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Ghana

Malaria Operational Plan FY 2023

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This FY 2023 Malaria Operational Plan has been approved by the Acting 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 2023 appropriation from the U.S. Congress. Any updates will be reflected in revised postings.

This document was prepared in the early months of 2022 as the COVID-19 pandemic continued to evolve worldwide, including in PMI-partner countries. The effects of the pandemic on malaria control and elimination work in 2023 are difficult to predict. However, because U.S. Congressional appropriations for PMI are specific to work against malaria and any appropriations for work against COVID-19 are specific for that purpose and planned through separate future U.S. Government planning processes, this FY 2023 MOP will not specifically address the malaria–COVID-19 interface and will reassess any complementary work through timely reprogramming in countries.

CONTENTS

ABBREVIATIONS

3Ts	Test, Treat, and Track
ACT	Artemisinin-based Combination Therapy
AI	Active Ingredient
ANC	Antenatal Care
CDC	Centers for Disease Control and Prevention
CDCS	Country Development and Cooperation Strategy
CE4MP	Community Engagement for Malaria Prevention
CHN	Community Health Nurse
CHO	Community Health Officer
CHPS	Community-based Health Planning and Services
CHV	Community Health Volunteer
CU5	Children Under Five Years of Age
CWC	Child Welfare Clinics
CY	Calendar Year
DHIMS2	District Health Information Management System 2
DHMT	District Health Management Team
e-tracker	Electronic Tracker
FDA	Food and Drugs Authority
FETP	Field Epidemiology Training Program
FY	Fiscal Year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GhiLMIS	Ghana Integrated Logistics Management Information System
GHS	Ghana Health Service
GOG	Government of Ghana
GS1	Global Standards 1
HMIS	Health Management Information System
HPD	Health Promotion Division
iCAP	Integrated Community Action Plan
IPTp	Intermittent Preventive Treatment for Pregnant Women
IRS	Indoor Residual Spraying
ISS	Integrated Supportive Supervision
ITN	Insecticide-treated Mosquito Net
LMD	Last Mile Distribution
LMIS	Logistics Management Information System
MBS	Malaria Behavior Survey
mCAP	Malaria Community Action Plan
MCH	Maternal and Child Health
MIP	Malaria in Pregnancy

MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
NIRMOP	National Insecticide Resistance Monitoring Partnership
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
OR	Operational Research
OTSS/OTSS+	Outreach Training and Supportive Supervision
PBO	Piperonyl Butoxide
PE	Program Evaluation
PPME	Policy Planning Monitoring and Evaluation
PMI	U.S. President's Malaria Initiative
RAS	Rectal Artesunate Suppositories
RDT	Rapid Diagnostic Test
RHMT	Regional Health Management Team
SBC	Social and Behavior Change
SCMP	Supply Chain Master Plan
SDP	Service Delivery Point
SMC	Seasonal Malaria Chemoprevention
SM&E	Surveillance, Monitoring, and Evaluation
SP	Sulfadoxine-Pyrimethamine
SPAQ	Sulfadoxine-Pyrimethamine and Amodiaquine
TWG	Technical Working Group
USAID	U.S. Agency for International Development
WHO	World Health Organization
ZOI	Zone of Influence

EXECUTIVE SUMMARY

To review the specific country context for Ghana, please refer to the Country Malaria Profile on the PMI country landing page, which provides an overview of the country malaria situation, key indicators, National Malaria Control Program (NMCP) strategic plan, and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, the U.S. President's Malaria Initiative (PMI) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in Sub-Saharan Africa and three programs across the Greater Mekong subregion in Southeast Asia to control and eliminate malaria. Ghana began implementation as a PMI partner country in fiscal year (FY) 2008.

Rationale for PMI's Approach in Ghana

PMI supports the goals and objectives outlined in Ghana's National Malaria Strategic Plan (NMSP) 2021–2025, including a reduction in malaria mortality by 90 percent and malaria case incidence by 50 percent (using 2019 as the base year), and achieving malaria pre-elimination in at least six[1] districts. PMI provides support for vector control; case management; malaria in pregnancy (MIP); seasonal malaria chemoprevention (SMC); social and behavior change (SBC); supply chain management; and surveillance, monitoring, and evaluation (SM&E). There are no key changes in strategies or budget levels in this Malaria Operational Plan (MOP). However, there are key changes in activities, including expansion of indoor residual spraying (IRS) to one additional district. For case management, the only commodity PMI plans to procure is injectable artesunate other commodity needs are covered by the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) and the Government of Ghana (GOG).

Overview of Planned Interventions

The proposed FY 2023 PMI funding for Ghana is $27 million, and PMI will support the following intervention areas with these funds:

[1] Ghana's NMSP states that at least seven districts are targeted for pre-elimination. Since the implementation of the NMSP, however, NMCP reduced this target to six districts to reach pre-elimination status by 2025.

1. Vector Monitoring and Control

In line with NMSP, PMI supports entomological monitoring and procurement and distribution of insect-treated mosquito nets (ITNs) through mass campaigns and school-based distribution, and implementation of IRS in high-burden districts. In coordination with the Global Fund, PMI will continue to support insecticide resistance monitoring at 30 national entomological surveillance sites and will support monthly vector bionomics monitoring at six of these sites. Additionally, PMI will support insecticide resistance, vector bionomics, and insecticide residual efficacy monitoring within PMI-supported IRS districts in the North East and Northern regions. PMI will continue to support the procurement of piperonyl butoxide (PBO) synergist and dual active ingredient (AI) ITNs to be distributed in the 2025 school-based distribution. PMI will also support the distribution of PBO and dual AI ITNs that will be procured in prior years for a total contribution of 3,000,000 nets for the 2024 mass distribution campaign. PMI will continue to support implementation of IRS in FY 2023, expanding from 9 to 10 districts in the Northern and North East regions.

2. Malaria in Pregnancy

PMI/Ghana's objectives for MIP are aligned with the national guidelines, which include provision of ITNs at the first antenatal care (ANC) visit, a minimum of three doses of intermittent preventive treatment for pregnant women (IPTp) in malaria-endemic areas starting at 16 weeks gestational age, and effective case management of malaria per World Health Organization (WHO) guidelines. With FY 2023 funds, PMI plans to continue support for providers' supportive supervision and SBC activities to increase uptake of MIP interventions, including adherence to IPTp protocols for pregnant women and responsiveness by health workers to patient needs. PMI will support improved capture and understanding of consumption data to help align facilities to national supply chain system processes and avoid stockouts of ANC commodities.

3. Drug-based Prevention

Ghana's guidelines for SMC include treating children 3 to 59 months of age with sulfadoxine-pyrimethamine and amodiaquine (SPAQ) in zones with highly seasonal malaria transmission in accordance with WHO recommendations. With FY 2023 funding, PMI plans to continue to support SMC, including the procurement, temporary warehousing, and distribution of SPAQ in 5 districts in the Bono East region, 16 in Northern, 7 in Savannah, 6 in North East, and 9 inthe Oti. Along with the Global Fund and the GOG, PMI will jointly support operational costs associated with the calendar year (CY) 2024 SMC campaign in all 7 target regions (the 5 mentioned above plus Upper East and Upper West) which will be implemented by Ghana Health Service (GHS).

4. Case Management

PMI/Ghana supports NMCP's objective to reduce malaria-related deaths, especially among children under five years of age (CU5) and pregnant women through the provision of prompt and accurate malaria case management at community-based health planning and services (CHPS) compounds and referral health facilities. With FY 2023 funding, PMI plans to continue to support NMCP, regional health directorates, and district health management teams (DHMTs) to strengthen the test, treat, and track (3Ts) approach through malaria-specific laboratory and clinical outreach training and supportive supervision (OTSS), OTSS+ (an improvement of the OTSS, aims to better both health facility and provider competency using a quality improvement approach; it encompasses malaria laboratory diagnosis, uncomplicated and severe malaria case management, and MIP), integrated supportive supervision (ISS), in-service trainings, job aids, coaching, mentorships, quarterly data analysis/review, and holistic assessments to improve laboratory confirmation and adherence to testing results. This support will encourage the engagement of regional and district health management and supervision teams to conduct biannual clinical OTSS visits at district hospitals, health centers, and CHPS compounds. CHPS outreach activities to the community (house to house) will also be strengthened. PMI plans to procure injectable artesunate in support of case management for severe malaria.

5. Health Supply Chain and Pharmaceutical Management

PMI will continue to support NMCP's national quantification and routine supply plan reviews to inform procurement decisions. PMI supports the warehousing of commodities and downstream distribution, including continued implementation of last mile distribution (LMD). Increased focus will be given to the implementation of the Supply Chain Master Plan (SCMP), including supporting the country's warehousing strategy. PMI will support the strengthening of the Ghana Integrated Logistics Management Information System (GhiLMIS), the increase of data visibility down to the CHPS level, and improvement of data utilization. PMI will also support planning and distribution for the CY 2024 ITN campaign. In addition, PMI will continue to support the implementation of activities designed to achieve the targets described in the stockout reduction initiative.

6. Social and Behavior Change

PMI/Ghana investments in SBC support NMSP 2021–2025 objective to ensure that 95 percent of the population will use at least one malaria preventive measure, and that 95 percent of those with fever seek care within 24 hours of onset of symptoms by 2025. With FY 2023 funds, PMI plans to support GHS's health promotion division (HPD) to strengthen malaria SBC activities through expansion of malaria community engagement activities. These include developing Community Health Action Plans and strengthening interpersonal communication at service delivery points (SDPs) through the support of

CHPS nurses, health officers, and health volunteers to conduct outreach visits; engage with communities; and promote correct and consistent uptake of malaria interventions.

7. Surveillance, Monitoring, and Evaluation

PMI/Ghana supports the National Malaria Control Monitoring and Evaluation Plan 2021–2025, which aims to strengthen malaria surveillance systems to ensure timely availability of high-quality, consistent, and relevant malaria data at all levels in order to track the progress of malaria control and prevention interventions toward 2025 malaria control targets. In FY 2023, PMI will continue to support SM&E activities as in previous years. PMI will provide technical assistance and support to improve data quality and ensure development and use of sub-district and facility-specific dashboards. PMI will also support implementation of an electronic tracker (e-tracker) through the policy planning monitoring and evaluation (PPME) division to strengthen and improve malaria routine data, analysis, and evidence-based decision-making.

8. Operational Research and Program Evaluation

No PMI-supported operational research (OR) or program evaluation (PE) is ongoing or has been recently completed, and none is planned with FY 2023 funds.

9. Capacity-Strengthening

PMI/Ghana's approach to capacity-strengthening is to support NMCP in efficiently planning and implementing activities defined in NMSP 2021–2025. With FY 2023 funding, PMI will lend support for effective coordination among malaria control partners, continued improvement in the management of malaria commodities supply and distribution, timely planning and conduct of ISS and OTSS, and reinforced use of data to inform program decisions. PMI support will continue to ensure the broad range of cross-cutting health systems strengthening activities where NMCP works with GHS divisions as appropriate, mainly the PPME, HPD, and institutional care division for increased capacity in Health Management Information System (HMIS), community engagement, and quality service delivery, respectively. PMI will continue to support the Ghana Food and Drugs Authority (FDA) to ensure availability of quality antimalarials in the pharmaceuticals supply and distribution system. In addition, PMI will support the Frontline Field Epidemiology Training Program (FETP) to train district, sub-district, and health center health care workers in data analysis and use.

I. CONTEXT AND STRATEGY

1. Introduction

Ghana began implementation as a U.S. President's Malaria Initiative (PMI) partner country in fiscal year (FY) 2008. This FY 2023 Malaria Operational Plan (MOP) presents a detailed implementation plan for Ghana based on the strategies of PMI and the National Malaria Control Program (NMCP). This FY 2023 MOP is fully aligned with the 2020–2025 U.S. Agency for International Development (USAID) Ghana behavior-led Country Development and Cooperation Strategy (CDCS). It was developed in consultation with NMCP and with the participation of national and international partners. The activities that PMI is proposing build on investments made by partners to improve and expand malaria-related services. Those partners include the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). This document provides an overview of the strategies and interventions in Ghana, describes progress to date, identifies challenges and relevant contextual factors, and describes activities planned with FY 2023 funding. For more detailed information on the country context, please refer to Ghana FY 2023 Country Malaria Profile, which provides an overview of the country's malaria situation, key indicators, the NMCP strategic plan, and the partner landscape.

2. U.S. President's Malaria Initiative

PMI is led by USAID and implemented together with the U.S. Centers for Disease Control and Prevention (CDC). Launched in 2005, PMI supports implementation of malaria prevention and treatment measures—insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS), accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs), intermittent preventive treatment of pregnant women (IPTp), and drug-based prevention—as well as cross-cutting interventions such as surveillance, monitoring, and evaluation (SM&E); social and behavior change (SBC); and capacity-strengthening. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in Sub-Saharan Africa and three programs in the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Over the next five years, PMI aims to save lives, reduce health inequities, and improve disease surveillance and global health security.

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

1. Reduce malaria mortality by 33 percent from 2015 levels in high-burden PMI partner countries, achieving a reduction of greater than 80 percent from 2000.
2. Reduce malaria morbidity by 40 percent from 2015 levels in PMI partner countries with high and moderate malaria burdens.
3. Bring at least 10 PMI partner countries toward national or subnational elimination and assist at least one country in the Greater Mekong Subregion to eliminate malaria.

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

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

3. Rationale for PMI's Approach in Ghana

3.1. Malaria Overview for Ghana

Malaria is endemic and perennial in Ghana, with pronounced seasonal variations in the northern part of the country. The length of malaria transmission varies by geographic region in Ghana, depending on the length of the dry season, during which there is a slight reduction in transmission. There are two distinct rainy seasons in the southern and middle parts of the country, from April to June and September to November. The north, however, is characterized by one rainfall season that begins in May, peaks in August, and lasts until September. There is a six-to-seven-month transmission season in a larger part of the north of the country and a shorter three-to-four-month transmission season in the upper part of the north, with the highest number of cases occurring between July and November. In the southern part of Ghana, the transmission season is nine months or more, with a small peak from May to June and a larger peak from October to November. Although Ghana's entire population is at risk of malaria infection, children under five years of age (CU5) and pregnant women are at higher risk of severe illness due to lowered immunity.

Ghana has shown steady progress in malaria prevention and control over the years and has stratified malaria risk at lower levels (i.e., district and sub-district) and targeted malaria interventions based on epidemiological and entomological data. Nationwide malaria parasite prevalence in children aged 6 to 59 months (based on microscopy) declined from 28 percent in 2011 to 14 percent in 2019. However, there are variations and significant decreases in prevalence within and between regions. The three northern regions showed significant declines in parasite prevalence among CU5 from 2011 to 2019 from 44 percent to 10 percent in Upper East, 51 percent to 11 percent in Upper West, and 48 percent to 13 percent in the Northern regions, respectively. (Of note, following a referendum in December 2018, six new regions were created in Ghana in 2019, resulting in the following changes: Northern region was divided into the North East, Northern, and Savannah regions; Brong Ahafo region was divided into Ahafo, Bono, and Bono East regions; Volta region was split into Oti and Volta regions; and Western region was divided into Western and Western North regions). The Western region currently has the highest prevalence of malaria among children aged 6 to 59 months, with a prevalence of 27 percent as of 2019. For more detailed information on malaria indicators, please refer to the Country Malaria Profile.

3.2. Key Challenges and Contextual Factors

Increasing insecticide resistance continues to pose a key challenge for Ghana in achieving its malaria control objectives through the deployment of available vector control tools such as ITNs and IRS. Pyrethroid resistance is widespread among populations of the main malaria vectors throughout the country and organophosphate resistance is spreading, limiting the use of this critical insecticide for IRS. Resistance to novel insecticides such as chlorfenapyr and clothianidin is also emerging, further jeopardizing the country's ability to effectively implement its insecticide resistance management plan. This challenge is compounded by the higher costs of new types of ITNs, increasing delivery and distribution costs, and population growth, resulting in decreased coverage in mass campaigns (i.e., omitting distribution from urban areas and IRS districts).

Acceptance and use of malaria prevention methods such as IRS and ITNs remain an ongoing challenge to malaria control efforts as well. Within communities benefiting from IRS, coverage is negatively impacted by the seasonal movement of rural dwellers to urban cities as well as increased urbanization of rural communities where households struggle or refuse to properly prepare houses for spraying. The use:access ratio for ITNs is poor, especially in urban areas, with 67 percent of the general population having access to ITNs but only 43 percent reporting use.

Climate change, including changing patterns in rainfall, temperature, and humidity, deforestation, and other examples of environmental degradation have been observed in

Ghana. These may lead to changing malaria epidemiology, potentially with impacts on how malaria prevention and control interventions are implemented. Increasing urbanization, as indicated by the 2021 Ghana Population and Housing Census Report, poses challenges to the deployment of malaria control tools using the traditional community-level channels and health service delivery options. those challenges require adaptive methods and channels to effectively implement malaria interventions in order to achieve the objectives set out in the strategic plan. Additionally, domestic resource mobilization and local participation in malaria control efforts have been poor or non-existent, which has presented challenges to supporting the current objectives of National Malaria Strategic Plan (NMSP).

Ghana Health Service (GHS) has started implementing a networks-of-practice health care service delivery model to improve the quality of services. Networks of practice is a design model that arranges service delivery assets into a network consisting of an anchor establishment called “the hub,” which offers a full array of services, complemented by secondary establishments called “spokes,” which offer more limited-service arrays. Model health centers serve as the hub, acting as a referral link between the district hospitals and community-based health planning and services (CHPS) zones.

In July 2010, the Government of Ghana (GOG) launched the national e-health strategy, and the country intends to automate important business practices related to health services. A range of programs and technologies have been piloted and/or implemented in the country. The proliferation of e-tools presents challenges, particularly for the interoperability of health service data. Ghana has a health information system interoperability road map, which it has begun implementing.

Jointly with the Global Fund, PMI/Ghana is supporting a Malaria Behavior Survey (MBS) in CY 2022 with the objective to “determine the socio-demographic and ideational characteristics associated with malaria-related behavioral outcomes in Ghana and identify key programmatic elements for consideration to improve malaria-related ideational and behavioral outcomes.” Findings from the MBS will be disseminated and discussed with stakeholders to inform programming of PMI activities and influence the attitudes of service providers. The goal is to apply more efficient approaches to increase rapid and sustainable uptake of individual and community-desired behaviors for malaria control and speed up the country’s objective of partial malaria pre-elimination by 2030.

Ghana participated in the pilot implementation of the RTS,S/AS01 malaria vaccine. In October 2021, the World Health Organization (WHO) recommended widespread use of this vaccine. Ghana intends to develop and submit a funding request to Gavi, the Vaccine Alliance, for the expansion of RTS,S/AS01 malaria vaccine from the initial 81 pilot districts to a new target yet to be determined. The promotion, management, and administration of the RTS,S/AS01 malaria vaccine will be the responsibility of the

expanded program on immunization (EPI) rather than NMCP. NMCP has conducted a thorough analysis of what is needed to promote the acceptance and use of this vaccine. PMI/Ghana will invest in the RTS,S/AS01 malaria vaccine program if NMCP and stakeholders determine relevant needs and there is a gap that would be appropriate to fill with PMI support.

3.3. PMI's Approach for Ghana

PMI supports the goals and objectives outlined in Ghana's NMSP 2021–2025, including a reduction in malaria mortality by 90 percent and malaria case incidence by 50 percent (using 2019 as the base year) and malaria pre-elimination in at least six districts.[2] PMI provides support for vector control, case management, malaria in pregnancy (MIP), seasonal malaria chemoprevention (SMC), SBC, supply chain management, and (SM&E). PMI and Global Fund also support procurement and distribution of malaria commodities, including drugs for the treatment of severe malaria, IPTp and SMC, malaria rapid diagnostic tests (RDTs), and insecticides for IRS, and ITNs. PMI no longer procures ACT drugs, as this has been fully covered by the GOG and Global Fund since FY 2018. While both PMI and the Global Fund procure ITNs for mass distribution campaigns, the Global Fund generally procures ITNs for continuous distribution through antenatal care (ANC) and child welfare clinics (CWCs), while PMI procures ITNs for school-based distribution. Other donors, such as Against Malaria Foundation, procure ITNs for mass campaigns, as needed. PMI and the Global Fund jointly support a local research partner to conduct nationwide entomological monitoring.

PMI supports nationwide malaria case management and laboratory training, malaria outreach training and supportive supervision (OTSS), as well as integrated supportive supervision (ISS), which is jointly supported with USAID Ghana Maternal and Child Health (MCH) and Reproductive Health programming at all levels of the health system. PMI supports MIP activities throughout Ghana through training for health staff, supportive supervision, and procurement of sulfadoxine-pyrimethamine (SP) as needed. PMI supports strengthening of the District Health Information (Management) System 2 (DHIMS2) with data validation, data use with wall charts, data review meetings and implementation, and expansion of an electronic tracker (e-tracker), which is an electronic patient monitoring system used in outpatient department (OPD) and ANC. PMI also supports periodic national demographic and malaria household surveys, routine SM&E.

PMI and USAID Ghana support nationwide SBC activities, including use of mass media and GHS's community engagement for malaria prevention (CE4MP) approach to

[2] Districts targeted for pre-elimination are: Asokwa in Ashanti region, Hohoe in Volta, and four districts in Greater Accra: Ablekuma Central, Ayawaso West, Shai Osudoku, and Tema West.

promote preventive behaviors identified through community malaria action plans. PMI support for CE4MP is currently established in the Volta region and other high burden regions (Central, Eastern, and Western) and will be prioritized for expansion with the ultimate goal of reaching every village.

PMI supports targeted preventive interventions, namely IRS and SMC, in the northern Sahelian regions of Ghana. PMI has supported IRS in the Northern and North East regions (formerly together with Savannah comprising the Northern region) since 2008 and is currently implementing IRS in nine districts in these two regions. AngloGold Ashanti Malaria Control Ltd implements IRS in all 11 districts in Upper West region, three districts in Upper East region, and two districts in Ashanti region with support from the Global Fund. With support from the Department for International Development (DFID, now discontinued) and the Global Fund, NMCP began implementing SMC in the Upper West region in 2015 and scaled up to the Upper East region in 2016. With additional support from PMI, NMCP began implementing SMC in the Northern, North East, and Savannah regions in 2019 and in Bono East and Oti regions in 2021.

3.4. Key Changes in This MOP

There are no key changes in strategies or budget levels in this MOP compared to the previous one. However, key changes in activities in this MOP compared with that of the previous year include: expansion of IRS to an additional district in the North East region and also allowing PMI support for SMC implementation to be applied in all targeted districts as needed to ensure the completion of SMC campaigns without restriction. PMI does not plan to procure rectal artesunate suppositories (RAS), RDTs, or SP in this MOP because the need is covered with non-PMI funds. The geographic focus by USAID Health Population and Nutrition Office (HPNO) of SBC activities is shifting to the Zone of Influence (ZOI) districts.[3] PMI will maintain support to national-level SBC efforts.

[3] ZOIs are described in USAID Ghana's CDCS and are those areas where the priority of MCH indicators are the lowest. USAID Ghana intends to focus investments on the ZOIs during the duration of the CDCS.

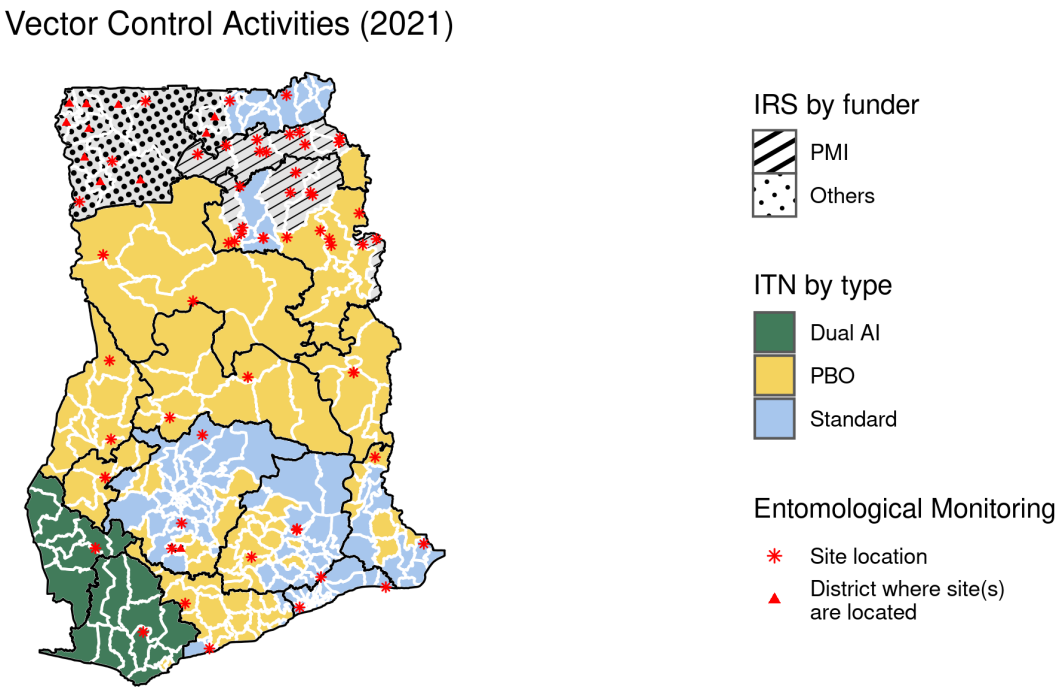
II. OPERATIONAL PLAN FOR FY 2023

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

In the current NMSP 2021–2025, Ghana aims to protect at least 80 percent of the population with effective malaria prevention interventions. This includes: universal coverage of ITNs (one net for every two persons in a household) through mass campaigns every three years and continuous distribution channels; IRS targeting of high-burden areas per stratification; larval source management (LSM) in targeted urban/peri-urban areas as well as rural areas where breeding sites are few, fixed, and findable; entomological surveillance to support implementation, monitoring, and evaluation of vector control interventions; and adoption of novel vector control interventions or tools approved by WHO and the Ghana Food and Drugs Authority (FDA). In line with NMSP, PMI supports the procurement and distribution of ITNs through mass campaigns and school-based distribution, and implementation and monitoring of IRS in nine high-burden districts in the North East and Northern regions. Although LSM is not currently supported, PMI is supporting entomological monitoring that will be used by NMCP in its own impact evaluation of this intervention. The Global Fund also supports procurement and distribution of ITNs through mass campaigns and ANC and CWC channels nationwide, as well as implementation of IRS by AngloGold Ashanti Malaria Control Ltd in 16 districts in Ashanti, Upper East, and Upper West regions. PMI and the Global Fund jointly support entomological monitoring activities at 30 national surveillance sites.

Figure 1. Map of Vector Control Activities in Ghana



1.2. Recent Progress (January 2021 to December 2021)

In CY 2021, PMI supported the following vector control activities:

- With the Global Fund, insecticide resistance monitoring in 30 national surveillance sites in 15 regions through the National Insecticide Resistance Monitoring Partnership (NIRMOP) managed by the Noguchi Memorial Institute for Medical Research.
- Vector bionomics monitoring in 6 of 20 national surveillance sites in 15 regions.
- Entomological monitoring at eight sites in eight districts in North East and Northern regions, including six PMI-supported IRS districts and two unsprayed districts. Monitoring included insecticide residual efficacy, insecticide resistance, and vector bionomics. For more information about entomological monitoring, please visit the entomological reports found at https://www.pmi.gov.
- Procurement of piperonyl butoxide (PBO) and dual active ingredient (AI) ITNs for distribution to approximately 1,500,000 children in grades 2 and 6in 15 regions for the CY 2022 school-based distribution.
- Prevention of MIP through training and supervision of health staff to provide ITNs to women at their first ANC visit.

- Technical assistance for planning for the 2021 ITN mass distribution campaign, which distributed standard, PBO, and dual AI ITNs to 33,269,524 people in 15 regions. The activity is in collaboration with NMCP and the Global Fund.
- Implementation of last mile distribution (LMD) of ITNs in Western and Western North regions.
- ITN durability monitoring by implementing a 36-month data collection period and monitoring the standard pyrethroid nets from the 2018 cohort.
- Community-/facility-/national-level SBC activities to improve demand for ITNs, increase appropriate use, promote care, and mitigate against misuse. For more information, please see the **SBC section**.
- Planning, implementation, and evaluation of IRS in nine districts, covering 366,283 structures and protecting 928,692 people during the March–May 2021 campaign, including the spraying of animal shelters that resulted in further reduction in mosquito densities in those districts targeted. For more information about IRS, please visit the most recent End of Spray Report.
- Training and engagement of 2,089 people in nine districts to support IRS mobilization and spray activities.

1.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of vector monitoring and control activities that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Entomological Monitoring
PMI will maintain support for insecticide resistance monitoring at the 30 NIRMOP sites (in coordination with the Global Fund) and monthly vector bionomics monitoring at 6 of the 30 national surveillance sites in coordination with Navrongo Health Research Centre. PMI will also continue to monitor insecticide residual efficacy and insecticide resistance and vector bionomics within PMI-supported IRS districts in the North East and Northern regions.

Summary of Distribution and Bionomics of Malaria Vectors in Ghana
The major malaria vectors throughout Ghana are members of the *An. gambiae* species complex, including *An. arabiensis, An. coluzzii* and *An. gambiae*. In the northern part of the country where PMI supports IRS, all three species are present throughout the transmission season from March through December, but *An. gambiae* tends to be the predominant species except during the drier months at the beginning and end of the season, when *An. coluzzii* is often more abundant. *An. funestus* is a minor vector in some parts of the country but generally at very low densities. The vector species are

most abundant in the rural and peri-urban areas and generally bite late at night. In the north, peak vector abundance is typically June through October, but this tends to be limited to August and September in those areas where IRS is implemented. *An. gambiae* s.l. tends to bite both indoors and outdoors, with humans being the preferred host, but data suggest that preferred resting locations for this species are in animal shelters or outdoors, with very small numbers collected inside sleeping structures, particularly in IRS areas.

Status of Insecticide Resistance in Ghana
As of 2021, pyrethroid resistance has been detected in *An. Gambiae* s.l. across Ghana. However, PBO partially restores susceptibility in most sites. Resistance to carbamates and organophosphates, including to pirimiphos-methyl in some IRS sites, continues to spread and there is emerging resistance to both clothianidin (in four sites) and chlorfenapyr (in five sites).

1.3.1. Insecticide-Treated Nets

PMI will provide support for the distribution of ITNs and technical assistance for the CY 2024 mass campaign. PMI is supporting procurement of ITNs for the campaign with FY 2021 and FY 2022 funding and with the existing commodity pipeline. PMI will also continue to support the procurement of ITNs for CY 2025 school-based distribution (with distribution costs to be covered in FY 2024). In line with current insecticide resistance data, PMI will continue to procure only PBO or dual AI ITNs. PMI also supports SBC to improve use and care of ITNs and to mitigate against misuse. Please see the **SBC section** for details on challenges and opportunities to improve intervention uptake or maintenance.

Insecticide-treated Mosquito Net Distribution in Ghana
In Ghana, ITNs are distributed via mass campaigns every three years and through school-based distribution to students in grades 2 and 6 in intervening years. Continuous distribution channels include pregnant women during ANC visits and children receiving a second dose of measles/rubella vaccination at CWC visits. IRS districts and some urban centers are excluded from mass campaigns and school-based distributions. The country began transitioning from standard to PBO and dual AI nets during the 2021 mass distribution campaign, and it plans to distribute all three types of nets based on insecticide resistance data during the CY 2024 campaign when an ITN gap of around 3.2 million is currently anticipated. NMCP intends to engage Against Malaria Foundation for ITN procurement to fill this gap; PMI will also reprogram existing pipeline funds to fill the gap. Please see the **ITN Gap Table** in the annex for more detail on planned quantities and distribution channels.

1.3.2. Indoor Residual Spraying

PMI will expand support for the planning, implementation, and evaluation of IRS from 9 to 10 districts. With this expansion, all districts in the North East region will receive IRS. The current IRS insecticide rotation plan includes both organophosphate and neonicotinoid-based insecticides. Due to spreading organophosphate resistance, however, some districts may not be able to switch from neonicotinoid-based insecticides in CY 2024 as planned. Therefore, the types of insecticides to be sprayed in CYs 2023 and 2024 IRS campaigns have yet to be determined.

Table 1. PMI-Supported Indoor Residual Spraying Coverage

Calendar Year	District*	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)	Insecticide
2021	Bunkpurugu-Nakpanduri, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moadori, Tatale-Sangue, West Mamprusi, Yunyoo-Nasuan	329,915	90.3	928,988	neonicotinoid, neonicotinoid+pyrethroid
2022*	Bunkpurugu-Nakpanduri, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moadori, Tatale-Sangue, West Mamprusi, Yunyoo-Nasuan	355,592	92.7	960,565	neonicotinoid, neonicotinoid+pyrethroid
2023**	Bunkpurugu-Nakpanduri, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moadori, Tatale-Sangue, West Mamprusi, Yunyoo-Nasuan	390,000	90	TBD	TBD
2024**	Bunkpurugu-Nakpanduri, Chereponi, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moadori, Tatale-Sangue, West Mamprusi, Yunyoo-Nasuan	TBD	90	TBD	TBD

* Preliminary figures as end of spray report is not yet available
** Planned

IRS Insecticide Residual Efficacy in Ghana

Wall bioassays were conducted monthly following the 2021 IRS campaign at 6 sites and showed a residual efficacy of at least 10 months for both Sumishield and Fludora Fusion across all surface types and locations.

2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

PMI/Ghana's objectives for MIP are aligned with the national strategy, which includes provision of ITNs at the first ANC visit, a minimum of three doses of IPTp in malaria endemic areas starting at 16 weeks gestational age, and effective case management of

malaria per WHO guidelines. WHO's recommendation of a minimum of eight contacts (2016) is articulated in the revised Ghana National Safe Motherhood Service Protocol (2016). The guidelines have, however, been adapted to provide for other services such as IPTp. The country therefore recommends one contact (booking) in the first trimester; three contacts in the second trimester (instead of the recommended two contacts, thus providing for early access to IPTp at 16 weeks); and a minimum of four contacts in the third trimester. This adaptation is reflected in the schedule of visits in the recently developed combined MCH record book.

2.2. Recent Progress (January 2021 to December 2021)

In CY 2021, PMI supported the following MIP activities:

- Community health officer (CHO) internships to improve the skills of health workers at the lowest level of care in the provision of IPTp and management of MIP.
- Training and post-training supervision for MIP task-shifting at the CHPS level.
- Supportive supervision and onsite training of health care workers at health facilities and CHPS compounds to effectively deliver malaria prevention services to pregnant women, including IPTp and distribution of an ITN at first ANC visit.
- Technical assistance to support GHS and NMCP in continuous distribution of ITNs though ANC clinics in health facilities.
- Review of the CHO home visit register in preparation for pilot implementation.

2.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of MIP activities that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

PMI plans to maintain all MIP activities in FY 2023 with the exception of procurement of SP, which will be covered entirely by the Global Fund and the GOG. Please see the **SP Gap Table** for more detail on planned quantities and distribution channels. While Ghana continues to record relatively high IPTp uptake, this lags behind comparatively high ANC attendance. PMI will continue to support facility-level training focusing on providers at all levels of care, but with a particular emphasis on the lower levels. PMI has invested in supportive supervision and SBC over the last several years and will continue to support this activity to enhance skills of ANC providers as well as improve coordination with other technical areas and staff at the facility level. This support will also help increase uptake of MIP interventions, including adherence to IPTp protocols and health worker responsiveness to patient needs. PMI will continue to support the MIP technical working group (TWG) to sustain and improve coordination with MCH in order to improve

availability of drugs at ANC, expand and improve community outreach, and track the uptake of IPTp.

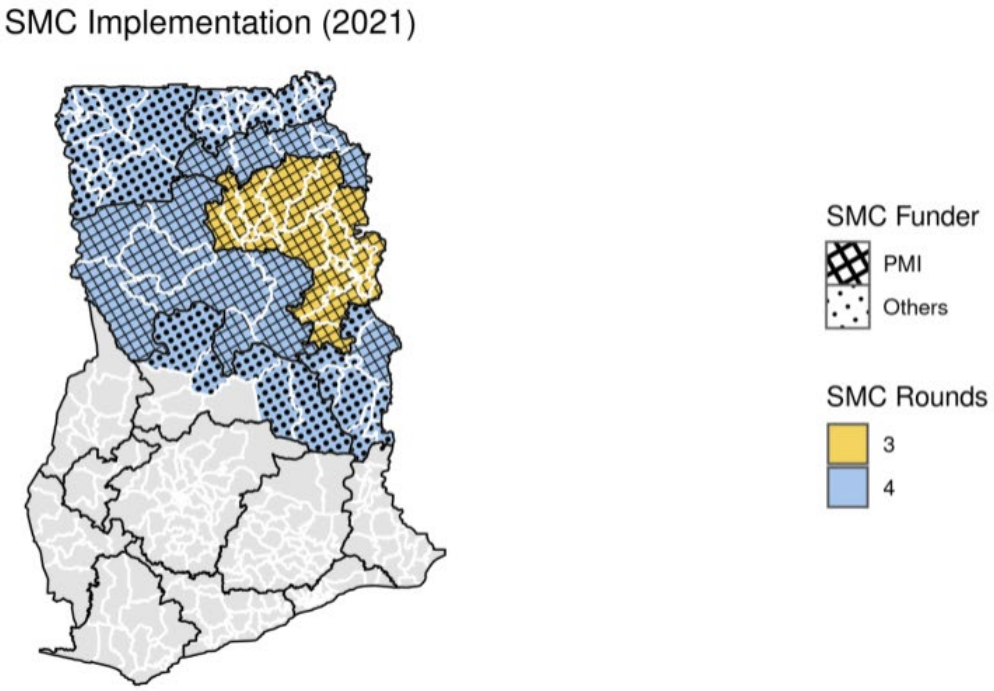
3. Drug-Based Prevention

3.1. Seasonal Malaria Chemoprevention

PMI Goal and Strategic Approach

Under the NMSP 2021–2025, Ghana aims to protect at least 80 percent of children aged 3 to 59 months living in zones where malaria transmission is highly seasonal with sulfadoxine-pyrimethamine and amodiaquine (SPAQ) in accordance with WHO recommendations. Ghana implements SMC yearly via door-to-door campaigns for a period of four months during the peak malaria transmission season (July–October) in seven Sahel regions (select districts in Bono East, North East, Northern, Savannah, Oti, Upper East, and Upper West). PMI support for SMC is in line with that of the national strategy. PMI, along with the Global Fund, supports procurement of SPAQ and operational costs for SMC in targeted districts in collaboration with the GOG.

Figure 2. Map of Seasonal Malaria Chemoprevention Implementation in Ghana



3.2. Recent Progress (January 2021 to December 2021)

In CY 2021, PMI supported the following SMC activities:

- Procurement of 4,673,800 SPAQ blister packs to help meet the need for the SMC campaigns for CYs 2021 and 2022.
- Human resource training and support for planning and coordination, SBC, procurement and supply chain management, monitoring and evaluation, and information technology for national supervisors (one per district), regional supervisors (one per district), district supervisors (six per district), sub-district supervisors (five per sub-district), and community SMC distributors (number required is based on the population of children aged 3 to 59 months).
- Adverse drug reaction management training for facility health workers.
- Engagement of stakeholders at the regional and district levels (regional/district health management teams; R/DHMTs), regional/district assembly, religious leaders, traditional leaders, and all other relevant departments and agencies) before and during SMC implementation for the purposes of community mobilization, information dissemination, logistical support, pharmacovigilance, and security.
- Completion of SMC (four cycles in six regions and three cycles in one region; see Figure 2). Of note, the Northern region was not able to complete a fourth cycle due to technical challenges, which will be addressed for the 2022 SMC campaign to assure four cycles to all targeted districts.
- Implementation of SBC activities focused on demand generation at the community level through collaborations with women's groups and civil society organizations. For more information, please see the **SBC section**.

3.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of SMC activities that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

With FY 2023 funding, PMI will continue to support SMC, including the procurement, temporary warehousing, and distribution of approximately 2,960,000 doses of co-blistered SPAQ, representing 52 percent of the total need for approximately 239,979 children aged 3 to 11 months and 1,171,662 children aged 12 to 59 months for four months in Bono East, North East, Northern, Oti, and Savannah regions. No gaps of SPAQ are anticipated for FY 2023. Please see the **SPAQ Gap Table** in the annex for more detail on the planned quantities and distribution channels. PMI will also support operational costs associated with the CY 2023 SMC campaign in all implementing regions, which will be conducted by GHS. The total operational cost for SMC is supported by the Global Fund and PMI. In CY 2022, the PMI contribution of $755,000 represents 15.3 percent of the total operational cost of $4,931,506.80. Please see the **SBC section** for details on challenges and opportunities to improve intervention uptake or maintenance.

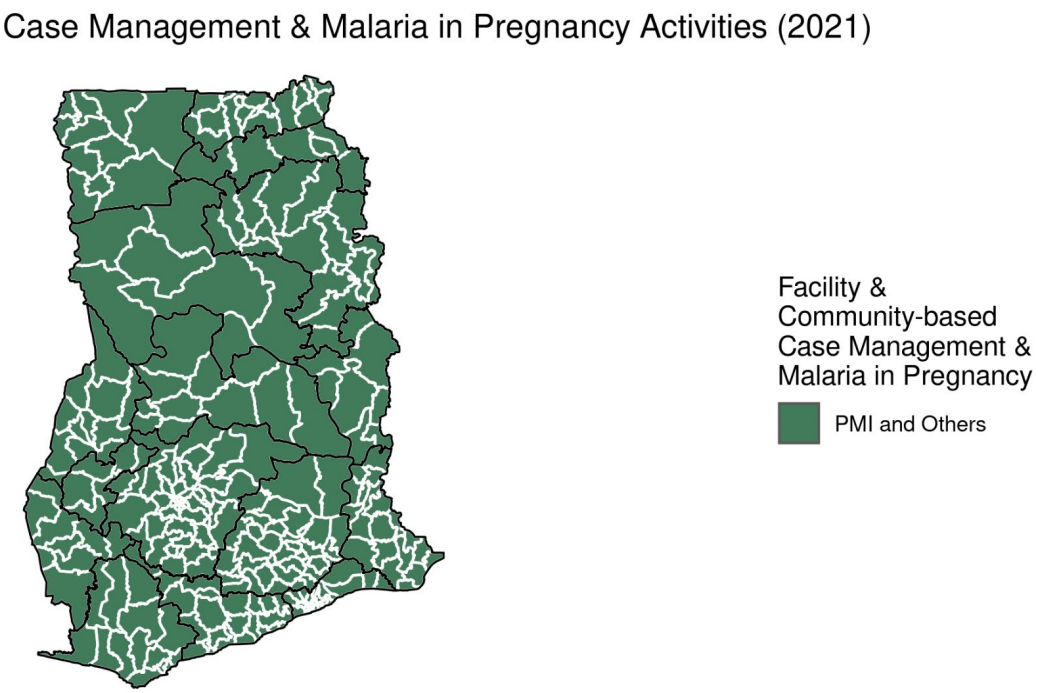
4. Case Management

4.1. PMI Goal and Strategic Approach

NMSP 2021–2025 aims to provide appropriate diagnoses of all suspected malaria cases and prompt and effective treatment to 100 percent of confirmed cases. Ghana subscribes to the 3Ts (test, treat, and track) approach, which seeks to test every suspected malaria case, treat positive cases with the recommended quality-assured antimalarial medicine, and track the disease through timely and accurate reporting to guide policy and operational decisions. PMI support for case management is aligned with NMSP to improve implementation of the 3Ts strategy and includes national-level policy and programmatic activities, commodity procurement, and improvement of facility- and community-level health worker performance. PMI has supported procurement of RDTs and injectable and rectal artesunate in close coordination and collaboration with the Global Fund and the GOG. PMI also supports OTSS, OTSS+ (an improvement of the OTSS which aims to better both health facility and provider competency using a quality improvement approach; it encompasses malaria laboratory diagnosis, uncomplicated and severe malaria case management, and MIP), and ISS activities nationwide.

In 1999, Ghana adopted the CHPS policy to expand health access at the community level, where a trained community health nurse (CHN) and midwife provide integrated community case management and ANC services in a facility constructed by the community and coordinated through the community health committee. Each CHPS compound serves a catchment population of around 5,000 people, and CHNs and midwives at each CHPS are supported by community health volunteers (CHVs). Health care services delivered at the CHPS include ACT treatment, IPTp through ANC, ITNs through ANC and CWCs, and RDTs. At the CHPS, RAS are given as pre-referral treatment for CU5 with severe disease, and all severe malaria cases, including MIP, are referred as described in the case management guidelines. CHPS staff are government employees who receive salaries through GHS and are supervised and provisioned through their sub-districts and DHMTs. Ghana CHPS policy continues to evolve, and many new CHPS compounds are constructed, staffed, and accredited annually, improving access. PMI supports capacity-building activities at CHPS through OTSS and CHO internships through which staff from CHPS facilities are attached to a district hospital under the mentorship of a medical doctor to acquire additional knowledge and skills on how to manage febrile conditions as well as to learn pre-referral precautions to be taken before patients are referred to the next higher level.

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



4.2. Recent Progress (January 2021 to December 2021)

PMI supported the following national, facility, and community level case management and commodity activities in CY 2021:

National-level

- Updating and digitization of national ISS tools to improve efficiency and promote timely analysis for decision-making.
- Revision of the national malaria case management training slides and nationwide malaria case management training to improve adherence to case management guidelines.
- Improvement of functionality of the national malaria slide bank by updating the national operational manual and supported the replenishment of the national malaria slide bank at Kintampo Health Research Centre.
- With NMCP, conduct of a national competency assessment for malaria microscopy for 29 medical laboratory scientists in order to strengthen competency of national- and regional-level supervisors.
- Coordination of two national meetings to review national guidelines on malaria.
- Review and updating of the national malaria case management guidelines.

Facility-level

- Conduct of clinical OTSS in targeted facilities nationwide.
- Training of 529 supervisors in OTTS+ and 33 supervisors on ISS.
- Relating to the Clinical Laboratory Unit (CLU) and NMCP, conduct of one round of laboratory OTSS+ and performing proficiency testing scheme visits to 140 out of 775 health facilities across the 16 regions.
- Conduct of 1,872 on-site training and supportive supervision visits in collaboration with private sector associations and district health teams (see Impact Malaria FY 2021 Annual Report).
- Convening of one national-level lessons-learned workshop on OTSS+ and two on clinical OTSS to promote data use and improve best practices.
- Conduct of 312 data-for-decision-making training for health staff across the 16 regions.

Community-level

- Conduct of 645 post-CHO internship coaching visits to targeted CHPS.
- Conduct of CHO internship training or mentorship visits reaching 320 community health workers.
- Conduct of 844 data coaching visits to health facilities in 16 regions.

PMI supported the following commodities activities in CY 2021:

- Procurement and distribution of 2,500,000 malaria RDTs.
- Procurement and distribution of 545,000 vials of parenteral artesunate.
- Procurement and distribution of 30,000 RAS.

4.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of case management activities that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Community-level

In FY 2023, PMI will support the training of CHOs/CHNs in the management of uncomplicated malaria cases at the community level and the use of RAS as pre-referral treatment for children with severe malaria. The GOG takes full responsibility for CHO/CHN salary compensation and PMI has no immediate plans to support this compensation.

Facility-level

PMI/Ghana will use FY 2023 funds to support refresher training in malaria case management, including diagnosis and treatment of uncomplicated malaria and referral

and management of severe malaria for approximately 12,000 health workers (approximately 30 percent of total health workers in the country) at public and private hospitals, health centers, and health posts. This includes 1,000 midwives and nurses (approximately 20 percent of the total number of midwives and nurses). PMI will also continue to support OTSS+ in all regions and will cover 80 percent of facilities. Each facility will be visited at least once per year, although the frequency of visits will vary based on performance (i.e., lower performing facilities will receive more frequent on-the-job training). Private-sector facilities are included in OTSS for quality improvement. PMI will support GHS/NMCP efforts to build the capacity of private-sector actors in malaria case management, including promoting appropriate use of RDTs. Along with USAID Ghana, including MCH, family planning, and HIV, PMI will support GHS to implement ISS using a comprehensive care checklist including supply chain, management, quality assurance, etc., to improve case management throughout the Ghana health system.

National-Level
In FY 2023, PMI/Ghana will provide technical support to NMCP for the revision of national treatment guidelines and support for coordination and convenings of the case management TWG, which meets quarterly. PMI will also provide support for four National Public Health Laboratory staff to participate in WHO External Competence Assessment for Malaria Microscopy certification.

Commodities
In FY 2023, the only case management commodity that PMI/Ghana will procure is injectable artesunate; all other commodities will be procured by the Global Fund and/or the GOG. PMI will also provide technical assistance for the management, oversight, logistics, warehousing, and distribution of malaria products. Please see the **Gap Tables** in the annex for more detail on planned quantities and distribution channels.

Ongoing and Planned Therapeutic Efficacy Studies (TES)
The upcoming CY 2023 TES will be the first study funded by PMI.

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

As described in NMSP 2021–2025, Ghana aims to ensure timely and adequate supply of quality-assured malaria commodities to all service delivery points (SDPs) by 2025. The strategies to achieve this objective are:

- Advocate for accurate data-driven forecasting and supply-planning of malaria commodities.
- Advocate for effective procurement and timely delivery of malaria commodities.

- Advocate for efficient warehousing and a sustainable distribution system across the supply chain.
- Strengthen quality assurance systems for malaria commodities.
- Support full implementation of Ghana Integrated Logistics Management Information System (GhiLMIS) for the provision of accurate and timely supply chain information for decision-making at all levels (may not be possible at all health facilities).
- Strengthen capacity of health care workers involved in commodity management at sub-national levels.
- Establish guidelines and policies for the distribution of RDTs and SP supplies to private sector.

The Supply Chain Master Plan (SCMP) 2021–2025 builds on experience and lessons learned from the SCMP 2015–2020 and a national supply chain assessment that was conducted in 2019. The SCMP provides a broad strategic framework to guide investments and interventions that strengthen health commodity financing, governance, warehousing, and distribution, as well as logistics information management that benefits all products, including malaria commodities. The SCMP describes supply chain strengthening activities and interventions across 11 focus functional areas.

PMI/Ghana contributes to the strategies described in NMSP and the SCMP through the following broad categories of activities:

- **Logistics Management Information Systems (LMISs):** Support the utilization of LMIS (GhiLMIS) that will ensure end-to-end commodity visibility across the supply chain.
- **Quantification:** Provide technical assistance to program in forecasting, supply planning, and pipeline updates of health commodities.
- **Procurement:** Build capacity and improve the procurement process for malaria commodities.
- **Warehousing and distribution:** Provide storage, inventory management, transportation, and waste management.
- **Policy, legal, and regulatory environment:** Provide technical assistance to Ministry of Health (MOH) and GHS to improve commodity security.
- **Strategy and planning:** Conduct evidence-based assessment to identify and address in-country high-risk challenges and barriers to malaria commodity availability at SDPs.

For more information on the country's supply chain, refer to Ghana FY 2023 Country Malaria Profile.

Stockouts of Malaria Commodities

To address stockouts of malaria commodities, PMI has developed a malaria stockout reduction initiative that describes specific activities designed to improve product availability. In Ghana, the target is a 15 percent reduction of stockouts in Year 1, and a 20 percent reduction in Years 2 and 3.

5.2. Recent Progress (January 2021 to December 2021)

In CY 2021, PMI's principal supply chain investments that aimed at improving malaria commodity availability at service sites included:

- GhiLMIS roll-out in health facilities and integration into Ghana's supply chain to provide end-to-end visibility and real-time data for decision-making. A total number of 1,647 sites which includes all hospitals and health centers have been on-boarded.
- Technical support for NMCP-led annual quantification, routine updates, and monthly supply plan reviews of malaria commodities to inform procurement decisions.
- Drafting of an ACT tracer list to guide stocking at SDPs; revising of the list of ACTs to reduce from eight to four presentations for all age bands).
- Procurement of commodities (RDTs, ITNs, injectable artesunate, RAS, SPAQ, etc.) to fill identified gaps.
- Assessment of the relative preference of ACTs and analysis of stockout root cause to inform forecasting and guide policies.
- End-use verification and targeted supportive supervision at SDPs to help improve supply management (stockouts of artemether-lumefantrine 6x4 reduced from 11 percent to 6 percent; ITN stockouts reduced from 15 percent to 5 percent between March and September 2021).
- Monthly stock status and quarterly reporting into Procurement Planning and Monitoring Report for Malaria.
- Leveraging of private-sector capacity to improve cost efficiency in ITN distribution through mass and continuous distribution mechanisms. Distribution of 4,629,400 ITNs in CY 2021.
- Integration of ITNs into LMD in three regions—Eastern, Volta, and Western.
- Technical support for logistics training and distribution monitoring of SMC commodities; Distribution of 1,878,500 doses of SPAQ in CY 2021.
- Securing of appropriate warehousing for PMI-procured commodities.
- Distribution of PMI-funded commodities from central to regional and district levels.
- Leverage of private-sector capacity for cost-effective distribution of commodities via LMD.

- Provision of three regional medical stores with storage containers for ITNs to facilitate integration into LMD.
- Strengthening of coordination mechanisms between the GOG and key stakeholders at various levels of the supply chain to further improve supply chain performance.
- Technical assistance to MOH and GHS to advocate for Global Standards 1(GS1) standards among local manufacturers and importers of malaria and other health program commodities and developed a national traceability strategy for GS1 implementation in Ghana.

5.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of health supply chain and pharmaceutical management systems strengthening that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Ghana will continue to support the activities as described in the preceding **Recent Progress** section across the broad categories of activities (LMIS; quantification; procurement; policy, legal, and regulatory environment; strategy, and planning). In addition, increased focus will be given to technical assistance for the implementation of the SCMP, including supporting implementation of the country's warehousing strategy, and supporting LMD while providing technical assistance for implementation of full transition plans. As the GhiLMIS roll-out continues down to the CHPS level, increased efforts will be made at GhiLMIS utilization, along with cultivating a culture of data use. Planning and distribution for the CY 2024 ITN campaign will also be included. Activities will be implemented to achieve the targets described in the stockout reduction initiative.

6. Social and Behavior Change

6.1. PMI Goal and Strategic Approach

Per NMSP 2021–2025, Ghana's objective is to ensure at least 95 percent of the population will use at least one malaria preventive measure, and 95 percent of those with fever will seek care within 24 hours of onset of symptoms by 2025.

PMI's approach is focused on understanding and addressing the barriers to behavior change in Ghana's efforts to increase the uptake of diagnostic, treatment, and prevention services. PMI's approach for behavior change is fully aligned with the 2020–2025 USAID Ghana behavior-led CDCS. Key behavioral risk factors that threaten the effort to interrupt onward transmission of malaria exist, including delays in care-seeking due to long distances to access health care, low use of ITNs, limited uptake of RDTs, low uptake of IPTp, and poor adherence to guidelines by health care personnel. Ghana

will be using multi-pronged strategies to encourage the adoption of desired malaria prevention and treatment behavior at various levels. PMI will continue to support the following strategies and activities in coordination and collaboration with other partners:

- Advocacy with stakeholders for commitment to ensure malaria interventions are prioritized and supported. The advocacy focuses on mobilizing support of traditional, religious, and opinion leaders, including queen mothers, chiefs, and policy-makers (e.g., regional house of chief), district assembly members, and the private sector. These efforts are aimed at increasing the commitment of policy-makers at all levels (national, district, and community) to allocate resources for the prevention and treatment of malaria.
- Engagement of the general public through mass media on various interventions on malaria control. Providision of information by engaging the general public in strategic mass media activities on the prevention and treatment of malaria. These activities provide national coverage with targeted media spots and provide information to families on appropriate care-seeking for fever, ITN use, IRS acceptance, larviciding acceptance, and malaria vaccine acceptance, if appropriate. Both electronic media—such as television, radio, videos—and outdoor media—such as billboards—will be employed to facilitate communication to various target audiences. Mobile vans and community information centers will broadcast pre-recorded malaria-related messages to the general public.
- Strengthening of community action for social mobilization through CHPS. The Community Health Action Plans concept of GHS is a community-based engagement approach aimed at fostering ownership, acceptance, and sustainability of community health services including malaria intervention and treatment interventions. The CHPS strategy brings health services to the doorstep of the population by promoting the uptake of all malaria control interventions ongoing in the country. At the community level, local leaders, citizens, nongovernmental organizations, faith-based organizations, and community-based organizations are mobilized to increase awareness, influence social norms, and correct misinformation and misconceptions about malaria. Other activities to strengthen community action and social mobilization include:
    - Development of community action plans by a community health management committee.
    - Door-to-door education visits by CHOs and volunteers to motivate people to use key malaria prevention and treatment interventions.

    - Facilitation of night or evening video shows on cinema vans to educate communities on appropriate use of ITNs and other malaria prevention interventions.
    - Educational sessions at mosques and churches on malaria prevention.
    - Development of SBC materials to facilitate and complement communications with general and specific audiences of the population. Materials include posters, counseling cards, leaflets, and TV spots.
    - Strengthening of the capacity of health workers and stakeholders in both private and public institutions to effectively engage communities at all levels. Health workers are an instant source of information for the general public. The interpersonal communication capacity of health workers in the public and private sectors as well as of sellers of over-the-counter medicine will be improved to effectively engage communities at all levels.

6.2. Recent Progress (January 2021 to December 2021)

Between January 2021 and December 2021, PMI supported SBC activities related to:

- CE4MP in 174 CHPS zones in the Volta region. This included providing support for the development of Malaria Community Action Plans (mCAPs). Through this support, CHOs, CHVs, and community health management committees mobilized people to donate resources to implement mCAP activities. Community engagement for health and well-being activities in 69 CHPS zones within six districts in the same region were performed. These aimed to bring greater awareness of malaria and included community planning for sustainable activities to prevent malaria as well as the development and regular monitoring of timetables to monitor progress on those activities. Community health management committees and communities implemented Integrated Community Action Plan (iCAP) activities with their own resources to address multiple topics, including malaria prevention.
- Qualitative case study analysis of the mCAP process in six CHPS zones in the Volta region. The study assessed mCAP implementation and captured the facilitators and barriers to community-led malaria prevention activities. The preliminary results showed that the involvement of local leadership at the onset and careful strategic selection of mCAP team members were key to success.
- Support for the commemoration of World Malaria Day on April 25, 2021, in collaboration with the GOG using the CE4MP strategy to mobilize communities to act. Over 70 CHPS zones in the Volta region organized community events, including theater performances. Community information

centers were used to educate and sensitize communities about malaria prevention and control. Sharing of lessons learned was organized in the Volta region and attended by traditional leaders, health service providers, community health management committees, and district assembly representatives.

Insecticide-treated Mosquito Nets

From the MIS 2019, the population access to an ITN is generally moderate to high but the use of ITNs given access is moderate to low in Ghana. The ITN use:access ratio is between 0.4 and 0.6 in most of the country, with lower values in urban/peri-urban areas. The use:access ratio is 0.47 in urban areas and 0.77 in rural areas. Regions with low ITN use:access ratios include Ashanti (0.60), Central (0.65), Eastern (0.52), Greater Accra (0.37), and Western (0.65). Given that the Ashanti and Greater Accra regions are predominantly urban, with improved housing, investment in SBC should be channeled to regions such Central, Eastern, and Western.

Malaria in Pregnancy

Challenges related to early and repeat ANC visits and IPTp uptake include late visits to health facilities, limited or poor patient education regarding the IPTp schedule, and unsupportive attitudes of providers toward pregnant women which makes them feel unwelcome. The same attitude of providers toward teenagers (pregnancy), makes the teenagers feel shy and reluctant to visit health facilities for ANC. All these contribute to gaps in ANC and IPTp outcomes.

Seasonal Malaria Chemoprevention

There are limited data available on SMC refusal rates or on barriers and facilitators to SMC acceptance and uptake. However, one study found that SMC uptake was influenced by the level of trust in health personnel and observed benefits of SMC (e.g., reduced morbidity and mortality in CU5). Barriers included preference for herbal medicines (especially among the Fulani nomads), geography (e.g., no access routes or cut off by water), and fear of adverse drug reactions. Among children whose parents refused SMC medicines due to concerns about adverse drug reactions, few were listed as ineligible due to a prior adverse reaction to SPAQ. NMCP works with CHOs and CHVs to identify challenges with SMC uptake, including monitoring SMC-associated adverse reactions and uses community-based SBC to promote SMC adherence.[4]

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4 Antwi, G.D., Bates, L.A., King, R., Mahama, P.R., Tagbor, H., Cairns, M., Newell, J.N. (2016). Facilitators and barriers to uptake of an extended seasonal malaria chemoprevention programme in Ghana: A qualitative study of caregivers and community health workers. PLOS ONE 11(11), https://doi.org/10.1371/journal.pone.0166951.

Case Management
The 2019 MIS showed that, among children with recent fever, 34 percent received advice or treatment from the public health sector, 35 percent sought treatment in the private sector, and 31 percent did not seek advice or treatment. Although care-seeking is improving in Ghana, progress in this area is impacted by negative experiences with health care workers, local beliefs, and costs associated with testing and treatment, compounded by lack of knowledge, attitudes surrounding fevers, and social norms. SBC investments are needed to improve early care-seeking and treatment for malaria at both the facility and community levels.

Service Delivery
To improve service delivery, SBC investment is needed in optimal use of health services and products, including timely care-seeking for the prevention and treatment of adverse health conditions, continuous advocacy for the completion of four ANC visits during pregnancy, and uptake of SP for IPTp.

6.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of SBC activities that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

In FY 2023, PMI will continue to support GHS's health promotion division (HPD) to strengthen malaria SBC activities through expansion of malaria community engagement and outreach at the national level. PMI will also provide support to strengthen interpersonal communication at SDPs for malaria quality services by supporting CHPS nurses, health officers, and health volunteers to engage with communities and promote correct and consistent uptake of malaria interventions. The current Ghana CDCS has a geographic focus toward the ZOI areas in the northern part of the country. PMI investments in FY 2023 will align with the CDCS to achieve its goal. Also, the current NMSP aims to achieve six pre-elimination districts. PMI will support the NSMP to address the SBC needs of those six districts for malaria interventions.

Priorities
PMI supports SBC activities that promote the uptake and maintenance of all key malaria interventions, ITN use, provider adherence to MIP guidelines for IPTp, and interpersonal communication of providers. These will be prioritized with FY 2023 funds (Table 2).

Table 2. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
ITN use	General population	Nationwide	• Expansion of malaria community engagement through HPD • Engagement of CHVs to mobilize community implementation of iCAPs • Strengthening of interpersonal communication skills of health actors at points of service
Adherence to MIP guidelines for administration of IPTp	Health care providers	Nationwide	• Expansion of malaria community engagement through HPD • Engagement of CHVs to mobilize community implementation of iCAPs • Strengthening of interpersonal communication skills of health actors at points of service
Health provider interpersonal communication	Health care providers	Nationwide	• Support of CHPS nurses, health officers, and health volunteers to engage with communities and promote correct and consistent uptake of malaria interventions

Additional Support Activities

To bolster the national government's capacity for the planning, design, implementation, and evaluation of SBC activities, PMI will continue to support development activities directed toward GHS's HPD and related government bodies. PMI recognizes the need for accurate and timely data on the specific behavioral factors that inform positive malaria outcomes; however, no SBC-related evidence-gathering activities are planned with FY 2023 funds as an MBS is currently underway. USAID Ghana, including PMI, will support HPD to design and roll out evidence-based SBC programming on malaria, family planning; reproductive, maternal, newborn, and child health; nutrition; and emerging infectious diseases at the national and regional levels and with a focused effort at the community level in 17 ZOI districts and beyond. The 17 ZOI districts are located in the Northern (six districts), North East (two districts), Upper East (four districts), and Upper West (five districts) regions. PMI support will be national but will support the focused effort in the ZOI.

7. Surveillance, Monitoring, and Evaluation

7.1. PMI Goal and Strategic Approach

The National Malaria Control Monitoring and Evaluation Plan 2021–2025 aims to strengthen malaria surveillance systems to ensure the timely availability of high-quality, consistent, and relevant malaria data at all levels in order to track the progress of malaria control and prevention interventions toward 2025 malaria control targets. One key goal for PMI/Ghana is to support NMCP to build its capacity to conduct surveillance as a core malaria intervention using high-quality data from both surveys and routine

health information systems. PMI contributes to Ghana's SM&E strategy for malaria by prioritizing DHIMS2 data validation, analysis, and use at all levels of the health system through quarterly data review meetings at the districts and capacity-building of health information officers in districts, sub-districts, health centers, and CHPS compounds. PMI support for SM&E is nationwide, in line with the national SM&E plan. This support includes:

- Improving supportive supervision and training at all health levels to ensure proper data collection, reporting, and interpretation.
- Continuing to support regional malaria data review workshops to discuss DHIMS2 data use and programmatic implications to improve malaria quality assurance system at all levels.
- Working with NMCP on the integration of DHIMS2 data with ISS and other health facility data from GhiLMIS to strengthen the logistics structure for surveillance at all levels.
- Supporting the deployment of the e-tracker, a transactional electronic register to help track patient service delivery and streamline data collection in health facilities through the policy planning monitoring and evaluation (PPME). This will help to strengthen and improve MCH, including malaria routine data, analysis, and evidence-based decision-making.
- Providing support for implementing household surveys, including Demographic and Health Survey and MIS, as needed, to inform program direction.

7.2. Recent Progress (January 2021 to December 2021)

In CY 2021, PMI supported the following SM&E activities:

- Prioritized 481 health facilities for data coaching visits in 14 regions. A total of 844 staff were coached and mentored on malaria standard registers, monthly reporting forms, standard operating procedure on HMIS, and visualization of data on facility-based wall charts.
- Collaborated with NMCP and PPME to train 432 regional, district, and hospital health information officers and malaria focal persons on wall charts and customization of dashboards for key malaria indicators in DHIMS2.
- Strengthened the capacity of R/DHMTs to use HMIS data to prioritize health facilities for clinical OTSS and develop stratification maps for prioritization to support implementation.
- Migrated national laboratory OTSS+ and ISS checklists from paper-based to an electronic platform (HNQIS app). The electronic checklists were used to conduct three rounds of laboratory OTSS+ and one round of ISS.

- Trained 105 regional laboratory OTSS supervisors on the use of dashboards for decision-making and local planning.
- Trained 10 NMCP staff on the use of ArcGIS Desktop version for spatial analysis
- Supported training of health workers in Eastern, Oti, Upper East, and Volta regions as part of the roll-out of e-tracker.
- Supported a rapid ecosystem assessment of how digital technologies were being used for community-based case management, data collection, reporting, and decision-making and developed recommendations on how to prioritize opportunities for improvement.
- Supported field epidemiology training program (FETP) by identifying malaria-specific projects for two FETP fellows.
- Strengthened NMCP and PMI capacity to manage and use malaria data for programming through the support of a malaria data scientist embedded within NMCP.

7.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of SM&E activities that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

In FY 2023, PMI will maintain support for routine SM&E activities and will continue to support the malaria data scientist at NMCP. This will include support for integrated data coaching visits to health facility data management staff to validate and audit data collection, analysis, and reporting to improve data quality as well as quarterly data review meetings at the sub-district levels where service providers must analyze, present, and make programmatic improvements based on their data. PMI will also support NMCP review meetings on improved analysis and data use and the PPME Center for Health Information Management boot-camp meetings to routinely assess and discuss malaria data. PMI will support data quality audits and provide logistical support to data validation and verification meetings at sub-national levels. PMI will also support Malaria surveillance data quality in pre-elimination districts, continue to support the integration of supportive supervision and malaria OTSS data into DHIMS, and expand support for e-tracker to additional regions. Finally, PMI will also support the CYs 2024 and 2025 MIS.

Table 3. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic and Health Survey			P			
Household Surveys	Malaria Indicator Survey (MIS)					P	
Household Surveys	Multiple Indicator Cluster Survey (MICS)						
Household Surveys	Expanded Program on Immunization Survey						
Health Facility Surveys	Service Provision Assessment (SPA)						
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey			P*			
Health Facility Surveys	Other Health Facility Survey						
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)		X*		P		
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System						
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	P	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)			P*	P*	P*	P*
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System	X	X	P	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	EUV	X	X	P	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	P	P	P	P

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

8. Operational Research and Program Evaluation

8.1. PMI Goal and Strategic Approach

NMSP includes proposed operational research (OR) activities that are part of the various technical units' workplans (SM&E and vector control). Sample activities include:

- Conducting impact studies for larval source management and IRS.
- Conducting Health Facility Survey (service diagnosis, staffing, logistics, patient satisfaction).

- Assessing the efficacy and durability of ITN monitoring.
- Assessing the quality of Giemsa stain in Ghana.
- Monitoring the prevalence of HRP2 gene deletion in Ghana through sentinel sites.
- Assessing the impact of different SBC approaches in Ghana.

PMI has supported the development and implementation of OR initiatives in Ghana and may invest in OR/program evaluation (PE) in line with NMCP's strategic plan that evaluates quality and efficiency of services, improves coverage, tests the effectiveness of new tools, and identifies opportunities and operational bottlenecks.

8.2. Recent Progress (January 2021 to December 2021)

No PMI-supported OR/PE activities are currently ongoing or were completed in CY 2021, and no OR/PE activities are currently being supported with non-PMI funds.

8.3. Plans and Justification with FY 2023 Funding

No OR/PE activities are proposed with FY 2023 funding.

9. Capacity-Strengthening

9.1. PMI Goal and Strategic Approach

PMI/Ghana's objective for capacity-strengthening targets NMCP's capacity to efficiently plan and implement activities defined in the 2021–2025 NMSP. This includes support to improve coordination among malaria control partners, management of malaria commodity supplies and distribution, timely planning and conducting of ISS and OTSS activities, and continuous management, analysis, and use of data to inform programmatic decisions. PMI support targets NMCP with several health systems strengthening activities, including facilitating linkages between NMCP and PPME, HPD, and institutional care division to improve HMIS, community engagement, and quality service delivery. PMI support also includes strengthening Ghana's capacity to ensure the availability of quality antimalarials, working with the Ghana FDA.

Ghana's NMSP does not include specific health systems strengthening objectives; however, it highlights the need to strengthen systems and remove barriers to successfully implement programs and achieve goals. NMSP is aligned with Ghana's universal health coverage (UHC) road map to achieve the 2030 objectives of the MOH:

- **MOH mission:** Contribute to socio-economic development and wealth creation by promoting health and vitality, ensuring access to quality health, population, and nutrition services for all people living in Ghana and promoting the development of a local health industry

- **Health sector goal:** Ensure a healthy and productive population that reproduces itself safely, without increased risk of injury or death, and with an increased life expectancy; reduce the excessive risk and burden of morbidity, mortality, and disability, especially in poor and marginalized groups; and reduce inequalities in access to health.

As described in NMSP 2021–2025, the Ghana NMCP aims to strengthen health systems by:

- Engaging both the public and private health sectors in all its activities.
- Supporting the effective roll-out and use of the GhiLMIS.
- Advocating for optimization of warehousing and operations across the supply chain.
- Working closely with the Ghana FDA to strengthen quality assurance systems, which are an integral part of efficient supply chain management.
- Collaborating with the PPME to put in place measures to strengthen the technical capacity of health workers as well as a logistics infrastructure for effective functioning of DHIMS2.

9.2. Recent Progress (January to December 2021)

In CY 2021, PMI supported the following capacity-strengthening activities:

- Long-term training of individuals to build NMCP and GHS capacity in epidemiology, SM&E, or other malaria program management functions as needed through FETP, which was established with the support of the U.S. government at the University of Ghana's School of Public Health in collaboration with GHS.
- Provided technical assistance to the Ghana FDA to:
    - Improve country and regional regulatory systems to assure the quality of medical products in the public and private sectors through the creation and facilitation of a national post-market surveillance TWG and the implementation of risk-based post-market surveillance of antimalarial drugs.
    - Increase the supply of quality-assured essential medical products of public health importance by providing technical assistance to two local manufacturers toward WHO prequalification of artemether-lumefantrine tablets.
    - Facilitate the process for local manufacturers and Ghana FDA to adopt the GS1 standards.
    - Work with GHS on coordination for implementation of ISS through strengthened regional and district supervision health teams. PMI, along

with other USAID Ghana technical teams, supports integrated planning and management of supervision aimed at building strong regional and district teams to run independent and efficient systems for on-the-job training, cutting down the high costs of traditional classroom training, and, more importantly, ensuring continued improvement of quality health services.
- Support capacity-building of GHS and NMCP in data management, specifically to improve the quality of data entered into DHMIS2 as well as the review, analysis, and use of data for improved malaria programming.
- Second a malaria data specialist to NMCP with the objective of building skills and establishing a culture of regularly interrogating data to inform malaria control programming.
- Continue to support the MOH and health partners to develop national procurement and supply chain schemes, which includes strengthening the quantification capacity for health commodities, including antimalarials. PMI continues to invest considerable efforts to support supply chain reforms aimed at improving efficiency and preventing stockouts of health commodities.
- Support Peace Corps activities, which were disrupted due to the coronavirus pandemic and the evacuation of volunteers worldwide.

9.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of capacity-strengthening activities that PMI proposes to support in Ghana with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

In FY 2023, PMI/Ghana will continue to support capacity-strengthening activities described in the **Recent Progress** section above. PMI will support two new advanced FETP students to support NMCP or GHS in epidemiology, monitoring and evaluation, or other malaria program management functions at the national and sub-national levels. PMI will continue to strengthen the institutional capacity of the GOG to promote and oversee the delivery of quality of health services in the public and private sectors; support will also target improving coordination at the central level between GHS, the National Health Insurance Authority, and the Health Facilities Regulatory Agency, national bodies jointly responsible for service delivery. With the planned resumption of Peace Corps activities in Ghana, PMI will support the Peace Corps through small grants to engage in malaria control and prevention activities, such as community mobilization for SBC and ITN distribution. In addition, special emphasis will be placed on

strengthening the capacity of NMCP to efficiently roll out activities related to pre-elimination in six districts by 2025.

10. Staffing and Administration

The PMI/Ghana team is composed of six health professionals. The single interagency team is led by the USAID mission director's designee and the USAID health office director. The team also consists of two resident advisors, representing USAID and CDC, and two Ghanaian public health experts. In addition, the team is supported by an administrative assistant shared with the President's Emergency Plan for AIDS Relief team, and a PMI-supported data specialist seconded to NMCP. The PMI interagency team works together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners. Technical expertise from PMI headquarters complements the PMI/Ghana programmatic efforts.

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	31,479,491	32,140,561	32,815,512
Total population at risk for malaria	31,479,491	32,140,561	32,815,512
PMI-targeted at-risk population	31,479,491	32,140,561	32,815,512
Population targeted for ITNs	25,499,908	26,010,565	26,530,962
Continuous Distribution Needs			
Channel 1: ANC	1,070,303	1,092,779	1,115,727
Channel 1: ANC Type of ITN	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)
Channel 2: EPI	1,007,344	1,028,498	1,050,096
Channel 2: EPI Type of ITN	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)
Channel 3: School	1,849,432	1,884,518	446,000
Channel 3: School Type of ITN	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)
Channel 4: Community			
Channel 4: Community Type of ITN			
Channel 5: Estimated number of HIV and TB clients to be given ITNs	61,211	54,847	57,938
Channel 5: Type of ITN	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)
Estimated Total Need for Continuous Channels	3,988,289	4,060,642	2,669,762
Mass Campaign Distribution Needs			
Mass distribution campaigns			17,364,515
Mass distribution ITN type			All three (Dual AI, PBO and Single Pyrethroid)
Estimated Total Need for Campaigns	0	0	17,364,515
Total ITN Need: Continuous and Campaign	**3,988,289**	**4,060,642**	**20,034,276**
Partner Contributions			
ITNs carried over from previous year	475,850	0	11,160,423
ITNs from Government	446,000	446,000	446,000
Type of ITNs from Government	Single Pyrethroid	Single Pyrethroid	Single Pyrethroid

Calendar Year	2022	2023	2024
ITNs from Global Fund	1,549,000	13,275,065	2,223,762
Type of ITNs from Global Fund	Dual AI and Single Pyrethroid	All three (Dual AI, PBO and Single Pyrethroid)	All three (Dual AI, PBO and Single Pyrethroid)
ITNs from other donors			
Type of ITNs from other donors			Single Pyrethroid
ITNs planned with PMI funding	1,500,000	1,500,000	3,000,000
Type of ITNs with PMI funding	Dual AI and PBO	Dual AI and PBO	Dual AI and PBO
Total ITNs Contribution Per Calendar Year	**3,970,850**	**15,221,065**	**16,830,185**
Total ITN Surplus (Gap)	**(17,439)**	**11,160,423**	**(3,204,091)**

Table A-2. RDT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	31,479,491	32,140,561	32,815,512
Population at risk for malaria	31,479,491	32,140,561	32,815,512
PMI-targeted at-risk population	31,479,491	32,140,561	32,815,512
RDT Needs			
Total number of projected suspected malaria cases	12,975,044	13,772,837	14,377,154
Percent of suspected malaria cases tested with an RDT	74%	74%	74%
RDT Needs (tests)	**10,456,069**	**11,211,089**	**11,703,004**
Needs Estimated based on HMIS Data			
Partner Contributions (tests)			
RDTs from Government	0	0	0
RDTs from Global Fund	17,966,700	15,167,275	15,167,275
RDTs from other donors	0	0	0
RDTs planned with PMI funding	2,500,000		
Total RDT Contributions per Calendar Year	**20,466,700**	**15,167,275**	**15,167,275**
Stock Balance (tests)			
Beginning Balance	4,468,645	14,479,276	18,435,462
- Product Need	10,456,069	11,211,089	11,703,004
+ Total Contributions (received/expected)	20,466,700	15,167,275	15,167,275
Ending Balance	**14,479,276**	**18,435,462**	**21,899,734**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	5,228,034	5,605,545	5,851,502
Total Surplus (Gap)	**9,251,242**	**12,829,918**	**16,048,232**

Table A-3. ACT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	31,479,491	32,140,561	32,815,512
Population at risk for malaria	31,479,491	32,140,561	32,815,512
PMI-targeted at-risk population	31,479,491	32,140,561	32,815,512
ACT Needs			
Total projected number of malaria cases	5,210,490	5,508,530	5,763,575
Total ACT Needs (treatments)	**5,210,490**	**5,508,530**	**5,763,575**
Needs Estimated based on HMIS Data			
Partner Contributions (treatments)			
ACTs from Government	1,083,679	1,109,624	1,122,828
ACTs from Global Fund	3,821,525	4,450,310	4,450,310
ACTs from other donors	0	0	0
ACTs planned with PMI funding	0	0	0
Total ACTs Contributions per Calendar Year	**4,905,204**	**5,559,934**	**5,573,138**
Stock Balance (treatments)			
Beginning Balance	2,433,793	2,128,507	2,179,910
- Product Need	5,210,490	5,508,530	5,763,575
+ Total Contributions (received/expected)	4,905,204	5,559,934	5,573,138
Ending Balance	**2,128,507**	**2,179,910**	**1,989,473**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	2,605,245	2,754,265	2,881,788
Total Surplus (Gap)	**(476,738)**	**(574,355)**	**(892,314)**

A-4. Inj. Artesunate Gap Analysis Table

Calendar Year	2022	2023	2024
Injectable Artesunate Needs			
Projected number of severe cases	260,525	275,427	288,179
Projected number of severe cases among children	231,294	244,524	255,845
Average number of vials required for severe cases among children	6	6	6
Projected number of severe cases among adults	29,231	30,903	32,334
Average number of vials required for severe cases among adults	6	6	6
Total Injectable Artesunate Needs (vials)	**1,451,330**	**1,534,346**	**1,605,385**
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government	300,000	300,000	300,000
Injectable artesunate from Global Fund	985,192	1,002,271	1,002,271
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	545,000	325,000	300,000
Total Injectable Artesunate Contributions per Calendar Year	**1,830,192**	**1,627,271**	**1,602,271**
Stock Balance (vials)			
Beginning Balance	483,510	862,372	955,297
- Product Need	1,451,330	1,534,346	1,605,385
+ Total Contributions (received/expected)	1,830,192	1,627,271	1,602,271
Ending Balance	**862,372**	**955,297**	**952,184**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	725,665	767,173	802,692
Total Surplus (Gap)	**136,707**	**188,124**	**149,491**

Table A-5. RAS Gap Analysis Table

Calendar Year	2022	2023	2024
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose (or expected to require pre-referral dose based on number of providers for the service)	7,816	8,263	8,645
Total Artesunate Suppository Needs (suppositories)	**14,850**	**15,699**	**16,426**
Needs Estimated based on HMIS Data			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	0	28,712	28,712
Artesunate suppositories from other donors			
Artesunate suppositories planned with PMI funding	30,000	30,000	0
Total Artesunate Suppositories Available	**30,000**	**58,712**	**28,712**
Stock Balance (suppositories)			
Beginning Balance	39,420	44,426	74,814
- Product Need	14,850	15,699	16,426
+ Total Contributions (received/expected)	30,000	58,712	28,712
Ending Balance	**44,426**	**74,814**	**87,100**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	7,425	7,850	8,213
Total Surplus (Gap)	**37,001**	**66,965**	**78,887**

Table A-6. SP Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	31,479,491	32,140,561	32,815,512
Total Population at Risk for Malaria	31,479,491	32,140,561	32,815,512
PMI Targeted at Risk Population	31,479,491	32,140,561	32,815,512
SP Needs			
Total Number of Pregnant Women	1,092,779	1,115,727	1,139,158
Percent of pregnant women expected to receive IPTp1	75%	77%	78%
Percent of pregnant women expected to receive IPTp2	70%	74%	77%
Percent of pregnant women expected to receive IPTp3	64%	69%	75%
Percent of pregnant women expected to receive IPTp4	44%	49%	55%
Percent of pregnant women expected to receive IPTp5	36%	44%	52%
Total SP Needs (doses)	**3,161,104**	**3,491,222**	**3,832,697**
Needs Estimated based on HMIS Data			
Partner Contributions (doses)			
SP from Government	2,680,559	3,328,792	3,675,374
SP from Global Fund	1,136,550	0	1,136,550
SP from other donors			
SP planned with PMI funding	970,000		
Total SP Contributions per Calendar Year	**4,787,109**	**3,328,792**	**4,811,924**
Stock Balance (doses)			
Beginning balance	2,039,629	3,665,634	3,503,205
- Product Need	3,161,104	3,491,222	3,832,697
+ Total Contributions (Received/expected)	4,787,109	3,328,792	4,811,924
Ending Balance	**3,665,634**	**3,503,205**	**4,482,432**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	1,580,552	1,745,611	1,916,348
Total Surplus (Gap)	**2,085,082**	**1,757,594**	**2,566,083**

Table A-6. SMC Gap Analysis Table

Calendar Year	2022	2023	2024
Total population in the SMC targeted age range	3,773,723	3,852,971	4,662,095
SMC Drug (SP+AQ) Needs			
National population 3-11 months targeted for SMC	226,639	233,207	239,979
National population 12-59 months targeted for SMC	1,106,532	1,138,599	1,171,662
Total national population targeted for SMC	**1,333,171**	**1,371,806**	**1,411,641**
PMI population 3-11 months targeted for SMC	166,554	171,844	177,312
PMI population 12-59 months targeted for SMC	813,175	839,005	865,699
Total PMI population targeted for SMC	**979,729**	**1,010,850**	**1,043,011**
Total SP+AQ Needs (co-blisters)	**5,332,684**	**5,487,223**	**5,646,566**
Partner Contributions (co-blisters, national)			
SP+AQ carried over from previous year	122,400	141,367	301,031
SP+AQ from Government	1,218,851	1,387,837	1,418,228
SP+AQ from Global Fund	1,337,500	1,359,050	1,287,233
SP+AQ from other donors	0	0	0
SP+AQ planned with PMI funding	2,795,300	2,900,000	2,960,900
Total SP+AQ Contributions per Calendar Year	5,474,051	5,788,254	5,967,393
Total SP+AQ Surplus (Gap)	**141,367**	**301,031**	**320,827**

Table A-7. Primaquine Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	31,479,491	32,140,561	32,815,512
Total population at risk for malaria	31,479,491	32,140,561	32,815,512
PMI-targeted at-risk population	31,479,491	32,140,561	32,815,512
Primaquine Needs			
Total projected number of malaria cases	5,210,490	5,508,530	5,763,575
Total projected number of Pf cases			
Total projected number of Pv cases	353,360	373,572	390,868
Total projected number of mixed cases (Pf + Pv)			
Total Primaquine Needs (tablets)	**11,142,318**	**11,779,659**	**12,325,057**
Needs Estimated based on HMIS Data			
Partner Contributions (tablets)			
Primaquine from Government	0	0	0
Primaquine from Global Fund	0	0	0
Primaquine from other donors	0	0	0
Primaquine planned with PMI funding	0	0	0
Total Primaquine Contributions per Calendar Year	**0**	**0**	**0**
Stock Balance (tablets)			
Beginning Balance	0	0	0
- Product Need	11,142,318	11,779,659	12,325,057
+ Total Contributions (received/expected)	0	0	0
Ending Balance	**(11,142,318)**	**(11,779,659)**	**(12,325,057)**
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	0	0	0
Total Surplus (Gap)	**(11,142,318)**	**(11,779,659)**	**(12,325,057)**