambiae* s.l. for seven sites in Liberia exposed to 1X deltamethrin diagnostic dose (blue bars) and to deltamethrin plus PBO (red bars) using CDC bottle bioassays, February–September 2020



Source: VectorLink Annual Entomology Report, 2019–2020

Anopheles gambiae s.l. were exposed to 1x deltamethrin diagnostic dosage and deltamethrin 1x plus PBO at Careysburg, Suehn Town, Jackson Farm, Cestos City, Compound 3, and Zeanzue. Mortality with deltamethrin alone ranged from 39 percent to 56 percent. With the addition of PBO, mortality across the sites increased to above 90 percent. The same process was applied to Jackson Farm with permethrin 1x (37 percent mortality) and with the addition of PBO (greater than 90 percent).

Figure A-2. Mortality rate of *An. gambiae* s.l. in Liberia when exposed to chlorfenapyr (100µg) using CDC bottle bioassay



*Black dots indicate how many hours after exposure till 100 percent mortality. Lab colony is susceptible strain of *An. coluzzii*.

Anopheles gambiae s.l. from Site 7, Jackson Farm, Cestos City, Compound 3, Zeanzue and Gbedin Camp 3 were exposed to diagnostic dosage of chlorfenapyr (100µg) using the CDC bottle bioassays. 100 percent mortality was achieved at all sites, ranging from a low of 24 hours to a maximum of 72 hours. The susceptible lab colony sample experienced 100 percent mortality at 24 hours as well.

Conclusions for Entomological Monitoring Investments

- Given the impact of COVID-19 on planned activities during 2020, we do not propose expanding entomological monitoring activities for 2021. Rather, we will maintain the course of planned activities in 2021 and also include monitoring activities not performed in 2020.
- Given widespread resistance to pyrethroids, the Interceptor® G2 dual AI (alpha-cypermethrin and chlorfenapyr) next-generation net was selected for the upcoming mass ITN campaign in June of 2021. Mosquito vectors in Liberia are currently fully susceptible to chlorfenapyr.

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

1.2. INSECTICIDE-TREATED NETS (ITNs)

Key Goal

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

Key Question 1

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

Liberia currently distributes ITNs through mass distribution campaigns and routine channels, including through ANC services and institutional delivery. In addition, a small number of ITNs are distributed to hospitals, orphanages, military barracks, and nursing schools. Funding for procurement of ITNs for mass campaigns comes from the Global Fund while PMI is the only donor that supports continuous distribution of nets.

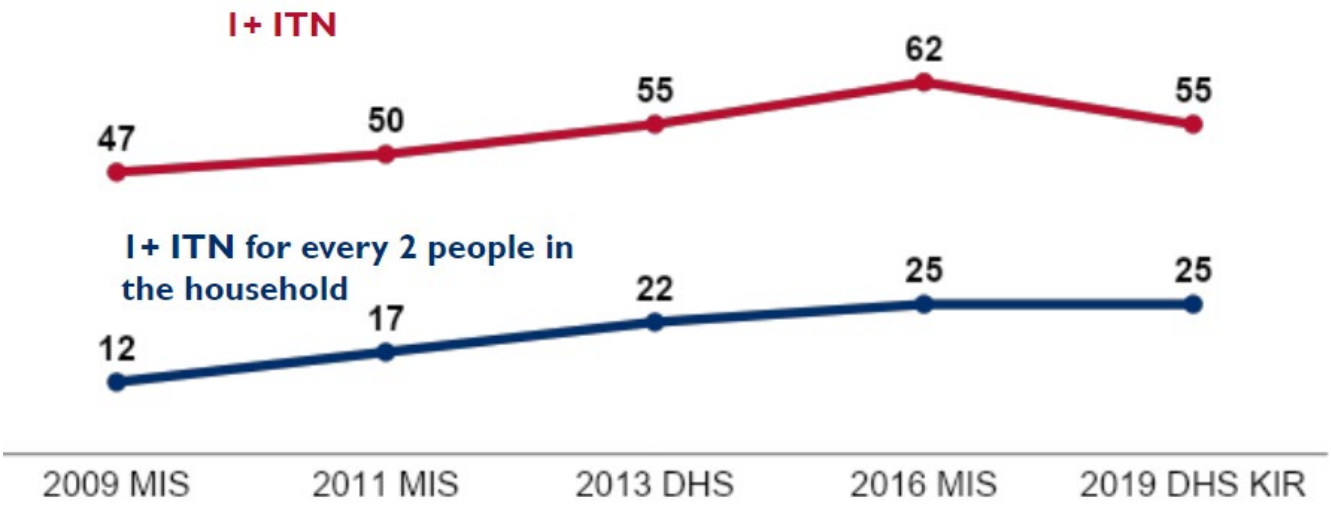
Liberia conducted its first nationwide mass universal net coverage campaign in 2015, distributing approximately 2.6 million ITNs procured by the Global Fund. Following the campaign, PMI procured and distributed 100,000 ITNs to communities in Monrovia that were missed. A second ITN mass campaign was conducted in 2018 and approximately 2.4 million nets procured by the Global Fund were distributed. PMI provided TA and logistics support for that campaign. A third ITN mass campaign is planned for June 2021. PMI is contributing TA and financial support for logistics and SBC activities. Whereas Global Fund procures nets for mass distribution campaigns every three years, PMI procures and distributes all ITNs for the continuous routine distribution channels.

To increase net ownership and access, PMI is working with NMCP and the Ministry of Education to support a phased implementation of school-based ITN distribution originally planned to begin in 2020, starting in three counties of Montserrado, Nimba, and Margibi. These counties were selected due to low net access, high number of schools, and schools with high gross school enrollment (per current data from the Liberia Education Statistics Report). However, because of COVID-19 restrictions and national lockdown, the schools closed and delayed the implementation of net distribution through this channel. However, plans are underway to conduct school-based distribution in early CY 2022, after the June 2021 mass distribution campaigns, but will target schools in counties that have low net coverage from the mass campaign. Going forward, PMI and NMCP will use the results of 2022 MIS to target counties with low net access and high school enrollment.

Supporting Data

Figure A-3. Trends in ITN ownership

Percentage of households that own ITNs



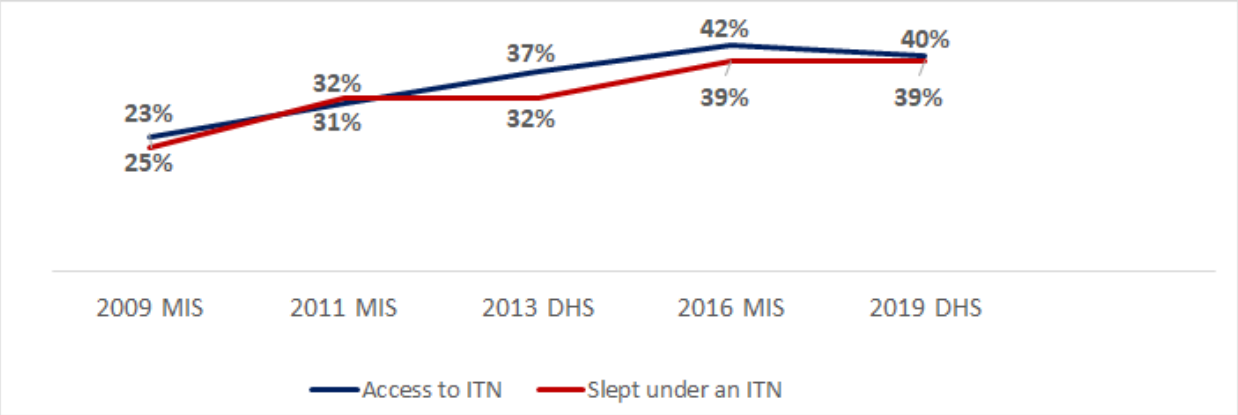
Key Question 2a

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

Access to an ITN increased steadily from 2009 to 2016, from 25 percent to 42 percent. However, between 2016 and 2019, ITN access decreased by 2 percentage points, to 40 percent. The planning for 2021 has taken into consideration the best practices and lessons learned from the previous campaigns that have a high likelihood of improving net access with the 2021 mass campaign.

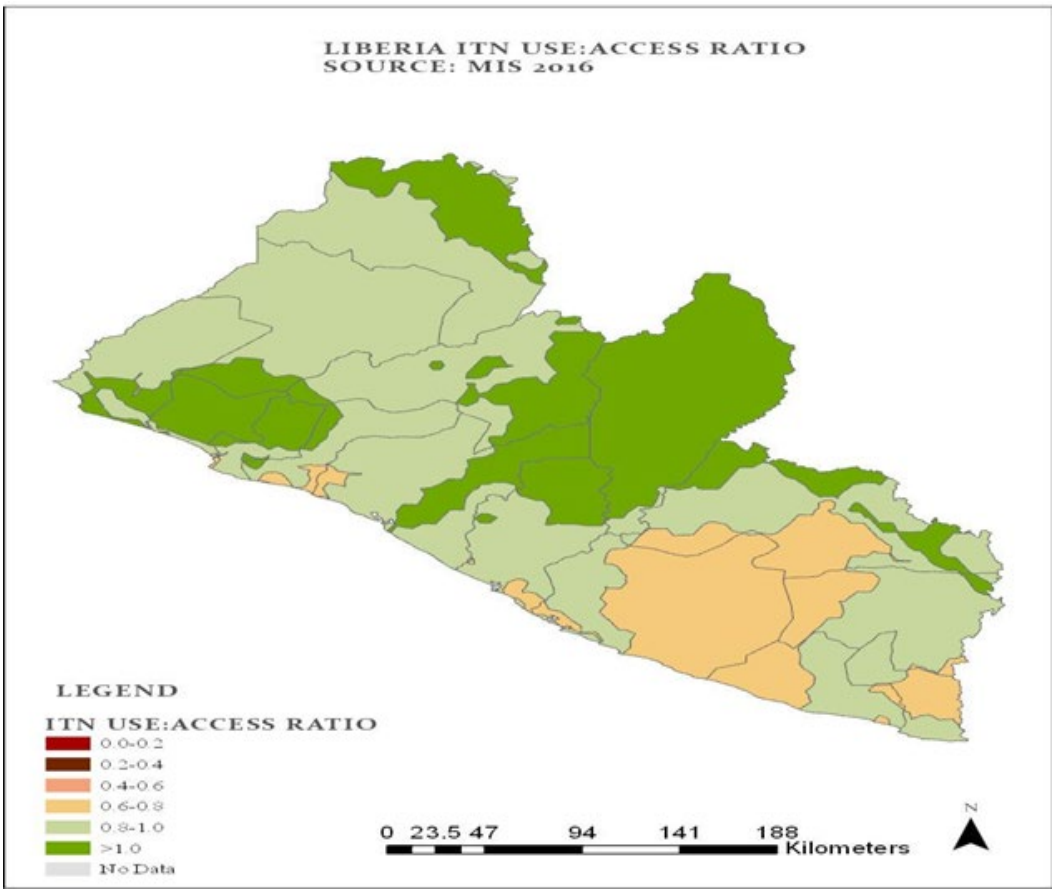
Figure A-4. Trends in ITN access and use

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



The ITN use to access ratio in most of Liberia is over 90 percent, meaning that among households with access to an ITN, the vast majority of available ITNs were slept under the previous night.

Figure A-5. Ratio of ITN access and use



The map shows a net access and use for Liberia of over 90 percent for most of the regions except greater Monrovia and part of the southeast counties that have a net access:use ratio of 60-80 percent.

Key Question 2b

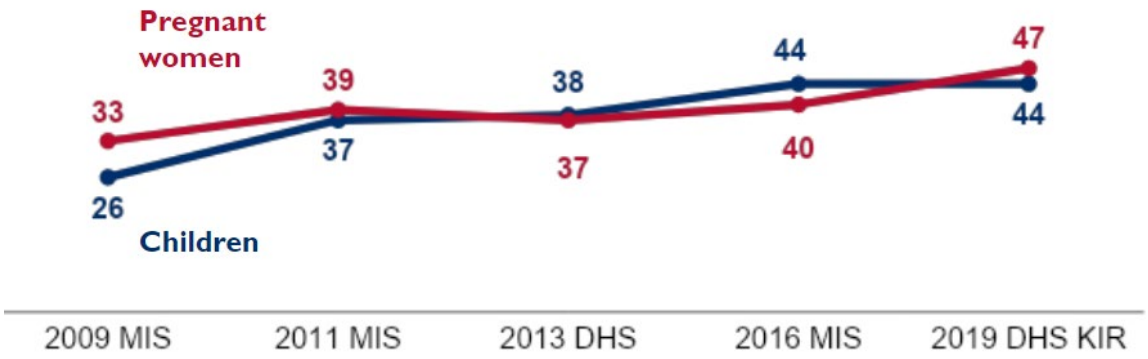
What percent of pregnant women and children under five years of age report sleeping under an ITN?

The 2019–2020 DHS shows that 39 percent of the population slept under a net the previous night before the survey. Net use is higher in pregnant women 15 to 49 years of age (47 percent) and children under five years of age (44 percent) than in the general population. Net use is higher for the population in households with an ITN: 69 percent for the general population, 78 percent for the pregnant women, and 72 percent for children under the age of five years.

Supporting Data

Figure A-6. Trends in ITN use among children and pregnant women

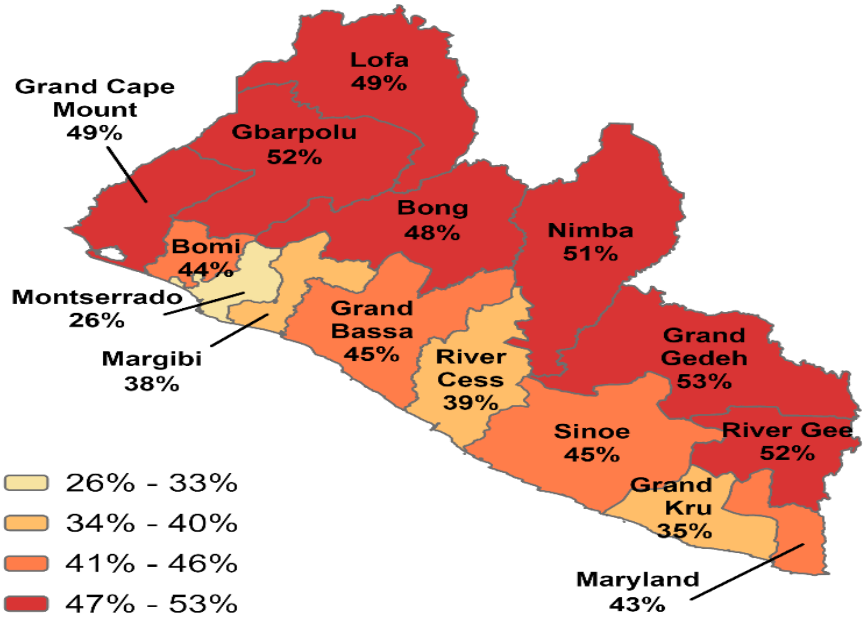
Children under five years of age and pregnant women 15 to 49 years of age who slept under an ITN the night before the survey



Key Question 3

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

Figure A-7. ITN access by county



The 2019–2020 DHS shows that the proportion of the population with access to an ITN (40 percent) is similar to the proportion of the population using an ITN (39 percent) that is evidence to show that there is no gap between net access and use. Net use is highest in children and pregnant women and older age groups but lowest in the school-going children 5 to 14 years of age. Net use is lower in urban areas (35 percent) than in rural areas 44 percent. Net use is lower in the highest wealth quintile (29 percent) than the lower (41 percent) and second (51 percent) wealth quintiles. Net use is higher for women (69 percent) than men (65 percent).

Supporting Data

Liberia

Data from the Liberia MIS and DHS have consistently shown that there is no gap between net access and use. The 2019–2020 DHS shows that of the 9,764 people in the survey, 83 percent of the population obtained ITNs from the mass distribution campaign. However, after two mass distribution campaigns in 2015 and 2018 supplemented by the routine distribution through health facilities, net access has minimally increased from 29 percent in 2009 to 40 percent in 2019. Supply chain and availability are the main limiting factors to net access and use. Liberia is going to refocus the social behavior communication effort to mobilize the community to access nets through the various channels like mass distribution campaigns and school net distribution.

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

Key Question 4

What type of nets are being distributed via which channels?

Supporting Data

Before 2021, PMI and the Global Fund were procuring and distributing pyrethroid-treated ITNs for Liberia that were being distributed through the routine channels and the mass distribution campaigns. Using data from the PMI-funded insecticide resistance data, the Liberia MOH changed the policy for ITNs procured for Liberia to the new dual AI interceptor G2 (iG2) nets. Starting in 2021, Global Fund has procured over 2.7 million iG2 nets for the 2021 mass distribution campaign. Using FY 2020 funds, PMI also procured dual AI iG2 nets for the routine distribution channel. However, at the time of writing this MOP, Liberia has 52,300 of the pyrethroid-treated ITNs at the central medical stores that will be distributed through the health facilities before the newer nets are distributed.

Table A-3. Insecticide treated net (ITN) distribution

Level Nationwide/Region/ State/Province	Mass Campaign [June/2021]	ANC (ANC & institutional delivery)	EPI*	School	Community	Other
Nationwide	2,739,494 (dual AI)	335,600 (pyrethroid)	0	0	0	0

*EPI = Expanded Program on Immunization

Key Question 5

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

Table A-4. ITN Gap Analysis Table

Calendar Year	**2021**	**2022**	**2023**
Total country population	4,555,021	4,650,676	4,748,341
Total population at risk for malaria	4,555,021	4,650,676	4,748,341
PMI-targeted at-risk population	4,555,021	4,650,676	4,748,341
Population targeted for ITNs	4,555,021	4,650,676	4,748,341
Continuous Distribution Needs			
Channel 1: ANC	227,751	232,534	237,417
Channel 2: EPI (Institutional Delivery)	227,751	232,534	237,417
Channel 3: School	0	100,000	100,000
Additional ITNs required to avoid ITN stockouts	56,938	58,133	59,354
Estimated Total Need for Continuous Channels	512,440	623,201	634,188
Mass Campaign Distribution Needs			
Mass distribution campaigns	2,800,000	0	0
Estimated Total Need for Campaigns	2,800,000	0	0
Total ITN Need: Continuous and Campaign	***3,312,440***	***623,201***	***634,188***
Partner Contributions			
ITNs carried over from previous year	52,300	0	0
ITNs from Government	0	0	0
ITNs from Global Fund	2,783,264	0	0
ITNs from other donors	0	0	0
ITNs planned with PMI funding	200,000	560,000	575,000
Total ITNs Contribution Per Calendar Year	***3,035,564***	***560,000***	***575,000***
Total ITN Surplus (Gap)	***-276,876***	***-63,201***	***-59,188***

Supporting Data

Mass campaign nets for 2021 are being procured by Global Fund and will be dual AI nets. PMI will procure routine nets for the ANC, institutional delivery, and soon to be established school channels. All routine nets will be dual AI. The routine net need is being met and PMI is contributing to filling a three-month pipeline.

Key Question 6

What is the current status of durability monitoring?

Supporting Data

PMI supported durability monitoring of DuraNet ITNs distributed during the 2018 mass distribution campaign in two sites in Grand Gedeh and Lofa Counties. Data collection is ongoing for the 36-month time point. The 24-month data collection was delayed because of COVID-19 restrictions to field activities. The data collection instead took place after 29 months. With FY 2020 funding, PMI will support the final 36-month data collection point. Results will be presented at the end of the monitoring activity.

Following the next ITN mass campaign in June 2021, PMI plans to support streamlined durability monitoring. Both physical and bioefficacy integrity will be monitored at a minimum of two sites, to net integrity and insecticide efficacy as measured by cone bioassays, tunnel testing, and chemical content analysis. The IG2 ITN monitoring will also include collection of entomological and epidemiological (routine HMIS) data to assess the impact of IG2 ITN distribution.

Table A-5. Timing of durability monitoring

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
April 2018	Tchien District, Grand Gedeh County	DuraNet	X	X	X	
April 2018	Zorzor District, Lofa County	DuraNet	X	X	X	

Durability monitoring is ongoing. The 36-month data collection started on March 25, 2021, and is estimated to end April 14. The final results and report will be out in July 2021. The results and conclusions will be presented at the end of the monitoring activity.

Conclusions for ITN Investments

- Based on the stock levels, PMI plans to procure 575,000 dual AI ITNs for routine distribution (ANC, institutional delivery, and schools).
- Based on the high net use but low ITN access, PMI will focus on improving net access by providing TA, logistics support, and SBC needed to improve net access during the 2021 ITN mass distribution campaign. The SBC activities will include informing the communities of the net distribution points and

mobilizing the community to collect the nets during the eight campaign days. Post-campaign SBC activities will focus on maintaining net use and care.

- PMI will also work with the MOH, NMCP, and Ministry of Education to start the implementation of the school-based net distribution as another channel to improve net access. The post-campaign survey will provide information on areas and schools to target for future school-based net distribution.
- There is a clear need to improve access of women and children to ITNs through ANC services. PMI will support direct distribution of ITNs to health facilities nationwide to overcome current challenges with last mile distribution of ITNs, and ensure sufficient availability to women attending ANC and delivering in a health facility.
- PMI will work with partners to strengthen the community health program and community health assistants (CHAs) to refer women for IPTp (and a net at first ANC) at health facilities and support the school-based distribution of ITNs.
- PMI will also focus on planning and implementation of the 2022 MIS that will provide updated data on ITN ownership, access, and use.
- Based on the ITN Access and Use Report, PMI will adjust and intensify SBC activities, targeting the sub-national level. The SBC activities will use various channels to mobilize communities to receive the nets through both the ITN mass and school-based distribution. PMI will undertake an assessment/evaluation to better understand barriers to net access.

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

1.3. INDOOR RESIDUAL SPRAYING (IRS)

IRS is not currently supported by PMI nor other partners in Liberia.

2. HUMAN HEALTH

2.1. CASE MANAGEMENT

NMCP Objective

The Liberia NMCP aims to reduce malaria mortality rates by at least 75 percent (43/100,000 population) from the 2016 rate (172/100,000 population) by the end of 2025 and reduce malaria case incidence by at least 75 percent (95/1,000 population) from the 2016 rate (380/1,000 population).

The specific case management objectives of the 2021–2025 strategic plan are as follows:

- At least 95 percent of all patients with suspected malaria cases will have been correctly tested at public and private health facilities in accordance with national guidelines.
- At least 90 percent of all patients with confirmed uncomplicated or complicated malaria cases will have been correctly managed at public and private health facilities in accordance with national guidelines.

- At least 95 percent of all pregnant women with confirmed uncomplicated or complicated malaria cases will have been correctly managed at public and private health facilities in accordance with national guidelines.

NMCP Approach

In accordance with WHO guidance, Liberia's malaria case management policy recommends parasite-based testing of all suspected cases and treatment of only test positive cases with an efficacious antimalarial drug. The malaria NSP defines suspected malaria as: "Illness suspected by a health worker to be due to malaria, generally on the basis of the presence of fever with or without other symptoms." Parasite-based malaria diagnosis has been rolled out nationwide with microscopy recommended for hospitals and RDTs recommended for health centers, clinics, and use by CHAs. However, RDTs are used at all levels, including hospitals and health centers that have microscopy capacity. As part of the new malaria NSP, the NMCP will identify laboratory technologists to be trained according to the WHO accreditation course and then conduct on-site evaluation and mentorship on microscopy at hospitals. Facility and community-based (point of service) quality control of RDTs will also be conducted.

The Liberia healthcare delivery system is organized into three tiers of primary healthcare that consists of clinics and the community health program, health centers and county hospitals, and referral hospitals. County Health Officers manage the county health system, while District Health Officers manage the district health systems. The coordination and supervision of case management are organized at different levels. The national level is responsible for policies and guidelines development, training of National and Regional Training of Trainers and supervising the county- and district-level training. The County Health Department is responsible for county-level policy dissemination and enforcement, training and supervision, data compilation and reporting, etc. The district level is responsible for district-level supervision, training, and policy dissemination at each health facility. This level also supervises community-level implementation of malaria case management, which is being done by CHAs and Community Health Services Supervisors (CHSSs).

The MOH has a community health worker program comprising CHAs and CHSSs. The CHSSs supervise CHAs with a target of about 10 CHAs to one CHSS. The community health worker program has been rolled out in 14 of the 15 counties (Figure A-12) (Montserrado that will be funded by the Global Fund using co-impact funds). CHAs implement iCCM interventions in rural and remote communities greater than 5 km away from health facilities, where health infrastructure is not accessible and malaria transmission is high. CHAs provide a minimum package of integrated services targeted at children under five years of age that includes testing by RDTs and treating for malaria, oral rehydration salts and zinc for diarrhea, and amoxicillin for treatment of pneumonia.

Similar to the public sector, the NMCP policy for malaria case management in the private sector emphasizes prompt testing and treatment of positive cases with a quality assured ACT. According to the 2019–2020 Liberia DHS, of caregivers of children under five years of age who sought care from a health worker, 48 percent sought care in the private sector including private facilities and private medicine vendors. The majority of private facilities in Liberia are in Montserrado County.

Malaria case management services are integrated into the healthcare delivery system and are available at all levels of care: national, county, district, and community levels. Access to prompt diagnosis and effective treatment is the

cornerstone of the NMCP's national strategy for case management in all public and private health facilities. The NMCP 2020 national treatment guidelines recommends the following for the public and private sector:

Uncomplicated Malaria:
First-line: Artemether + lumefantrine (AL) fixed-dose combination (FDC) in age-appropriate packets.

Note: When the current ASAQ stock runs out in 2021, AL FDC will be the only first line ACT in the country.

Uncomplicated malaria during pregnancy:

- First trimester: Oral quinine. However, if oral quinine is not available, ACT can be administered with caution to save lives.
- Second and third trimesters: the drug of choice is ACT first-line (artemether + lumefantrine FDC) or oral quinine where ACT is not available.
- Note: First dose of ACT must be administered as direct observed treatment (DOT)

Complicated/Severe Malaria: Treatment in the preferred order for complicated or severe malaria include parenteral: artesunate (intravenous/intramuscular [IM]) or artemether (IM) or quinine (IM).

Note: After three doses of parenteral treatment, the full dose of ACT should be given if the patient can tolerate oral medication.

Pre-Referral for Severe/Complicated Malaria: If the healthcare worker/facility cannot manage severe malaria, one of the following should be provided:

- Rectal artesunate for children under five years of age
- IM artemether or artesunate for adults or children under five years of age (and children under six years of age where rectal artesunate is not available) or IM quinine where ACT is not available.

PMI Objective in Support of NMCP

PMI's objective is to fully support the national case management strategies outlined in the Liberia National Malaria Strategic Plan (2021–2025) by providing diagnostic tests and technical support to scale up diagnostic testing for malaria with RDTs and microscopy nationwide with the goal that all persons with suspected malaria attending public health facilities and community services are tested for malaria, and all patients tested positive are treated for malaria according to national guidelines. In addition, PMI will support the NMCP's efforts to ensure availability of quality-assured diagnostic testing for malaria at all levels of the healthcare system, including at the community health program, at all times.

PMI-Supported Recent Progress (FY 2020)

During FY 2020

- PMI continued its service delivery support to 12 counties out of the 15 counties for facility-based case management and also increased its support for the Liberia MOH at the central level. In these counties,

testing rates for suspected malaria cases remained high at over 90 percent although largely influenced by commodity availability, specifically for testing in communities.

- As of February 2021, a total of 3,561 CHAs and 383 CHSSs have been trained on the National Community Health Assistant curriculum across 14 counties and are actively working in 14 counties. Approximately 8,000 CHAs are needed to cover the proportion of the population that lives >5 km from a health facility. The community health program is mainly funded by USAID, PMI, Global Fund, UNICEF, the World Bank, and other philanthropic organizations.
- PMI supported phased rollout of rectal artesunate as pre-referral treatment for severe malaria cases found in the community and at health facilities with no capacity for injectables for severe malaria treatment. The adoption of this activity has been slow in part because the PMI-supported community partner closed before training was complete.
- All 12 PMI-supported counties have a malaria focal person supporting the county malaria program.
- PMI supported the development, printing, and distribution of the national registers and job aids for outpatient and ANC departments in health facilities in the 15 counties. To support adherence to national case management guidelines, PMI supported training/retraining 453 healthcare workers at different levels of the healthcare system in the use of the updated malaria case management guidelines; these trainings included in-service training, workshops, mentoring, use of updated case management guidelines, and data collection tools. Additionally, a total of 386 health workers were trained to conduct and support the joint integrated supportive supervision (JISS) led by MOH.
- During the COVID-19 outbreak, PMI provided internet support to NMCP senior staff, malaria focal persons in 12 counties, conducted virtual site visits and virtual meetings.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

With FY 2021 funding PMI will do the following:

- Continue to procure and distribute RDTs for malaria diagnosis and ACTs for treatment at public health facilities and in the community.
- As part of the new malaria strategic plan 2021–2025, the NMCP will identify laboratory technologists to be trained according to the WHO accreditation course and then conduct on-site evaluation and mentorship on microscopy at hospitals. Facility and community-based (point of service) quality control of RDTs will also be conducted.
- PMI will continue to support training/retraining of healthcare workers and community health workers (e.g., CHAs and CHSSs) to strengthen prompt and appropriate malaria case management at all levels of service delivery points (SDPs) in public and private health facilities in the 12 counties. In addition PMI will continue to provide support to the county health team and the central MOH staff for training and supportive supervision.
- Continue to support supportive supervision as well as oversight for community-based health workers to enhance iCCM and expand the CHA reach.

Key Goal

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

Key Question 1a

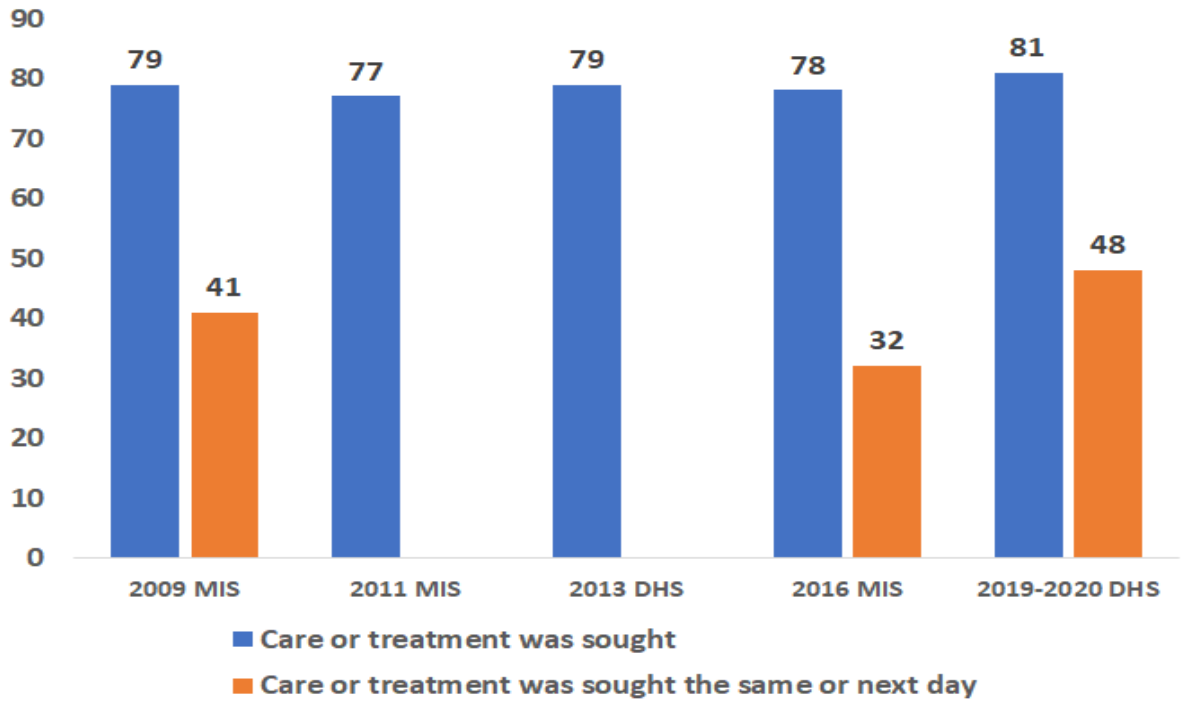
Status of care-seeking and/or access to care for children under five years of age with fever:

The DHS 2019–2020 found that among children under five years of age who had fever within two weeks preceding the survey and whose care-givers sought advice or treatment, 47.9 percent went to public sector providers, while 53.5 percent went to various types of private sector providers.

Supporting Data

Figure A-8. Trends in care-seeking for fever

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



Key Question 1b

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

The percentage of children with a fever for whom advice or treatment was sought has remained high and almost stable from 2009 to 2020. Among children who had a fever and were taken for advice or treatment, the proportion taken the same or next day was 41 percent in 2009, 32 percent in 2016, and 48 percent in 2019–2020. Such information was not available in 2011 and 2013.

The planned behavior survey to explore the factors influencing the care-seeking behavior has been delayed and will be conducted in 2021. In 2016, Tarr-Attia et al. found that poverty, insufficient education on malaria, corruption, and poor trust in healthcare establishments were structural factors that may play a greater role than local traditional beliefs in deterring Liberians from seeking, accessing, and using government-endorsed malaria control strategies. (Tarr-Attia et al. [2018] Malar J. 17:382, https://doi.org/10.1186/s12936-018-2529-5).

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

Key Question 2a

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

According to 2020 routine surveillance data reported through HMIS, 94 percent of suspected malaria cases received a parasitological test at public and private health facilities according to national guidelines. Over the last six years, malaria testing rate at public health facilities has increased from 82 percent in 2015 to 94 percent in 2020. The proportion of confirmed malaria cases has remained almost stable from 64 percent in 2015 and 64 percent in 2020, with a slight decrease to 61 percent in 2016 and 2017. The PMI team is reviewing malaria testing data to further explore the reasons for the flat testing positivity rate despite decreasing malaria cases during the same time period. Of the confirmed uncomplicated malaria cases, 63 percent received first-line antimalarial treatment according to national guidelines during that same time period. The main challenge for malaria treatment is the recurrent commodity stockouts at health facilities and in the community.

Figure A-9. Malaria testing and positivity rates per year, Liberia HMIS 2015–2020

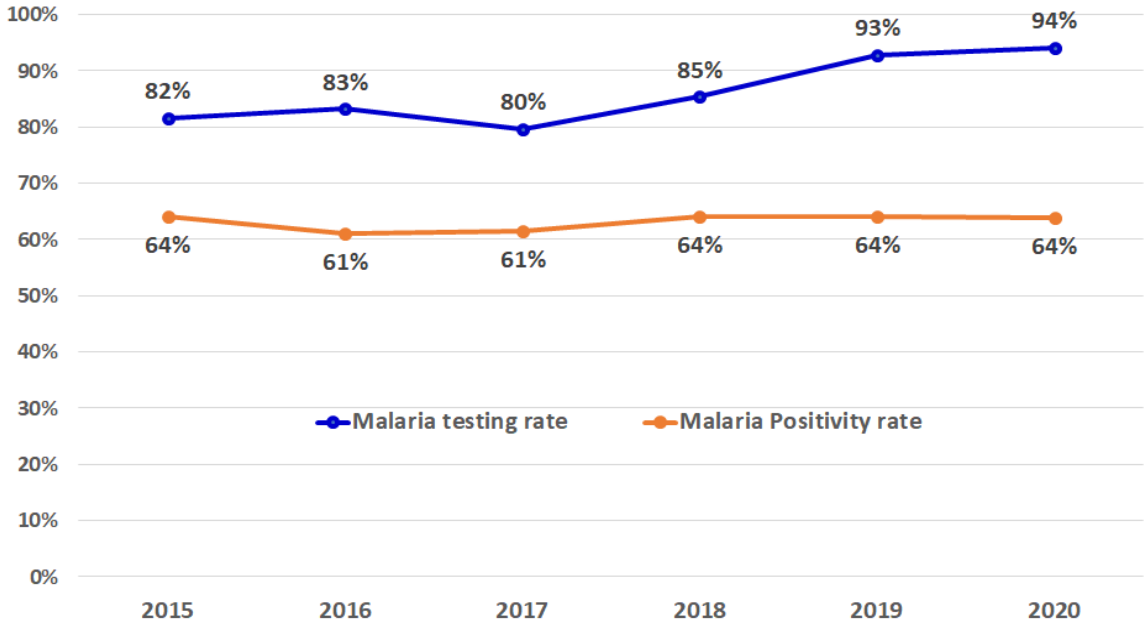
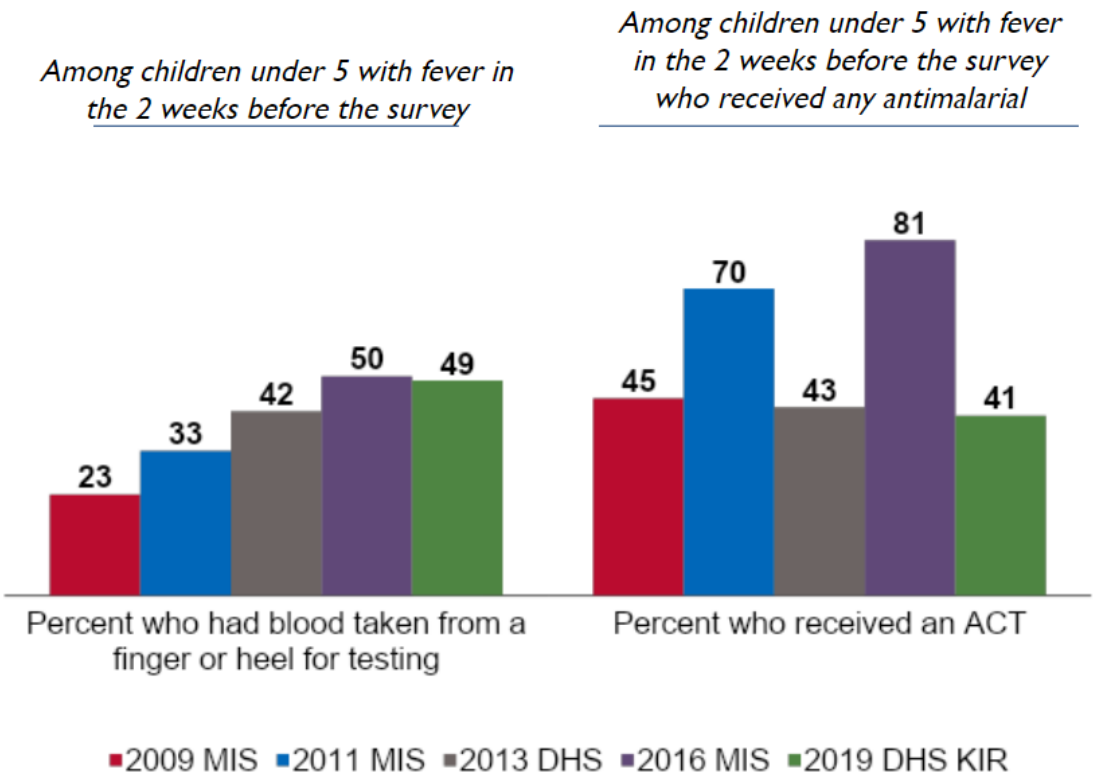


Figure A-10. Trends in diagnosis and treatment of children with fever

Among children under five years of age with fever in the two weeks before the survey and with fever in the two weeks before the survey who received any antimalarial

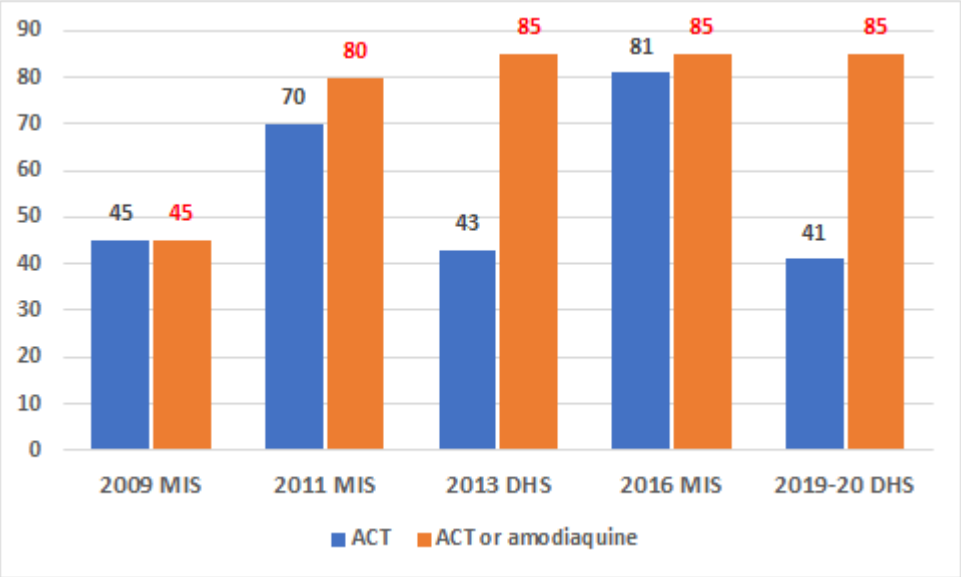


The bars on the left side represent children under five years of age who had blood taken from a finger or heel for testing during the national surveys. This is used as a proxy measure of diagnostic testing for malaria. The percentage of children tested were 23 percent in 2009, 33 percent in 2011, 42 percent in 2013, 50 percent in 2016, and 49 percent in 2019–2020.

The bars on the right side had the percent of children who received an ACT, which varied as follows: 46 percent in 2009, 70 percent in 2011, 43 percent in 2013, 81 percent in 2016, and 41 percent in 2019–2020. The observed high percentages were reported during the MIS years. The percentage of children with a fever given ACT appears to vary widely between surveys conducted in Liberia from 2009 to 2019–2020.

However, if the assumption is made that when respondents indicated their child received amodiaquine the child actually received ASAQ, the trend line would rise from 45 percent in 2009 to 85 percent in 2013 and 2019–2020 (Figure A-11 below).

Figure A-11. Among children with recent fever who took an antimalarial, percentage who received ACT, and the percentage who received ACT or reported receiving amodiaquine



Key Question 2b

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

Overall, the HMIS reported malaria testing rate is high (>90 percent) in Liberia and testing has become a routine practice at public health facilities. HMIS data indicated that only 63 percent of confirmed malaria cases received malaria treatment mainly due to ACT stockouts. Despite the procurement of sufficient malaria commodities to cover all malaria testing and treatment needs at all public health facilities and in the community, access to commodities at SDPs remains an ongoing bottleneck for provision of quality of malaria care. The 2018 Service Availability Readiness Assessment (SARA) study identified training needs and lack of updated guidelines at health facilities. Data on training gaps and service availability can at least help to understand the challenges faced by healthcare workers and how this impacts on health worker behaviors to provide quality services and meet patients' needs (e.g., in 2020 health workers experienced delays in their salary payments, which influenced their motivation in delivering timely and appropriate healthcare services according to case management guidelines). To address the training gap, in 2020–2021 after the COVID-19 lockdown, PMI supported a series of trainings/mentoring and site support visits in the 12 supported counties. PMI supported the development of the new strategic plan 2021–2025, printing and distribution of updated registers, standard operating procedures, job aids, and reporting forms. During the COVID-19 outbreak, PMI provided internet support to limited staff in counties/districts to facilitate remote support and data review.

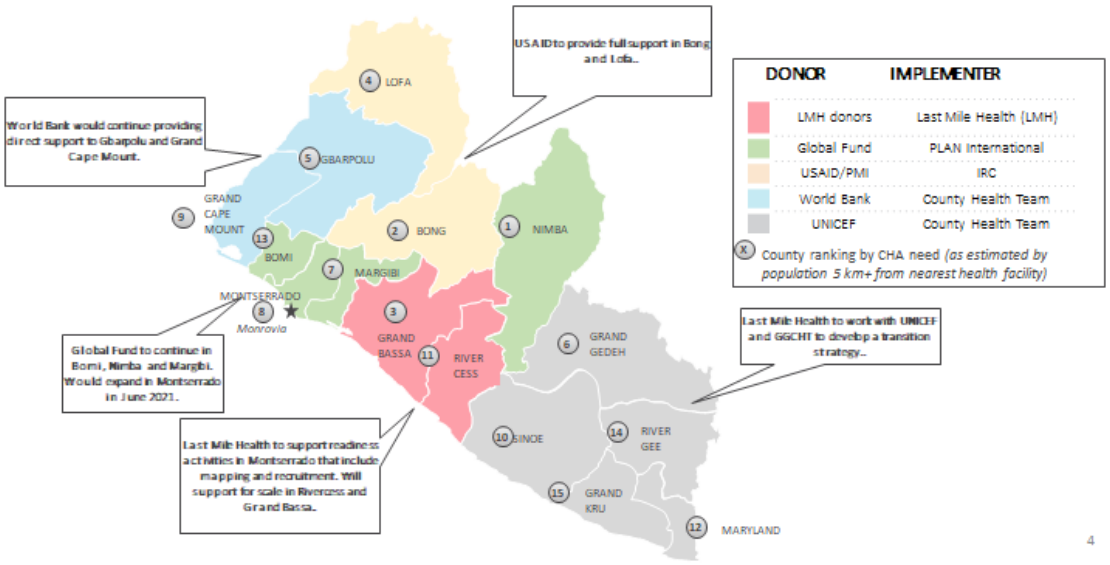
Key Question 3

What is the current and planned support for case management at health facilities and in the communities by Community Health Workers (CHWs)?

Malaria case management services are available at all levels of the healthcare system in the public sector. Numerous donors and partners support case management at health facilities and in communities through training, supervision, and procuring commodities. PMI provides direct support to 12 out of the 15 counties, and the World Bank supports the remaining three. (For more details see the paragraph above.)

PMI has a new Community Program implementing partner that will start in the coming weeks to provide direct support to three counties. The geographic distribution of community healthcare providers is shown on the map below. PMI will continue to support the rollout of rectal artesunate by CHAs and at clinics with no capacity for severe malaria case management.

Figure A-12. Community health service geographic coverage by donors/partner, Liberia 2020



Liberia community health program support is mainly driven by donors operating in different geographic areas in order to provide national coverage. There are a total of five donors covering the 15 counties of Liberia (map above), they include: USAID/PMI, Global Fund, Last Mile Health, UNICEF, and World Bank.

Key Question 4

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

For calendar years 2021–2023, Liberia will need an estimated 7.5 million RDT kits and there is no gap anticipated. PMI is the only donor procuring RDTs for Liberia.

Table A-6. RDT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	4,555,021	4,650,676	4,748,341
Population at risk for malaria	4,555,021	4,650,676	4,748,341
PMI-targeted at-risk population	4,555,021	4,650,676	4,748,341
RDT Needs			
Total number of projected fever cases	2,144,100	2,189,126	2,235,098
Percent of fever cases tested with an RDT	100%	100%	100%
RDT Needs (tests)	**2,144,100**	**2,189,126**	**2,235,098**
Needs Estimated based on HMIS Data			
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	3,131,475	2,500,000	3,000,000
Total RDT Contributions per Calendar Year	***3,131,475***	***2,500,000***	***3,000,000***
Stock Balance (tests)			
Beginning Balance	1,096,750	2,084,125	2,394,999
- Product Need	2,144,100	2,189,126	2,235,098
+ Total Contributions (received/expected)	3,131,475	2,500,000	3,000,000
Ending Balance	2,084,125	2,394,999	3,159,901
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	1,608,075	1,641,845	1,676,323
Total Surplus (Gap)	***476,050***	***753,154***	***1,483,578***

Supporting Data

Key Question 5

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

In CY 2021–2023 PMI and Global Fund will procure 5,804,130 ACT treatments, enough ACTs to treat all patients with confirmed malaria at public health facilities and in the community.

Table A-7. ACT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	4,555,021	4,650,676	4,748,341
Population at risk for malaria	4,555,021	4,650,676	4,748,341
PMI-targeted at-risk population	4,555,021	4,650,676	4,748,341
ACT Needs			
Total projected number of malaria cases	1,384,395	1,478,236	1,614,459
Total ACT Needs (treatments)	1,384,395	1,478,236	1,614,459
Needs Estimated based on HMIS Data			
Partner Contributions (treatments)			
ACTs from Government	0	0	0
ACTs from Global Fund	1,281,000	122,250	474,990
ACTs from other donors *[specify donor]*	0	0	0
ACTs planned with PMI funding	2,241,930	600,000	600,000
Total ACTs Contributions per Calendar Year	***3,522,930***	***722,250***	***1,074,990***
Stock Balance (treatments)			
Beginning Balance	1,619,975	3,758,510	3,002,524
- Product Need	1,384,395	1,478,236	1,614,459
+ Total Contributions (received/expected)	3,522,930	722,250	1,074,990
Ending Balance	3,758,510	3,002,524	2,463,055
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	1,038,296	1,108,677	1,210,844
Total Surplus (Gap)	***2,720,214***	***1,893,847***	***1,252,211***

Supporting Data.

Key Question 6

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

The estimated need for injectable artesunate over the three years is 373,549 vials. Liberia started rolling out the pre-referral treatment and at this time, there is not enough data to anticipate whether there will be gaps. That makes the quantification of rectal artesunate arbitrary. By MOP FY 2023, the country should have data available to guide its quantification exercise.

Table A-8. Inj. ART Gap Analysis Table

Calendar Year	2021	2022	2023
Injectable Artesunate Needs			
Projected number of severe cases	124,596	103,547	80,723
Projected number of severe cases among children	87,217	72,483	56,506
Average number of vials required for severe cases among children	4	4	4
Projected number of severe cases among adults	37,379	31,064	24,217
Average number of vials required for severe cases among adults	8	8	8
Total Injectable Artesunate Needs (vials)	***94,381***	***156,873***	***122,295***
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	0	255,295	165,450
Injectable artesunate from other donors [specify donor]	0	0	0
Injectable artesunate planned with PMI funding	197,567	50,000	50,000
Total Injectable Artesunate Contributions per Calendar Year	***197,567***	***305,295***	***215,450***
Stock Balance (vials)			
Beginning Balance	38,156	141,342	289,764
- Product Need	94,381	156,873	122,295
+ Total Contributions (received/expected)	197,567	305,295	215,450
Ending Balance	141,342	289,764	382,919
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	70,786	117,655	91,721
Total Surplus (Gap)	***70,556***	***172,109***	***291,197***

Table A-9. RAS Gap Analysis Table

Calendar Year	2021	2022	2023
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose	21,804	25,369	28,253
Total Artesunate Suppository Needs (suppositories)	***21,804***	***25,369***	***28,253***
Needs Estimated based on Other (please specify in comment section)			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	0	0	0
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	12,480	10,500	10,500
Total Artesunate Suppositories Available	***12,480***	***10,500***	***10,500***
Stock Balance (suppositories)			
Beginning Balance	834	0	0
- Product Need	21,804	25,369	28,253
+ Total Contributions (received/expected)	12,480	10,500	10,500
Ending Balance	-8,490	-14,869	-17,753
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	10,902	12,684	14,127
Total Surplus (Gap)	***(19,392)***	***(27,553)***	***(31,880)***

Supporting Data

Liberia started rolling out the pre-referral treatment in late CY 2020; due to COVID-19, the process has been slower than anticipated. The pre-referral treatment will be administered by trained CHAs in the community, and by healthcare workers at clinics and health centers without capacity to manage severe malaria. So far the consumption data is not available yet. Please see the injectable artesunate gap analysis table.

Key Question 7

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

Liberia will procure 3 million quinine tablets for CY 2021–2023. There is not any anticipated gap. There is no plan to procure primaquine for *P. vivax* treatment.

Supporting Data

N/A.

Key Question 8

Are first-line ACTs effective and monitored regularly?

The first-line ACT remains effective in Liberia as documented by the 2017–2018 therapeutic efficacy study (TES) of AL and ASAQ in patients with uncomplicated malaria. The PCR-corrected adequate clinical and parasitological response to ASAQ (95.3 percent) and AL (100 percent) were reported. The NMCP with funding from Global Fund is currently finishing a compliance study on adherence to ASAQ and AL. PMI will support the NMCP to conduct a TES in CY 2021.

Supporting Data

Table A-10. Recently completed and ongoing antimalarial therapeutic efficacy studies

Year	Sites	PMI Funded Y/N	Treatment Arms	PCR-Corrected ACPR>90 percent	Location Molecular Resistance Work Completed or Planned
2017–2018	4	No	ASAQ/AL	95.3% vs. 100%	Institut Pasteur France

ACPR: adequate clinical and parasitological response; AL: artemether-lumefantrine; ASAQ: amodiaquine-artesunate; DP: dihydroartemisinin-piperaquine; PARMA: PMI-supported Antimalarial Resistance Monitoring in Africa.

The upcoming 2021 TES will be the first one funded by PMI. PMI looks forward to funding future studies in Liberia.

Key Question 9

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

With FY 2021 funding, PMI will support the NMCP to strengthen malaria diagnostics capacity for county diagnostics officers who conduct supervision at health facilities, and training/retraining of laboratory technicians conducting malaria microscopy at public hospitals. These laboratory technicians will be trained/retrained in preparation for the 2022 MIS.

PMI/USAID will formalize engagement with and support for the private sector for improving quality of services and reporting of malaria indicators. PMI will continue the distribution of national tools (e.g., the 2020 new registers, standard operating procedures/job aids, and monthly reporting forms) to private health facilities and will orient healthcare workers and data officers on the use of the tools.

Conclusions for Case Management Investments

Liberia has seen many improvements in malaria case management activities over the past five years. Liberia continues to provide a high malaria testing rate over 90 percent during the past two years at public health facilities. The positivity rate has remained slightly above 60 percent since 2015. During the past two consecutive

years, the total number of reported confirmed malaria cases fell below one million. The estimated incidence of confirmed malaria cases per 1,000 population decreased from 260 to 164 from 2016 to 2020 respectively (HMIS data and population from UN population estimate at www.worldometers.info), and malaria mortality rate in the general population decreased from 32 to 7 per 100,000 population respectively in 2016 and 2020. All this progress resulted from strong PMI and other donors funding support and technical support. PMI has strengthened its technical support of the NMCP to promote and support prompt testing and treatment of positive cases with a quality-assured ACT in the health facilities and the community.

However, there is still a need to continue building and strengthen the capacity of healthcare workers through training, especially related to full implementation of the new national strategic guidelines and use of the newly distributed registers and tools, use of the new pre-referral treatment, and to decrease stockout rates of malaria commodities across the country.

FY 2022 funding will build off existing efforts and there are no major changes proposed for case management activities. In CY 2020, Liberia adopted one first-line ACT treatment using AL and will use only AL when the current ASAQ stock runs out in August 2021. This transition process started several years ago and has been supported by the findings of the 2018 TES. The TES indicated that PCR-corrected adequate clinical and parasitological response (ACPR) for ASAQ was 91.8 percent (95 percent, confidence index (CI) 80.4-97.7) and 92.7 percent (84.8-97.3) in Bensenville and Saclepea, respectively, while the PCR-corrected ACPR values for AL was 100 percent for both sites (with 95 percent CI: 95.4-100 for Kakata and 95 percent CI: 95.9-100 for Sinje) respectively. All patients, but two at one site, cleared their parasitemia on day 3. The treatment was well tolerated and no serious adverse reaction was observed (Liberia NMCP 2017–2018 TES Final Report [J. Koko, 2019])

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

2.2. DRUG-BASED PREVENTION

NMCP Objective

Under the 2021–2025 NSP, drug-based prevention falls under Objective 2: reduce malaria case incidence by at least 75 percent (95/1,000 population) from 2016 rate (380/1,000 population).

The 2016 MIS shows a malaria prevalence of 45 percent by mRDTs in children under the five years of age, an indication that Liberia is still in the malaria control phase. Given this high malaria prevalence, the 2021–2025 malaria NSP proposes only two drug-based prevention interventions: prevention of malaria in pregnancy (MIP) that includes IPTp, and the intermittent preventive treatment in infants (IPTi).

The 2021–2025 objectives for drug-based prevention are as follows:

- At least 80 percent of pregnant women (disaggregated by age) using ANC services will have been protected with appropriate IPTp3+ doses during their pregnancy.
- At least 80 percent of pregnant women receive ITNs during the first ANC visit and at delivery.

- At least 80 percent of pregnant women (disaggregated by age) slept under LLIN the previous night before the survey.
- All pregnant women with fever are tested for malaria and treated accordingly.
- At least 25 percent of children under two years using EPI services have been protected with appropriate IPTi3 and malaria vaccine, where applicable.

NMCP Approach

In 2016, Liberia adopted the 2012 WHO IPTp policy that recommends IPTp-SP to be given as directly observed therapy (DOT) for all pregnant women at each scheduled ANC visit until the time of delivery, provided that the doses are given at least one month apart. In 2017 and 2018, with support from PMI and the Global Fund, NMCP rolled out the implementation of the new IPTp policy in all 15 counties.

The NMCP is making efforts to better coordinate with the Family Health Division to adopt the 2016 WHO ANC policy. The 2019–2020 DHS shows that 87 percent of women 15 to 49 years of age who had a birth in the five years before the survey had four or more ANC visits, and 71 percent received ANC during the first trimester. The same survey shows that the proportion of pregnant women who received the first and second dose of IPTp was 90 percent and 70 percent, respectively, but IPTp3 coverage is only 40 percent. The NMCP and partners attribute the low IPTp3 coverage to the late adoption of WHO IPTp policy. Additionally, the MOH Reproductive Division has not yet adopted the 2016 ANC policy that recommends pregnant women to have at least eight ANC contacts during each pregnancy at recommended intervals. The current MIP guidelines encourage pregnant women to seek IPTp at 13 weeks of gestation and continue every month throughout their pregnancy. These guidelines were harmonized across all MIP and case management related documents, including national pre-service curriculum, in-service community training materials, SBC module materials, and SM&E tools, and were revised for nationwide use.

Sulfadoxine-pyrimethamine (SP) continues to be the drug of choice for IPTp and is regularly supplied at health facilities for use by pregnant women as DOT at every ANC visit after the first trimester, a month between doses. The first IPTp DOT is given at 13 weeks.

Given the high malaria burden in children under five years of age in Liberia, coupled with overall higher death burden in infants (63 percent of deaths in children under the age of five years of age occur during the first year of life [2019–2020 DHS]), the NMCP is proposing to explore the possibility of introducing IPTi using SP during the second to third year of this strategic plan (2022–2023) after gathering enough evidence on the feasibility of this intervention. Once the decision is made to introduce IPTi, the NMCP will plan and engage the EPI Division on the integration of IPTi service with routine EPI vaccine schedules at the health facility and community levels. The NMCP will follow the WHO guidelines for providing IPTi by administering three doses of SP to infants during routine vaccinations. The 2025 NSP target for IPTi is at least 25 percent of infants using EPI services have been protected with appropriate IPTi3.

PMI Objective in Support of NMCP

In Liberia, PMI supports only one intervention for drug-based prevention: IPTp. The NMCP, PMI, and other partners will evaluate the possibility of introducing IPTi in Liberia and will provide TA and support when the decision is made. Currently, PMI is providing the following support for MIP:

- PMI procures all the SP for all 15 counties of Liberia.
- PMI supports MIP activities, including IPTp implementation in 12 of the 15 counties in Liberia with The World Bank providing support for the remaining three counties.
- PMI provides training of health workers, supportive supervision and mentoring, and data recording in the ANC register.
- PMI supports operational research into low coverage of IPTp.

PMI-Supported Recent Progress (FY 2020)

- PMI procured and distributed 239,400 ITNs for the routine program (ANC and delivery at a health facility).
- PMI procured 337,500 SP treatments (1,012,500 tablets) with FY 2020 funds.
- Provided training to 612 health workers in MIP in the 12 PMI-supported counties.
- PMI supported the full package of MIP interventions in the past 12 month that included IPTp, provision of LLINs to pregnant women during the first ANC visit and at delivery, and testing for malaria and providing appropriate treatment for the pregnant women that have fever during ANC visits. The HMIS and population-based surveys are showing an increasing improvement.
    - The HMIS shows that of the 173,572 pregnant women that attended at least one ANC visit, and 87,931 (51 percent) received IPTp3 during the course of their pregnancy. This is higher than the 69,688 of 180,345 (39 percent) pregnant women who received IPTp3 in 2019 and 42,607 of the 179,049 (24 percent) who received IPTp3 in 2018.
    - The 2019–2020 DHS also shows an improving trend in IPTp coverage, especially IPTp3. The percentage of women receiving one or more doses of IPTp increased from 58 percent in 2009 to 90 percent in 2019–20, while the percentage receiving two or more doses increased from 47 percent to 70 percent. Over the same period, the percentage of women receiving three or more doses of IPTp increased from 11 percent to 40 percent.
    - The HMIS also shows improving malaria testing for pregnant women. Of the 213,525 pregnant women who had fever, 205,104 were tested for malaria giving a malaria testing rate of 96 percent, which is higher than the malaria test rates of 95 percent in 2019, 88 percent in 2018, and 80 percent in 2017. The HMIS data also show a declining malaria positivity rate among pregnant women from 55 percent in 2017, 53 percent in 2018, and 51 percent in 2019, and the rate is currently at 49 percent in 2020.
    - In 2020, of the 173,572 pregnant women who attended the first antenatal care ANC visit, 127,283 (73 percent) received ITNs at an ANC visit and at delivery at the health facility. This is an increase from 66 percent and 56 percent in 2019 and 2018, respectively.
- PMI provided TA and support for the revision of the ANC and delivery registers to include more columns for recording up to four doses of IPTp and a column to record ITNs issued in the ANC and

delivery registers. Revision of HMIS forms and tools delayed the recording and reporting of IPTp3+ in ANC registers and HMIS forms. In 2015, the MOH revised the HMIS forms and registers, and currently, the ANC register has a column for IPTp1, IPTp2, IPTp3, and IPTp3+ as well as ITNs issued at first ANC. The delivery register also has a column for ITNs issued at delivery. In addition, PMI supported the revision, printing, and distribution of technical guidelines and IPTp schedule cards. With PMI support, Liberia has trained 577 health workers on the use of the revised registers and technical guidelines.

- PMI printed the revised HMIS registers, including ANC and delivery registers, and distributed 7,033 registers to 717 health facilities in 12 counties.
- PMI worked with the Global Fund to distribute SP and ITNs to all the health facilities in the 15 counties and responded to reports of stockouts of these commodities.
- PMI is supporting an IPTp operational study to determine factors or barriers to uptake of IPTp and ANC services by pregnant women. The study is at the protocol development stage and data collection will commence in June 2021.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

- SP will continue to be regularly supplied at health facilities for use by pregnant women as DOT at every ANC visit after the first semester, a month between doses. The first IPTp DOT will be given at 13 weeks.
- PMI will procure and distribute 510,000 ITNs through ANC and institutional delivery and 800,000 treatments of SP.
- PMI will implement IPTp operational study to determine factors or barriers to uptake of IPTp. The study is at the protocol development stage and data collection will commence in June 2021.
- PMI will explore SBC and other interventions for improving IPTp3 coverage.
- PMI will conduct refresher training and supervision for MIP.

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

2.2.1. MALARIA IN PREGNANCY (MIP)

Key Goal

Support the national strategy for MIP, which includes (1) provision of ITNs at the first antenatal care (ANC) visit and at time of delivery, (2) a minimum of three doses of intermittent preventive treatment for pregnant women (IPTp) in malaria endemic areas starting at 13 weeks gestational age, and (3) effective case management of malaria per WHO guidelines.

The case management guidelines and MIP technical guidelines recommend every pregnant woman with fever that attends ANC to be tested for malaria with mRDTs or microscopy and treated accordingly. All midwives conducting ANC have been trained on how to conduct malaria testing with mRDTs. However, some operational policies and practices at various health facilities may not allow mRDTs to be stocked at ANC units. For such instances, the pregnant women are referred to the laboratory for testing. The MIP technical guidelines

recommend quinine for the management of malaria in the first semester and ACT in the second and third trimester

Key Question 1a

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

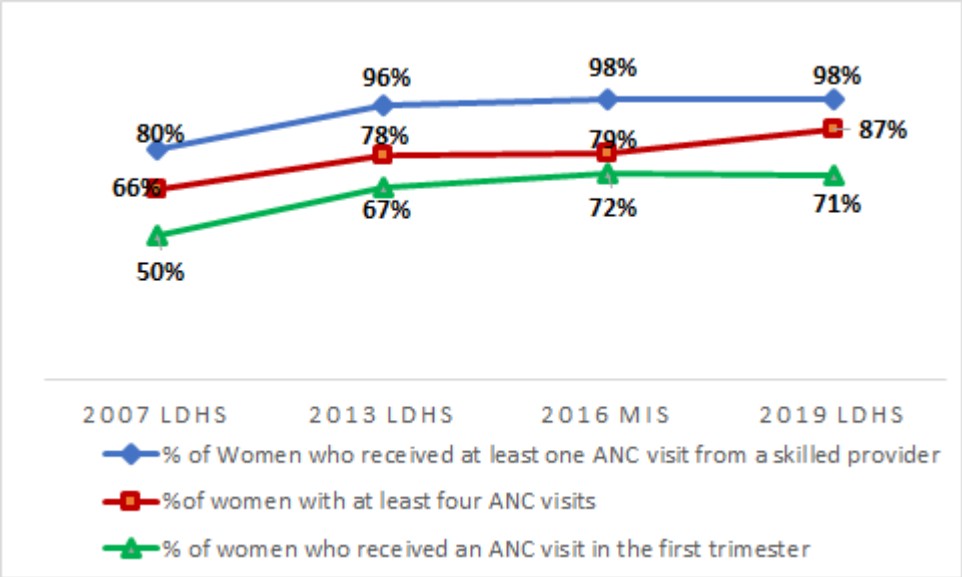
The MIS and DHS show a steady increase in ANC1 and ANC4 attendance. Coverage of antenatal care from a skilled provider has been above 95 percent since 2013 and is almost universal (98 percent) as of 2019–2020. The 2019–2020 DHS shows that 87 percent of pregnant women attended at least the four recommended ANC visits for their most recent birth in the five years before the survey, and 71 percent received ANC during the first trimester for their most recent pregnancy. Rural women are somewhat less likely than urban women to have at least four ANC visits (85 percent versus 89 percent). The percentage of women who had at least four ANC visits rose from 78 percent in 2013 to 87 percent in 2019–2020, while the percentage who received ANC in the first trimester increased from 67 percent in 2013 to 71 percent in 2019–2020.

These data demonstrate that Liberia has no challenges for ANC attendance even though they have not adopted the 2016 WHO ANC policy that recommends pregnant women to have at least eight ANC contacts during each pregnancy at recommended intervals. The MIP technical guidelines recommend initiation of IPTp at 13 weeks of gestation and given at a monthly interval up to the time of delivery. The implication is that 71 percent of the pregnant women who attend ANC during the first trimester do not qualify to receive IPTp but this is an opportunity for the pregnant women to receive an ITN early on in their pregnancy. The training needs to capitalize on the fact that almost three quarters of pregnant women attend ANC during the first trimester and should not be given SP for IPTp, and if they have confirmed malaria, they should be given quinine instead of ACTs.

Supporting Data

Figure A-13. Trends in ANC coverage

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



Key Question 1b

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

Supporting Data

Liberia has near universal use of ANC services and early in the gestation even though Liberia has not adopted the 2016 WHO ANC policy that recommends pregnant women to have at least eight ANC contacts during each pregnancy at recommended intervals. The 2019–2020 DHS presents the structural and environmental barriers for the 2 percent of pregnant women who do not attend ANC and the 13 percent who do not attend the recommended four ANC visits. The survey shows that lack of money to pay for transportation (35 percent), transportation (19 percent), and lack of time (12 percent) were cited as the main reasons for the ANC attendance gaps.

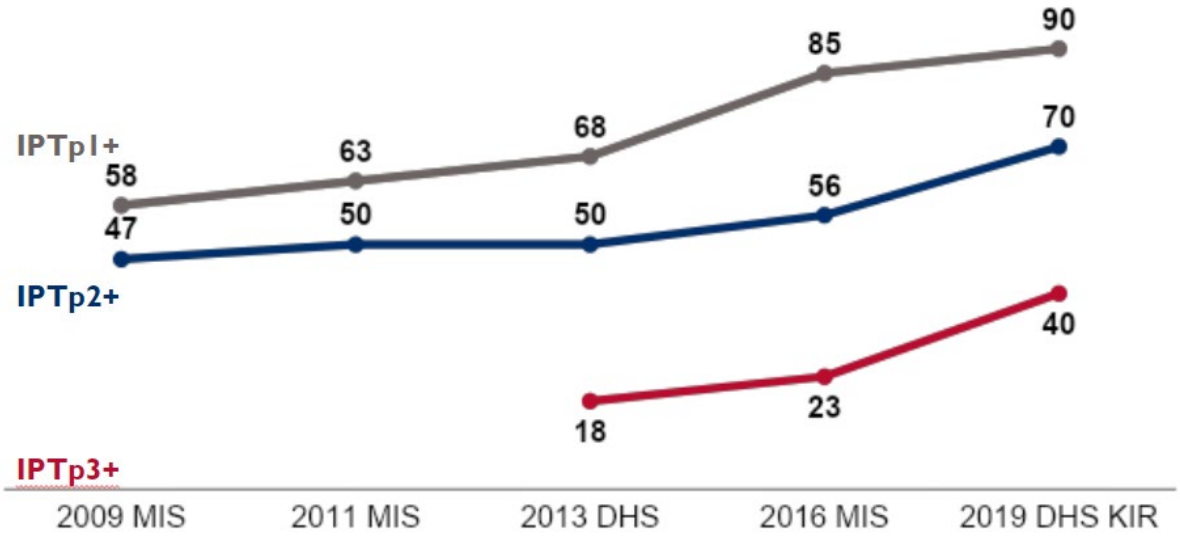
Key Question 2

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

Supporting Data

Figure A-14. Trends in IPTp

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



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

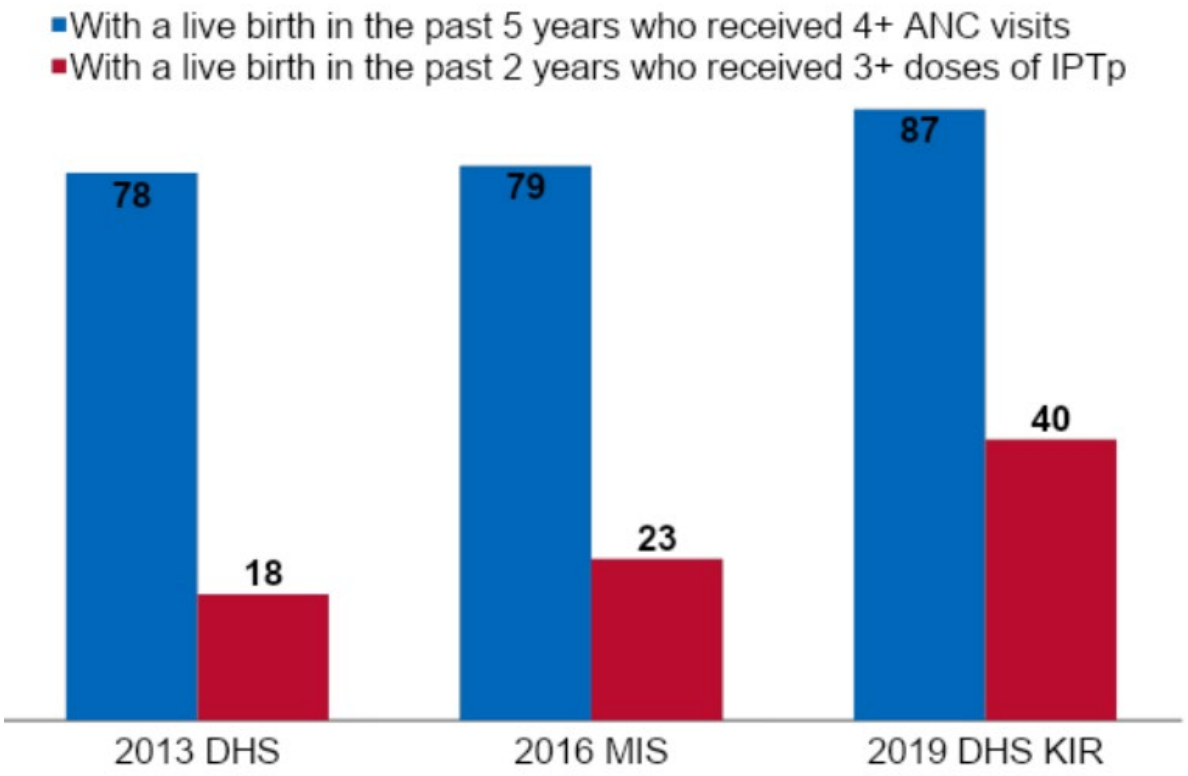
Key Question 3a

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

Supporting Data

Figure A-15. Trends in missed opportunities for IPTp

Percentage of women 15 to 49 years of age



Key Question 3b

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

Supporting Data

The current MIP guidelines encourage pregnant women to seek IPTp at 13 weeks of gestation and continue every month throughout their pregnancy. All the MIS and DHS show an upward trend in IPTp coverage, including IPTp3. IPTp1 increased from 58 percent in 2009 to 90 percent in 2019–2020; IPTp2 increased from 47 percent in 2009 to 70 percent in 2019–2020; and IPTp3 increased from 11 percent in 2009 to 40 percent in 2019–2020. However, IPTp2 and IPTp3 coverage are below the national targets of 80 percent and 60 percent, respectively. The IPTp3 and IPTp4+ (four or more doses of IPTp) reporting started in 2017 and HMIS data shows an increasing trend in both indicators.

Although 2019–2020 DHS shows a high ANC4 attendance of 87 percent, IPTp 3 coverage is low at 40 percent. The policy, structural, and environmental factors contribute to the high IPTp1-IPTp3 and ANC4-IPTp3 gap that needs urgent attention. PMI will investigate the causes of the missed opportunity for IPTp through the 2021 MBS and the planned 2021 IPTp study. The planned 2021 IPTp study will cover a sample of health facilities and will provide more information on provider behaviors related to missed opportunities for IPTp3. Missed opportunity for IPTp is a priority behavior for this MOP.

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

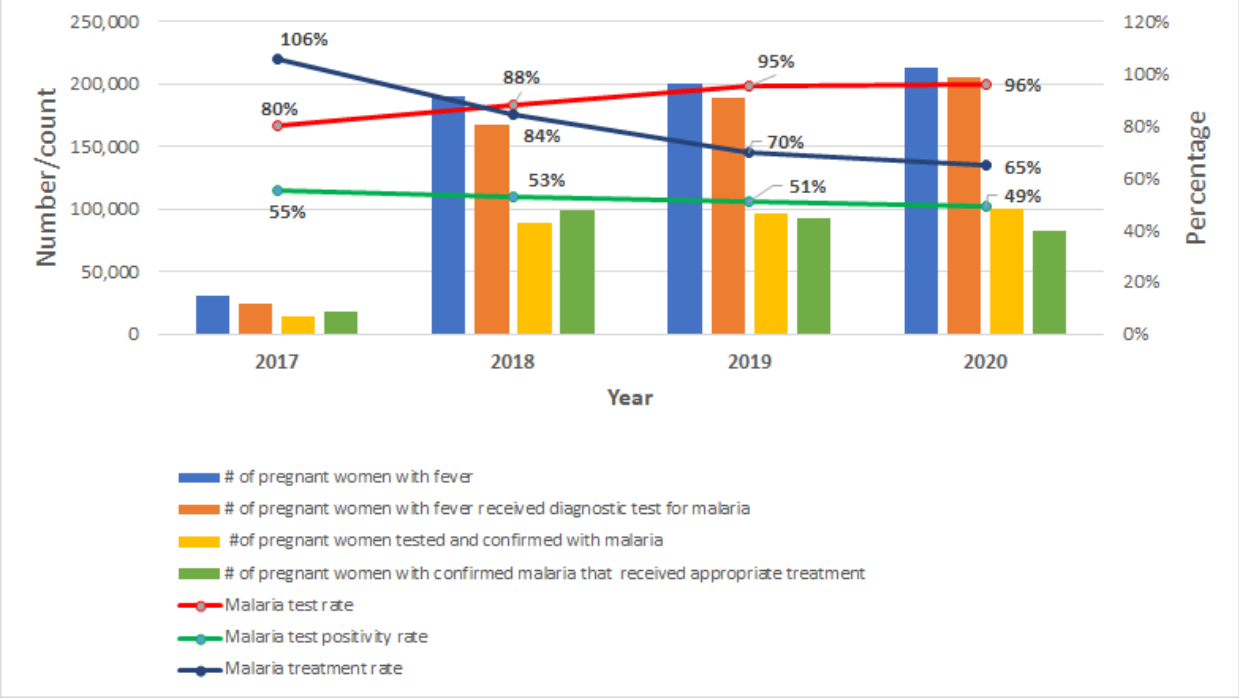
Key Question 4

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

The HMIS captures information on malaria case management for the pregnant women, as indicated below.

Supporting Data

Figure A-16. Trend in malaria case management for pregnant women



The HMIS data shows improving malaria testing for pregnant women. In 2020, of the 213,525 pregnant women that had fever, 205,104 tested for malaria giving a malaria testing rate of 96 percent, which is higher than the malaria test rates of 95 percent in 2019; 88 percent in 2018; and 80 percent in 2017. The HMIS data is also showing a declining malaria positivity rate among pregnant women from 55 percent in 2017, 53 percent in 2018, 51 percent in 2019 and currently at 49 percent in 2020. The HMIS data is showing a declining treatment rate for pregnant women that requires investigation.

Key Question 5

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

Supporting Data

- Currently, only PMI procures SP for the entire country. PMI will procure and distribute 800,000 treatments (2,250,000 tablets) of SP, including a buffer stock of nine months.
- PMI procured 675,000 SP treatments with FY 2020 funding, which will be enough to cover the total SP need in CY 2021 and remain with a buffer stock of 314,132 to cover any increase in IPTp uptake.

Table A-11. SP Gap Analysis Table

Calendar Year	2021	2022	2023
Total Country Population	4,555,021	4,650,676	4,748,341
Total Population at Risk for Malaria	4,555,021	4,650,676	4,748,341
PMI Targeted at Risk Population	4,555,021	4,650,676	4,748,341
SP Needs			
Total Number of Pregnant Women	227,751	232,534	237,417
Proportion of women expected to attend ANC1 at 13 weeks or greater (% PW receiving IPTp1)	100%	100%	100%
Proportion of women expected to attend ANC2 (% PW receiving IPTp2)	70%	80%	90%
Proportion of women expected to attend ANC3 (% PW receiving IPTp3)	52%	66%	75%
Proportion of women expected to attend ANC4 (% PW receiving IPTp4)	4%	4%	4%
Total SP Needs (treatments)	***514,717***	***581,335***	***638,652***
Needs Estimated based on HMIS Data			
Partner Contributions (treatments)			
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	337,500	1,050,000	800,000
Total SP Contributions per Calendar Year	***337,500***	***1,050,000***	***800,000***
Stock Balance (treatments)			
Beginning balance	119,667	0	468,665
- Product Need	514,717	581,335	638,652
+ Total Contributions (Received/expected)	337,500	1,050,000	800,000
Ending Balance	-57,551	468,665	630,014
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	386,038	436,001	478,989
Total Surplus (Gap)	***(443,589)***	***32,665***	***151,025***

Conclusions for MIP Investments

Available data shows an increasing trend of IPTp1, IPTp2, and IPTp3 coverage. The LMIS shows that SP is occasionally stocked out in some health facilities and the buffer stock at central medical stores is below the recommended nine months. The 2020 EUV survey shows an average stockout of 12 percent for SP, above the target of 5 percent. PMI and the MOH are developing a two- to three-year country-level investment plan that will meaningfully improve stockout rates for malaria products, including SP. PMI will procure 800,000 treatments (2,400,000 tablets) of SP for IPTp in 2023. This is slightly higher than the 675,000 treatments procured for 2021. More SP is required to cater for the expected increase in IPTp3 coverage and to refill the buffer stock at central medical stores. With PMI FY 2022 funding, PMI will address the gap in treatment of women that are confirmed to have malaria. PMI will strengthen the community health program and support the CHAs to refer pregnant women for IPTp at health facilities.

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

2.2.2. SEASONAL MALARIA CHEMOPREVENTION (SMC)

SMC is not a recommended intervention for Liberia.

2.2.3. ADDITIONAL DRUG-BASED PREVENTIVE STRATEGIES

This country is not a designated country for near-term pre-elimination or elimination and there is no PMI support planned for such work in Liberia.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.1. SUPPLY CHAIN

NMCP Objective

The 2021–2025 malaria NSP objective is to strengthen and maintain capacity for program management, coordination, and partnership to achieve malaria program performance at all levels by the end of 2025. Three strategies under this objective related to procurement and supply chain management are (1) ensure availability and access to antimalarial drugs and other commodities at all levels, (2) strengthen commodity security and diagnostic functions to prevent stockouts and expiries, and (3) strengthen systems and provide tools for procurement and supply chain management.

NMCP Approach

Procurement and supply chain management is largely controlled and managed by the Department of Pharmaceutical Services (DPS), formally the Supply Chain Management Unit at the MOH, which now includes the Central Medical Stores (CMS). Quantification workshops for all malaria commodities nationally will be conducted

to appropriately forecast and procure needed malaria commodities for distribution to all hospitals, health facilities, and communities.

The NMCP will collaborate with the DPS to share programmatic data on malaria burden and stock status for antimalarial commodities including ITNs at all levels to guide malaria commodity distribution. In collaboration with the CMS, a targeted supply chain and distribution plan for all levels (public, non-for-profit, and community) will be developed to guide distribution decisions. A dedicated Procurement and Supply Management officer/specialist will be provided to manage all malaria supply chain issues at the NMCP level including conducting regular malaria commodities gap analysis, supply planning, and critical supply chain reviews. The NMCP will participate in regular commodity security coordination meetings with key stakeholders for information sharing, decision-making, and actions that promote commodity security across the country. The NMCP will advocate and provide technical expertise to DPS for the revision and production of the Essential Medicines List and the Standard Treatment Guidelines.

The DPS coordinates consumption data collection from the SDPs by the County Health Teams (CHTs), which is used to inform first and last mile distribution of malaria commodities to the county depots, hospitals, and health facilities. The DPS also oversees the National Quantification Technical Committee for forecasting, supply planning, and procurement monitoring of malaria commodities; the National Distribution Committee for malaria commodities distribution planning and monitoring through the quarterly distribution; and the National Supply Chain Data Verification Committee, which guides the review of the data for decision-making in collaboration with different arms of the Ministry of Health.

The CMS is responsible for inventory management at the central Caldwell warehouse and quarterly distribution of commodities to the 13 county depots and last mile distribution to hospitals nationwide and health facilities in Montserrado and Margibi Counties. At the county level, the county pharmacists and supply chain focal persons work together with the CHT to plan and implement distribution of health products to the SDPs. Hard copies of the LMIS, containing stock on hand and consumption data, are completed by health facility staff on a monthly basis and aggregated quarterly before submitting to the district health officers, who enter the data into eLMIS on a quarterly basis. The data are further reviewed at the county level before publication by the CHT. It is after this publication that the data are visible to the central level for use. However, at the hospital level, some hospital pharmacists and/or pharmacy technicians enter the data directly into eLMIS rather than submitting the hard copies of the LMIS to the district health officers for data entry at the district level.

The eLMIS data are used by DPS to determine resupply quantities after which requisitions are developed and forwarded to CMS for resupply of commodities to county depots, hospitals and health facilities.

PMI Objective in Support of NMCP

PMI provides support for the implementation of the national supply chain strategy through supporting 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 and capacity-building for integrated management of health commodities at the central warehouse. Furthermore, PMI supports distribution of the malaria commodities to the 13 county depots, hospitals nationwide, and public health facilities in Montserrado and Margibi Counties, and supports all ITN distribution nationwide. Through coordination between PMI, other USAID health teams, Global Fund, and the MOH a new two-year approach was agreed upon to provide intensive TA support at CMS, while continuing to support distribution. It was agreed that for the next two years, starting in March 2021, PMI (and USAID) will provide comprehensive TA in the form of four technical advisors embedded in CMS (management advisor, warehouse operations advisor, financial management specialist, and information technology advisor) who will support the current CMS leadership in managing the warehouse and Global Fund will cover the distribution of commodities to the 13 county depots, hospitals, and last mile distribution in Montserrado and Margibi counties utilizing the World Food Programme as their implementing partner. CHTs outside Montserrado and Margibi counties are responsible for last mile distribution to the health facilities through funding support from Global Fund (except for ITNs, which are covered by PMI).

PMI has been supporting the revitalization 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 six Logistics Management Advisors (LMAs), who work with the CHTs to strengthen data collection and stock management at the county level.

PMI-Supported Recent Progress (FY 2020)

PMI supported the following activities in FY 2020:

- National Forecasting and Supply Planning: Facilitated the national forecasting and supply planning for malaria commodity requirements. Continued to work with the NMCP to review the malaria commodities stock status report based on available products at the central level to guide further placement of orders for malaria commodities to avoid stockouts.
- Malaria Commodities Distribution: Supported CMS to expand and complete three rounds of malaria commodity distribution. The expansion included direct delivery to the 35 hospitals, in addition to supplies to about 30 health facilities in Margibi County. These are in addition to the distribution to 13 county depots and over 98 health facilities in Montserrado County during the period of COVID-19 outbreak.
- End Use Verification (EUV) Survey: Supported the NMCP to complete two EUV surveys in July and November 2020. The November survey included the continuity of care in the context of COVID-19 module.
- Central Medical Stores Technical Assistance: PMI worked with the Mission health team to develop and finalize a strategy for embedding technical advisors within the CMS. This was part of the national strategy to increase local ownership and sustainability in the management of CMS Caldwell. The approach includes embedding four technical advisors who will provide support in areas of leadership, warehouse operations management, financial management, and information technology support for efficient management of the facility.
- Deployment of Logistics Management Advisors: Supported the deployment of six LMAs at the county level. This approach was used as a strategy to enhance the capacity of health workers in commodity management and documentation and reporting of health commodity utilization at the subnational levels,

especially at the SDPs, and to improve supply chain visibility at the subnational level. The LMAs, in collaboration with the CHTs, supported 659 health facilities visits in 15 counties with hands-on mentoring support provided to 846 health workers on supply chain management.

- Storage and distribution of routine ITNs: Supported the identification and use of a government-managed warehouse for storage of ITNs for routine distribution. The storage facility provided by the General Services Agency was identified as a suitable interim point for storage of the nets, rather than private sector storage, and has been in use from October 2020 to store PMI-procured nets.
- Routine ITN distribution: Supported CMS to distribute over 335,000 ITNs to county depots and collaborated with the CHTs to further support last mile distribution from the county depots to over 450 health facilities to improve access to nets during first ANC visits and at institutional child birth. The previous year (2019) experienced delays in routine net distribution that were resolved in the second half of 2020 through the planning for semiannual distribution to replace ad hoc distribution.
- Electronic Logistics Management Information System (eLMIS): Continued to support the final roll out and use of the national eLMIS. The reporting rate is now above 90 percent and there is marked improvement in national visibility on malaria commodity requirements and utilization at the SDPs to inform resupply decision-making. By the third quarter of FY 2020 the eLMIS platform was showing completed consumption data entry for all SDPs. This new outcome was driven by a decision of the Supply Chain Technical Oversight Committee, headed by the Chief Medical Officer, that no facility would receive supplies unless the full county consumption data was entered into the eLMIS system. PMI supported national training of trainers on the eLMIS Standard Operating Procedures. Through this process 14 master trainers were trained on the system. They have completed training of national reference hospitals staff to increase accuracy of and confidence in consumption data. Hospitals file eLMIS data directly into the electronic platform and receive their supply of commodities directly. This support has dramatically enhanced the availability of antimalaria commodities at all hospitals.
- CHT Supply Chain Coordination Meetings: PMI supported the CHTs in the implementation of supply chain technical working group meetings at the county level in all 15 counties. These meetings serve as a forum to discuss the challenges identified within the health supply chain system and to propose strategies that will be utilized in addressing these challenges.
- Malaria Commodity Stockout Reduction Initiative: In collaboration with the NMCP and malaria stakeholders, PMI and its implementing partners discussed bottlenecks to malaria commodity availability, established a baseline stockout rate of priority malaria commodities (ACTs, RDTs, and SP), and proposed solutions to address the challenges.
- Liberia Medicines and Health Products Regulatory Authority (LMHRA) strategy and planning: Supported the LMHRA to identify 27 regulations that need to be developed (10 are being drafted now) and supported LMHRA to develop a five-year strategic plan (desk review completed). Provided technical advice to inform the relocation of the LMHRA quality control lab. In addition, PMI supported a 10-day intensive training for 13 LMHRA employees on medicines dossier evaluation using the common technical document format, active pharmaceutical ingredient stability, pharmaceutical product development, manufacturing and process validation, bioequivalence, and active pharmaceutical ingredient specification.
- Post-Market Surveillance: Launched the Post-Market Surveillance technical working group and trained 23 members on risk-based post-market surveillance.

- Diversion of PMI-procured commodities: PMI supported an assessment[2] of malaria commodities sold in the private sector in Montserrado and Nimba, and found PMI- and Global Fund-procured commodities in medicines stores and open markets, but not pharmacies or private clinics. PMI procured nets were also found in the open markets. The extent of the diversion will need further investigation.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

In support of the NMCP plan to improve availability of malaria commodities at the SDPs, PMI will be supporting the following major activities in FY 2021:

- Long-Term Technical Assistance Deployment: The deployment of the long-term TA at the CMS is one of the primary supply chain activities in FY 2021 and FY 2022. The technical advisors arrived in March 2021 and will be in place through February 2023. The focus is to develop 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.
- Malaria Commodities Stock Status Review: To monitor the availability and use of malaria commodities in the country, PMI will continue to work with NMCP to review malaria commodity stock status and coordinate with the Global Fund to fill any gaps and avoid stockouts. This will also include working with the NMCP on the final last mile distribution and use of ASAQ stock to minimize the risk of expiries given the transition to AL as the first-line ACT.
- Routine ITN procurement and distribution: PMI will continue to provide support to the NMCP for the procurement and last mile delivery of routine ITNs to health facilities across the country. PMI will work with the NMCP and Ministry of Education to establish and provide logistical support for the school-based distribution channel following the mass campaign.
- Supply chain data management and visibility: PMI will continue to support the LMAs to work with the CHTs and health facilities to support supply chain data visibility through the eLMIS. This will also include mentorship support at the health facilities to improve quality of the LMIS data being collated and used for decision-making.
- Work with the Global Fund to pilot a commodity kit system for CHAs in select counties, starting with Bomi and Margibi. PMI will contribute commodities to the kit system.
- Improve County Depot Storage Areas: To improve storage conditions at the county depots, PMI will support minor upgrades at select county depots with shelves and cooling systems. Over the next 12 months PMI will cover the county depots in Bong, Bomi, Grand Bassa, Grand Cape Mount, River Cess, and Gbarpolu counties and over the course of the next several years PMI plans to reach all 13 county depots.
- Mass ITN campaign support: PMI will continue to support the implementation of the national ITN mass distribution campaign scheduled for June 2021. The support to the NMCP will include coverage of the national TA role and other logistics support functions.

[2] PQM+. (2021). Findings on the Allegation of Antimalarial Medicines Procured by Global Fund and the President's Malaria Initiative Being Sold in Private Markets in Montserrado County. Submitted to the U.S. Agency for International Development by the PQM+ Program. Rockville, MD: U.S. Pharmacopeial Convention.

- Malaria commodities stockout reduction initiative: PMI will continue to build off the investment plan as part of the implementation of the malaria commodity stockout reduction initiative over the next two to three years to improve commodity availability at the SDPs.
- End Use Verification (EUV) Survey: PMI in collaboration with the NMCP will conduct the EUV twice a year. The EUV will continue to serve as a spot check opportunity to monitor availability of malaria commodities at the SDPs and at the county depots. At the MOH's request, PMI and the Global Fund have been working to merge PMI's EUV with Global Fund's On-Shelf Availability assessment. Once approved by the MOH, PMI will use the new tool.
- LMHRA strategy and planning: PMI will support the LMHRA to complete the needed regulations and conduct a stakeholder meeting on the deployment of priority regulations. PMI will assist LMHRA to complete the five-year strategic plan, including a staffing plan and cost structure for regulatory services.
- Post-market surveillance and investigation of diversion of malaria commodities: PMI will continue to support post-market surveillance of malaria commodities across the 15 counties and 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 medicines stores and open markets, working with the Office of the Inspector General as needed.

Key Goal

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

Key Question 1

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

Supporting Data

Liberia has been managing two first-line ACTs (AL and ASAQ) for the past few years, but starting in 2021 only AL will be procured. In 2021, the last of the ASAQ will be distributed and all new orders will be for AL. There is great variability in AL and ASAQ stock status, ranging from being overstocked, stocked according to plan, and understocked; however, when AL stocks were high, ASAQ was low and vice versa, so for most of the year there was an ACT available at the central level. In FY 2020 Q4 there were delays in placement of some Global Fund orders for AL. PMI placed some emergency orders and expedited our existing orders, but there were a few months at the end of FY 2020 and beginning of FY 2021 when the country was stocked out of AL.

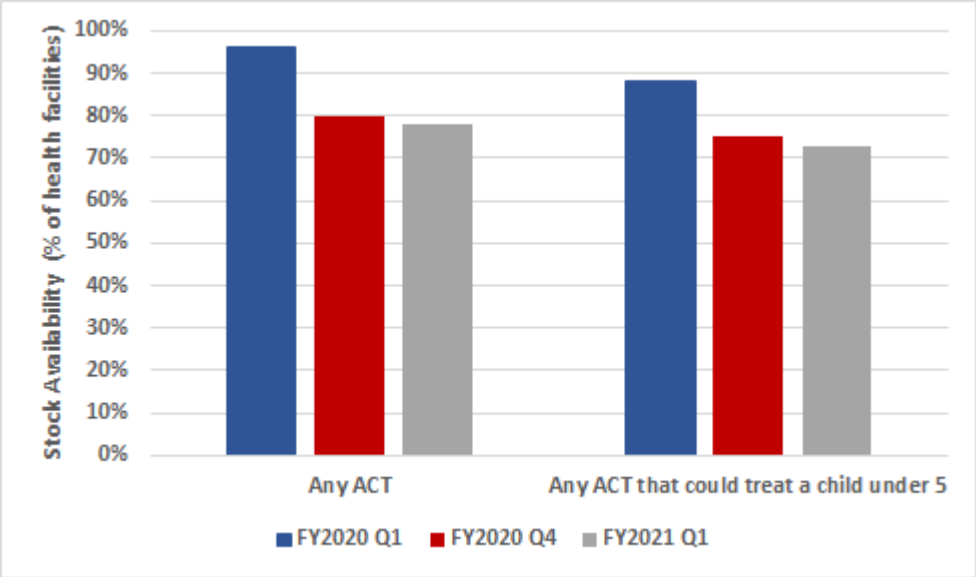
SP has generally been stocked according to plan, while injectable artesunate and RDTs have been understocked. During a portion of this time Liberia also had Injectable Artesunate 120mg procured by the Government of Liberia. RDT shipments were delayed due to the global manufacturing challenges due to COVID-19 lockdown and restrictions. PMI is the sole partner responsible for procuring RDTs so will aim to bring the stock levels back into the planned range in the coming year.

Key Question 2

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

Supporting Data

Figure A-17. SDPs with Any ACT available on the day of visit (EUV surveys)



ACT stockout rates appear high when looking at AL and ASAQ independently, but are not as severe when looking at whether facilities had any ACTs as seen in the EUV surveys. As mentioned above, the stockout situation did worsen at the end of FY 2020/beginning of FY 2021 because of delays in order placement. PMI came in with some emergency orders to fill the gap, but facilities were stocked out for several months. In addition, the CMS was only able to complete three rather than the four planned distributions in 2020, which exacerbated the stockout situation at health facilities. The shortfall in distribution rounds is the result of inefficiencies in the approval process for resupply of commodities at the national level and limited human capacity at the CMS. Each distribution cycle is planned to run for two weeks but has been taking over six weeks. PMI has supported evaluations to identify the problems. The deployment of the long-term technical advisors is the primary measure the supply chain partners are taking to mitigate the CMS capacity issues. The MOH leadership has made a commitment to ensure four rather than three rounds of distribution are completed going forward with the help of the new reforms.

SP stockouts fluctuated over the past year but remained low, while RDT stockouts increased. The stockout levels are in part due to the missed round of distribution during 2020. In addition, last mile distribution continues to experience challenges due to release of Global Fund funding at the county level to support distribution to health facilities.

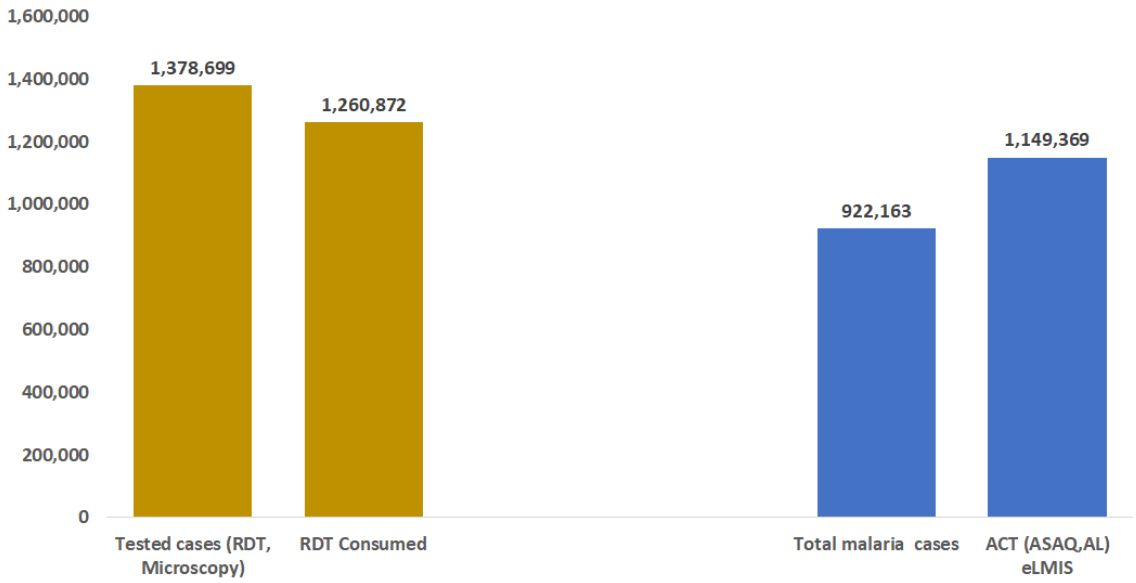
Stockouts are most pronounced in the hard to reach areas of the southeastern counties during the rainy season.

Key Question 3

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

Supporting Data

Figure A-18. Comparison of RDT consumption and suspected cases tested and ACT consumption and malaria cases in 2020



As shown in Figure A-18, the number of suspected malaria cases tested with an RDT (1.38 million) in 2020 was similar to the RDT consumption (1.26 million). However, ACT consumption (1.15 million) was higher than the number of confirmed malaria cases (0.92 million). This is something the PMI team has been aware of and is working with the NMCP and our supply chain implementing partner to better understand the discrepancy.

Key Question 4

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

Supporting Data

Liberia has made significant progress in rolling out the eLMIS, which was completed around Q3 FY 2020, and it now provides commodity data visibility throughout the country. PMI supported a massive supply chain data entry into eLMIS at the county level between May and July 2019, resulting in the reporting rates improving from 0 percent to 74 percent by July 2019. To sustain the efforts, PMI supported six LMAs at the county level to improve supply chain data visibility and use. As of September 2020, the LMAs and CHTs had provided onsite

mentorship to 505 health workers in 346 health facilities across the country on the eLMIS and malaria supply chain record keeping at health facilities. Reporting rates for the last two quarters have been above 90 percent. With improved data visibility, malaria commodity resupply decisions are now based on data which is increasing malaria commodity availability at health facilities. Until 2020, malaria stakeholders were relying on EUV data to get a picture of stockouts in-country.

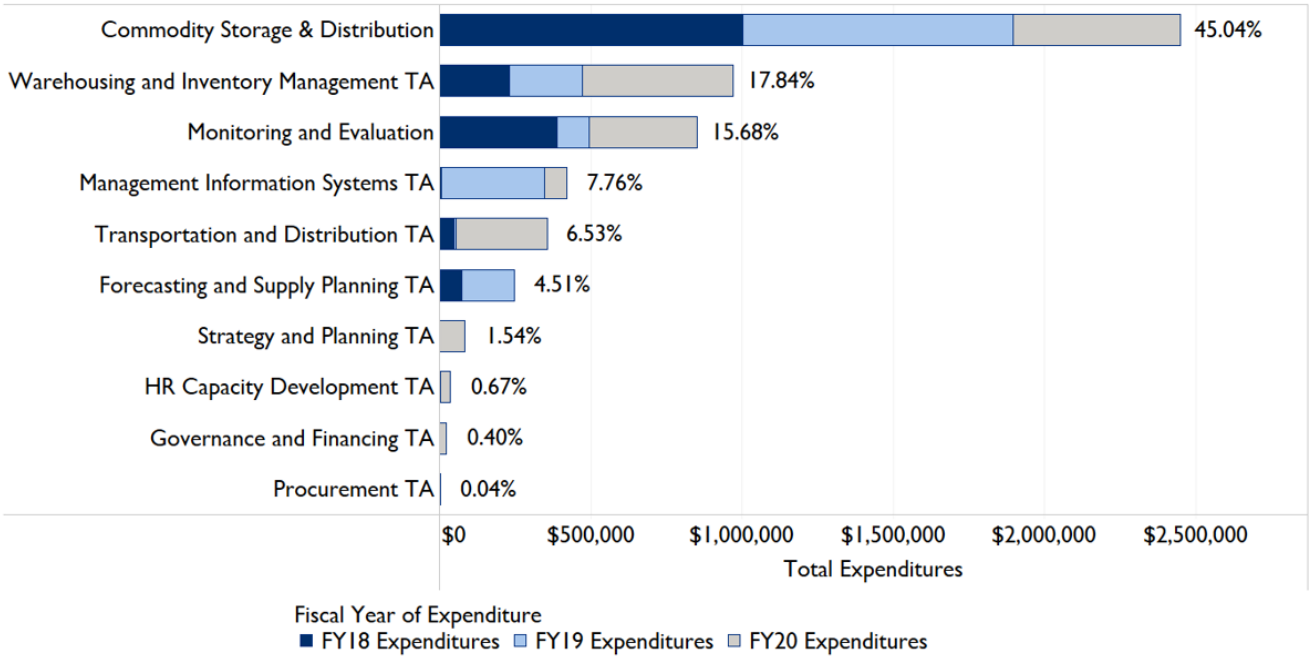
It must be noted that the marked increase in reporting to the eLMIS in itself does not constitute fulfillment of the essential requirement of accurate consumption data entry into the eLMIS by all health facilities. Recent site visits in Nimba, Lofa, and some southeastern counties by various teams of Liberia Mission Health Office staff unveiled evidence of discrepancies in consumption data captured in the Daily Dispensing Register and data carried through the corresponding Stock Status Report/ Requisition. PMI supports data validation in targeted counties through direct USAID Liberia Health Office, implementing partner, and MOH site visits to fact find, direct interventions, and offer on-the-spot training where challenges still persist in eLMIS usage.

Key Question 5

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

Supporting Data

Figure A-19. PMI supply chain investment by technical area



The supply chain in Liberia is heavily donor dependent, with USAID (including PMI) and Global Fund providing the main support. Over the past three years, 45 percent of PMI's supply chain funding has gone toward warehousing and distribution, specifically hiring third-party logistics to supplement the CMS trucks for distribution. PMI also spends a significant amount on TA for warehousing (18 percent) and distribution (7 percent). In the coming two years (2021 and 2022) this will be reversed, where more will be spent on warehousing and distribution TA and less on actual distribution costs based on the agreement between PMI/USAID, Global Fund, and the MOH. Other areas of supply chain support include M&E (including the EUV [16 percent]), eLMIS (8 percent), and forecasting and supply planning (5 percent).

Several of the priority areas identified in the stockout reduction initiative investment plan development include (1) improving the capacity of the CMS to efficiently manage operations of the central warehouse and ensure timely delivery of commodities to county depots and health facilities, (2) strengthening eLMIS reporting and use, (3) redesigning the supply chain system to include two or three hubs to reduce supply chain layers and increase direct delivery from CMS to health facilities in central and northern counties of Liberia to improve last mile distribution, (4) increasing private sector fleet engagement and increased government fleet maintenance, and (5) improving timely fund release for the CHTs to support last mile distribution. PMI is currently supporting the first two areas and participating in discussions for areas 3–5.

Key Question 6

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

Supporting Data

The Liberia health supply chain is challenged by the road conditions, especially in the southeastern counties during the rainy season, which lasts for up to eight months of the year. This makes supply of malaria commodities to these counties very challenging. In addition, the unavailability of an equipped warehouse facility in these counties makes bulk supply during the dry season difficult necessitating frequent visits to mitigate short supply of malaria products. PMI is looking into improvements and equipment for county depots, particularly in the southeastern counties that will minimize the need for long distance travel from Monrovia to provide commodities to these counties especially during the rainy season when the roads are nearly impassable. The MOH is also exploring options for supplying these counties during the rainy season either by alternate routes or supplying additional commodities in advance of the rainy season.

Conclusions for Supply Chain Investments

The data above indicate that the country still suffers from stock management challenges, particularly around ensuring timely and adequate supply to the health facilities. There are often commodities at the central level or county depots, but stockouts at the health facilities. However, on a positive note, the eLMIS has been rolled out, reporting rates are high, and the stock data is being used to inform the resupply quantities.

In recognition that the country needs a new approach to managing the supply chain, the MOH and the two major donors, USAID (including PMI) and the Global Fund, have agreed to a two-year intensive investment in mentoring and capacity-building at CMS, which will run from March 2021 through February 2023. PMI (and other

USAID health elements) will cover the cost of this intensive TA, while the Global Fund covers first and last mile distribution. An assessment of the effectiveness of the TA support will be conducted at the end of 2021 before proceeding into the second year. The FY 2020 and FY 2021 MOPs will be reprogrammed to reflect a shift in PMI's funding away from distribution to TA. PMI and the Mission health team are discussing what approach to take following the two-year period, which will be when the FY 2022 funding is available. We have reduced the overall support for TA in this MOP and added back some support for distribution; however, we are hoping overall supply chain support can be decreased in the coming years, and as decisions are made about the next phase of support to strengthen the supply chain in Liberia, we will reprogram the FY 2022 MOP as needed.

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

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

NMCP Objective

The objective of the NMCP Surveillance, Monitoring, and Evaluation and Operational Research Unit (SMEOR) is to provide reliable information on the performance of national strategic plan 2021–2025 implementation progress, effectiveness, and efficiency of the national response to control malaria in Liberia.

NMCP Approach

The SMEOR Unit is the technical arm of the NMCP that designs, coordinates and implements SMEOR activities aimed at tracking progress on implementation of the National Malaria Strategic Plan (2020–2025).

The NMCP SMEOR Unit in collaboration with the central MOH Monitoring, Evaluation, and Research Department routinely tracks the status of the national malaria control and prevention implementation strategies, collects reliable data on key malaria indicators, and review progress toward the national strategic plan 2021–2025 targets and milestones. The SMEOR Unit supports and ensures data management and quality at all levels of the healthcare system.

At subnational level, the SMEOR Unit works with County M&E Officers, County Data Managers, County Registrars, District Health Teams, and Officers in Charge of health facilities. Key malaria indicators are aggregated using a monthly report form from each malaria SDP at health facilities and in the community. The monthly reports are transmitted through the County Health Office for entry and reporting using the Health Management and Information System (HMIS) that uses the District Health Information System Version II (DHIS2) platform for health facilities and the Community-Based Information System for integrated Community Case Management. In addition to the HMIS, there is quarterly monitoring and evaluation (M&E) of malaria control activities such as data verification, End Use Verification (EUV) surveys and other data quality assessments. Additional information is gathered every 2-3 years during either the national Malaria Indicator Survey or Demographic Health Survey.

The SMEOR Unit leads and coordinates most of the malaria operational and assessment activities, mainly funded by Global Fund and other sources.

PMI Objective in Support of NMCP

PMI supports building the NMCP SMEOR capacity to collect data from all counties, manage and generate high-quality data from both surveys and routine health information systems, and align its activities with the National Malaria Strategic Plan 2021–2025. PMI and the Global Fund have provided the majority of funding for SM&E national activities in Liberia over the past years, with some additional funding from WHO.

PMI-Supported Recent Progress (FY 2020)

With FY 2020 funding, PMI supported/contributed to the following:

- PMI supported a long-term TA advisor seconded at the NMCP to support M&E capacity development and malaria SM&E activities.
- Supported counties, districts, health facilities, and community to improve data collection, aggregation, review, and reporting through DHIS2/HMIS.
- Developed, printed, and distributed national registers (outpatient, ANC, facility delivery), job aids, and data monthly reporting tools for all public health facilities the 15 counties.
- Trained trained/oriented 258 M&E and data clerks and supervisors across the country to use the newly printed monthly reporting forms, improve data quality, and promote data review meetings and use.
- PMI conducted the 24-month follow-up of the net durability monitoring of one brand of ITNs (DuraNet) distributed during the 2018 mass distribution campaign in two counties (Lofa and Grand Gedeh). The 36-month follow up will be completed in 2021.
- Conducted entomological surveillance to describe malaria vector population and insecticide resistance monitoring at supported sentinel sites, and trained/retrained community health volunteers on larva collection and basic mosquito identification and insecticide resistance tests.
- Supported the conduct of two EUV surveys to assess the availability of malaria commodities at health facilities and county depots.
- Hired a consultant to support the NMCP to develop the new National Strategic Plan 2021–2025.
- Supported routine surveillance data collection and transmission, data review exercises in 12 out of the 15 Counties of Liberia.
- Mapped new malaria data elements in the DHIS2 to build validation rules for malaria data.
- Supported a community digital assessment that recommended digital tools for improving CHW and frontline provider service delivery, governance, and performance of the health systems.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

In FY 2021, PMI will continue to support the following:

- Ongoing routine surveillance activities and special surveys (e.g., net durability monitoring at the 36th month, EUVs across the country, and routine data reporting through HMIS).
- Data quality assurance and supportive supervision with the MOH to improve HMIS data reporting and use. This activity will be addressed jointly with the Global Fund.
- The analysis of malaria data, sharing, and use at all levels of the public healthcare system.

- Training/retraining of M&E staff mainly at health facilities and districts in the 12 supported counties.
- Given that the NMCP staff are stretched thin with the various data collection and analysis activities in Liberia, PMI Liberia will continue to support the NMCP in the form of a long-term technical advisor for M&E who is embedded with the NMCP for another 12 months.
- PMI will support the national Malaria Indicator Survey in 2022 (MIS 2022).

Key Goal

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

Key Question 1

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

Surveys including DHS, MIS, health facility surveys, EUV, and programmatic information from the joint Integrated Supportive Supervision (JISS) and implementing partners' reports provide needed information to the malaria stakeholders on malaria services availability, coverage, mortality, and morbidity to guide implementation, scale-up, and strengthening of malaria services in the country. Additionally, the routine surveillance data collected through HMIS and eLMIS provide ongoing information on malaria burden, access to malaria services, and use of national guidelines to help stakeholders to take corrective measures on a monthly basis and advise counties and districts accordingly.

See Table A-12 below.

Supporting Data

Table A-12. Available malaria surveillance sources

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Household Surveys	Demographic Health Survey (DHS)	X	X				
Household Surveys	Malaria Indicator Survey (MIS)				P		
Household Surveys	Multiple Indicator Cluster Survey (MICS)						
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment (SPA)						
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey						
Health Facility Surveys	Other Health Facility Survey						

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)			P		P	
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System						
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)						
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System (eLMIS)	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	EUV	X	X	X	P	P	P
Other	School-based Malaria Survey						
Other	Knowledge, Attitudes, and Practices Survey, Malaria Behavior Survey			P			
Other	Malaria Impact Evaluation						
Other	Entomologic Monitoring Surveys	X	X	X	P	P	P

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

Key Question 2

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

With FY 2022 MOP funding, PMI will continue to support the routine quality data collection and monthly submission on time through HMIS by building the M&E staff and data clerks' capacity through supporting training/retraining and on-site mentoring at all levels of the public healthcare system, and supporting and promoting routine data quality assessment and data review meetings by county and district staff on at least a quarterly basis. PMI will support the NMCP and MOH to engage and train M&E staff and data clerks at functional private health facilities and provide national guidelines and other tools to promote quality data collection and enhance reporting through the national HMIS.

Table A-13. HMIS activities supported and to be supported with FY 2022 funding

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)
	FY 20	FY 21	FY 22	
Central Level				
Data quality assessments (separate from supervision – funding for travel to lower levels)		x	(x)	(x)
Program monitoring and technical assistance (funding for travel to lower levels)		x	(x)	(x)
Training (funding for central level to conduct training at lower levels, capacity-building, such as on-the-job training for central-level staff)	x	x	(x)	(x)
Human Resources (secondment of person in NMCP for SM&E, office/team for SM&E)	x	x		
Data Use (analysis, interpretation, visualization (dashboards, bulletins, dissemination/feedback to lower levels, decision-making)	x	x	(x)	(x)
Policy guidelines and coordination (updating policies, guidelines, supporting subcommittee meetings, and supporting participation in subcommittee meetings)		x	(x)	
External relations/communications/outreach (support travel to international meetings and publications)	x	x	(x)	(x)
Support to annual operational plans for national malaria program	x	x	(x)	(x)
Desk review to catch "logic errors system" (provide TA to catch logic errors)		x	(x)	(x)
Admin 1 Level (County). PMI supports activities in 12 counties while the World Bank supports activities in three counties.				
Registers (warehousing, printing, distribution)	x	x	(x)	
Data quality assessments (separate from supervision – funding for travel to lower levels)	x	x	(x)	

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)
	FY 20	FY 21	FY 22	
Program monitoring and technical assistance (funding for travel to lower levels)	x	x	(x)	
Training (funding for county staff to conduct training at lower levels, capacity-building (e.g., on-the-job training for county-level staff)	x	x	(x)	
Human Resources (secondment of person for malaria SM&E, office/team for SM&E)				
Data Use (analysis, interpretation, visualization [dashboards, bulletins], dissemination/feedback to lower levels, decision-making)	x	x	(x)	(x)
Participation in national meetings (support for travel costs)				
Support to Annual Operational Plans for County Malaria Program				
Admin 2 Level (District)				
Data entry, summary, and transmission (training, re-training, computers, internet, tools)		x	(x)	(x)
Supervision (training, traveling, supervision tools/checklists, create/design system for organized/methodical supervision)	x	x	(x)	(x)
Data validation (data validation activities before monthly data submission – organize health facilities)	x	x	(x)	(x)
Monthly/quarterly data quality review meetings (venue, meeting support)	x	x	(x)	(x)
Data Use (analysis, interpretation, visualization (i.e., dashboards), dissemination/feedback to facilities, decision-making)	x	x	(x)	(x)
Human Resources (secondment of person for malaria SM&E, office/team for SM&E)				
Annual planning with county (support travel)				

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)
	FY 20	FY 21	FY 22	
Facility Level				
Data collection/entry, summary, and transmission (training, retraining, computers, internet, tools)				
Supervision of CHWs (training, traveling, administering supervision tools/checklists of CHWs)				
Data use (analysis, interpretation, visualization (dashboards), dissemination/feedback to CHWs, decision-making)				
Monthly/Quarterly data quality review meetings(support for travel)				
Community Level				
Data collection/entry and transmission(training, re-training, tools)	x	x	(x)	
Data use (analysis, interpretation, decision-making)	x	x	(x)	

Supporting Data

Key Question 3

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

- Developed, printed, and rolled out nationwide the new health facilities registers, monthly reporting forms, and other tools to improve routine data collection, reporting and completeness nationwide.
- Training of 258 M&E and data clerks mainly working at health facilities and districts to build their knowledge on M&E, data management, verification, analysis, and reporting on time.
- The number of reported malaria confirmed cases per year declined from 1,188,926 in 2016 to 946,506 in 2020. This represented an estimated 242,420 malaria cases averted in five years. During the past two years, Liberia reported less than one million malaria cases a year.
- Review of monthly HMIS data helped PMI to identify potential impact of COVID-19 on reduction of health facility attendance.
- Community monthly reporting rate apparently was not affected by the COVID-19 outbreak and or lockdown.

Table A-14. Outcomes of HMIS strengthening efforts

	Indicator	2019	2020
Timeliness	% of reports received on time	63%	67%
Completeness	"Confirmed malaria cases for children under five years of age" was reported in X [number or percent] of facility-months	77.5% (8,007/10,332)	76.6% (8,211/10,716)
Accuracy	Populate with most recent DQA data:	N/A	84%

Key Question 4

Are there any other considerations that impact your funding allocation in this category (e.g., strategic information or capacity-building in-country)?

Nothing additional to report.

Conclusions for Surveillance, Monitoring, and Evaluation Investments

- PMI ongoing support has been critical to strengthen and build national capacity to improve malaria routine surveillance data quality, completeness, and reporting on time through DHIS2/HMIS.
- The support provided to 12 counties to conduct quarterly data review at county, district, and health facility levels provided opportunities to promote data use for program improvement, guide implementation, and inform stakeholders on malaria burden by administrative geographic locations.
- The overall confirmed malaria cases have decreased since 2016 and fell below a million cases per year during the past two calendar years (2019 and 2020). However the reported number of malaria cases in 2020 was slightly higher than the reported number in 2019, despite a slight decrease of outpatient attendance in early 2020. It is not clear whether the observed increase from 2019 to 2020 has any relation to COVID-19. During the early phase of COVID-19, in-person meetings and mentoring and site visits for data review meetings were stopped.
- The reported estimated malaria incidence per 1,000 population decreased from 281 in 2016 to 164 in 2020 (HMIS data and UN population estimate). During that same time period, malaria mortality rates in the general population decreased from 35 to 7 per 100,000 population.
- PMI supported MOH to develop and roll out the eLMIS, which has become a reliable national source of information on commodities stock status and distribution during the past 12 months.
- Conducted the EUV twice a year at health facilities and county depots in 10 counties per survey.

3.3. OPERATIONAL RESEARCH

NMCP Objective

The NMCP Surveillance, Monitoring, Evaluation, and Operational Research (SMEOR) unit is composed of three subunits (Surveillance, Monitoring and Evaluation, and Operational Research), and is responsible for planning and conducting operational research studies in collaboration with other NMCP focal points and partners. An overarching strategic objective for the NMCP is to contribute to the knowledge of malaria epidemiology and control in coastal West Africa through operational research in partnership with higher educational institutions in Liberia. The current National Strategic Plan places further emphasis on the strengthening and improvement of the national surveillance system data quality to drive decision-making and using operational research to bridge any implementation gaps.

NMCP Approach

The NMCP, MOH, PMI, and other partners have an inventory of PE/OR activities, which is updated annually and used to set an annual research agenda. In 2020–2021, due to the ITN mass campaign distribution planning and the COVID-19 outbreak, there has not been an annual OR/PE planning meeting yet. The NMCP and partners will continue to complete ongoing/planned PE activities. Emerging research areas include studies on barriers to uptake of MIP services and factors influencing the periodic regional changes observed in malaria prevalence. Additional studies may be identified on emerging issues as the need arises.

PMI Objective in Support of NMCP

PMI will continue to provide TA to identify priority OR/PE topics and funding to conduct them and surveys such as malaria indicator surveys.

PMI-Supported Recent Progress (FY 2020)

In FY 2020, PMI in collaboration with the NMCP developed and submitted a protocol on barriers to IPTp uptake to the Liberia IRB and to CDC for clearance (in progress). This study will be funded with PMI's FY 2019 funding.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

- Assessment of barriers to the uptake of the IPTp services in ANC settings in Liberia, MOP FY 2019 funding; protocol submitted to Liberia IRB for review and to CDC for clearance. Data collection is planned for CY 2021.
- Malaria behavior survey with FY 2019 funding, but the planning of the survey was affected by COVID-19 lockdown. The protocol development is under way, and the study is expected to start in August 2021.

PMI Goal

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

Key Question 1

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

In addition to the PE listed above, the following program evaluation has been identified as a priority: Understanding the reasons for consistent low ITN access (from 23 percent in 2009 to 40 percent in 2019–2020) in Liberia.

Supporting Data

The table below includes PE/OR currently conducted in Liberia with USG, Global Fund, multilaterals or other major donors.

Table A-15. Ongoing program evaluation and operational research

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
PMI FY 2019 MOP	Strategic Technical Assistance for Improved Health Systems (STAIP)	Identifying provider behaviors related to missed opportunities for IPTp3.	Protocol drafted and under review at CDC and in Liberia; study has not started data collection
Global Fund	NMCP	To measure the level of adherence to ACT dose regimen in uncomplicated malaria patients of all ages seeking treatment at health facilities	Data collection completed and data entry in progress

Key Question 2

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

- There are no additional specific challenges in intervention that the team wants to explore.

Key Question 3

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

If there is a budget line item in Table 2 that is not covered by the above questions?

- No there is no other consideration to be budgeted in Table 2

Conclusions for Program Evaluation and Operational Research Investments

- In FY 2021, the team will start implementation of the assessment of the barriers to IPTp uptake and will work with Liberia public universities to develop local capacity in program evaluation.
- With FY 2022 funding, PMI Liberia will support a programmatic evaluation of reasons for low ITN access.

There are no proposed OR studies with FY 2022 funding. See the community activity for the program evaluation of reasons for low ITN access.

3.4. SOCIAL AND BEHAVIOR CHANGE (SBC)

NMCP Objective

Under the 2021–2025 NMSP, SBC falls under Objective 4: Strengthen and maintain capacity for program management, coordination, and partnership to achieve malaria program performance at all levels.

Liberia has had two five-year communication strategies for 2020–2015 and 2016–2020. The second communication strategy ended in 2020 and PMI is supporting the development of the first Social and Behavior Change (SBC) strategy that will run from 2021–2025. Because of COVID-19 restrictions, the development of the strategy is delayed. According to the malaria NSP 2021–2025, SBC objectives and 2025 targets are as follows:

1. Increase the proportion of children under five years of age with fever seeking treatment within 24 hours from 48 percent in 2019 to 75 percent in 2015.
2. Maintain the proportion of suspected malaria cases receiving a parasitological test at public/private health facilities and community level above 95 percent (currently, malaria test rate is 94 percent [source HMIS] and 20 percent of tests are performed at the community level [source: Community-Based Information System].
3. Increase the proportion of children under five years of age with confirmed uncomplicated malaria receiving appropriate first-line treatment from 85 percent to 90 percent (2019–2020 DHS).
4. Increase IPTp3 coverage from 2019–2020 levels of 40 percent to 80 percent.
5. Ensure LLIN use from 2019–2020 levels of 39 percent to 80 percent.

NMCP Approach

The current SBC activities are focusing on the following three priority behaviors:

1. Maintaining use and care of ITNs.
2. Missed opportunities for IPTp3 and ITNs in health facilities.
3. Provider adherence to malaria case management guidelines and test results.

The SBC activities ensure that (1) everyone presenting with fever is tested and receives an ACT within 24 hours, (2) pregnant women receive three or more doses of IPTp, and (3) communities and pregnant women demand, access, and consistently sleep under the ITNs year-round to prevent malaria.

The SBC activities are at the national level in the 12 USAID/PMI focus counties. The World Bank and Global Fund are supporting SBC activities in the remaining three counties.

Table 3.4.1 (below) provides the baseline and targets for the NMCP Malaria Communication Strategy. The 2016 MIS provides the baseline for most of the behavioral and communication objectives. PMI Liberia will obtain the rest of the baseline information from the recently completed 2019–2020 DHS and the MBS planned for August 2021.

Table A-16. Behavioral and communication objectives for the NMCP

Behavioral Objective: Vector Control	Baseline	Target
Increase the proportion of people with access to nets	42%	80%
Increase the proportion of pregnant women who receive an ITN at ANC and at institutional delivery.	40% pregnant women 44% children	80%
Communication Objectives	**Baseline**	**Target**
1. Increase the proportion of pregnant women delivering with the assistance of a skilled provider.	To be determined	90%
2. Increase the proportion of pregnant women and caregivers of children under five years of age who perceive themselves and their children to be at risk if they do not sleep under an ITN year-round.	To be determined	90%
3. Increase the proportion of pregnant women and caregivers who believe that using an ITN will reduce their risk of malaria.	To be determined	90%
4. Increase the proportion of providers who believe that issuing ITNs during ANC and institutional delivery will reduce the risk of malaria for pregnant women and children under five years of age.	To be determined	90%

Behavioral Objective: Vector Control	Baseline	Target
5. Increase the proportion of providers who feel confident that they can distribute ITNs to pregnant women at ANC clinics and during delivery when ITNs are available at the facility.	To be determined	90%
Behavioral Objective: Malaria Case Management	**Baseline**	**Target**
1. Increase the proportion of caretakers of children under five years of age with recent fever who seek treatment for malaria.	78% (2016 MIS)	90%
2. Increase the proportion of caregivers of children under five years of age who have accurate knowledge of malaria transmission.	90% (2016 MIS)	90%
3. Increase the proportion of individuals who seek treatment within 24 hours when they suspect they have malaria.	To be determined	80%
Communication Objectives	**Baseline**	**Target**
1. Increase the proportion of caretakers of children under five years of age who perceive their children to be in danger if they do not promptly seek treatment for malaria after the onset of fever.	32% (2016 MIS)	90%
2. Increase the proportion of caretakers of children under five who perceive prompt treatment seeking to be the norm in their community.	To be determined	90%

PMI Objective in Support of NMCP

PMI supports SBC at the national, health facility, and community level. However, SBC support is limited to the 12 counties receiving PMI support. The remaining three counties are being supported by the Global Fund and World Bank. PMI supports the priority behaviors of:

- Maintaining use of ITNs
- Missed opportunities for IPTp3 in health facilities
- Provider adherence to malaria case management guidelines, including malaria test results.

The existing National Malaria Communication Strategy expired in 2020. Therefore, PMI is supporting the development of the next National SBC Strategy that will provide a framework for NMCP and partners to support SBC activities for 2021–2025. The draft aligns with NMCP's 2021–2025 strategic plan and the three priority malaria interventions: ITNs, case management, MIP.

PMI contributes to the body of evidence for SBC programming. For example, PMI is supporting the design and implementation of the 2021 Malaria Behavior Survey (MBS) that will provide information for identifying and understanding the demographic, psychosocial and contextual factors associated with the key priority behaviors and assess impact of exposure to malaria related SBC activities.

PMI supports SBC activities that target various audiences, including the community, policy makers, county administrators, and service providers in health facilities and in the community. PMI support uses various communication channels that include mass and social media, community dialog, and interpersonal communication, especially targeting service providers.

PMI investment in the community health program includes developing the capacities of the CHAs and CHWs to provide the dual role of service providers as well as change agents for positive behaviors. To date, CHAs and CHWs have contributed to mobilizing communities to use and care for nets, mobilize communities to seek early for malaria testing and treatment, and refer pregnant women for ANC and IPTp to reduce missed opportunities.

PMI-Supported Recent Progress (FY 2020)

The Liberia SBC activities were delayed in FY 2020 due to COVID-19 lockdown and restrictions. There is a new SBC partner and during the first year of project implementation, COVID-19 significantly impacted project start-up and implementation of field activities. The SBC activities supported in FY 2020 were as follows:

- Trained 385 (256 male, 129 female) people in various SBC activities, including SMART advocacy and community mobilization.
- The planning and design of the 2021 MBS. PMI supported several meetings with NMCP, MOH, and other malaria partners to develop the design and methodology for the MBS. The study is now at the protocol stage. Data collection will take place in August 2021 and the report disseminated in October/November 2021. The MBS study will provide baseline information for the behavioral and communication objectives as well as information for SBC strategy and programming. The study will explore a range of attitudes and beliefs that influence household's behavior ranging from the use of mosquito nets, prompt and appropriate care-seeking for malaria, and IPTp. The MBS will be conducted in three health regions/clusters of Liberia (North Central, South Central, and Greater Monrovia). The total number of households for the three regions combined will be in the range of 4,000, which will yield a sample of about 5,000 women and about 1,400 men, for a total of approximately 6,400 respondents. The MBS preparatory activities are ongoing; reviewing local research data collection agency proposals and field staff training should take place in June 2021 with data collection commencing immediately thereafter. Fieldwork will take not more than 45 days and will end no later than September 2021.
- PMI is supporting the NMCP to develop a new national SBC strategy that is aligned with the new malaria NSP (2021–2025). PMI supported various consultative meetings and technical assistance for the development of the strategy.
- Work with Global Fund principal recipient and NMCP to design SBC activities for the ITN mass distribution campaign. The SBC activities will target advocacy and social mobilization in all 15 counties. The SBC will use various channels to inform and mobilize communities to collect ITNs from the door to door distribution in Montserrado and various distribution points in the 15 upcountry and rural counties.
- Support to the NMCP and MOH SBC technical working group meetings at the national level and the SBC coordination meetings in the 12 USAID supported counties.
- PMI supported reviewing, adapting, and repurposing existing malaria SBC materials (audio, print, and digital) for use on radio, print, and social media.

- Supported two global awareness days: April 25 World Malaria Day and August 20 World Mosquito Day. PMI supported various SBC activities for consistent ITN use, early care-seeking, and testing every fever case, and adhering to test and treatment protocols.
- Supported community-based SBC activities, including assisting individuals and groups to access health services and educating communities on various health issues.

PMI-Supported Planned Activities (FY 2021 with currently available funds)

- Finalize the development of the National Malaria SBC Strategy, including operationalization and developing SBC materials to support ITN access and use, improving IPTp3+ coverage, testing before treatment among providers, and early care-seeking for fever. PMI will support dissemination and implementation of the strategy at the national and subnational levels.
- Provide technical support to the NMCP to draft the SBC activities for the Global Fund COVID-19 Response Mechanism application for 2021. The application will include the three SBC priority behaviors.
- Support NMCP and the Health Promotion Division of the MOH to use the results of 2021 MBS and 2019–2020 DHS to revise malaria SBC messages and materials including audio, social media, and interpersonal communication.
- Support SBC activities for the ITN mass distribution campaign, including pre-, during, and post-campaign SBC activities. PMI will support airing SBC messages on various channels including mass and social media and community meetings that are compliant to COVID-19 safety measures.
- Supporting NMCP and partners to integrate umbrella branding into malaria SBC campaigns, namely "Zero Malaria Starts with Me" and Healthy Life. PMI-supported SBC will continue to include theory informed, evidence-based activities under an integrated Zero Malaria Starts with Me umbrella.
- Integrate SBC activities into the community health program.
- Develop the capacities of the NMCP and county health teams in planning, implementation, coordination, and monitoring of SBC activities. This includes support for the central and county SBC technical working groups.
- Support SBC activities using various channels like mass media, social media, community dialog, advocacy meetings, and interpersonal communication. All SBC-related meetings and community mobilization activities will observe COVID-19 safety measures.
- Support for two global awareness days: World Malaria Day on April 25 will incorporate the theme "Zero Malaria – Draw the Line Against Malaria" and World Mosquito Day on August 20 will promote bed net use as a protective measure against mosquitoes.
- Support Health Fairs. The overall aim of the community health fairs is to address the health needs of the community in terms of access and coordination. The community health fairs will be used as an approach to bring community dwellers together in a central space for a full day where they will have access to key information on available health services. Key health information will include bed net care and use demonstrations, early care-seeking, referral, and promotion of IPTp.

Key Goal

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

Key Question 1

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

Supporting Data

Table A-17. Prioritized behaviors with FY 2022 funds

Behavior	Target Population	Geographic Focus	Justification
Maintain use of ITNs	Community, community leaders, pregnant women, teachers, students, caretakers of children, health workers at ANC and delivery sites	National and all 15 counties	The 2019–2020 DHS shows a high net access:use ratio but ITN access is low at 40%, just a year after the 2018 ITN mass distribution campaign. This net access is below the national target of 80%. PMI will support SBC activities to improve demand, access, and consistent use of ITNs distributed through the various channels such as mass distribution campaigns and the alternate routine distribution channels such as school net distribution.
Missed opportunities for IPTp3 in health facilities	Pregnant women, spouses, in-laws, service providers	12 counties (Bomi, Bong, Grand Bassa, Grand Cape Mount, Grand Gedeh, Grand Kru, Lofa, Margibi, Maryland, Montserrado, Nimba, and River Gee)	All MIS and DHS show consistent high coverage of ANC4+ attendance. The 2019–2020 DHS shows that (87%) attended at least the four recommended prenatal care visits but IPTp3 is only 40%, which is below the national target of 60%. The 2020 HMIS shows that only 73% of pregnant women receive a net at the first ANC visit. The policy, structural, and environmental factors contribute to the high IPTp1-IPTp3, ANC4-IPTp3, and ANC1-ITN gaps that require a focused SBC approach to address the attitude and practice of health workers.
Provider adherence to malaria case management guidelines, including	Community, community leaders, caretakers of children, community health workers, health workers, and other service providers	12 counties (Bomi, Bong, Grand Bassa, Grand Cape Mount, Grand Gedeh, Grand Kru, Lofa, Margibi,	The 2019–2020 DHS shows 81% of children who had a fever two weeks preceding the survey sought advice or treatment but only 48% of these were taken for advice or treatment the same or next day. The demographic surveys show that since 2013, only 85% of the children with fever at the time of the survey were given ACTs.

Behavior	Target Population	Geographic Focus	Justification
malaria test results		Maryland, Montserrado, Nimba, and River Gee)	PMI will prioritize SBC interventions that promote early care-seeking behaviors, testing before treatment, and community and health worker adherence to both negative and positive malaria test results. FY 2022 funds will also be used to create awareness on the dangers of self-medication and the presence of counterfeit and substandard medicines in the market.

Key Question 2a

For prioritized behavior 1 (maintain use of ITNs), what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

All the Liberia MIS and DHS have consistently shown a low net ownership, access, and use. However, the same surveys have shown consistent high net use in the households that have nets. The recent 2019–2020 DHS shows net access of 40 percent and ITN use of 39 percent, 44 percent, and 47 percent in the general population, children under the age of five years, and pregnant women 15 to 49 years of age, respectively. However, the population-based surveys have consistently shown a high net use in the households that have an ITN. The recent 2010–2020 DHS shows a net use in households with an ITN of 67 percent for the general population, 72 percent for children, and 78 percent for pregnant women. All Liberia MIS and DHS have shown that the main source of nets are mass distribution campaigns followed by the health facilities. However, for the population in households that have an ITN, the data shows slightly lower ITN use among the school-going children 5 to14 years of age (59 percent), in urban areas, especially greater Monrovia (60 percent) than rural areas (69 percent), and male (65 percent) than female (69 percent). Net use is also lower in the highest wealth quintile (58 percent) than in the lowest and second wealth quintiles (68 percent and 71 percent respectively). These data demonstrate that Liberia's gap is in getting universal coverage and access to ITNs and not net use.

The knowledge and research gaps are in the area of net access and reasons behind low net access after the 2015 and 2018 ITN mass distribution campaign. Another knowledge gap is in understanding the disparities and gender imbalances in net ownership, access, and use between the different wealth quintiles, urban and rural populations, male and female, and the different age groups, especially the school-going children 5 to 15 years of age. PMI plans to use the annual Knowledge, Attitude, and Practice (KAP) study, the 2021 MBS, and the 2022 MIS to address the knowledge gaps.

Key Question 2b

For prioritized behavior 2 (increased IPTp3 for pregnant women), what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

The Liberia MIS and DHS show a steady increase in ANC1 and ANC4 attendance. Coverage of prenatal care from a skilled provider has been above 95 percent since 2013 and is almost universal (98 percent) as of 2019–2020. The 2019–2020 DHS shows that (87 percent) attended at least the four recommended ANC visits for their most recent birth in the five years before the survey, and 71 percent received ANC during the first trimester for their most recent pregnancy. The percentage of women who had at least four ANC visits rose from 78 percent in 2013 to 87 percent in 2019–2020, while the percentage who received care in the first trimester increased from 67 percent in 2013 to 71 percent in 2019–2020. Rural women are somewhat less likely than urban women to have at least four ANC visits (85 percent vs. 89 percent).

The IPTp3 and IPTp4+ (four or more doses of IPTp) reporting started in 2017 and HMIS data shows an increasing trend in both indicators. All the Liberia malaria indicator and demographic health surveys show an upward trend in IPTp coverage, including IPTp3. The IPTp1 increased from 58 percent in 2009 to 90 percent in 2019–0220; IPTp2 increased from 47 percent in 2009 to 70 percent in 2019–2020; and IPTp3 increased from 11 percent in 2009 to 40 percent in 2019–2020. However, IPTp2 and IPTp3 coverage are below the national targets of 80 percent and 60 percent, respectively. In 2020, of the 173,572 pregnant women who attended the first ANC visit, 127,283 (73 percent) received ITNs at ANC visits and at delivery at the health facility. This is an increase from 66 percent and 56 percent in 2019 and 2018, respectively.

The ANC and IPTp data demonstrate that Liberia has no challenges with early ANC attendance and attending the recommended four ANC visits. The policy, structural, and environmental factors contribute to the high IPTp1-IPTp3 and ANC4-IPTp3 gap that needs urgent attention. PMI will investigate the causes of the missed opportunity for IPTp through the annual KAP study, 2021 MBS, the 2022 MIS, and the planned 2021 IPTp study.

Key Question 2c

For prioritized behavior 3 (provider adherence to malaria case management guidelines, including malaria test results), what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

The Liberia MIS and DHS show an improving trend in early care-seeking behavior and testing for malaria. The data shows that the number of children under five years of age who have had a fever in the two weeks that preceded the survey increased from 77 percent in 2009 to 81 percent in 2019–2020. Of those who sought advice or treatment, 41 percent were taken for advice or treatment on the same day in 2009 compared with 48 percent in 2010–2020. Although the number of children with fever that had a malaria test increased from 23 percent in 2009 to 49 percent in 2019–2020, it is a drop from 50 percent in 2016. The proportion of children with fever given ACTs improved from 45 percent in 2009 to 85 percent, but this has stagnated since 2013.

Key Question 3

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

Implementation of SBC activities is hampered by low funding and gross understaffing of the SBC unit of the NMCP and the counties.

Supporting Data

The SBC is a core intervention of the 2021–2025 malaria NSP and NMCP has an SBC Advisor as part of the management structure. Counties also have SBC activities as core interventions. However, implementation of SBC activities is hampered by the gross understaffing of the SBC unit of the NMCP and the counties as well as low funding.

The NMCP has only one person managing all the SBC activities. Counties are also staffed with one SBC focal person who has no specialized training in SBC. All SBC activities at the central and country levels are underfunded. The Health Promotion Division of the MOH focuses on only developing and standardizing SBC messages. Currently, PMI is the main funding source for SBC for malaria, followed by the Global Fund. The MOH has committed to improving staffing for SBC at the NMCP. PMI is currently providing TA for a detailed analysis of the SBC landscape and developing the new Malaria SBC strategy. Additional support will be required for developing implementation guidelines, messages, and high-level advocacy for the three prioritized behaviors. PMI will provide additional support for developing the capacity of NMCP and county SBC staff, strengthening SBC coordination structures, and quarterly coordination meetings at NMCP, MOH, and the 12 PMI-focus counties.

Conclusions for SBC Investments

Liberia is implementing an integrated SBC portfolio with funding from various USAID funding streams that include PMI, MCH, population, and Global Health Security Agenda funds; as well as other funding from especially the Global Fund and World Bank for the three World Bank-supported counties. PMI support for SBC has resulted in improved demand and use of malaria interventions at health facilities and in the community. With FY 2022 funding, PMI will do the following:

- Focus on the prioritized three behaviors of maintaining ITN use, increased uptake for IPTp3, and provider adhering to malaria case management guidelines, including malaria test results. SBC activities will focus on the following:
  - Supporting activities for maintaining use of ITNs distributed through mass distribution campaigns, health facilities, schools, and other channels.
  - Developing strategies to reduced missed opportunities for IPTp3 for pregnant women.
  - Developing interventions for improving provider adherence to malaria case management guidelines, including malaria test results.
- Develop the capacity of the NMCP to plan, implement, and monitor SBC activities at the national and subnational levels, including supporting the SBC coordinating structures at the national and county levels.
- Conduct formative assessments, program evaluations, or operational research activities to address the identified knowledge gaps:
  - The operational research activities include the annual KAP study.
  - ITN access study to assess low and disparities to ITN access.
- Support SBC capacity-building at the national and/or subnational level including the county health teams and community service providers.

PMI/Liberia is planning to maintain the same funding level for SBC activities at $900,000. This is the same funding level for SBC in FY 2021 but is more than FY 2020 funding ($750,000). FY 2020 funding was the first year of PMI funding for SBC activities and the funding decision was made after analysis of other USAID funding sources (MCH, Population, and Global Health Security Agenda). PMI plans to complement PMI funding with funding from the Global Fund under the Streamlines Malaria Grant and the new funding opportunity, COVID-19 Response Mechanism 2021 (C-19RM 2021), which will fund COVID-19 SBC-related activities up to December 2023.

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

3.5. OTHER HEALTH SYSTEMS STRENGTHENING

NMCP Objective

Objective 4 in the Liberia National Malaria Strategic Plan 2021–2025 is to strengthen and maintain NMCP capacity for program management, coordination, and partnership for effective management of the malaria control program at all levels.

NMCP Approach

A high priority of the NMCP is to increase the qualifications of its staff, particularly in terms of their managerial and supervisory capacity.

The Liberia MOH has made a commitment to decentralize services to the county and district levels and to integrate health services at both the health facility and community levels to improve access to healthcare. Strengthening the capacity of lower levels of the healthcare system, particularly at the level of county and district health teams, to manage, supervise, and improve the quality of malaria services and program implementation, is also a key priority.

Finally, the NMCP and partners are prioritizing the strengthening of core MOH-wide management systems that are essential for effective delivery and management of malaria services, such as in-service training, supervision, and strengthening the supply chain, HMIS, and eLMIS.

PMI Objective in Support of NMCP

PMI's objectives align with those of the MOH and NMCP. PMI plans to support the decentralization of services by providing support and TA at the central level, as well as to the 15 counties through support to the CHTs.

PMI supports a broad array of HSS activities that cut across intervention areas, such as strengthening in-service training of health workers, supply chain management, health information systems, regulation of health services and pharmaceuticals, and capacity-building of the NMCP and other relevant MOH departments, as well as that of CHTs and 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 (NPHIL) and Liberia Medicines and Health Products Regulatory Authority (LMHRA).

Currently, PMI and the World Bank together support all 15 counties in Liberia, to include all core interventions except IRS. The World Bank uses performance-based financing to support CHTs in Gbarpolu, River Cess, and Sinoe counties. In the remaining 12 counties, PMI uses two mechanisms for HSS activities, malaria case management, and MIP activities. PMI provides direct government to government support through a Fixed Amount Reimbursement Agreement (FARA) for malaria case management and MIP in six counties (Bong, Lofa, Nimba, Grand Cape Mount, Grand Gedeh, and River Gee) and also provides wrap-around TA for these counties and expanded TA for the remaining six counties of Bomi, Montserrado, Margibi, Grand Bassa, Grand Kru, and Maryland. In addition, PMI provides tailored health systems strengthening TA and SM&E for the 12 PMI-focus counties, including the six FARA counties; and at the direction of PMI and USAID, supports PE and OR. PMI's support to the 12 counties through the FARA and other implementing partners is integrated with other non-malaria health services including maternal, neonatal, child, and adolescent health; nutrition; and family planning. These programs receive PMI, MCH, and population funds. The PMI team worked with the NMCP and partners to map partner and donor activities by county to improve coordination and avoid duplication of efforts.

PMI-Supported Recent Progress

In 2009, PMI expanded support for strengthening malaria service delivery to 12 of the 15 counties in Liberia. The 12 counties are Bong, Nimba, Lofa, Grand Cape Mount, River Gee, Grand Gedeh, Bomi, Margibi, Grand Bassa, Grand Kru, Maryland, and Montserrado). The remaining three counties (Gbarpolu, River Cess, and Sinoe) were supported by the World Bank. HSS activities were tailored for each county based on the results of the CHT assessment. As discussed in other sections, PMI supported training and mentoring on the use of eLMIS and supported improvements in DHIS2, which supported the NMCP by modifying registers and supported the printing of the new registers to better capture malaria data in DHIS2.

The COVID-19 pandemic has forced the Peace Corps to stop activities and leave Liberia; it is uncertain when Peace Corps volunteers will return to Liberia and support malaria control activities.

PMI-Supported Planned Activities

PMI will continue to support other HSS activities in all 12 previously supported counties through both the FARA and TA implementing partners.

When Peace Corps volunteers are able to return to Liberia, they will continue to educate school-age children and teenage parents on malaria prevention. PMI will support three malaria Peace Corps volunteers and provide support for malaria education activities carried out by other volunteers.

With support of NMCP technical capacity and program management, TA will support the coordination meetings, site visits, and annual NMCP data and program review meetings. The TA will also support NMCP staff technical capacity-building including attendance at international meetings, conferences, and training courses. TA to the NMCP will also include revising the malaria communication strategy, supporting NMCP and MOH SBC coordination, and developing strategies and plans for monitoring SBC activities.

Key Goal

Key Question 1

PMI support that engages Peace Corps

Before the COVID-19 authorized departure, Peace Corps volunteers incorporated malaria messaging into the various classroom and extracurricular activities, including a malaria unit in science classes, malaria statistics in math lectures, and added malaria activities to health clubs at schools. Any future health volunteers will support the CHSSs who support CHAs and will focus on maternal and child health, including malaria.

Before the COVID-19 authorized departure in early 2020, there was a Peace Corps malaria coordinator (a returning Peace Corps volunteer) based in Monrovia who worked closely with the NMCP, PMI Resident dvisors, and PMI's implementing partners.

Conclusion: Peace Corps/Liberia hopes to have volunteers return to Liberia in 2021 if both the GOL and the U.S. Embassy in Liberia deem it safe during the COVID-19 pandemic. PMI would then support three malaria volunteers. If this happens, PMI will continue to support joint in-service trainings where a Peace Corps volunteer attends with a teacher and healthcare worker from their community. The team will then prepare malaria lessons for the classroom. PMI will also continue to support Peace Corps volunteers to conduct malaria projects in the communities where they reside.

Supporting Data

N/A

Conclusions for Additional Health Systems Strengthening Investments

With FY 2022 funding, PMI will continue to support other HSS activities similar to those from previous years. The TA will support NMCP staff professional capacity development including attendance at international meetings and conferences and training courses.

PMI plans to include a change to the FY 2020 funding for other HSS activities. Besides maintaining support for strengthening the program management capacity of the NMCP, PMI plans to provide TA to the MOH Health Promotion and Community Health Units to strengthen SBC messaging (also planned for FY 2021).

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