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Tanzania (Mainland)

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

ACT	Artemisinin-based Combination Therapy
AI	Active Ingredient
AL	Artemether-lumefantrine
ANC	Antenatal Care
bMDRT	Basic Malaria Diagnostic Refresher Training
CBS	Case-based Surveillance
CDC	Centers for Disease Control and Prevention
CHMT	Council Health Management Team
CHW	Community Health Worker
CORP	Community-owned Resource Person
DHIS2	District Health Information Software 2
ECAMM	External Competency Assessment Malaria Microscopy
eLMIS	Electronic Logistics Management Information System
EPI	Expanded Program on Immunization
FETP	Field Epidemiology Training Program
FY	Fiscal Year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GOT	Government of Tanzania
GOTHOMIS	Government of Tanzania Health Operations Management Information System
HMIS	Health Management Information System
IDSR	Integrated Disease Surveillance and Response
IPC	Interpersonal Communication
IPTp	Intermittent Preventive Treatment for Pregnant Women
IRS	Indoor Residual Spraying
ITN	Insecticide-treated Mosquito Net
LSM	Larval Source Management
MBS	Malaria Behavioral Survey
mCCM	Malaria Community Case Management
MIP	Malaria in Pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly, and Children
MOP	Malaria Operational Plan
mRDT	Malaria Rapid Diagnostic Test
MSD	Medical Stores Department
MSDQI	Malaria Services and Data Quality Improvement

NHLQATC	National Health Laboratory Quality Assurance and Training Centre
NIMR	National Institute for Medical Research
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
OpenSRP	Open-source Smart Register Platform
OR/PE	Operational Research/Program Evaluation
PBO	Piperonyl Butoxide
PCV	Peace Corps Volunteer
PfPR	Plasmodium Falciparum Parasite Rate
PMI	U.S. President's Malaria Initiative
PO-RALG	President's Office–Regional Administration and Local Government
QA/QC	Quality Assurance/Quality Control
R/CHMT	Regional and Council Health Management Teams
SBC	Social and Behavior Change
SM&E	Surveillance, Monitoring, and Evaluation
SMPS	School Malaria Parasitaemia Survey
SNP	School Net Program
SP	Sulfadoxine-pyrimethamine
TES	Therapeutic Efficacy Study
THMIS	Tanzania HIV and Malaria Indicator Survey
USAID	U.S. Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

To review the specific country context for Tanzania, please refer to the Country Malaria Profile located on the U.S. President's Malaria Initiative's Tanzania landing page, which provides an overview of the country malaria situation, key indicators, the National Malaria Control Program (NMCP) strategic plan, and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, the U.S. President's Malaria Initiative (PMI) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illnesses, 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. Tanzania began implementation as a PMI partner country in fiscal year (FY) 2006.

Rationale for PMI's Approach in Tanzania

The population of mainland Tanzania remains at risk of malaria infection. The dominant type of infection is *Plasmodium falciparum*, which accounts for 96 percent of malaria infection in Tanzania. Over the years, Tanzania has made significant progress in malaria control. Results from the 2017 Malaria Indicator Survey (MIS) showed that 8 percent of children under five years of age in Tanzania tested positive for malaria, based on malaria rapid diagnostic test (mRDT) results, a downward trend from the 2011–2012 Tanzania HIV and Malaria Indicator Survey (THMIS) (10 percent). The MIS 2017 data also show that overall prevalence by region ranged from 24 percent in Kigoma to less than 1 percent in Kilimanjaro region. The highest prevalence regions were in the northwest and southeast areas of mainland Tanzania. Other MIS 2017 data indicate that 78 percent of households owned at least one insecticide-treated mosquito net (ITN), an increase from 38 percent in 2007–2008. Fifty-four percent of children slept under bed nets, an increase from 25 percent in 2007–2008, and 57 percent of pregnant women received medications to prevent malaria, an increase from 30 percent in 2008.

Overview of Planned Interventions

The proposed FY 2023 PMI funding for Tanzania is $39 million. PMI will support the following intervention areas with these funds.

1. Vector Monitoring and Control

PMI Tanzania will support entomological monitoring activities, including insecticide resistance monitoring, and insecticide-treated mosquito net (ITN) procurement and distribution. This will include:

- Procurement and distribution of new types of ITNs for the school net program (SNP), and support for distribution of Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund)-procured ITNs.
- Annual rapid assessment surveys to determine ITN coverage across the 26 regions.
- Technical support for alternative distribution channels and targeted mass replacement campaigns.
- Support for longitudinal entomological monitoring, which may be modified/expanded to include areas where dual active ingredient (AI) nets will be deployed. PMI support focuses on the national insecticide resistance monitoring program at 22 mainland sentinel sites, which may be adjusted to include areas with dual AI nets.
- Support for streamlined durability monitoring of dual AI ITNs. PMI will monitor a cohort of ITNs distributed via SNP or via the 2024 mass campaign, regions/sites to be determined. FY 2023 funds will support data collection at pre-distribution or 12-month time points.
- Support social and behavior change (SBC) activities (net use, care, and sharing) during the school net program ITN distribution in 14 PMI-supported regions.

2. Malaria in Pregnancy

- PMI supports the World Health Organization's recommended approach to prevent the adverse effects associated with malaria in pregnancy (MIP) through provision of: 1) ITNs through antenatal care (ANC) clinics, 2) intermittent preventive treatment (IPTp) with sulfadoxine-pyrimethamine, and 3) prompt and effective case management of pregnant women with malaria.
- PMI will continue to support Council Health Management Teams (CHMTs) to conduct Malaria Services and Data Quality Improvement (MSDQI) supportive supervision and training at health facilities to improve the quality of MIP services.
- PMI will continue to reinforce the messaging on the importance of IPTp among pregnant women, their partners, and the community at large.

3. Drug-based Prevention

- PMI does not support seasonal malaria chemoprevention or other drug-based prevention in mainland Tanzania.

4. Case Management

- Support a comprehensive case management strategy including universal, quality-assured parasitological testing of all cases of suspected uncomplicated malaria, prompt and effective treatment with artemisinin-based combination therapy (ACT) of all cases of parasitologically confirmed uncomplicated malaria, and emergent pre-referral and/or definitive management of severe febrile illness and severe malaria.
- Provide technical assistance for the national slide bank, and quality-assured mRDT for NMCP and the National Public Health Laboratory, including procurement of microscopy slides for the national slide bank.
- Support microscopy proficiency testing for the national external quality assurance at the National Health Laboratory Quality Assurance and Training Centre.
- Conduct basic and advanced (aMDRT) malaria diagnostic refresher training and external competency assessment malaria microscopy for laboratory technicians.
- Support planning and implementation of MSDQI supportive supervision visits for NMCP and the President's Office–Regional Administration and Local Government (PO-RALG) across all regions, and for CHMTs in up to 25 districts.
- Support community case management of malaria through Community-owned Resource Persons (CORPs). PMI will provide training, supervision, and compensation for the Government of Tanzania's (GOT's) newly established CORPs program in up to 25 districts.
- Procure approximately $2.5 million ACTs and parenteral artesunate.
- Support the use of a multi-media approach to ensure adoption of promoted malaria behaviors, including mass media, mid-media, and interpersonal communication (IPC) to address the key behaviors which discourage seeking prompt and appropriate care for children under five years of age who have a fever and could benefit from use of an mRDT to confirm malaria.

5. Health Supply Chain and Pharmaceutical Management

- PMI has continued to support NMCP through strengthening forecasting and supply planning activities, procurement, capacity building, supportive supervision, management information system, and supply chain monitoring.

- PMI investment in supply chain activities has resulted in reduction of the stockout rates each quarter for the majority of commodities.
- PMI will support NMCP to carry out a nationwide, statistically representative data quality assessment to identify gaps in data quality.
- PMI will support monitoring of the availability of ITNs and compare the information to the Medical Stores Department (MSD) zonal stocks displayed via the Medical Stores Department (MSD) portal, and liaise with NMCP to intervene in cases of stockouts.

6. Social and Behavior Change

PMI's SBC support to the Tanzania NMCP prioritizes the promotion of positive human behaviors to increase uptake of malaria preventive and control services and products. To this end, PMI proposes the following:

- Support the use of a multi-media approach, including mass media, mid-media, and IPC, to ensure adoption of promoted malaria prevention practices, including the following key behaviors: go early, attend, and complete more than four ANC visits (eight contacts are desired); receive IPTp+3 during ANC visits; sleep under an ITN every night, especially pregnant women and children under five years of age; and seek prompt and appropriate care for children under five years of age who have a fever, including the use of an mRDT to confirm malaria.
- Support SBC strategy and guideline development that promotes a high level political and local government advocacy for planning, budgeting, and coordination of malaria prevention and control interventions.
- Support SBC activities during the SNP ITN distribution in 14 PMI supported regions.
- Support the implementation of malaria interventions based on the findings of the malaria behavior survey conducted in mainland Tanzania in 2021.
- Continue to support building capacity of NMCP at the national level, and malaria focal people at the regional level, especially in use of various data points to inform planning and monitoring of SBC activities.
- Support national coordination taskforce for malaria SBC to improve its effectiveness.

7. Surveillance, Monitoring, and Evaluation

PMI will continue support to strengthen malaria surveillance systems and to monitor and evaluate malaria interventions with a focus on high malaria burden regions. PMI will also continue providing technical guidance for surveillance, monitoring, and evaluation (SM&E) of malaria interventions in lower malaria burden regions. Specific support will include the following:

- Continue to support malaria-related data integration and management systems and regular technical working groups to review and discuss SM&E activities.
- Provide technical guidance in development of electronic Integrated Disease Surveillance and Response (IDSR) to manage surveillance data for early epidemic detection and case-based surveillance (CBS) in lower malaria burden regions.
- Continue to support NMCP in analyses, reviews, and dissemination of malaria-related data.
- Support regional and council health management teams to use malaria transmission risk maps to plan malaria interventions at the district level (i.e., PlanRep).
- Support three participants for the Field Epidemiology Training Program Frontline (Basic) course, with an emphasis on selecting participants working in malaria interventions.

8. Operational Research and Program Evaluation

- No operational research or program evaluation (OR/PE) studies planned with FY 2023 funds.

9. Capacity Strengthening

- Continue to support capacity strengthening for NMCP staff, including participation in international and national-level training.
- Continue to support the FETP and contribute to the advanced training of Tanzanian epidemiologists.
- Support up to three Peace Corps Volunteers to work with the NMCP and PMI-supported implementing partners on malaria-related activities.
- Support PO-RALG to conduct supportive supervision to improve the quality of malaria services.
- Support strengthening of interoperability functions of several GOT information management systems to inform decision-making, including District Health Information Software 2 (DHIS2) with the Government of Tanzania Hospital Management Information System (GOTHOMIS), and the planning and reporting system (PlanRep) with the Facility Financial Accounting and Reporting System.

I. CONTEXT AND STRATEGY

1. Introduction

Tanzania began implementation as a U.S. President's Malaria Initiative (PMI) focus country in fiscal year (FY) 2006. This FY 2023 Malaria Operational Plan (MOP) presents a detailed implementation plan for Tanzania, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners. The activities that PMI is proposing build on partner investments to improve and expand malaria-related services, including investments by the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This document provides an overview of the strategies and interventions in mainland Tanzania, describes progress to date, identifies challenges and relevant contextual factors, and provides a description of activities that are planned with FY 2023 funding. For more detailed information on the country context, please refer to the Country Malaria Profile, which provides an overview of the country malaria situation, key indicators, the NMCP strategic plan, and the partner landscape.

2. U.S. President's Malaria Initiative

The U.S. President's Malaria Initiative (PMI) is led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC). Launched in 2005, PMI supports implementation of malaria prevention and treatment measures—insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS), accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs), intermittent preventive treatment of pregnant women (IPTp), and drug-based prevention—as well as cross-cutting interventions such as surveillance, monitoring and evaluation; social and behavior change; and capacity strengthening. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 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 will work with NMCPs and partners to accomplish the following objectives by 2026:

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

2. Reduce malaria morbidity by 40 percent from 2015 levels in PMI partner countries with high and moderate malaria burden.
3. Bring at least 10 PMI partner countries toward national or subnational elimination and assist at least one country in the Greater Mekong Subregion to eliminate malaria.

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

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

3. Rationale for PMI's Approach in Tanzania

3.1. Malaria Overview for Tanzania

The entire population of mainland Tanzania is considered at risk for malaria, although transmission varies significantly among and within regions. *Plasmodium falciparum* accounts for 96 percent of malaria infection in Tanzania. The principal vectors of malaria in Tanzania are mosquitoes of the *Anopheles gambiae* complex (*An. gambiae s.s. and An. arabiensis*), and *An. funestus*. Tanzania has made significant progress in malaria control. Results from the 2017 MIS showed that 8 percent of children under five years of age in Tanzania tested positive for malaria, based on malaria rapid diagnostic test (mRDT) results, down from the 2011–2012 THMIS (10 percent) and 2015–2016 Tanzania Demographic and Health Survey-MIS (15 percent). Prevalence on the mainland varies by region from <1 percent in the highlands of Arusha to as high as 15 percent in the Southern Zone and 24 percent along the Lake and Western Zones. Encouraging indicators from the 2017 MIS include:

- 78 percent of households owned at least one ITN, an increase from 38 percent in 2007–2008.
- 54 percent of children slept under bed nets, an increase from 25 percent in 2007–2008.

- 57 percent of pregnant women received medications to prevent malaria, an increase from 30 percent in 2007–2008.

For more detailed information on malaria indicators, please refer to the Country Malaria Profile.

3.2. Key Challenges and Contextual Factors

Key challenges to achieving malaria objectives include:

- Delays in the phased scale-up of piperonyl butoxide (PBO) ITNs to achieve sufficient coverage in high burden regions due to constrained Global Fund and PMI funding.
- Lack of a scalable community health worker (CHW) testing and treatment policy (current policy relies on employing retired/out of work medical professionals such as CHWs, with major challenges in recruitment and retention).
- Resource constraints in scaling up support for high-quality case management as well as health systems strengthening (including supply chain, surveillance, and health workforce capacity) across all high burden regions/districts.
- Tanzania hosts the largest refugee population on the African continent, with camps in three districts (Kakonko, Kasulu, and Kibondo,) where malaria is the main cause of morbidity, especially during the rainy season.

3.3. PMI's Approach for Tanzania

PMI supports a comprehensive package of malaria control interventions in support of the NMCP's National Malaria Strategic Plan (NMSP) 2021–2025. The plan outlines a long-term vision of a society free from malaria. The strategy's mission is that all Tanzanians have equitable access to sustainable, quality, effective, safe, and affordable malaria preventive and curative services through efficient collaborative partnership and community ownership. The national goal is to reduce the average malaria prevalence in children under five years of age (plasmodium falciparum parasite rate—$PfPR_{6\text{-}59}$) from 7 percent in 2017 to less than 3.5 percent in 2025. Further, each of the epidemiological strata has targets which were identified in a nationwide stratification exercise conducted in 2017. These targets are: 1) reduce malaria burden in moderate to high-risk strata, from 15 percent *PfPR* in 2017 to less than 7.5 percent *PfPR* in 2025; and 2) maintain and further reduce transmission in low and very low prevalence in areas targeting elimination from 1 percent *PfPR* in 2017 to less than 0.5 percent *PfPR* in 2025.

The strategy to achieve these targets consists of six components. The first three are core strategies, and the last three are support strategies:

- Integrated malaria vector control

- Malaria diagnosis, treatment, and preventive therapies
- Surveillance monitoring and evaluation
- Commodities and logistics management
- Social behavioral change and advocacy
- Program management

Each strategic component has specific objectives and outcomes, with intervention packages that vary by epidemiologic stratum.

PMI focuses most of its technical assistance on 14 of 26 regions located in the Lake/Western Zones, Northern, and Southern Zones. The Global Fund provides implementation support for interventions in the remaining 12 regions. Consistent with PMI technical guidance, PMI/Tanzania's investment strategy focuses on promoting high coverage of a set of high-quality, evidence-based malaria control interventions, including:

- PBO and dual active ingredient (AI) ITNs distributed continuously through clinics and schools, as well as through targeted mass replacement campaigns where necessary based on coverage data;
- Malaria in pregnancy (MIP) interventions, including IPTp;
- Case management of malaria, including prompt diagnosis and treatment and pharmaceutical supply chain strengthening;
- Data for decision-making, gleaned from surveillance, monitoring and evaluation, and operational research activities; and
- Social and behavior change (SBC) activities, to promote consistent and correct use of interventions by high proportions of target populations and service providers.

According to the stratification of malaria burden and delineation of intervention packages tailored to each epidemiological stratum, regions in the Lake, Western, and Southern Zones are largely classified in the moderate and high burden strata, where the NMCP priority remains burden reduction. PMI support for interventions, as listed above, largely aligns with the intervention packages and approaches that the NMSP recommends for these strata. PMI does not support certain intervention packages in the NMSP, including bio-larviciding as well as newer chemoprevention approaches including seasonal malaria chemoprevention/intermittent preventive treatment in school children and in infants. Global Fund and other sources are currently supporting implementation research to investigate these approaches for their efficacy, effectiveness, and feasibility.

PMI's approach in Tanzania reflects all five PMI strategic focus areas, most notably in reaching the unreached with effective vector control interventions by prioritizing

distribution of new types of ITNs through the school net program (SNP); strengthening the nascent CHW program to extend availability of malaria case management; and improving local expertise entomological and drug resistance surveillance through local research and government institutions.

3.4. Key Changes in this MOP

Key shifts in the FY 2023 MOP are:

- Transition from IRS to dual AI mosquito nets: PMI is shifting from IRS in six districts with FY 2021 funds to two districts with FY 2022 funds, to a transition to dual AI mosquito nets with FY 2023 MOP funds.
- Community case management of malaria through Community-Owned Resource Persons (CORPs): PMI will provide training, supervision, and compensation for the Government of Tanzania's (GOT's) newly established CORPs program in up to 25 districts.

II. OPERATIONAL PLAN FOR FY 2023

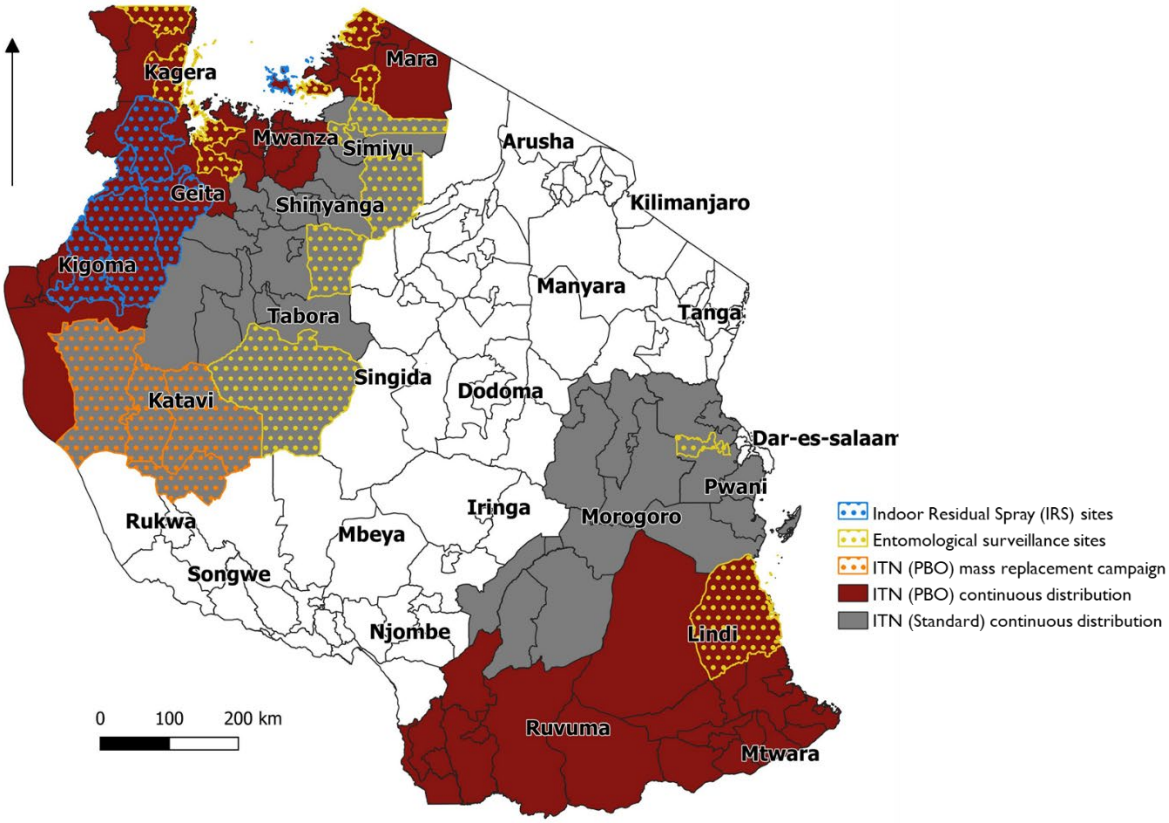
1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

The NMCP's strategic objective of integrated malaria vector control as presented in the Tanzania NMSP 2021–2025 is to reduce malaria parasites transmission by maintaining recommended evidence-based vector control interventions according to the targeted malaria risk strata. IRS and ITNs are the core malaria vector control interventions to implement integrated malaria vector control, supplemented by larval source management (LSM), upon attainment of universal coverage of the two core interventions. The strategy also recommends the monitoring of vector control cross sectional activities including insecticide resistance management.

PMI specifically supports the use of all vector control interventions with the exception of LSM. PMI supports entomological monitoring in 22 sites; the Global Fund supports 32 sites. The Global Fund supports targeted mass campaigns every three years while PMI supports continuous distribution of ITNs via SNP, antenatal care (ANC), and Expanded Program on Immunization (EPI) channels in 14 regions. PMI implemented IRS in six districts but will transition to support coverage with dual AI bed nets in districts where IRS will be withdrawn.

Figure 1. Map of Vector Control Activities in Tanzania, 2021



1.2. Recent Progress (between October 2020 and September 2021)

- Supported insecticide resistance monitoring in 22 sentinel sites nationwide, in collaboration with National Institute of Medical Research (NIMR). Supported longitudinal entomological monitoring in 10 sites in the Lake Zone, six of which were located in IRS districts and four in non-IRS districts. Longitudinal monitoring activities included vector bionomics monitoring (mosquito species, density, biting behavior, and host preferences) and insecticide residual efficacy monitoring for IRS.
- Provided technical assistance to NIMR (at Amani and Mwanza) for field data and samples collection activities, supportive supervision, and laboratory analysis for entomological monitoring.
- Supported the procurement and distribution of 3,110,834 (standard and PBO) ITNs to targeted populations through SNP in 14 regions.
- Supported distribution of 1,365,880 (standard and PBO) Global Fund-procured ITNs through ANC and EPI clinics in 14 regions.
- Supported prevention of MIP by providing ITNs to women at their first ANC visit (for more details, see **Case Management** and **MIP** sections).

- Supported national and community-level SBC activities to improve demand for ITNs, increase appropriate use, promote care, and mitigate against misuse. For more information, please refer to the **SBC section**.
- Supported the planning, implementation, and evaluation of the 2021 IRS campaign in six districts, covering 568,484 structures and protecting 2,081,886 people during the two-phase campaign between October 5 and December 22, 2021. For more information about the IRS, please refer to the 2021 End of Spray Report.
- Trained and engaged community members in six 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 Tanzania with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

1.3.1. Entomological Monitoring

PMI will continue to support entomological monitoring and in-country laboratory analysis of entomological samples in the Lake Zone in areas where the PMI-supported IRS program will transition to dual AI ITNs as well as districts that have previously transitioned from IRS to PBO ITNs. This will include a streamlined durability monitoring of dual AI ITNs, as this will be the first introduction of these nets at scale in Tanzania. PMI will continue to sustain the nationwide insecticide resistance monitoring program in 22 established sentinel sites nationwide.

Tanzania is at high risk for the introduction and establishment of *An. stephensi*, PMI will collaborate with the NMCP and local institutions (such as NIMR, Ifakara Health Institute) to develop an *An. stephensi* surveillance plan, initially focusing on major seaports. The NMCP currently conducts some larval surveillance activities as part of the mainland NCMP LSM program, and collaborations with the Swiss Tropical and Public Health Institute are planned to improve and formalize a larval surveillance strategy. Activities for enhanced surveillance of *An. stephensi* will be included in accordance with the PMI *An. stephensi* action plan guidance for high risk countries. Enhanced surveillance efforts also will leverage and coordinate with future LSM programs carried out around seaports with connections to major transport routes, and with other existing vector surveillance programs.

Summary of Distribution and Bionomics of Malaria Vectors in Tanzania

The NMCP established a nationwide longitudinal National Entomological Surveillance Program in 62 district councils in 2015. Data from 2016–2019 indicate that both *An. arabiensis* and *An. funestus* s.s were the main vectors, followed by *An. gambiae* s.s.

An. funestus s.s populations were higher in the high and moderate malaria epidemiological transmission strata, while *An. arabiensis* was the dominant vector in the low/very low malaria transmission strata.

Longitudinal entomological monitoring (October 2020–September 2021) was conducted in six sentinel sites and in the six IRS target districts (Biharamulo, Bukombe, Kakonko, Kasulu, Kibondo, and Ukerewe) and in four sentinel sites in non-IRS districts (Bunda DC, Geita District Council, Kasulu Town Council, and Muleba). Fludora® Fusion was used for IRS in Biharamulo, Bukombe and Ukerewe, while Sumishield® was used in Kakonko, Kasulu, and Kibondo.

Molecular species identification of the mosquito specimens indicates that, overall, *An. funestus* s.s was the most abundant vector, *An. arabiensis* is the second most abundant vector, followed by *An. gambiae* s.s and *An. parensis*. Vector species composition differed between the IRS and non-IRS sites. The proportion of *An. arabiensis*, *An. gambiae* s.s and *An. parensis* was significantly higher in IRS sites compared to non-IRS sites, while *An. funestus* s.s was significantly higher in the non-IRS sites. Mosquitoes collected from the non-IRS sites were found to have a higher malaria parasite infection rate (1.2 percent) compared to the IRS sites (0.5 percent).

In all sites, *An. funestus* s.l. was the predominant vector biting indoors, except in Bukombe, Kakonko, and Ukerewe, where *An. gambiae* s.l. was the most abundant biting indoors. IRS decreased mean bites per person compared to non-IRS sites. In general, indoor and outdoor biting of *An. funestus* s.l. and *An. gambiae* s.l. were low throughout the night in IRS sites, pre- and post-spray. In non-IRS areas, *An. funestus* s.l. were found biting indoors more than outdoors, with peak biting activity between 11 pm–12 am and 2–3 am. Blood meal sources analyzed by capture site indicated that the majority of blood-fed *An. funestus* s.s. and *An. arabiensis* collected were found to have human or a mix of human-animal blood meals.

Status of Insecticide Resistance in Tanzania

In 2020–2021, PMI-supported insecticide resistance testing in 22 sentinel districts across 14 regions in mainland Tanzania indicated widespread pyrethroid resistance. *An. gambiae* s.l. was resistant to permethrin in 17 sentinel districts, resistant to deltamethrin in 16 districts, and resistant to alpha-cypermethrin in 20 districts. *An. funestus* s.l. resistance testing was carried out in 10 districts and was found to be resistant to permethrin in seven districts*. An. funestus* s.l. was also found to be resistant to deltamethrin and alpha-cypermethrin in six districts. Pirimiphos-methyl resistance was detected in *An. gambiae* s.l. in 2 of the 22 districts. Pirimiphos-methyl resistance *in An. funestus* s.l. was tested in six districts, with two districts showing possible resistance. *An. gambiae* s.l. tested in six districts with clothianidin were susceptible except for one district, where reduced susceptibility (mortality of 97.5 percent) was detected. As dual AI

nets are introduced, there are plans to include the monitoring of resistance to insecticides on these nets, such as chlorfenapyr and pyriproxyfen.

PBO restored susceptibility of *An. gambiae* s.l. to permethrin in four of the six sites where testing was carried out and in four of the five sites where PBO + deltamethrin was tested. In one of the sites, PBO did not restore susceptibility to either permethrin or deltamethrin, indicating that there may be other resistance mechanisms involved.

1.3.2 Insecticide-Treated Nets (ITNs)

The country is planning to fully transition from standard to PBO nets by the end of calendar year 2022. There are plans to start deployment through continuous distribution of dual active ingredient nets in select regions, based on resistance data and prioritizing those districts where IRS will be withdrawn, during the calendar year 2024. The distribution of the dual active ingredient nets in areas following IRS withdrawal will be carried out in collaboration with the NMCP. PMI will continue to support procurement and distribution of ITNs through continuous distribution channels. PMI will provide technical support to the country's 2024 targeted mass distributions through participation on a national task force comprising NMCP, Global Fund, and other malaria stakeholders, as well as local government authorities. PMI also supports SBC to improve use and care of ITNs and prevent misuse.

ITN Distribution in Tanzania

In mainland Tanzania, ITNs are distributed via targeted mass campaigns every three years. Continuous distribution channels include ANC and EPI clinics, with distribution to pregnant women and children under the age of one year; alternative delivery systems to special population groups; and schools, for ITN provision to grades 1 and 7 every year.

The commodity gap analysis table has shown a surplus of ITNs in calendar year 2022 and 2023. However, NMCP is processing the Global Fund grant reprogramming to scale up the use of PBO nets nationwide.

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

Table 1. Streamlined Durability Monitoring

Campaign Date	Site	Brand	Pre-distribution	12-month	24-month	36-month
2024 (TBD)	TBD	Dual AI (brand TBD)	X	X		

1.3.3. Indoor Residual Spraying (IRS)

PMI is discontinuing support of the IRS in Tanzania. In calendar year 2022, PMI reduced the number of districts from six to two and plans to discontinue support for IRS

starting in calendar year 2023. PMI plans to use MOP funding to transition to procurement and distribution of dual AI nets.

Table 2. PMI-Supported IRS Coverage

Calendar Year	District*	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)	Insecticide
2021	6 districts (Biharamulo, Bukombe, Kakonko, Kasulu, Kibondo, and Ukerewe)	568,484	93.0%	2,081,886	Clothianidin and deltamethrin
2022*	2 districts (Kasulu DC and Kibondo DC including Nyarugusu and Nduta refugee camps])	245,000	TBD	880,000	Clothianidin

*Denotes target for current year.

IRS Insecticide Residual Efficacy in Tanzania

Wall bioassays were conducted monthly following the 2020–2021 IRS campaign. The quality of IRS and residual efficacy of Fludora® Fusion (combination of clothianidin and deltamethrin) was monitored in two IRS districts (Ukerewe and Biharamulo). The bioassays indicated that a high quality of IRS and residual efficacy monitoring in all surfaces retained >80 percent mortality 10 months post-IRS. Areas sprayed with SumiShield® (Clothianidin), monitored in three districts (Kakonko, Kasulu DC, and Kibondo), showed similar results with high quality IRS, with most surfaces retaining >80 percent mortality 10 months post-IRS. Six months post-IRS withActellic® (pirimiphos-methyl based formulation), monitored at one district (Bukombe), showed that only cement walls retained a residual efficacy of >80 percent seven months post-IRS.

2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

PMI supports the World Health Organization's (WHO) recommended approach to reduce the burden of malaria infection among pregnant women through the provision of:

- IPTp;
- ITNs; and
- Prompt and effective case management of malaria illness and anemia.

The Ministry of Health (MOH) has adopted the WHO 2016 guidelines and the updated WHO policy of IPTp3+, which is to give three or more doses of sulfadoxine-pyrimethamine (SP) monthly until the day of delivery, administered as directly observed therapy during ANC visits. The 2016 guidelines support early initiation of IPTp between 13-16 weeks. The national guidelines plan to withdraw IPTp in the very low epidemiological strata where case-based surveillance (CBS) and risk mitigation have been established. In 2014, MOH started implementation of a policy to test all women for malaria infection using an mRDT at their first ANC visit, irrespective of symptoms, and treat those who test positive according to national guidelines. If a woman is treated for malaria with an antimalarial at the ANC visit or in the four weeks before, she does not need SP. Instead, she should be instructed to return in a month for her next ANC visit, at which time she would be given IPTp-SP. The objectives are to achieve 95 percent coverage of two doses of IPTp and 85 percent coverage of 3+ doses of IPTp; 85 percent use of ITNs by pregnant women; and 100 percent prompt case management of malaria infections in pregnancy.

- Iron/folate combination (ferrous sulphate 200 mg + folic acid 0.25 mg) is provided at ANC according to national policy for prevention and treatment of anemia. High-dose folic acid is procured and provided for pediatric indications only and is not provided at ANC.
- Case management of uncomplicated malaria in pregnancy follows WHO recommendations. The NMCP has revised the malaria diagnosis and treatment guidelines to include injectable artesunate as the treatment of choice for severe malaria in the first trimester as recommended per WHO guidelines. In addition, the guidelines recommend artemether-lumefantrine as the treatment of choice for uncomplicated malaria in all age groups and all trimesters during pregnancy.
- Health facilities use the Malaria Services and Data Quality Improvement (MSDQI) supportive supervision process to observe and evaluate diagnostic and treatment practices of providers at ANC. Facilities with low performance are targeted for supportive supervision and mentorship, and data from the MSDQI tool and Health Management Information System (HMIS)/District Health Information Software 2 (DHIS2) are used to monitor performance. Mentors with MSDQI support facility providers to appropriately assess danger signs, take an adequate clinical history, conduct a sufficient physical examination, provide adequate counseling and communication, and ensure data quality in the HMIS register, tally, and summary that are entered into DHIS2. More details on MSDQI process are in the Case Management section.
- ITN access is increased through alternative schemes (see ITN section).

Based on information from MIS 2017, 26 percent of women self-reported receiving three or more doses of IPTp. Since 2016, the proportion of pregnant women who receive IPTp2 and 3+ has increased among women attending ANC, as reported in HMIS/DHIS2; however, declines were observed in 2020 and 2021 due to shortages of SP throughout the country. In 2021, GOT has instructed all health facilities to procure SP using facility resources.

2.2. Recent Progress (between October 2020 and September 2021)

- PMI and Global Fund support has resulted in distribution of 1,365,880 ITNs (standard and PBO) free of charge to pregnant women at their first ANC visit and to children at their first measles vaccination visit in 14 high malaria endemic areas of Tanzania mainland. Further details can be found in the ITN section.
- PMI supported procurement of 2.25 million doses of SP.
- PMI supported Council Health Management Teams (CHMTs) to conduct MSDQI supportive supervision visits and training to improve the quality of MIP services at 608 (98 percent) facilities across three PMI-supported regions:, Katavi, Lindi, and Mtwara.
- PMI partners printed and distributed 1,400 copies of the updated 2018 ANC guidelines, and conducted guideline orientation for 578 health care workers on IPTp and 1,097 health care workers on mRDT.
- PMI supported meetings of the MIP Task Force, a group composed of members from the NMCP, the Reproductive and Child Health group, and other relevant stakeholders who have been working to address challenges in SP availability and IPTp uptake.
- PMI supported SBC to reinforce messaging on the importance of IPTp among pregnant women, their partners, and the community at large.
- PMI, in collaboration with the health system strengthening team, will concentrate on supporting supply chain management to address challenges in prioritizing, quantification, budgeting, ordering and procurement of SP.

2.3. Plans and Justification for FY 2023 Funding

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

- PMI's funding will contribute to a larger effort, funded by other USAID health programs, to improve the demand for and the quality of ANC on Tanzania mainland, including malaria prevention and treatment of acute infections.

- PMI will continue to support MSDQI supportive supervision and mentorship to ANC health care providers across PMI-supported districts (see Case Management section).
- PMI will support continued training and supervision for IPTp3+ and case management integrated with family planning, maternal and child health, and HIV programming.
- PMI will continue to support SBC to increase ITN use, ANC attendance, and IPTp uptake.
- PMI will support provision of ITNs to pregnant women through continuous distribution at ANC (see the ITN section).

Please see FY 2023 MOP budget tables for a detailed list of proposed activities with FY 2023 funding.

3. Drug-based Prevention

PMI does not support seasonal malaria chemoprevention or other drug-based prevention in mainland Tanzania. NMCP is currently drafting a proposed national policy for chemoprevention approaches, including seasonal malaria chemoprevention and intermittent preventive treatment in school children and in infants. The Global Fund and other sources supported implementation research, conducted between 2019–2021, to investigate these approaches for their efficacy, effectiveness, and feasibility. Results from these studies have not been disseminated, but dissemination might occur before the end of calendar year 2022.

4. Case Management

4.1. PMI Goal and Strategic Approach

The case management goal of the National Malaria Strategic Plan 2021–2025 is to prevent mortality related to malaria infection through universal access to appropriate diagnosis and treatment and targeted provision of preventive therapies for vulnerable groups. The national targets are to increase to 85 percent the proportion of people with suspected malaria who:

- Receive appropriate diagnosis and treatment, and
- Receive appropriate management of both uncomplicated and severe malaria according to the National Guidelines for Malaria Diagnosis, Treatment, and Preventive Therapies, 2020.

The National Guidelines for Malaria Diagnosis, Treatment, and Preventive Therapies, 2020 calls for parasitological confirmation by microscopy or mRDT for all patients with suspected malaria before initiation of treatment. Microscopic examination of Giemsa-

stained blood films remains an important component of malaria diagnosis throughout Tanzania. However, in the public sector, microscopy is only available at regional and district hospitals and some health centers (about 20 percent of all health facilities), whereas about 70 percent of malaria cases in the private sector are confirmed via blood smears. Within the Dar es Salaam region, however, over 50 percent of malaria cases are diagnosed by microscopy in public facilities. HMIS data show that on average in 2021, 94 percent of malaria cases were confirmed by mRDT, 5.8 percent by microscopy, and 0.2 percent were unconfirmed in outpatient departments. In the inpatient departments in 2021, 98.7 percent of malaria cases were confirmed by mRDT or microscopy, while 1.3 percent were unconfirmed. The rate of unconfirmed cases has been steadily declining from 36 percent in 2014 to 0.3 percent in 2021.

A national malaria microscopy quality assurance and quality control (mMQA/QC) system was established in 2017 following the completion of the slide bank at the Malaria Reference Laboratory within the national laboratory, the National Health Laboratory Quality Assurance and Training Centre (NHLQATC). The mMQAQC system includes monthly blinded cross-checking of blood slides by a district supervisor and periodic external QA via blinded positive and negative samples sent from the slide bank. District supervisors also monitor the mMQA/QC process and conduct mRDT quality control at the health facility level through MSDQI supportive supervision, which is designed to improve microscopy and mRDT diagnostic quality via routine monitoring and training by district and regional supervisors and mentorship. The NMCP coordinates lot testing of mRDT kits using a WHO protocol, and random samples are sent to the NHLQATC and WHO-identified, qualified laboratories in Cambodia or the Philippines.

The use of ACTs in mainland Tanzania began in 2006 with artemether-lumefantrine as the first-line drug for the treatment of uncomplicated malaria. In 2013, the NMCP revised the National Diagnostic and Treatment guidelines to include injectable artesunate for the treatment of severe malaria. The current guidelines call for referral of patients with severe malaria from lower-level facilities to the nearest health center with the capability of administering intravenous artesunate after first giving the patient an intramuscular injection of artesunate. Intramuscular artemether can be used as a second-line drug if artesunate is not available. Use of pre-referral rectal artesunate at lower-level facilities is also permitted if injection is not available, though in practice this does not occur because rectal artesunate is not procured by either the GOT or its partners.

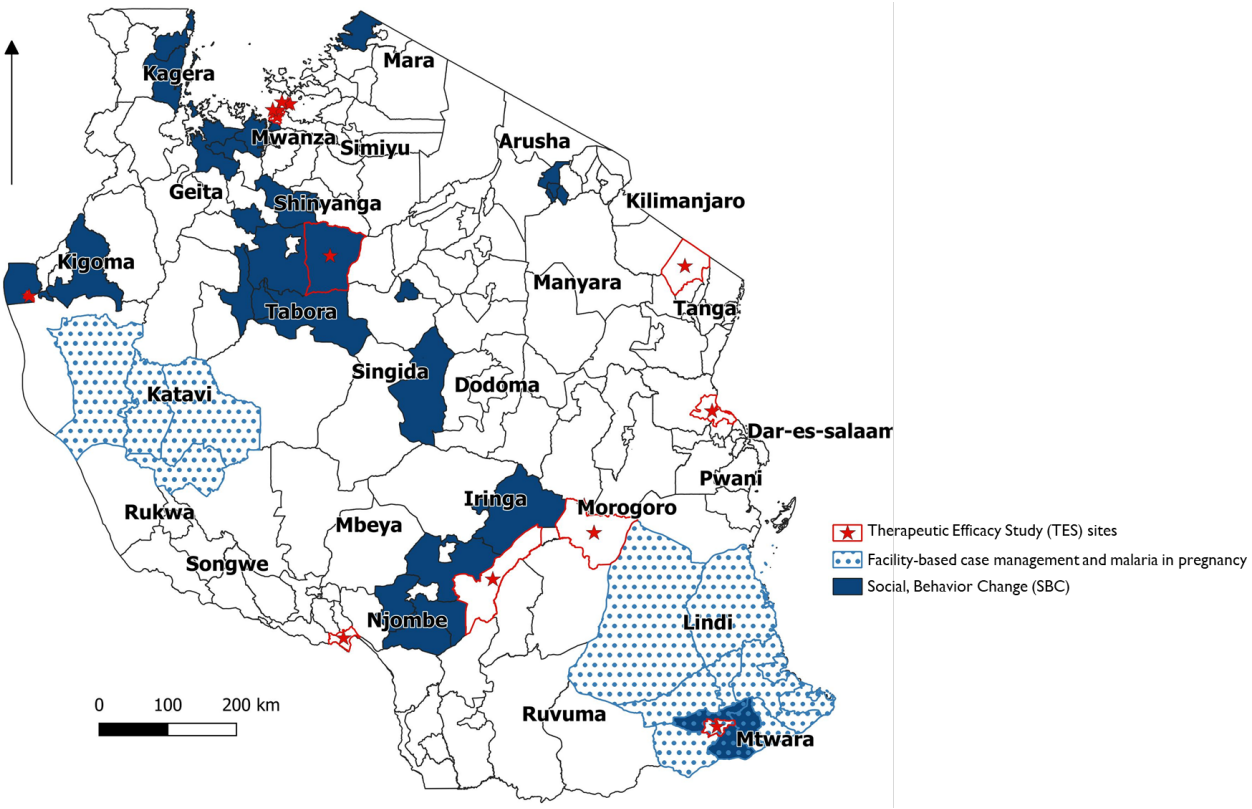
To monitor and improve the quality of malaria-specific case management, MSDQI supervisors from the Regional and Council Health Management Teams (R/CHMT) use the comprehensive electronic MSDQI checklists through tablet devices to evaluate and provide immediate onsite feedback and mentorship on case management issues to health care workers. Health facilities are evaluated at each department through seven

MSDQI modules. Scoring is automated and provided to supervisors, facility managers and health care workers at the time of the evaluation. Data are also uploaded and displayed on the NMCP malaria dashboard in DHIS2. NMCP conducts regular zonal and regional data feedback meetings to prioritize interventions using MSDQI data.

The NMCP has participated in renewed efforts by the Ministry of Health, Community Development, Gender, Elderly, and Children (MOHCDGEC) to develop the national policy and guidelines for Community-based Health Services, 2020 to further expand health services using community health volunteers with a scope primarily limited to health promotion. The NMCP included a proposal within their 2021–2023 Global Fund grant to implement malaria community case management (mCCM) through Community-Owned Resource Persons (CORPs), with an expanded scope of practice to perform mRDTs and provide first-line antimalarials to confirmed cases of uncomplicated malaria in the community in the top five priority regions of Katavi, Kagera, Geita, Kigoma, and Ruvuma. Global Fund approved the proposal; however, to date, the NMCP has only identified 38 percent of the CORPs needed to implement mCCM for the top 10 priority districts within these regions, and mCCM has not been implemented. Currently, only Katavi is a PMI-supported region among these five.

NMCP works with both the public and private sector to promote universal access to mRDTs and ACTs. Through the support of the Global Fund and first-line buyers, the private sector facilitates the availability of quality, affordable ACT via a co-pay mechanism. NMCP's strategies, though not currently approved by MOHCDGEC, include expansion of mRDT diagnostic services to accredited drug dispensing outlets, of which there are more than 6,000 in mainland Tanzania. The majority are located in rural areas where access to malaria commodities and testing services is limited. However, despite a pilot program that demonstrated the feasibility of mRDT introduction to accredited drug dispensing outlets, as well as consensus between the MOHCDGEC and various development and implementing partners that the program should be scaled up, the relevant regulatory bodies have not yet approved the introduction of mRDT.

Figure 2. Map of Case Management and Malaria in Pregnancy Service Delivery, Social Behavior Change, and Drug Efficacy Activities in Tanzania, 2021



4.2. Recent Progress (between October 2020 and September 2021)

From October 2020 through September 2021, PMI provided technical assistance to NMCP to develop case management policies and strategies, strengthen mRDT and microscopy diagnostic capacity, and plan for the implementation of malaria case management using data generated from the MSDQI process. PMI procured approximately $2.5 million in ACTs and parenteral artesunate, and supported drug efficacy monitoring following the standard WHO protocol at four sentinel sites in mainland Tanzania, including molecular testing of antimalarial resistance markers for first- and second-line ACTs.

National-Level Case Management Activities

- Provided technical assistance to NMCP for the development of policies, strategies, and implementation plans related to case management and malaria in pregnancy (see MIP section).
- Supported development, printing, and dissemination of the National Guidelines for Malaria Diagnosis, Treatment, and Preventive Therapies, 2020.

- Provided diagnostic technical assistance for the slide bank, malaria microscopy, and mRDT to NMCP.
- Supported NMCP and President's Office–Regional Administration and Local Government (PO-RALG) in planning for MSDQI supportive supervision visits and data analysis of MSDQI across all regions of mainland Tanzania.
- Provided information technology support to maintain the national MSDQI electronic data system and supported the transition from paper to electronic MSDQI in Katavi region.
- Conducted a diagnostic capacity assessment for malaria microscopy in mainland Tanzania and the National Public Health Laboratory.
- Procured 220 non-*Plasmodium falciparum* microscopy slides for the national slide bank.
- Conducted the training of 38 laboratory technicians in basic and 15 in advanced malaria diagnostic refresher training; 10 technicians were assessed in External Competency Assessment of Malaria Microscopists (ECAMM) courses, and 9 were recommended for WHO ECAMM certification.
- Provided technical guidance to NMCP for the program evaluation of MSDQI as a tool for outreach training and supportive supervision (see Operational Research section).
- PMI supported drug efficacy monitoring following the standard WHO protocol at four sentinel sites in mainland Tanzania, including the molecular testing of antimalarial resistance markers for first and second-line ACT's.

Commodities

- Tanzania uses combination (multi-species) mRDTs procured by Global Fund. PMI did not procure combination rapid diagnostic tests for Tanzania.
- Procured approximately 2.5 million treatments ($2.0 million) in ACTs.
- Procured 210,000 vials ($500,000) of parenteral artesunate.
- Under the new National Guidelines for Malaria Diagnosis, Treatment, and Preventive Therapies, 2020, Rectal Artesunate can be administered as a pre-referral medication of severe malaria in children under 6 years of age in places where parenteral artemisinin administration is not possible. However, guidelines and training for healthcare workers on the use of rectal artesunate suppositories has not been implemented in Tanzania. A quantification for rectal artesunate suppositories was not conducted by NMCP for the Global Fund grant period 2021–2023. Currently, rectal artesunate is not procured by either the Government of Tanzania or its partners, including PMI.

Facility-Level Case Management Activities

- Supported MSDQI implementation (on-site training and supportive supervision) in 608 (98 percent of health facilities in three regions (Katavi,

Lindi, and Mtwara). Implementation of MSDQI in other regions of mainland Tanzania was funded by the Global Fund with partial support from PMI via funds allotted to the NMCP and PO-RALG for integrated supportive supervision and technical oversight.
- Trained 35 supervisors on the use of the electronic MSDQI in Katavi, Lindi, and Mtwara regions.
- Trained 66 mentors on malaria case management (including severe and uncomplicated malaria) in Katavi, Lindi, and Mtwara regions.
- Conducted skills training for 1,069 healthcare workers and nurses on malaria case management (including severe and uncomplicated malaria), 578 healthcare workers in IPTp provision, and 1,097 healthcare workers and laboratorians on mRDT diagnosis in Katavi, Lindi, and Mtwara regions.

Community-Level Case Management Activities

- Supported implementation of SBC interventions targeting pregnant women and caregivers of children under age five years to generate awareness and uptake of malaria-related health interventions, such as early care seeking for febrile illness and antenatal care services, IPTp, and ITN ownership and use (see Social Behavior Change section).

Please note that recent progress with monitoring antimalarial efficacy and the Therapeutic Efficacy Study (TES) approach is presented in the **Plans and Justification for FY 2023 Funding** section below.

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 mainland Tanzania with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

PMI is currently developing a new partner mechanism to support malaria case management (and surveillance, monitoring, and evaluation [SM&E] and SBC) with an increasing emphasis on technical guidance to ensure quality case management in facilities and the community through monitoring performance and making recommendations on the use of data to target interventions at the district and ward levels in high malaria burden regions. Currently, PMI plans to award and develop the scope of this activity before the end of calendar year 2022. Selection of districts for PMI support will be coordinated with NMCP and other key malaria stakeholders. Broadly, PMI expects to continue the same activities described in the Recent Progress section with new activities summarized below.

National-Level Case Management Activities
PMI will continue to provide high-quality technical assistance to NMCP for the development of policies, strategies, and implementation plans related to case management and malaria in pregnancy, including:

- Diagnostic technical assistance for the slide bank, malaria microscopy, and mRDT for NMCP and the National Public Health Laboratory.
- Procurement of microscopy slides for the national slide bank.
- Support for the implementation and monitoring of microscopy proficiency testing for the national external quality assurance at NHLQATC.
- Conducting of basic and advanced malaria diagnostic refresher training, and ECAMM training for laboratory technicians.
- Planning and support for MSDQI supportive supervision visits for NMCP and PO-RALG, and data analysis of MSDQI across all regions of mainland Tanzania.
- Support for and participation in case management-related technical working groups.

Commodities

- Procure approximately $2 million (approximately 2.5 million treatments) of ACTs and $500,000 (approximately 210,000 vials) of parenteral artesunate.

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

Facility-Level Case Management Activities
PMI currently supports implementation of MSDQI, including the electronic tablet-based system, for monitoring and improving malaria case management in public health facilities in three high malaria burden regions, Katavi, Lindi, and Mtwara. As mentioned above, following a new partner award for case management, SM&E, and SBC, PMI will continue to support implementation of MSDQI in up to 25 districts in high malaria burden regions, and provide technical guidance on the use of MSDQI data to target interventions in non-PMI-supported regions. With support from the Global Fund, NMCP supports implementation of MSDQI in public health facilities in non-PMI-supported regions, with partial support from PMI via funds allotted to the NMCP and PO-RALG for integrated supportive supervision and technical oversight (see national-level case management activities above).

Community-Level Case Management Activities

As mentioned above, following a new partner award for case management, SM&E, and SBC, PMI will coordinate with NMCP and key malaria stakeholders to develop a scope that might include the following activities in PMI-supported districts:

- Onsite training and supportive supervision or mentorship visits for supervisors and CORPs who implement community case management and SBC.
- If policy approved by GOT, provide monetary and/or non-monetary compensation to CORPs.
- Development of additional modules within MSDQI to assess, monitor, and improve the quality of malaria services during the provision of mCCM implemented by CORPs.
- Enhancement of OpenSRP, an electronic health record designed to collect and transmit data on community health services for referral to health facilities, to expand its usefulness for malaria surveillance (see SM&E section).

Monitoring Antimalarial Efficacy

PMI provides technical and financial support for TES conducted through collaborating institutions in Tanzania: NIMR, Catholic University of Health and Allied Sciences (CUHAS), Kilimanjaro Christian Medical Centre (KCMC), Muhimbili University of Health and Allied Sciences, Ifakara Health Institute, and NMCP. PMI will continue to support drug efficacy monitoring following the standard WHO protocol at four sentinel sites in mainland Tanzania and will include molecular testing of antimalarial resistance markers for first- and second-line ACTs.

Table 3. Ongoing and Planned Therapeutic Efficacy Studies

Ongoing Therapeutic Efficacy Studies			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2021	Kyela, Nagaga, Simbo, Karume, Kagera*	AL	In-country
Planned TES (funded with previous or current MOP)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2022	Kibaha, Mkuzi	AL	In-country
2022	Bukangara, Ujiji	AL, ASAQ, DP	In-country

AL = artemether-lumefantrine; DP = dihydroartemisinin-piperaquine;
ASAQ = artesunate-amodiaquine
*Site funded by WHO but samples will be analyzed with PMI-funded sites

Completed Therapeutic Efficacy Studies			
Year	**Site name**	**Treatment arm(s)**	**PCR-corrected efficacy for each drug at each site**
2019[1]	Gombe, Simbo	AL	98%
2019[1]	Ipinda, Nagaga	AL	100%
2020*	Mlimba, Mzuki, Kibaha, Ujiji	AL	TBD

AL = artemether-lumefantrine; TBD = to be determined
[1]U.S. Agency for International Development (2020). Efficacy and Safety of Artemether-Lumefantrine for the Treatment of Uncomplicated Falciparum Malaria: Mainland Tanzania. U.S. President's Malaria Initiative.
*Genotyping of the 2020 samples is currently being completed.

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

PMI's objective in supporting health supply chain and pharmaceutical management falls under PMI's strategic area 5: Building capacity and health systems. PMI contributes to NMCP's strategy and larger GOT health supply chain strategies and prioritized interventions. PMI provides nationwide support for supply chain strengthening. PMI/Tanzania objectives for health supply chain and pharmaceutical management are to support the NMCP to maintain timely availability of safe and quality malaria commodities and supplies at service delivery points and reduce stockout rates to less than 5 percent.

5.2. Recent Progress (between October 2020 and September 2021)

PMI's principal supply chain investments aimed to support the NMCP to ensure malaria commodities are available in all service delivery points in the right amount and when needed. Specifically, this included support for forecasting and supply planning, procurement, capacity building, supportive supervision, management information systems, and supply chain monitoring. As a result of these investments, stockout rates have been decreasing each quarter (from 15 percent in Q1 to 10 percent in Q4) for the majority of the commodities. The primary reasons for the change are PMI technical assistance support in quantification, regular quantification review updates (aimed at updating forecasting assumptions by analyzing and triangulating data from DHIS2, electronic Logistics Management Information System (eLMIS), and MSD), monitoring (including pipeline monitoring), and regular discussion with the program on potential stockouts.

In FY 2021, PMI supported the following activities:

Quantification and Supply Chain Analyses
Technical assistance was provided to NMCP on malaria health commodities forecasting and supply planning. In February 2021, a malaria quantification review was conducted in Tanzania mainland, following a quantification conducted in November 2019. The review aimed to update forecasting assumptions; analyze and triangulate data from

DHIS2, eLMIS, and MSD on reported malaria cases and commodities; update the forecast tables of each commodity; and review and update the supply plan.

The quantification review recommended the following:

- Conduct a root cause analysis and establish the reasons why few infants were issued ITNs compared to the pregnant women in the same periods when the stock was sufficient.
- Remind health care providers to issue ITNs to a nine-month-old child even if the major histocompatibility complex-related protein 1 (MR1) was not given (e.g., if a vaccine is stocked out).
- Roll out the redesigned logistics system to the remaining regions to enable health facilities to provide monthly stock on hand and consumption data to facilitate accurate quantification and evidence-based decision-making related to malaria commodities.
- Increase PO-RALG oversight to health facilities to ensure mRDT testing data at ANC and other testing sites are reported in eLMIS, DHIS2, and other reporting platforms.

Regular Malaria Commodities Monitoring
PMI supported regular monitoring of supply plans, including reviewing the forecasts and supply plans for key malaria commodities. Such monitoring helps to identify commodity challenges such as a surge of consumption or COVID-19 related challenges, changes in patient management practices at primary health facilities, and data quality gaps.

- Supported NMCP to investigate high consumption by developing a tracker for informed decision-making.
- Monitored availability of malaria commodities and presented and discussed findings with key stakeholders for corrective actions around stock status and health commodities pipeline trends.
- The overall stockout rates of malaria commodities from October 2020 to September 2021 ranged from 10-15 percent.
- PMI collaborated with MOH and PO-RALG to conduct a data quality assessment aimed at assessing the quality of supply chain data of both the eLMIS and paper-based tools, and devised interventions to improve the quality of data entered into the eLMIS—thereby enhancing evidence-based supply chain decision-making.

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 mainland

Tanzania with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

The National Malaria Strategic Plan 2021–2025 identified strategies for promoting partnerships to ensure malaria commodities are available at all service delivery points in the right amount and when needed, and that all are quality-assured and safe.

To improve malaria commodity availability in all service delivery points, in the right amount and when needed, PMI will support NMCP to carry out a nationwide, statistically representative data quality assessment to identify gaps in data quality. The identified gaps would then be comprehensively addressed in collaboration with other key malaria stakeholders. PMI will also continue to support NMCP to quantify and produce supply plans to inform timely procurement of malaria health commodities and to conduct regular quantification reviews to update plans as needed. In addition, PMI will support analysis of quantification processes and outputs to determine points for improvements. PMI support on health commodities quantification is intended to build GOT capacity.

PMI will also reinforce monitoring the availability of ITNs for comparison with the information in the MSD portal zonal stocks display, and liaising with NMCP for intervention in cases of stockouts. This will go hand in hand with addressing the ITNs coding in line with MSD upgrading to Epicor 10. The monitoring will include SP and ACT, and in particular the contribution of health facilities procuring SP using their own funding resources; the latter will be coupled with capacity building of health care providers to manage the issue of reporting ACTs having different units. PMI will also support analyses to identify and address data variation in health commodities reporting systems such as DHIS2 and eLMIS.

PMI will support national-level IMPACT (Information Mobilized for Performance Analysis and Continuous Transformation) team coordination to identify and address malaria commodities availability. The IMPACT team approach is a data use and data quality improvement initiative that is anchored in GOT oversight structures such as R/CHMTs to ensure sustainability. This includes strengthening the already started eLearning initiative, with a special focus on data storage (servers or cloud subscriptions), hardware, and development (programming), thus providing avenues for health care workers to learn and acquire skills to better manage malaria health commodities.

Commodity tracking and regular reporting, including linking commodities and services, will help to inform supply chain decision-making. PMI will support investments that track malaria health commodities in collaboration with other institutions like the MSD and implementing partners like the Comprehensive Client-Centered Health Program (C3HP). Increased government contribution to funding for ACTs and SP is key for sustainability. PMI will continue to collaborate with the government and to conduct data-

driven advocacy for greater funding from the government. Additionally, PMI will support eLMIS, DHI2 and MSD Epicor 10 interoperability, including malaria logistics data versus services data.

6. Social and Behavior Change

6.1. PMI Goal and Strategic Approach

PMI's Social and Behavior Change (SBC) support to the Tanzania NMCP prioritizes the promotion of positive human behaviors to increase uptake of malaria preventive and control services and products. These include using an evidence-based and participatory approach to support regional SBC needs, harmonize messages and media, and strengthen NMCP capacity to manage and deliver high quality user-centered SBC interventions.

PMI supports NMCP to achieve key behavioral objectives in line with its national strategies, including correct and consistent ITN use, ITN care, ANC attendance, IPTp uptake, prompt care-seeking, and adherence to national case management and MIP guidelines. The use of a multi-media approach to ensure adoption of promoted behaviors, including mass media and interpersonal communication (IPC) primarily focused on the 14 PMI focus regions (Morogoro, Simiyu, Tabora, Shinyanga, Katavi, Lindi, Mtwara, Ruvuma, Pwani, Mara, Mwanza, Kagera, Geita and Kigoma). PMI also supported the SBC strategy and guideline development that promotes high-level political and local government advocacy.

6.2. Recent Progress (between October 2020 and September 2021)

Under the integrated health SBC platform, NAWEZA, PMI supported ongoing implementation of a comprehensive set of SBC activities targeting pregnant women and their partners, and parents and caregivers of children under five years of age, by promoting uptake of IPTp3+ during ANC visits, sleeping under an ITN every night, and seeking prompt and appropriate care for self and for children under five years of age who have a fever, including the use of a rapid diagnostic test (mRDT) to confirm malaria. NAWEZA activities intensified regional media support and community-level SBC activities in 29 districts (19 of these districts are PMI focus areas). FY 2021 key outputs included:

- Implementation of mass media activities including the final season of the NAWEZA radio anchor show, airing of messages on ITN use and prompt care seeking for fever reaching 18.5 million people; maintenance of 53 outdoor sign boards and 3 billboards across PMI priority areas in the project's 29 enhanced districts addressing ITN use, early care seeking, and IPTp3+; and achieving 116,250 followers,11.8 million views, and 43,826 engagements via

NAWEZA social media promoting ITN use, early care seeking, ANC attendance, and uptake of IPTp3+.

- Community mobilization activities across priority districts which reached 555,239 people with messages about ITN use, early care-seeking for fever, ANC attendance, and uptake of IPTp3+.
- Implementation of IPC activities by CHWs, which included 44,400 pregnant women and their partners reached through NAWEZA Pregnancy and Childbirth small group dialogue sessions promoting ANC attendance and uptake of IPTp3+ and ITN use during pregnancy; 446,521 mothers and caregivers of infants reached through timed household visits as part of the NAWEZA caregiving package; refinement of NAWEZA pregnancy and childbirth package; small group dialogue session implementation guide and toolkits to address gaps highlighted in the midterm evaluation and from quarterly supportive supervision visits; and 721 community volunteers trained on the refined tools.
- PMI supported the Malaria Behavioral Survey (MBS) in FY 2021. The survey team is finalizing the results report, and once shared the recommendations will be used to inform additional SBC activities. With PMI support, key behavioral determinants were routinely tracked through omnibus and sentinel surveys. This tracking was intended to support understanding of how the above-described activities were contributing to achievement of SBC objectives, and to help identify areas for improvement.

ITN Use

Findings of the FY 2021 sentinel survey, which was conducted across 19 regions in Tanzania including 14 PMI regions, indicated that the proportion of people with a positive attitude toward ITN use rose from 64 percent in FY 2020 to 91 percent in FY 2021. PMI regions below the national average which might need greater emphasis included Mtwara (80.8 percent), Kigoma (87.5 percent), Shinyanga (88.8 percent), and Tabora (88.8 percent). In FY 2021, sentinel survey results indicated that about 85 percent of respondents reported sleeping under an ITN, a decrease from FY 2020 where 94 percent of respondents reported the same.

MIP

According to sentinel survey results, the proportion of pregnant women who felt confident attending ANC early and at least four times increased from 76 percent in 2020 to 80 percent in 2021. Regions which are below the national average are Mtwara (78.7 percent) and Shinyanga (79.4 percent). Based on DHIS2 data, across 14-PMI supported regions in 2021, 90 percent of pregnant women attended four or more ANC visits compared to 78 percent in 2020. However, Tabora (61 percent), Katavi (67 percent), Shinyanga (71 percent), and Geita (76 percent) are still far below this level

and require additional support to maximize ANC attendance and access to MIP services. At the health facility level, despite an increase in ANC4+, IPTp3+ uptake remains below target at 61 percent nationally. Across PMI regions, uptake is particularly low in Geita (IPTp3+: 36 percent, ANC 4: 76 percent), Tabora (IPTp3+: 40 percent, ANC 4: 71 percent), and Shinyanga (IPTp3+: 41 percent, ANC 4: 61 percent). This may have contributed to an SP stockout, which was reported across regions and districts. The proportion of pregnant women who reported sleeping under an ITN increased from 94 percent in 2020 to 97 percent in 2021, according to sentinel survey data.

Case Management

Based on FY 2021 sentinel survey data, the proportion of people with comprehensive knowledge of malaria causes, symptoms, prevention, and treatment rose from 75 percent in FY 2020 to 90 percent in FY 2021, though additional awareness-raising is needed in Tabora (74 percent) and Mtwara (76.3 percent). Generally, the proportion of caregivers who sought prompt care for a sick child (with fever or illness) at a health facility rose from 80 percent in FY 2020 to 89 percent in FY 2021.

6.3. Plans and Justification with FY 2023 Funding

In FY 2023, PMI will continue to support SBC interventions addressing the following key behavioral objectives: go early, attend, and complete more than four ANC visits (eight contacts are desired); take IPTp3+ during ANC visits; sleep under an ITN every night, including pregnant women and children under five years of age; and seek prompt and appropriate care for children under five years of age who have a fever, including the use of a rapid diagnostic test (mRDT) to confirm malaria.

PMI will also support use of multiple, reinforcing channels to reach target audiences in support of the above behavioral objectives. This will include the following:

- Media engagement, including airing radio spots, DJ presenter mentions, and existing anchor show episodes across national and regional radio stations, with airing intensified prior to and during the rainy season.
- Mid-media, to trigger discussions around ITN use, early care-seeking, early ANC attendance, and uptake of IPTp3+. PMI will support public service announcements and mother meet-ups across priority regions.
- Increased dialogue on key malaria behaviors. PMI will support a range of IPC activities at the community level, including timed household visits with new mothers, community dialogue sessions with pregnant women and their partners, and *kijiwe cha kahawa* with men (men's coffee corner discussions) across priority regions.
- SBC activities during the SNP bed net distribution targeting the general populations in 14 PMI regions. Key behavioral determinants which will be addressed include the following key indicators: awareness of the school net

distribution, including which classes are eligible and why they were selected (targeting parents and caregivers with school age children); belief that it is important to sleep under an ITN every night; belief that an ITN is safe and effective to use (targeting the general population); belief that ITNs prevent nuisance bugs that can disturb sleep (targeting the general population); confidence in their ability to adopt correct ITN use and care practice; belief that malaria is a serious and life-threatening disease (targeting general population); and belief that it is important to share extra nets (targeting head of households).

Table 4. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Sleep under an ITN every night	Pregnant women and caregivers of children under 5	14 PMI Regions	• Targeted community mobilization and IPC to address myths and misconceptions around ITN safety and effectiveness. • Contextualized mass media content aired at national and regional level during programs segments high listenership trends among the target audience to normalize ITN use behaviors across underperforming regions.
Prompt care-seeking for children under five years of age who have a fever	Caregivers of children under five years of age	National	• Engagement of mass media using national and community radios. • Targeted community mobilization and IPC activities in regions where prompt care-seeking is low (i.e., Kigoma, Mara and Tabora).
Uptake of IPTp3+ during ANC visits	Pregnant women	Highly intensive intervention in Geita, Kagera, Morogoro, Shinyanga, and Simiyu	• Improved adherence to protocols and strengthened quality of client-centered counseling from facility side. • From supply side: Ensure consistent, adequate availability of SP.

Additional Support Activities

PMI will continue to support the implementation of malaria interventions based on the findings of the malaria behavior survey conducted in mainland Tanzania in 2021. These findings will shed a new light on areas of improvement and determinants that need to be addressed together with those mentioned above as informed by a sentinel survey. PMI will also continue to support the national coordination taskforce for malaria SBC to improve its effectiveness, strengthening capacity of key players and stakeholders for effective SBC design, implementation, and evaluation; and capacity building for NMCP staff on the use of data (e.g. from the MBS survey results) to inform SBC program priorities and strategies.

7. Surveillance, Monitoring, and Evaluation

7.1. PMI Goal and Strategic Approach

PMI provides technical assistance and resources to strengthen malaria surveillance systems and to monitor and evaluate malaria interventions, with a focus on high malaria burden regions. PMI also provides technical guidance, but not direct implementation, for SM&E of malaria interventions in lower malaria burden regions.

The goal of NMCP is to provide timely and reliable information for assessing progress toward global and national malaria targets; ensure cost-effective uses of resources; and account for investments in malaria control in the country. The Malaria Surveillance, Monitoring, and Evaluation Plan 2021–2025 strategy emphasizes three specific objectives which target funding and guide the implementation of SM&E activities throughout mainland Tanzania.

Objective 1: Strengthen comprehensive malaria surveillance and response for improved programmatic performance;

Objective 2: Strengthen the malaria framework for collecting, processing, and storing essential indicators from periodic service delivery and programmatic surveys; and

Objective 3: Strengthen the comprehensive malaria strategic information system to generate knowledge for evidence-based planning and decision-making at all levels.

The approach to a comprehensive malaria surveillance framework in the mainland includes four major elements:

- Malaria disease surveillance: This includes passive monthly HMIS and weekly electronic Integrated Disease Surveillance and Response (IDSR) reporting through health facilities, and active case detection.
- Malaria programmatic surveillance: This includes malaria commodities supply management tracking, monitoring routine malaria preventive services, and insecticide resistance and therapeutic efficacy monitoring.
- Malaria transmission surveillance: This includes parasitological, such as sentinel population surveillance, malaria indicator and school malaria parasitological surveys, and antenatal clinic surveillance; entomological (malaria vector) surveillance; and meteorological monitoring.
- Malaria quality services surveillance: This includes malaria services and data quality improvement (MSDQI), data quality assessment, and health product QA/QC.

Malaria disease surveillance includes all routine malaria information reported by health facilities at weekly (IDSR) and monthly (HMIS) intervals. These two components

constitute the foundation of passive surveillance and are well established in the mainland's health care delivery system. NMCP has developed guidelines for and implemented a CBS system in the very low malaria burden regions, starting as a pilot in 2021 on feasibility in the three regions of Kilimanjaro, Arusha, and Manyara, with a plan to further scale up to other very low malaria burden regions (Malaria Case-Based Surveillance, 2020). NMCP plans to adopt a facility-based early epidemic detection system to detect sudden increases in malaria cases in very low malaria burden regions.

The HMIS data from health facilities are typically recorded and reported in a paper-based format, whereas a mobile phone-based reporting system has been introduced for electronic IDSR. At larger health facilities and at the district level, dedicated staff enter HMIS data into DHIS2. A data quality audit process has been integrated into the MSDQI tool to improve the quality and use of routine malaria data reported from health facilities to HMIS nationwide (see a description of MSDQI in the Case Management section). R/CHMTs, NMCP, and partners review and use the routine data for decision-making.

NMCP has developed two distinctly separate but complementary electronic platforms within DHIS2 for the storage, analysis, visualization, interpretation, and utilization of aggregated malaria-related data: the Malaria Dashboard and the Malaria Composite Database.

The Malaria Dashboard displays and provides access to five categories of indicators, populated primarily with data from the HMIS and service delivery departments. The categories include: 1) uncomplicated malaria diagnosis through outpatient department, 2) malaria testing, 3) malaria commodities or pharmaceuticals, 4) severe malaria morbidity and mortality through inpatient department, and 5) preventive services focused on reproductive and child health, including provision of ITNs and IPTp.

The Malaria Composite Database is designed to systematically organize and integrate malaria-related information collected outside the routine HMIS. It is being developed in partnership with the University of Dar es Salaam College of Information and Communication Technologies. The data sources for the composite database are from 1) programmatic and operational studies (e.g., Therapeutic Efficacy and Insecticide Resistance Monitoring), 2) survey and surveillance outcomes (e.g., entomological and parasitological surveillance), 3) vector control performance indicators (e.g, ITN, LSM, and IRS distribution), 4) malaria commodities accountability through the eLMIS, 5) the malaria services and data quality improvement (MSDQI) process and SBC monitoring, and 6) the Tanzania Meteorological Agency for evaluating climatic variations and suitability for malaria transmission.

For a description of the NMCP approach for entomological surveillance and insecticide resistance monitoring, see the Vector Control section. For a description of the malaria

commodities supply management tracking (e.g. eLMIS), see the Supply Chain section. For a description of the TES, see the Case Management section.

7.2. Recent Progress (between October 2020 and September 2021)

- PMI partners continued to support malaria-related data management and analyses, development of malaria bulletins, and routine review and monitoring of data reported in the DHIS2 to address any anomalies.
- PMI supported NMCP and PO-RALG to conduct supportive supervision visits in 15 high malaria burden regions to monitor implementation of malaria activities.
- In collaboration with NMCP, PO-RALG, and Ministry of Education, PMI supported NMCP to complete the analysis and dissemination of the 2019 School Malaria Parasitaemia Survey (SMPS). PMI partners supported the development of the 2021 SMPS protocol, an Open Data Kit data collection tool, and training of field teams. The results of this survey are expected to be available by the last quarter of 2022.
- PMI partners in collaboration with PO-RALG supported NMCP to conduct data review meetings for R/CHMTs in nine regions: Kagera, Geita, Kigoma, Shinyanga, Simiyu, Morogoro, Tanga, Mtwara and Ruvuma. The objectives are to assist the R/CHMTs to routinely analyze data from health facilities, update their respective district malaria profiles, and ensure all relevant district and regional personnel have access to DHIS2. Access to DHIS2 allowed the council (district) teams to continuously monitor malaria indicators, as well as timeliness and completeness of facility reports.
- PMI partners provided technical assistance for data cleaning, review, analysis, and interpretation of the baseline data collected by NMCP in regions where CBS was piloted (see above).
- Through partners, PMI supported six participants in the Frontline (Basic) Field Epidemiology Training Program (FETP) and provided technical assistance to a resident in the advanced course for cleaning, analyzing, and developing reports for the malaria death data verification analysis.
- PMI supported one NMCP staff to attend a short course at Imperial College London on infectious disease modeling, and two to attend malaria surveillance and epidemiology training.
- PMI partners trained 62 GOT staff to improve scientific writing, including development of manuscripts, and seven NMCP staff on the basic R statistical package to improve analytical skills.

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 Tanzania with FY 2023 funding: see Malaria-operational-plans.

The core of the routine malaria surveillance system in mainland Tanzania is the HMIS and IDSR systems, which are both on the DHIS2 platform. In coordination with other partners supporting routine surveillance in the mainland, PMI will support improving data quality in HMIS through the continued implementation of MSDQI (see Case Management section) and support to routine health information system strengthening (see Capacity Strengthening section).

PMI will provide technical guidance but not direct implementation on the continued development of electronic IDSR as a possible tool for management of surveillance data for early epidemic detection and CBS in lower malaria burden regions. This will include establishing electronic IDSR thresholds for lower malaria burden settings, and technical guidance on the development of standard operating procedures, including for CBS.

PMI will continue to support efforts to: 1) strengthen the malaria-related data integration and management systems (i.e., DHIS2 malaria dashboard and composite database), tools (e.g., electronic IDSR and MSDQI), and the unit within the NMCP to analyze and disseminate information for decision-making, and 2) hold regular meetings and attend technical working groups to review and discuss SM&E activities.

PMI will support the inclusion of malaria indicators in periodic nationally representative household surveys (i.e., Demographic and Health Survey/MIS and MBS) and school-based (i.e., SMPS) surveys planned for the calendar year 2023. PMI will continue to support the NMCP to undertake the SMPS for 2023 on data management (i.e., data organization, data entry, data merging, and data cleaning exercise) and report writing activities. In addition, PMI will support data analysis and data reviews. Data collection will be conducted in May and June 2023 before schools close for the end of the term, while data cleaning and analysis will be conducted in July and August 2023. This exercise is expected to be completed by the last quarter of 2023.

PMI will continue to support NMCP in reviewing monthly HMIS data after each reporting period; conducting monthly data review meetings; reviewing malaria indicators in the DHIS2; preparing, printing, and disseminating quarterly and semi-annual/annual malaria bulletins using HMIS data.

PMI will continue to support NMCP in conducting routine regional malaria surveillance data review meetings with R/CHMTs for up to 25 PMI-supported districts. For a description of the PMI focus districts, see the Case Management section.

PMI will continue to support NMCP to capacitate R/CHMTs to develop malaria transmission risk maps for their wards and use the maps to plan for malaria interventions (PlanRep). The NMCP, in collaboration with the Swiss Tropical and Public Health Institute's project, Toward Elimination of Malaria in Tanzania will develop the malaria micro-stratification tool at the council level. For a description of PMI support for PlanRep, see the Capacity Strengthening section.

PMI will support three participants for the FETP Frontline (Basic) course with an emphasis on selecting participants working in malaria, such as surveillance officers, malaria focal persons, and data quality improvement liaisons. For a description of FETP activities, see the Capacity Strengthening section.

For a description of PMI support for entomological surveillance and insecticide resistance monitoring, see the Vector Control section. For a description of PMI support for therapeutic efficacy studies, see the Case Management section. For a description of PMI support for operational research and program evaluation, see the Operational Research section.

Table 5. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic Health Survey			P			
Household Surveys	Malaria Indicator Survey (MIS)			P			
Household Surveys	Multiple Indicator Cluster Survey (MICS)						
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment (SPA)						
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey						
Health Facility Surveys	Other Health Facility Survey						
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)	X	X	P	P	P	p
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System						
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	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 (eLMIS)	X	X	P	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	End-user verification						
Other	School-based Malaria Survey		X		P		p
Other	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey		X				
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

The National Malaria Strategic Plan 2021–2025 indicates that NMCP and research partners will develop a national malaria operational research agenda to guide the strategic plan implementation and provide evidence for innovative initiatives. NMCP

addresses potential OR/PE topics during the program and data reviews conducted during the various thematic technical working groups (e.g., vector control, case management, SM&E, SBC, etc.) and coordinates OR through a focal point. PMI works together with NMCP, implementing partners, and other donors and research institutions to support relevant OR/PE.

8.2. Recent Progress (between October 2020 and September 2021)

No recent MOP-funded OR/PE studies have taken place. The core-funded Program Evaluation of Tanzania's Supportive Supervision Program (MSDQI) was initiated in 2021, with data collection and analysis underway as of March 2022.

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

Recently Completed OR/PE Studies	Status of Dissemination	Start date	End date
Group Antenatal Care (ANC) and Surveillance	Shared with stakeholders; manuscript under development	January 2020	June 2021
Ongoing or Planned OR/PE Studies	**Status**	**Start date**	**End date**
Supportive Supervision (MSDQI) Program Evaluation	Ongoing data collection and analysis	October 2021	December 2022

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

Source of Funding	Implementing Institution	Research Question/Topic	Current Status/ Timeline
Social Care, UK Foreign, Commonwealth and Development Office, the Medical Research Council, and Wellcome Trust	London School of Hygiene and Tropical Medicine, Kilimanjaro Christian Medical University College (KCMUCo), NIMR-Mwanza, and University of Ottawa	Study title: Efficacy of different types of bi-treated long lasting insecticidal nets and deployment strategy for control of malaria transmitted by pyrethroid resistant vectors. Short title: PAMVEC Study	April 2018–June 2022

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 continues to strengthen health systems through support of activities to achieve USAID's development objectives in Tanzania. PMI support enables countries and communities to lead, manage, and implement their own programs through effective

supply chain management, training and supervision of health care workers, health financing systems including engaging with national health insurance schemes, and monitoring and disease surveillance systems.

The Health, Social Welfare, and Nutrition Services in the PO-RALG is responsible for interpreting policies and coordinating policy implementation at the regional and local government authorities levels. A decentralized structure of health services management at the regional level, via the Regional Health Management Teams, is responsible for conducting supportive supervision and mentorship for the district councils. The district-level CHMTs are responsible for ensuring that health programs are implemented according to the design. CHMTs are also responsible for providing technical assistance to primary health care facilities. PMI supports strategies to strengthen malaria programing, planning, implementation, and monitoring within this health system. Previous USAID investments, with PMI funding, contributed to the improvement of GOT's planning and budgeting system (i.e., PlanRep) and extended it to lower local government (LLG) village and *mtaa* (equivalent to streets) levels. All 26 mainland regions, 184 Local Government Authorities, 3,956 LLGs, and 5,000+ health facilities in mainland Tanzania are able to plan and budget for malaria interventions.

9.2. Recent Progress (between October 2020 and September 2021)

Capacity for NMCP

- Participated in international, regional, and national-level training, including meetings, such as the annual American Society of Tropical Medicine and Hygiene conference, Roll Back Malaria technical working group meetings (vector control, SBC and MIP), and regional medical and vector-borne diseases conferences.
- Co-authored presentations at the ASMTH 2021 conference: "Surveillance of efficacy and safety of AL for the treatment of uncomplicated falciparum malaria in mainland Tanzania" and "Low prevalence of *Plasmodium malariae* and *P. vivax*, and high prevalence of *P. ovale* detected among Tanzanian school children within the 2017 School Malaria Parasitemia Survey (SMPS)."
- With PMI support, 28 members of the national supervision team (11 from NMCP) oriented on how to review the MSDQI checklists, assess MSDQI scoring outputs, and use the updated MSDQI package. Members of the national supervision team served as trainers for the health facilities as they conducted supportive supervision visits for MSDQI.

Capacity for the Field Epidemiology Training Program

The African Field Epidemiology Network, USAID Tanzania, CDC Atlanta, and CDC Tanzania (with PMI and PEPFAR funding) have worked together since 2008 to develop and strengthen the Tanzania FETP. FETP is a public health training program to build

competencies in applied epidemiology, implementation, evaluation, and management of disease interventions, surveillance strengthening, epidemic preparedness and response, and leadership skills. MOH manages the program and collaborates with Muhimbili University of Health and Allied Sciences and NIMR for the advanced course. PMI Tanzania and CDC Tanzania facilitate linkages between Tanzania FETP residents, NMCP and the Zanzibar Malaria Elimination Program, and implementing partners to ensure residents take advantage of the available opportunities and experiences in the area of malaria control in Tanzania. PMI staff coordinate with NMCP and the Zanzibar Malaria Elimination Program to identify meaningful and appropriate field placements for advanced course residents and research areas that allow the residents and basic (Frontline) participants to select thesis or project topics in malaria.

In 2021, FETP graduated its twelfth cohort of 14 advanced course residents, which makes a total of 166 residents having graduated since the program started in 2008, and enrolled the 14th cohort (21 advanced course residents). Following completion of the FETP training, 137 (82.5 percent) have returned to government institutions and work under various capacities. This includes the following: at MOH, the former director of health quality assurance; the former director of NHLQATC; NMCP Head of Surveillance, Monitoring, and Evaluation; NMCP Head of the Vector Unit; and National Coordinator of the Influenza Program; and at PO-RALG, the Malaria Coordinator; Laboratory Coordinator; and Disease Surveillance Coordinator. At the subnational level, others have been promoted to be district and regional medical officers and have played a crucial role in the implementation of the malaria control program at regional and district levels. Following the completion of the advanced FETP course, these public health workers are expected to chair technical committees contributing to the oversight of malaria surveillance and commodities, and to lead discussions in these meetings to focus on malaria interventions.

Advanced course FETP residents have undertaken field placement assignments and conducted evaluations of various malaria activities including evaluating:

- Effectiveness of fever management and associated factors under five years of age in reducing malaria burden in Dodoma
- Etiology and management of febrile illness among children aged 2-59 months attending Mbeya Zonal Referral Hospital
- Factors associated with appropriate care-seeking for fever among children under five years of age in malaria elimination settings, Kilimanjaro region
- Prevalence of malaria infection in people living with HIV attending care and treatment at Kitete Regional Referral Hospital, Tabora region
- Human IgG antibody response to Aedes salivary peptide (Nterm 34 kDa), an epidemiological approach to assess risk for chikungunya and dengue transmission in lower Moshi Tanzania

- Molecular characterization and phylogenetic analysis of dengue viruses from 2017–2019 outbreaks in Tanzania

A total of 25 malaria and related field outputs have been accepted and presented in local and international scientific conferences, and seven malaria and related field outputs have been published in peer review journals.

PMI also supported three trainees to participate in the Basic (Frontline) FETP course, an applied epidemiology capacity building program established in 2015 in Tanzania. It is a three-month, on-the-job training program aimed at building skills needed to conduct surveillance effectively at the district and regional levels, focusing on improving disease detection, reporting, response, and feedback through use of data generated from health facilities. Frontline trainees were from PO-RALG and malaria focal persons from the high malaria burden regions.

Capacity for Peace Corps Volunteers
Due to the ongoing COVID-19 pandemic, no Peace Corps volunteers (PCVs) have been in Tanzania since March 2020.

Other Public Health Capacity Strengthening

- USAID/Tanzania improved the matching of financial resources with malaria interventions through the PlanRep process.
- IThe Facility Financial Accounting and Reporting System was integrated with PlanRep, enabling PO-RALG and NMCP to track expenditures related to malaria interventions.
- The GOTHOMIS at MOH was enhanced to enable tracking of the number of people tested for malaria and the quantity of prescribed ACTs.
- Enhanced the integrated Monitoring and Evaluation System at PO-RALG to enable tracking of the number of confirmed and clinical malaria cases reported through outpatient/inpatient department and IDSR.
- PMI supported PO-RALG to conduct supportive supervision; this support will be included in the newly designed case management mechanisms.
- USAID/Tanzania, with PMI funding, continued to support the different independent health information systems to ensure interoperability and streamline information sharing with the associated sub-systems to improve health data quality and use. To date, 17 national internal and external systems have been interlinked, along with developed standard operating procedures, technical guidance, and policies.

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 Tanzania with FY 2023 funding. Please visit

www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Capacity for NMCP
PMI will continue to support NMCP to participate in supportive supervision, and international, regional, and national-level training, conferences, and workshops.

Capacity for the Field Epidemiology Training Program
PMI will continue financial and technical support to Frontline and advanced course participants in FETP. Trainees will receive technical assistance from resident advisors and participate in malaria field assignments and investigations throughout mainland Tanzania and Zanzibar. PMI will continue to track the placement of advanced course FETP graduates in post-training MOH assignments that directly influence malaria control policies and practices. In addition, PMI, through implementing partners, will support training for district-level health officers through the Frontline course. The budget for these district-level officers will be included in implementing partner work plans. PMI will ensure the Frontline training does not duplicate ongoing PMI-supported training and capacity building efforts supported by implementing partners. PMI and partners will consult the in-country FETP Frontline program for exact costs, but it is anticipated the implementing partner will need to budget no more than $10,000 per Frontline participant.

Capacity for Peace Corps Volunteers
Despite the ongoing pandemic, it is anticipated that in FY 2023 the Peace Corps program will have resumed the placement of PCVs in Tanzania. PMI will support up to three PCVs to work with NMCP and PMI-supported implementing partners on malaria-related activities. PMI will provide funds for Small Project Assistance grants that are available on a competitive basis to support PCVs' community-based malaria SBC activities.

Other Public Health Capacity Strengthening
PMI will support PO-RALG to conduct supportive supervision in high malaria burden regions. This initiative will support PO-RALG to establish performance standards, build health worker skills, examine facility and council administrative and financial systems performance, and enforce existing rules to promote accountability.

PMI will support strengthening of interoperability functions of several health information systems to inform decision-making, including DHIS2, GOTHOMIS, PlanRep with the Facility Financial Accounting and Reporting System, the integrated Monitoring and Evaluation System, and OpenSRP with National Health Client Registry for unique client or patient validation and identification, and will implement data visualizations and

dashboards to promote and improve data use for evidence-based decisions. Specifically, PMI will support the following:

- Define malaria service outputs to strategically match the Local Government Authority financial resources allocation with malaria interventions through PlanRep and the malaria micro stratification tool, i.e., allocation of interventions based on malaria risk maps to ward (sub-district) level.
- Incorporate the International Classification of Diseases diagnostic codes in GOTHOMIS, and map the codes with DHIS2 for enhanced monitoring of services for malaria diagnosis.
- Strengthen the Health Data Repository to receive de-identified individual-level data from all health electronic medical records through the health information mediator to provide program managers, decision-makers, and other stakeholders with secure access to specialized, programmatic de-identified patient-level data.

10. Staffing and Administration

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

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	59,517,754	61,342,896	63,218,278
Total population at risk for malaria	56,541,866	58,275,751	60,057,364
PMI-targeted at-risk population	28,270,933	29,137,876	30,028,682
Population targeted for ITNs	28,270,933	29,137,876	30,028,682
Continuous Distribution Needs			
Channel 1: ANC	2,380,710	2,453,716	2,528,731
Channel 1: ANC Type of ITN	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI and PBO
Channel 2: EPI	2,261,675	2,331,030	2,402,295
Channel 2: EPI Type of ITN	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI and PBO
Channel 3: School	5,257,968	5,581,869	5,762,839
Channel 3: School Type of ITN	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI and PBO
Channel 4: Community Type of ITN			
Channel 5: Special population	1,188,157	746,840	266,650
Channel 5: Type of ITN	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI and PBO
Estimated Total Need for Continuous Channels	11,088,510	11,113,455	10,960,515
Mass Campaign Distribution Needs			
Mass distribution campaigns	792,800	0	1,103,638
Mass distribution ITN type	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI and PBO
Estimated Total Need for Campaigns	792,800	0	1,103,638
Total ITN Need: Continuous and Campaign	**11,881,310**	**11,113,455**	**12,064,153**
Partner Contributions			
ITNs carried over from previous year	1,855,160	1,300,277	1,541,874
ITNs from Government	0	0	0
Type of ITNs from Government	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI and PBO
ITNs from Global Fund	7,665,837	7,500,131	6,861,689
Type of ITNs from Global Fund	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI and PBO
ITNs from other donors	0	0	0
Type of ITNs from other donors			
ITNs planned with PMI funding	3,660,590	3,854,921	3,660,590
Type of ITNs with PMI funding	PBO and Single Pyrethroid	PBO and Single Pyrethroid	Dual AI
Total ITNs Contribution Per Calendar Year	**13,181,587**	**12,655,329**	**12,064,153**
Total ITN Surplus (Gap)	**1,300,277**	**1,541,874**	**0**

Table A-2. RDT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	59,517,754	61,342,896	63,218,278
Population at risk for malaria	56,541,866	58,275,751	60,057,364
PMI-targeted at-risk population	28,270,933	29,137,876	30,028,682
RDT Needs			
Total number of projected suspected malaria cases	26,722,455	27,850,133	28,810,496
Percent of suspected malaria cases tested with an RDT	95%	95%	95%
RDT Needs (tests)	23,056,807	24,056,666	24,895,608
Needs Estimated based on HMIS Data			
Partner Contributions (tests)			
RDTs from Government			
RDTs from Global Fund	27,787,150	29,361,175	22,147,762
RDTs from other donors	0	0	0
RDTs planned with PMI funding	0	0	0
Total RDT Contributions per Calendar Year	**27,787,150**	**29,361,175**	**22,147,762**
Stock Balance (tests)			
Beginning Balance	11,384,700	16,115,043	21,419,552
- Product Need	23,056,807	24,056,666	24,895,608
+ Total Contributions (received/expected)	27,787,150	29,361,175	22,147,762
Ending Balance	**16,115,043**	**21,419,552**	**18,671,706**
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	17,292,605	18,042,500	18,671,706
Total Surplus (Gap)	**(1,177,562)**	**3,377,053**	**0**

Table A-3. ACT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	59,517,754	61,342,896	63,218,278
Population at risk for malaria	56,541,866	58,275,751	60,057,364
PMI-targeted at-risk population	28,270,933	29,137,876	30,028,682
ACT Needs			
Total projected number of malaria cases	8,465,521	8,503,932	8,373,032
Total ACT Needs (treatments)	**8,769,578**	**8,808,082**	**8,676,865**
Needs Estimated based on HMIS Data			
Partner Contributions (treatments)			
ACTs from Government			
ACTs from Global Fund	7,013,550	6,516,738	4,465,586
ACTs from other donors	0	0	0
ACTs planned with PMI funding	2,360,670	2,459,010	2,459,010
Total ACTs Contributions per Calendar Year	**9,374,220**	**8,975,748**	**6,924,596**
Stock Balance (treatments)			
Beginning Balance	7,389,270	7,993,912	8,161,578
- Product Need	8,769,578	8,808,082	8,676,865
+ Total Contributions (received/expected)	9,374,220	8,975,748	6,924,596
Ending Balance	**7,993,912**	**8,161,578**	**6,409,309**
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	6,577,184	6,606,062	6,507,649
Total Surplus (Gap)	**1,416,729**	**1,555,517**	**(98,340)**

Table A-4. Inj. Artesunate Gap Analysis Table

Calendar Year	2022	2023	2024
Injectable Artesunate Needs			
Projected number of severe cases	281,290	279,712	278,134
Projected number of severe cases among children	113,360	112,724	112,088
Average number of vials required for severe cases among children	3	3	3
Projected number of severe cases among adults	167,930	166,988	166,046
Average number of vials required for severe cases among adults	6	6	6
Total Injectable Artesunate Needs (vials)	**1,347,660**	**1,340,100**	**1,332,540**
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government			
Injectable artesunate from Global Fund	1,362,842	1,302,041	1,043,557
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	210,210	210,210	210,210
Total Injectable Artesunate Contributions per Calendar Year	**1,573,052**	**1,512,251**	**1,253,767**
Stock Balance (vials)			
Beginning Balance	680,636	906,028	1,078,178
- Product Need	1,347,660	1,340,100	1,332,540
+ Total Contributions (received/expected)	1,573,052	1,512,251	1,253,767
Ending Balance	**906,028**	**1,078,178**	**999,405**
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	1,010,745	1,005,075	999,405
Total Surplus (Gap)	**(104,718)**	**73,103**	**0**

Table A-5. SP Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	59,517,754	61,342,896	63,218,278
Total Population at Risk for Malaria	56,541,866	58,275,751	60,057,364
PMI Targeted at Risk Population	28,270,933	29,137,876	30,028,682
SP Needs			
Total Number of Pregnant Women	2380710	2453716	2528731
Percent of pregnant women expected to receive IPTp1	100%	100%	100%
Percent of pregnant women expected to receive IPTp2	80%	82%	84%
Percent of pregnant women expected to receive IPTp3	62%	64%	66%
Percent of pregnant women expected to receive IPTp4	57%	59%	61%
Total SP Needs (doses)	**7,118,323**	**7,483,833**	**7,864,354**
Needs Estimated based on HMIS Data	7,441,334	7,818,294	8,211,175
Partner Contributions (doses)			
SP from Government	7,903,958	8,293,560	8,698,835
SP from Global Fund	0	0	0
SP from other donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Contributions per Calendar Year	**7,903,958**	**8,293,560**	**8,698,835**
Stock Balance (doses)			
Beginning balance	153,000	938,635	1,748,361
- Product Need	7,118,323	7,483,833	7,864,354
+ Total Contributions (Received/expected)	7,903,958	8,293,560	8,698,835
Ending Balance	**938,635**	**1,748,361**	**2,582,843**
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	3,559,162	3,741,917	3,932,177
Total Surplus (Gap)	**(2,620,527)**	**(1,993,555)**	**(1,349,334)**