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Kenya

Malaria Operational Plan FY 2024

Suggested Citation: U.S. President's Malaria Initiative Kenya Malaria Operational Plan FY 2024. Retrieved from www.pmi.gov

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

CONTENTS

ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
CCMm	Community case management of malaria
CDC	Centers for Disease Control and Prevention
CHU	Community health unit
CHV	Community health volunteer
CoE	Committee of experts
DNMP	Division of National Malaria Program
EPI	Expanded Programme on Immunization
FELTP	Field Epidemiology Laboratory Training Program
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
ICD	International Classification of Diseases
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
KDHS	Kenya Demographic and Health Survey
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Authority
KHIS	Kenya Health Information System
KMIS	Kenya Malaria Indicator Survey
KMS	Kenya Malaria Strategy
LMIS	Logistics Management Information System
LSM	Larval source management
MCAT	Malaria community action team
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
mRDQA	Malaria routine data quality assessment
PAPfPr	Population-adjusted *P. falciparum* prevalence
PBO	Piperonyl butoxide
PMI	U.S. President's Malaria Initiative

PPB	Pharmacy and Poisons Board
RDT	Rapid diagnostic test
RTS,S	RTS,S/AS01 (malaria vaccine)
SBC	Social and behavior change
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TES	Therapeutic efficacy study
TWG	Technical working group
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

To review the specific country context for Kenya, please refer to the country malaria profile located on PMI's country team landing page, which provides an overview of the country's malaria situation, key indicators, the strategic plan of the Division of National Malaria Program (DNMP), and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, the U.S. President's Malaria Initiative (PMI) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 27 countries in Sub-Saharan Africa and 3 programs across the Greater Mekong Subregion (GMS) in Southeast Asia to control and eliminate malaria. Kenya began implementation as a PMI partner country in fiscal year (FY) 2007.

Rationale for PMI's Approach in Kenya

Since 2013, PMI has prioritized the areas of Kenya with the highest burden of malaria to complement funding from the Kenyan government and other partners to achieve the greatest reduction in malaria morbidity and mortality. The eight counties of Bungoma, Busia, Homa Bay, Kakamega, Kisumu, Migori, Siaya, and Vihiga, with an estimated population of 10.4 million in 2022, form the lake endemic malaria epidemiological zone and have the highest malaria burden. PMI support in these eight counties has focused on vector control; case management; supply chain management; malaria in pregnancy (MIP); social and behavior change (SBC); and surveillance, monitoring, and evaluation (SM&E). PMI also funds policy formulation and guidelines development for the DNMP.

Overview of Planned Interventions

The proposed FY 2024 PMI funding for Kenya is $31 million. PMI will support the following intervention areas with these funds.

1. Vector Monitoring and Control

PMI supports the distribution of insecticide-treated mosquito nets (ITNs) through routine channels, mass campaigns conducted every three years, indoor residual spraying (IRS) in counties with a high burden of malaria, and entomological monitoring. With FY 2024 funds, PMI will procure ITNs for distribution through antenatal care (ANC) and child welfare clinics in 23 endemic and epidemic-prone counties and select subcounties in six seasonal and low transmission counties. PMI will continue to support IRS in two counties and entomological monitoring in eight counties in western Kenya with a high burden of malaria where PMI has deployed piperonyl butoxide (PBO) ITNs and implemented IRS, as well as in Turkana County,

where *An. stephensi* has been detected recently. With FY 2024 funds, PMI will expand surveillance for *An. stephensi* in at least one other county in northern Kenya.

2. Malaria in Pregnancy

PMI supports the first objective of the Kenya Malaria Strategy (KMS) 2019–2023 to protect 100 percent of people living in areas with malaria risk by 2023 by providing access to appropriate malaria preventive interventions. The strategy calls for the provision of ITNs at the first ANC visit in 29 counties and sulfadoxine-pyrimethamine (SP) (intermittent preventive treatment of pregnant women [IPTp]) beginning at 13 weeks in 14 coastal and lake malaria endemic counties. PMI will support MIP interventions at the national and county level with FY 2024 funds. At the national level, PMI will fund the DNMP to convene committee of experts (CoE) meetings to deliberate on any changes in policy or guidelines related to MIP interventions as advised by the committee for adopting policies approved by the World Health Organization (WHO). At the county level, PMI will strengthen the capacity of health workers and community volunteers to deliver the different approaches to facilitate uptake of MIP services through focused training on the management of uncomplicated and severe malaria in pregnancy, messaging on MIP, and the importance of IPTp.

3. Drug-Based Prevention

PMI does not support seasonal malaria chemoprevention and/or other drug-based prevention other than IPTp in Kenya.

4. Case Management

In FY 2024, PMI will fund integrated strengthening of case management at the national level, as well as at the county, subcounty, facility, and community level in the lake endemic zone. PMI will procure malaria rapid diagnostic tests, artemisinin-based combination therapy, and injectable artesunate to meet the projected case management commodity gaps. PMI will support the DNMP and the National Malaria Reference Laboratory with external quality assurance, slide bank maintenance, and diagnostic proficiency testing.

5. Health Supply Chain and Pharmaceutical Management

PMI supports the DNMP to ensure an uninterrupted supply of safe and efficacious medicines and medical supplies for the Kenyan population living in areas with malaria risk. In FY 2024, PMI will fund efforts to strengthen governance and oversight of malaria commodities, enhance commodity security through forecasting, improve quantification and periodic pipeline monitoring, promote the continuous use of high-quality supply chain data for decision making and capacity strengthening of commodity managers at the national and subnational level. PMI will also finance the Pharmacy and Poisons Board to conduct integrated postmarket surveillance activities and provide technical assistance to local manufacturers aimed at attaining certification for good manufacturing practices. To enhance commodity accountability, PMI will support third-party monitoring along the supply chain.

6. Malaria Vaccine

Malaria vaccine deployment has been expanded to include comparator areas in counties with a high burden of malaria. PMI will collaborate with the DNMP and the Expanded Program on Immunization to provide technical assistance for intervention design to promote the uptake of the vaccine while maintaining continued use of the other malaria interventions.

7. Social and Behavior Change

PMI's support for SBC is fully aligned with national strategies and includes funding to strengthen related structures and implementation. With FY 2024 funds, PMI will continue strengthening the capacity of SBC program personnel at the national level with skills to design, implement, and evaluate SBC activities. At the county and subcounty level, PMI will enhance the capacity of the malaria community action teams to expand their activities within community health units and with community health volunteers (CHVs). Additionally, through partnerships with local community-based organizations and collaboration with local leaders and CHVs, PMI will support SBC implementation that combines mass media, interpersonal communication, and structural interventions to increase the adoption and maintenance of key malaria prevention and treatment behaviors.

8. Surveillance, Monitoring, and Evaluation

PMI support for SM&E is aligned with the Kenya Malaria Monitoring and Evaluation Plan 2019–2023 and prioritizes capacity strengthening for malaria SM&E in various areas, which include strengthening structures and mechanisms for SM&E coordination, ensuring the availability of quality malaria data, and promoting use of the data for planning and decision making, subnational stratification to identify optimal intervention mixes for deployment in various malaria epidemiological zones.

With FY 2024 funding, PMI plans to support the 2025 Kenya Malaria Indicator Survey; the 2025 Kenya National Malaria Forum; county- and national-level implementation strengthening of the malaria Health Management Information System (HMIS) through data review and analysis; production and dissemination of county malaria bulletins; routine data quality monitoring; automation of national- and county-level malaria information products; and continued support for the establishment and operationalization of systems for malaria elimination.

9. Operational Research and Program Evaluation

PMI provides technical and logistical support to operational research prioritization activities and the DNMP's quarterly operational research committee meetings. However, PMI has not supported the implementation of operational research in Kenya in the recent past and does not plan to do so with FY 2024 funding. In terms of program evaluation, in 2023, PMI supported the midterm evaluation of KMS 2019–2023 and plans to fund the development of the 2024–2028 strategy and the end-term evaluation of the current strategy.

10. Capacity Strengthening

PMI funds capacity strengthening at the institutional and individual level across a range of technical areas and different parts of the health system. In FY 2024, PMI will fund the training of national program and county health managers on leadership, governance, and domestic resource mobilization approaches; frontline health workers and CHVs on malaria case management through pre- and in-service training; county- and subcounty-level commodity managers on good inventory management practices; and health records information officers on mentorship for data quality and use. PMI will also fund the Field Epidemiology Laboratory Training Program's advanced and frontline training on malaria surveillance; provide support to Peace Corps volunteers in the lake endemic counties; and support a WHO national program officer to provide technical recommendations to the DNMP in multiple areas.

11. Staffing and Administration

Up to five health professionals will oversee PMI in Kenya. The single interagency team is led by the mission director of the United States Agency for International Development (USAID) or a designee and consists of a Resident Advisor representing USAID, a Resident Advisor representing Centers for Disease Control and Prevention, 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 project design, development, providing technical leadership and support to the DNMP for implementation of malaria prevention and control activities, monitoring and evaluation of activity outcomes and impact, dissemination of results, and technical direction to PMI implementing partners.

I. CONTEXT & STRATEGY

1. Introduction

Kenya began implementation as a PMI partner country in fiscal (FY) 2007. This FY 2024 Malaria Operational Plan (MOP) presents a detailed implementation plan for Kenya based on the strategies of PMI and the Division of National Malaria Program (DNMP). It was developed in consultation with the DNMP and with the participation of national and international partners. The activities that PMI is proposing build on investments made by PMI and partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). This document provides an overview of the strategies and interventions in Kenya, describes progress to date, identifies challenges and relevant contextual factors, and provides a description of activities that are planned with FY 2024 funding. For more detailed information on the country context, please refer to the country malaria profile, which provides an overview of the country's malaria situation, key indicators, the DNMP's strategic plan, and the partner landscape.

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

PMI is led by the United States Agency for International Development (USAID) and implemented with the U.S. Centers for Disease Control and Prevention. Launched in 2005, PMI supports the implementation of malaria prevention and treatment measures such as insecticide-treated mosquito nets (ITNs), indoor residual spraying, accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs), intermittent preventive treatment for pregnant women (IPTp), and drug-based prevention, as well as cross-cutting interventions such as surveillance, monitoring, and evaluation; social and behavior change (SBC); and capacity strengthening. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria in our generation, with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 27 countries in Sub-Saharan Africa and 3 programs in the Greater Mekong Subregion (GMS) 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 on progress already made in PMI-supported countries, PMI will work with national malaria control programs 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 Kenya

3.1. Malaria Overview for Kenya

For more detailed information on malaria indicators, please refer to the country malaria profile.

Kenya has made significant progress in the fight against malaria over the past decade, achieving an almost 50 percent reduction in malaria prevalence, both nationally and in the eight-county lake endemic epidemiological zone, where the burden is the highest (Kenya Malaria Indicator Surveys [MIS], 2020). Across Kenya, malaria risk is heterogeneous, and its epidemiology is influenced by altitude, rainfall patterns, and temperature. Therefore, malaria prevalence varies considerably by season and across geographic regions. The country is divided into six malaria epidemiological zones, and malaria prevalence can also vary within these zones. Within Kenya and within the eight-county lake endemic epidemiological zone, Busia and Siaya are the counties with the highest burden, with a predicted population-adjusted *P. falciparum* prevalence (PAPfPr) in children aged 2–10 years greater than 30 percent. Bungoma, Kakamega, Kisumu, and Migori counties, also in the lake endemic zone, are counties with a moderate burden and PAPfPr of 10–30 percent. Vihiga in the lake endemic zone, Mombasa in the coastal endemic zone, and Turkana in northwestern Kenya are counties with low to moderate burdens and PAPfPr of 5–10 percent. Homa Bay in the lake endemic zone, and Kilifi and Kwale in the coastal endemic zone, are counties with low transmission and a PAPfPr of 1–5 percent. The remaining 35 counties fall into the very low burden category, with a PAPfPr under 1 percent.

Despite significant progress, malaria remains a major public health problem in Kenya, with malaria cases accounting for an estimated eight percent of outpatient consultations in Kenya in 2022 (Ministry of Health [MOH] Kenya, 2023). The Kenya MISs indicate that the national prevalence of malaria among children younger than five years of age decreased from 8 percent in 2015 to 6 percent in 2020. This decline was driven by decreases in the lake endemic counties, where PMI focuses over 70 percent of its investments. In this endemic

zone, the prevalence of malaria among children younger than five years of age decreased from 27 percent to 19 percent during the same period. Prevalence-based models incorporating data from MISs, school surveys, and malaria vaccine and climate data for 2000–2020 suggest that the counties in the lake endemic zone have transitioned from high malaria transmission areas to low-to-moderate malaria transmission areas. Routine data from the Kenya Health Information System (KHIS) demonstrate that the annual incidence of diagnostically-confirmed malaria cases in the outpatient setting stood at 92 per 1,000 in 2022. Nationwide, prevalence models based on the 2020 MIS and other data sources suggest that only 30 percent of the country's population lives in an area with malaria prevalence over 1 percent; representing a significant reduction from the 2015 MIS, which demonstrated that 75 percent of the population lived in counties with a malaria prevalence over 1 percent. Given the heterogeneity in malaria prevalence, malaria interventions are targeted based on epidemiological zones, as indicated in Table 1.

Table 1. Planned Malaria Control Activities in Kenya

Epidemiological Zone	Number of Counties					
	ITN: Mass	**ITN: ANC and CWC**	**IRS**	**Case Management**	**MIP**	**SBC**
Lake endemic	8 (PBO/ PYR)[1]	8 (PBO)	2	8[4]	8	8
Coastal endemic	5 (PYR)	5 (PBO)	-	5	5	-
Highland epidemic prone	13 (PYR)	11 (PBO)	-	10[4]	-	-
Seasonal semiarid risk	5 (PYR)	7 (PBO)	-	16	1	-
Low risk[3]	1 (PYR)	1 (PBO)	-	9	-	-
Total	**28[2]**	**29[3]**	**2**	**47**	**14**	**8**

[1] PMI is supporting procurement and distribution of PBO nets in four counties in the lake endemic zone for the 2023/2024 campaign; no PMI resources are available for the 2026/ 2027 campaign so net type is still under discussion

[2] The total number of unique counties is 28. *Bungoma*, *Elgeyo Marakwet*, *Kakamega* and *West Pokot* have their sub counties that receive mass distribution ITNs falling in two epidemiological zones.

[3] The total number of unique counties is 29. *Bungoma*, *Kakamega* and *West Pokot* have their sub counties that receive routine ITNs falling in two epidemiological zones.

[4] Community case management of malaria in all 8 lake endemic counties and 2 highland epidemic prone counties.

ANC: antenatal care; CWC: child welfare clinic; IRS: indoor residual spraying; ITN: insecticide-treated mosquito nets; MIP: malaria in pregnancy PBO: piperonyl butoxide; PYR: pyronaridine; SBC: social and behavioral change.

3.2. Key Challenges and Contextual Factors

Opportunities

Subnational stratification and tailoring: Kenya is currently writing the Global Fund Cycle 7 application for submission in August 2023 and implementation from 2024–2027. The funding envelope for malaria activities within this grant is $8 million less than the previous grant (2021–24) allocation. The DNMP, with support from the Global Fund and PMI, is conducting a subnational tailoring activity to inform the optimal mix of malaria interventions that can be efficiently deployed to further reduce the malaria burden while sustaining the gains.

Kenya—A Primary Impact country:[1] The selection of Kenya as a USAID Primary Impact country coupled with the government's new focus on universal health care and the provision of incentives for community health volunteers (CHVs)—now officially referred to as *community health promoters* by the Kenyan government but still described as CHVs in this document in alignment with government documents—presents an opportunity to expand community case management of malaria as part of integrated last-mile service delivery in the primary care networks, bringing services closer to the people and reaching the unreached.

Malaria vaccines: Kenya expanded its introduction of the RTS,S/AS01 (RTS,S) malaria vaccine to almost all subcounties in the lake endemic zone in 2023. Kenya will continue to have access to the vaccine for these 51 subcounties. With the Malaria Vaccine Implementation Programme ending in 2023, there will be less immunization partner attention on the malaria vaccine, which may result in a funding gap for SBC and advocacy support—which is critical to fundraising and enhancing uptake of the fourth dose of the vaccine.

Challenges

New malaria vector: *Anopheles (An.) stephensi* was first identified in Kenya in December 2022 in Marsabit County. In February 2023, the vector was also identified in Turkana County. While PMI has provided support for the training of entomologists and other health workers from 13 counties and is planning to support a baseline assessment in those same counties, the DNMP currently lacks sufficient funding to support the robust epidemiological and entomological surveillance required to closely monitor or respond to this vector.

[1] Kenya is one of seven USAID Global Health Bureau Primary Impact focus countries. Primary Impact is a USAID initiative to accelerate progress on primary health care, with the recognition that it is the foundation for improving health outcomes across the lifespan. Primary Impact aims to improve coordination and integration of primary health care programming across USAID, with a focus on five priority domains: effective models of delivery, community engagement and partnership, subnational and facility management, system integration and interoperability, and resilient health systems and services.

Emerging resistance to antimalarial drugs and insecticides: Therapeutic efficacy study (TES) data from the lake endemic zone in 2016 demonstrate a polymerase chain reaction (PCR)-corrected artemether-lumefantrine (AL) efficacy of 88.5 percent—below the 90 percent threshold of the World Health Organization (WHO), which corresponds with the recommendation to change the country's first-line ACT. Additionally, the spread of insecticide resistance to pyrethroids continues to be reported in lake- and coast-endemic zones, requiring a shift to more expensive nets, such as those with piperonyl butoxide (PBO) or dual active ingredients.

Availability and quality of inpatient malaria case and mortality data: Despite ongoing efforts with the DNMP and the Division of Health Informatics to enhance national and subnational coding and reviewing capacity, reporting rates for inpatient malaria case and malaria mortality indicators remain low, with challenges introduced by the change from International Classification of Diseases (ICD)-10 to ICD-11 coding systems, limited resources for training health workers and coders on ICD-11, and a lack of sufficient reporting tools.

3.3. PMI's Approach for Kenya

PMI support to the Ministry of Health and the DNMP is fully aligned with the Kenya Vision 2030, the Kenya Health Sector Strategic Plan 2018–2023, and the Kenya Malaria Strategy (KMS) 2019–2023. Since 2013, PMI has prioritized support to the areas of Kenya with the highest malaria burdens to achieve the greatest reduction in malaria morbidity and mortality. The eight counties in the lake endemic zone—Bungoma, Busia, Homa Bay, Kakamega, Kisumu, Migori, Siaya, and Vihiga—with a total estimated population of 10.4 million in 2022 (MOH Kenya 2022)—have the highest malaria burden, with the exception of five epidemic-prone subcounties: three in Bungoma (Cheptais, Mt Elgon, Tongaren) and two in Kakamega (Likuyani, Lugari). PMI has focused its support on vector control; case management; supply chain management; malaria in pregnancy (MIP); SBC; and SM&E in these eight counties. The epidemic-prone subcounties in this region receive ITNs and case management commodities but are not targeted for MIP services.

In the other 39 counties, the DNMP, with Global Fund support, is the leading provider of technical support. PMI support is, however, aligned with the the Kenyan government's subnational elimination strategy, and PMI complements these efforts by: (1) providing national-level support for the development, review, harmonization, and standardization of policy documents and guidelines, including the development of the National Malaria Elimination Implementation Plan and a Malaria Elimination baseline assessment; (2) funding the availability of malaria health information through the KHIS platform; (3) strengthening regulatory systems for postmarket surveillance and quality assurance of malaria medicines; and (4) strengthening the capacity of the health workforce. PMI also supports national-level SM&E, SBC, supply chain management, health financing, and program management through its participation in the DNMP's committee of experts meeting and the Malaria Health Sector Working Group. PMI-procured ACTs, rapid diagnostic test (RDTs), and treatments for severe malaria are distributed nationwide, along with similar commodities purchased by the Global

Fund and the Kenyan government; and sulfadoxine-pyrimethamine (SP) for IPTp is purchased by the Kenyan government and distributed in the coastal and lake endemic counties. Routine distribution of PMI-procured ITNs extends beyond the lake endemic zone to cover 21 additional counties in the coastal endemic and epidemic-prone counties, for a total of 29 counties. Mass net distributions in 28 counties are primarily supported by Global Fund, with PMI filling remaining gaps in the lake endemic counties.

3.4 Key Changes in this MOP

Mass net campaign support: PMI will not support the procurement and distribution of ITNs for the 2026/2027 country rolling mass net campaign due to a limited budget envelope. Instead, it will prioritize the procurement and optimal coverage of pregnant women and children under one year of age with effective ITNs through routine distribution channels, including antenatal and child welfare clinics.

II. OPERATIONAL PLAN FOR FY 2024

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

Figure 1a. Map of Vector Control Activities in Kenya
(ITNs are shown for mass campaigns.)

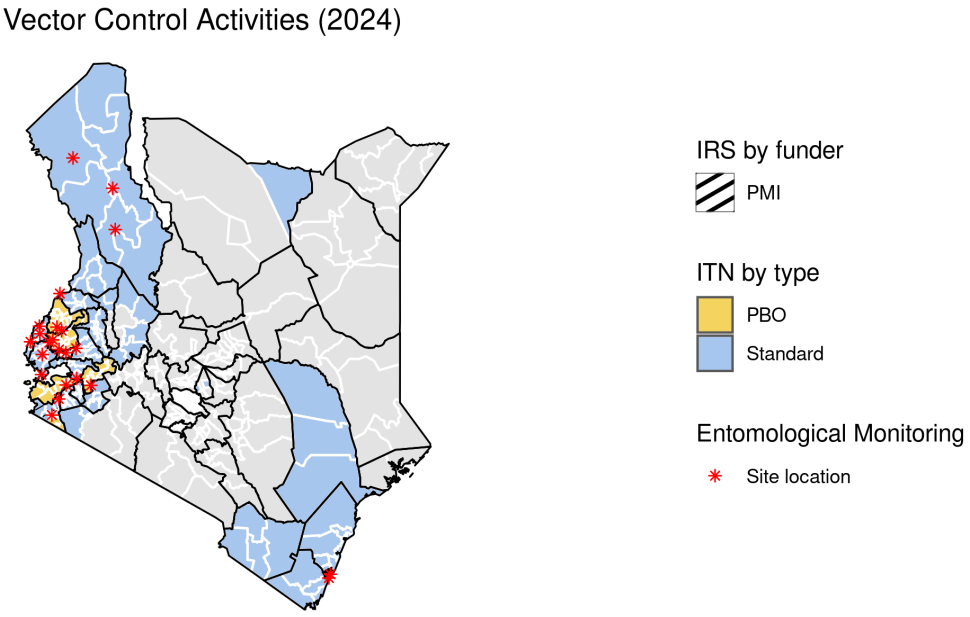
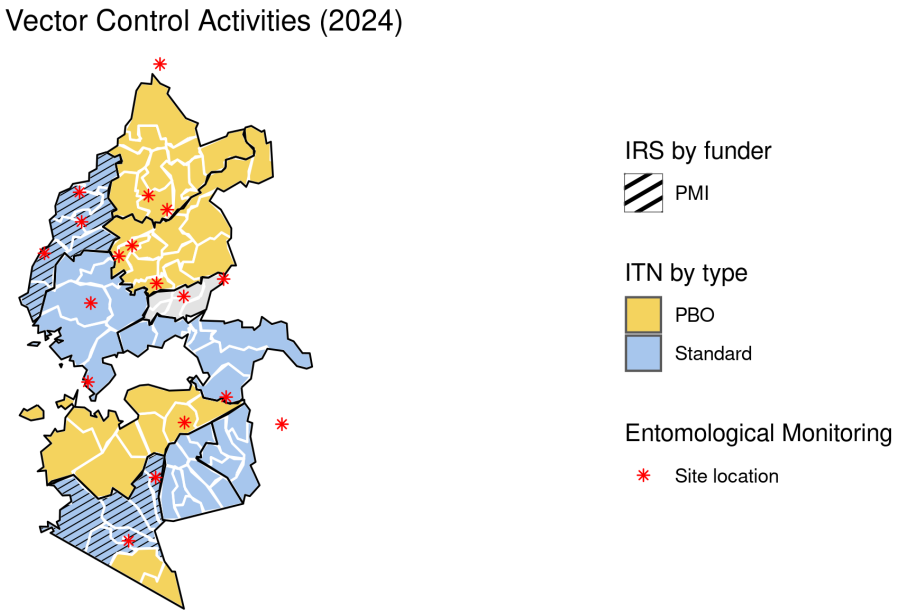


Figure 1b. Map of Vector Control Activities in the Lake Endemic Counties in Kenya
(ITNs are shown for mass campaigns.)



1.2. Recent Progress (April 2022–March 2023)

- Supported entomological monitoring at 14 sentinel sites in eight counties, in collaboration/partnership with the DNMP and county health management teams. Monitoring activities included vector bionomics monitoring at all sites and insecticide-resistance monitoring at 11 sites. Insecticide residual-efficacy monitoring was conducted at two sites where IRS was implemented. For more information about entomological monitoring, refer to the 2022 Entomological Report.
- Supported community-based entomology activities at three sites in two counties (Kakamega and Vihiga) in addition to the 14 sentinel sites. One county had a community-based-only site and another county had both a community-based site and a sentinel site. The community-based entomological monitoring involved the use of light traps placed by CHVs in targeted houses throughout each month. Batteries were charged using solar panels provided to the CHVs, and mosquitoes were preserved in ethanol until they could be processed at a central location. Collections by trained technicians were also completed to assess the reliability of the CHVs.
- Supported surveillance of *An. stephensi* at three sites in Turkana County in coordination with the DNMP and with the Turkana County health management team.
- Provided technical assistance and training to the DBMP and county health management teams in 13 counties for entomological monitoring of *An. stephensi*.
- In FY 2022, procured 2.2 million and delivered 2.9 million ITNs. Supported the procurement and distribution of PBO ITNs through antenatal care (ANC) and child welfare clinics in three counties with a high burden of malaria. The other 33 counties supported the procurement and distribution of pyrethroid-only ITNs for distribution through ANC and Expanded Programme on Immunization (EPI)/child welfare clinics.
- Provided technical assistance for the planning of the 2023/2024 rolling ITN mass distribution campaign, which will distribute PBO ITNs to four counties and pyrethroid-only ITNs to 28 counties. The activity is being conducted in collaboration with the Global Fund and the DNMP. PMI is procuring the PBO ITNs while the Global Fund will procure the pyrethroid-only ITNs.
- Supported campaign digitalization to register households for the ITN campaign on mobile devices. The digitization approach was piloted in two villages in Bungoma County and is being refined to be ready for use during the 2023–2024 mass net campaign.
- Supported ITN durability monitoring of two different PBO ITNs (Olyset Plus and PermaNet 3.0) from the 2021 cohort by implementing 12-month data collection.
- Supported national-, facility-, and community-level SBC activities to increase demand for ITNs, encourage appropriate use, promote care, and mitigate against misuse. For more information, refer to the SBC section.

- Supported the planning, implementation, and evaluation of IRS in two counties. The 2023 IRS campaign during March/April of 2023 covered 379,921 structures, protecting 1,502,836 people. For more information about IRS, please refer to the most recent end of spray report.
- Trained and engaged community members/other cadres in Migori and Homa Bay Counties to support IRS mobilization and spray activities.
- Provided technical assistance to the DNMP and the county health management teams in Migori and Homa Bay Counties with the planning, training, supervision, and close-out of IRS operations.

1.3 Plans and Justification for FY 2024 Funding

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

1.3.1. Entomological Monitoring

PMI will continue to support entomological monitoring activities in Kenya, including insecticide-resistance monitoring and vector bionomics at 17 sites. Longitudinal entomological surveys will be carried out in 14 sentinel sites in the eight lake endemic counties in western Kenya with a high burden of malaria, and an additional three sites in Kakamega and Vihiga counties will be monitored through community-based vector surveillance. In the 14 sentinel sites, vectors will be monitored using pyrethrum spray catches and CDC light traps, with supplemental collections using window exit traps and clay pot resting traps in six sites targeted with either IRS or PBO ITNs. Community-based collections will employ only CDC light traps.

Mosquitoes in all sites will be monitored for resistance to pyrethroids (permethrin, deltamethrin, and alpha-cypermethrin) with and without the synergist PBO, an organophosphate (pirimiphos-methyl), a neonicotinoid (clothianidin), and a pyrrole insecticide (chlorfenapyr). In IRS sites, cone bioassays will be done to monitor the quality of spraying and determine the residual life of IRS insecticides.

PMI will support monitoring of *An. stephensi* at three sites in Turkana County in northwestern Kenya where this invasive malaria vector was recently detected as well as the expansion of surveillance for *An. stephensi* in at least one county in northeastern Kenya. It will continue to collaborate with local partners and provide technical support to the DNMP, the Division of Vector Borne Diseases, and county health management teams to facilitate surveillance of *An. stephensi* in other counties in northeastern and coastal Kenya.

Summary of Distribution and Bionomics of Malaria Vectors in Kenya

As of 2022, the mosquito populations in Kenya were predominantly *An. funestus s.l.* and *An. gambiae s.l.* across all sites. *An. funestus s.l*. was the most common anopheline in Busia and Siaya counties, while *An. gambiae s.l.* was the predominant species detected in Migori, Homa Bay, Kisumu, Kakamega, and Bungoma counties. Mosquito populations in the lake endemic counties have two peaks following the long rains (April–June) and short rains (October–November). The most recent human landing catch data are several years old, but they indicate that peak biting by *An. funestus* occurs between 11:00 p.m. and 8:00 a.m., although some biting occurs after 8:00 a.m. Most exposure to bites by this species occurred indoors. *An. gambiae s.l.* (predominantly *An. arabiensis*) showed similar patterns, although the numbers collected indoors and outdoors were similar. IRS significantly impacted densities of *An. funestus* but not *An. gambiae s.l.* (predominantly, *An. arabiensis*), suggesting the latter are less likely to rest indoors. Between December 2021 and September 2022, the overall sporozoite rate was 0.9 percent. No infected mosquitoes were detected in Migori, while the sporozoite rate in Homa Bay was 2.2 percent in the three months before IRS and 0.3 percent in the seven months after spraying.

An. stephensi was first detected in four sites in Marsabit County in December of 2022. It was subsequently found in Turkana County in February 2023. PMI and the DNMP plan to scale up surveillance for *An. stephensi* in other counties and are developing a response plan to address any increase in malaria cases in areas where *An. stephensi* has been reported.

Status of Insecticide Resistance in Kenya

Based on surveillance activities conducted in 2021/2022, pyrethroid resistance is widespread in *An. gambiae s.l.* across study sites in Kenya. The addition of PBO to permethrin, alphacypermethrin, or deltamethrin generally increased mortality compared with permethrin, alphacypermethrin, or deltamethrin alone, although in most cases it did not fully restore susceptibility. *An. gambiae s.l.* was susceptible to pirimiphos-methyl after 24 hours, chlorfenapyr after 72 hours, and clothiandin after 120 hours at all sites tested.

An. funestus was tested in only three counties but was resistant to all pyrethroid insecticides. In Bungoma County, *An. funestus* was resistant to deltamethrin at up to 10 times the diagnostic dose. Mortality increased after pre-exposure to PBO for alphacypermethrin, permethrin, and deltamethrin, although it remained below 90 percent for all three pyrethroids. *An. funestus* is fully susceptible to pirimiphos-methyl, clothianidin, and chlorfenapyr.

1.3.2. Insecticide-Treated Nets

With FY 2024 funds, PMI will continue to support the procurement and distribution of ITNs through routine channels (antenatal care and child welfare clinics). Based on the low malaria risk in some areas of the country, the DNMP is recommending a reduction in the number of counties targeted for routine ITN distribution from 37 to 23 counties, plus select subcounties in another 6 counties. PMI will shift to this reduced geographic scope for ITN distribution. The reduction covers counties where malaria prevalence and incidence is very low. Given widespread resistance to pyrethroids, PMI is committed to procuring only PBO ITNs or dual active-ingredient ITNs for Kenya, although currently no dual active-ingredient ITNs are registered for use in Kenya. Once dual active ingredient ITNs are registered, PMI, in consultation with the DNMP will select the most appropriate ITNs based on insecticide resistance data.

ITN Distribution in Kenya

In Kenya, ITNs are distributed via rolling mass campaigns targeting universal coverage for populations at risk for malaria every three years. ITNs are also distributed continuously through ANC and child welfare clinics targeting pregnant women and children under one year of age. PMI transitioned from pyrethroid-only ITNs to PBO ITNs for three counties with a high burden of malaria: Kakamega, Busia, and Bungoma—during the 2021 mass distribution campaign. The DNMP, with Global Fund resources, plans to procure pyrethroid-only ITNs through the end of the current Global Fund cycle which ends in 2024.The DNMP, with Global Fund resources, continues to procure pyrethroid-only ITNs for the rest of the mass net target counties due to concerns about the higher cost of PBO ITNs and the reduced coverage that would occur if a switch were made without additional resources. PMI, in 2022 supported the transition to PBO nets through routine distribution channels for the eight lake endemic counties, therefore the remaining pyrethroid nets distributed in 29 counties are expected to be exhausted by October 2023. PMI no longer procures pyrethroid nets and will select only PBO or dual active-ingredient ITNs in future procurements.

A gap of 2.6 million nets is expected for the upcoming mass campaign in 2023/2024. The mass net gap is anticipated to be even larger in 2026/2027 due to the reduced Global Fund C7 malaria allocation for Kenya and the lack of savings or additional resources from PMI to fund the campaign. The DNMP included PBO or dual active ingredient ITNs for the 2026/2027 campaign for the six lake endemic counties that will not be receiving IRS and pyrethroid ITNs for the two lake endemic counties receiving IRS within allocation in the Global Fund C7 grant application. Additional nets for the 2026/2027 campaign are included within Prioritized Above Allocation Request (PAAR) for the six coastal endemic counties.

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

Table 2. Streamlined Durability Monitoring

Campaign Date	Site	Brand	Baseline	12 months	24 months	36 months
2021	Busia	Olyset Plus	February 2021	June/July 2022	Planned	Planned
2021	Kakamega	PermaNet 3.0	February/ March 2021	June/July 2022	Planned	Planned

PMI is currently supporting streamlined durability monitoring to assess the duration of insecticidal efficacy of two piperonyl butoxide ITNs that were distributed during the 2021 mass campaign. Nets that were not distributed during the mass campaign were collected from the warehouse assessed for insecticidal efficacy and chemical content. The 12-month follow-up was conducted in June/July 2022, while the 24-month follow-up is planned for June/July 2023.

1.3.3. Indoor Residual Spraying

PMI will continue to support IRS in two high-burden lake endemic counties. As the malaria burden in Homa Bay County has declined substantially with prevalence below 5 percent, beginning with the 2024 IRS campaign, PMI will cease IRS operations in Homa Bay County and will shift support to spraying in Busia County where malaria prevalence in the 2020 MIS was approximately 39 percent. IRS will continue in Migori County, where malaria prevalence has declined but remains above 10 percent. As part of the IRS exit strategy, Homa Bay County will receive PBO ITNs in the 2023/2024 mass campaign. According to the Kenya Insecticide Resistance Management Strategy, IRS should be conducted with a single insecticide for two consecutive years and then rotated with another insecticide. Based on this policy, pirimiphos methyl will be sprayed in Migori. To align the rotation schedules, Busia will also be sprayed with pirimiphos-methyl in 2024, although PMI plans to rotate both counties to clothianidin insecticides in 2025.

Table 3. PMI-Supported IRS Coverage

Calendar Year	County	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)	Insecticide
2022	Migori Homa Bay	413,985	96.8	1,614,938	Migori: Fludora Fusion (deltamethrin + clothianidin); Homa Bay: SumiShield (clothianidin)
2023	Migori Homa Bay	379,921	95.4	1,502,836	Actellic (Pirimiphos methyl)
2024**	Migori Busia	*	*	*	Actellic (Pirimiphos methyl)
2025**	Migori Busia	*	*	*	Fludora Fusion (deltamethrin + clothianidin) and Sumishield (clothianidin)

* Planned.

IRS Insecticide Residual Efficacy in Kenya

Wall bioassays were conducted monthly following the 2022 IRS campaign at one site in Migori that has been sprayed with Fludora Fusion (deltamethrin + clothianidin) and at one site in Homa Bay that had been sprayed with SumiShield (clothianidin). Mortality of susceptible mosquitoes at five days after exposure was 100 percent after 10 months in Migori and after 9 months in Homa Bay.

1.3.4 Other Vector Control

With funding from the Kenyan government and with technical support from the government of Cuba, larval source management (LSM) has been implemented in eight lake endemic counties in western Kenya. PMI does not support LSM in Kenya but is working with the DNMP to determine the optimal allocation of existing resources for LSM, including its potential application in northern Kenya to address the threat of *An. stephensi*.

2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

PMI's objective for MIP interventions supports the first objective of KMS 2019–2023, which aims to protect 100 percent of people living in areas with malaria risk through access to appropriate malaria preventive interventions by 2023. ITNs will be provided at the first ANC visit and SP (IPTp) beginning at 13 weeks in all malaria endemic counties (14 lake and coastal endemic counties).

PMI's technical assistance investments in MIP are focused in the eight lake endemic counties in the western region of the country. PMI supports the review, development, and dissemination of appropriate MIP communication materials in addition to facilitating sessions with CHVs on human-centered design, which enhances behavior change by involving the community in the identification of and response to challenges. PMI supports capacity strengthening of health care workers and CHVs to manage MIP through on-the-job training and mentorship.

In the eight counties, PMI supports two service-delivery levels, community and health facility. In the community, PMI supports work with CHVs to raise awareness and inform pregnant women on the dangers of MIP, the importance of getting the recommended IPTp doses as well as getting prompt and appropriate treatment for malaria in health facilities. The CHVs also identify and refer pregnant women to health facilities if they have missed getting IPTp doses at any time during their pregnancies.

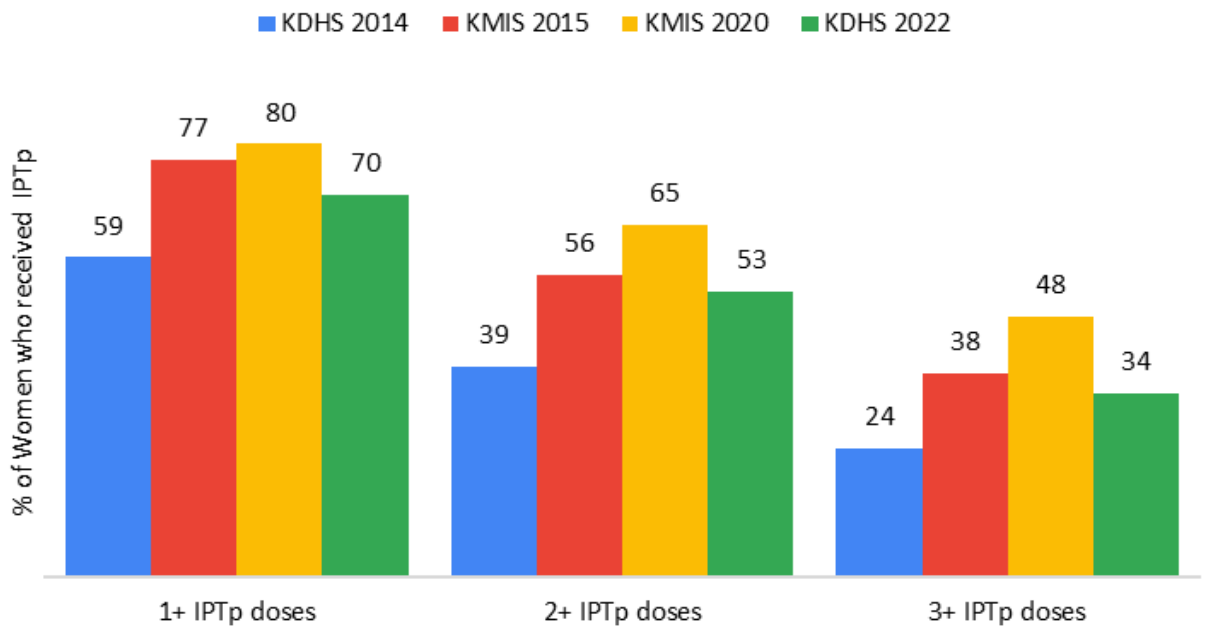
At the health facility level, PMI supports training for health care workers who are responsible for providing IPTp to all pregnant women who present at the ANC clinic in addition to informing them about the number of doses they need to receive during their pregnancy. In health facilities, IPTp doses are administered as directly observed therapy based on the IPTp provision schedule of eight ANC contact visits. The recommended IPTp provision schedule in

Kenya recommends the first dose between 13–16 weeks, followed by subsequent doses with an interval of four weeks in between, in line with WHO's 2016 guidance on starting IPTp.

As stipulated in the malaria strategy, the objective is to attain 100 percent coverage for all pregnant women with the recommended doses of IPTp. Although the Kenya Malaria Indicator Survey (KMIS) 2020 showed improvements across all IPTp doses compared with KMIS 2015, a decline of more than 10 percent was observed for IPTp 2 and 3 in the Kenya Demographic and Health Survey (KDHS) 2022. This points to the persistent challenges in the delivery of IPTp services that hinder progress toward achieving the national target.

Figure 2 shows IPTp uptake in the KDHS 2014, KMIS 2015, KMIS 2020, and KDHS 2022 surveys in the 14 malaria endemic counties where IPTp is implemented in Kenya. The findings indicate an improvement in IPTp coverage between 2014 and 2020, followed by a drop in 2022.

Figure 2. Trends of IPTp 1, 2, and 3 Uptake in KDHS 2014, KMIS 2015, KMIS 2020, and KDHS 2022



KDHS: Kenya Demographic and Health Survey; KMIS: Kenya Malaria Indicator Survey.

The 2020 KMIS noted several obstacles to IPTp uptake (e.g., knowledge on the need to take IPTp more than once and availability of IPTp in the facilities). The survey also established that over 35 percent of the women did not understand that they needed to take more than one dose of IPTp during their pregnancy, an indication that knowledge on the importance of IPTp was inadequate in the communities. In addition, 40 percent of pregnant women who received ANC were not given IPTp, a likely indication of drug stockouts or health workers not giving out IPTp

to pregnant women. Other previously identified barriers include starting ANC later in pregnancy, economic and cultural issues, attitudes of health worker attitudes, and lack of supplies for the provision of directly observed therapy.

The 2022 Malaria Behavior Survey (MBS), found that women who had positive attitudes toward IPTp and ANC attendance were consistently and positively associated with having planned ANC visits (early, four or more, and eight or more). Exposure to malaria messaging was also statistically associated with ANC attendance. The survey corroborated the 2020 KMIS study on knowledge, which indicated that 20 percent of pregnant women did not have comprehensive knowledge on IPTp and only about 16 percent of married couples discussed ANC-related issues. Lack of communication among couples could imply that men may not know the importance of early ANC attendance and delay giving permission or allowing their partners/wives to attend such clinics.

The DNMP, in collaboration with PMI and other stakeholders, is taking measures to address the identified barriers using various approaches. PMI uses SBC approaches such as human-centered design to address some barriers, by involving the community in the design of solutions targeting identified barriers. It facilitates the training of different cadres of health workers (community volunteers and facility-based health workers) on MIP and its importance in ensuring the delivery of healthy babies. PMI also facilitates the establishment of malaria community action teams (MCATs) who cascade actions identified and planned by the community to address key issues hindering the uptake of IPTp and other malaria control interventions (e.g., ITNs and adherence to malaria treatment). CHVs and MCATs organize sessions where they counsel pregnant women on the proper use of ITNs and the importance of attending ANC early and often.

PMI and the DNMP also work collaboratively at the national level to conduct the annual quantification exercise to determine the country's need for malaria commodities, including SP. MIP’s committee of experts accepted the recent WHO policy change on the use of ACTs (artemether-lumefantrine) in the first trimester, and it will be included in KMS 2024–2027, replacing quinine plus clindamycin. In the case of severe or complicated malaria in all trimesters, intravenous or intramuscular injections are advised in the first 24 hours. To ensure adherence to treatment guidelines, PMI supports the training of health care workers and CHVs in malaria case management and treatment, as well as regular supportive supervision to poorly performing facilities to monitor the quality of services provided and plan for actions to address the challenges identified.

2.2. Recent Progress (April 2022–March 2023)

PMI supported the following MIP activities at the national and county level:

- Convened the MIP CoE meetings and participated in the committee's deliberations. These meetings are attended by the following partners: a representative of the sexual and reproductive health department of the MOH (normally chairing the meeting); a representative from the Division of Health Promotion; a representative from the DNMP's case management team; representatives from PMI implementing partners responsible for case management, SBC, and procurement and supply management; Amref Health Africa; the Population Council; and representatives from the counties where MIP is being implemented.
- Facilitated the county malaria mentors to train 90 health care workers on MIP.
- Facilitated the county and subcounty mentors to conduct mentorship on MIP at 492 health facilities.
- Distributed 300 ANC diaries for high volume health facilities across the focus counties to strengthen defaulter tracing mechanisms and reduce missed opportunities for IPTp uptake.
- Facilitated the subcounty health management teams to train 509 CHVs on MIP and orient 297 CHVs on MIP.
- Supported CHVs to carry out joint meetings with the local administrators to discuss challenges and factors contributing to the low uptake of IPTp among pregnant women.

2.3. Plans and Justification for FY 2024 Funding

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

The most recently completed TES, conducted in Siaya in 2016, did not include the evaluation of molecular markers of SP resistance. There are no plans to evaluate molecular markers of SP resistance on the 2016 TES samples. The ongoing TES will include analysis of *Pfdhps* and *Pfdhfr* gene mutations.

Refer to the SP gap table in the annex for more details on planned quantities and distribution channels.

Refer to the SBC section for details on challenges and opportunities to improve intervention uptake and maintenance.

PMI will continue to support the DNMP in carrying out MIP interventions in the selected counties in the lake endemic region of the country.

The following activities will be undertaken with FY 2024 funding:

- Sensitize and train health care workers and supervisors on the MIP package of interventions, and improve health facility reporting.
- Sensitize, orient, and supervise CHVs on the MIP package of interventions, and improve reporting, including through referrals of women who may have missed an ANC visit for IPTp and other services.
- Continue routine distribution of ITNs to pregnant women during ANC clinics, as well as the delivery of SBC messaging on the importance of consistent net use.
- Support the DNMP to update MIP guidelines to align with WHO recommendations on AL use in the first trimester of pregnancy.
- Provide supportive supervision at 1,400 health facilities (at least one visit per facility) across the eight lake endemic counties.
- Deliver refresher training for CHVs on MIP interventions, including minimizing missed opportunities for ANC attendance.

3. Drug-Based Prevention

PMI does not support seasonal malaria chemoprevention or drug-based prevention other than IPTp in Kenya.

4. Case Management

4.1. PMI Goal and Strategic Approach

Kenya will roll out its new national malaria strategy in late 2023. Currently, PMI supports the second objective of KMS 2019–2023: to manage 100 percent of suspected malaria cases according to the treatment guidelines by 2023. PMI supports all five KMS 2019–2023 strategies related to this objective:

1. Strengthen capacity for integrated malaria case management,
2. Strengthen capacity for case management of severe malaria,
3. Provide malaria case management at the community level in targeted areas
4. Ensure quality malaria parasitological diagnosis, and
5. Procure diagnostic and treatment commodities.

Kenya's National Guidelines for the Diagnosis, Treatment, and Prevention of Malaria in Kenya 2020 (sixth edition) promotes a comprehensive case management strategy, including universal, quality-assured parasitological testing of all cases of suspected malaria, prompt treatment with effective ACTs of all cases of parasitological-confirmed uncomplicated malaria, and prereferral and/or definitive management of severe febrile illness and severe malaria. PMI supports all aspects of this approach through its funding for national-level policy and programming, commodity procurement, and improvement of facility- and community-level health worker performance. PMI supports nationwide procurement of malaria RDTs, ACTs, and injectable artesunate, accounting for approximately 50 percent of the country's malaria

commodity needs; the Global Fund supports 40 percent; and the Kenyan government supports the remaining 10 percent. PMI also supports facility-level targeted training and supportive supervision activities in all subcounties in the eight lake endemic counties; the Global Fund supports 39 counties. The guidelines do not include any case management strategies related to malaria elimination; however, the DNMP is exploring the possibility of case-based detection.

PMI support for community case management of malaria (CCMm) remains limited to the eight counties in the lake endemic zone. Although CCMm coverage remains fragmented due to limited resources, there has been an increase in the establishment and maintenance of fully functional community health units (CHUs). In Kenya, CHUs are linked to health facilities, and each unit consists of one community health assistant who supervises 10 CHVs. Each CHU is responsible for up to 5,000 people (500–1,000 households). Two approaches to CCMm are currently pursued in Kenya: CCMm and integrated community case management (iCCM). The CCMm approach involves targeted training and supervision of community health workers to deliver case management to individuals of all ages in endemic zones, whereas iCCM supports the integrated case management of malaria, pneumonia, and malnutrition in children younger than five years of age.

Approximately 2,005 (79 percent) of functioning CHUs in the eight-county lake-endemic region, along with two counties (Nyamira and Kisii) in the highland epidemic region, have been supported with training and supervision by donor organizations to provide CCMm. Of these, the Global Fund supported 1,853 (72 percent) in the lake endemic and highland epidemic counties, and PMI supported 150 (6 percent) in the lake endemic counties. In its next grant cycle, the Global Fund plans to expand coverage for CCMm to 553 (21 percent) additional CHUs in the eight lake endemic and two highland epidemic regions. Thus, CCMm is expected to approach 100 percent by the end of the next Global Fund grant cycle. In the recent past, UNICEF provided limited support to iCCM in 11 counties, including areas of two lake endemic counties, Siaya and Homa Bay. PATH has also supported 239 of 289 (83 percent) in lake-endemic Kisumu County.

PMI does not provide payments to CHVs, but has worked with lake endemic counties to enact community health service bills that earmark funds for counties to pay CHVs. Lake endemic counties pay CHVs stipends at varying amounts (approximately $13–20 per month), which can be inconsistent or delayed. A significant challenge faced by the community health system is the lack of sufficient printed tools for community health data collection. To address this, the DNMP has included a request for funding in the Global Fund Cycle 7 proposal to support the printing of tools.

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

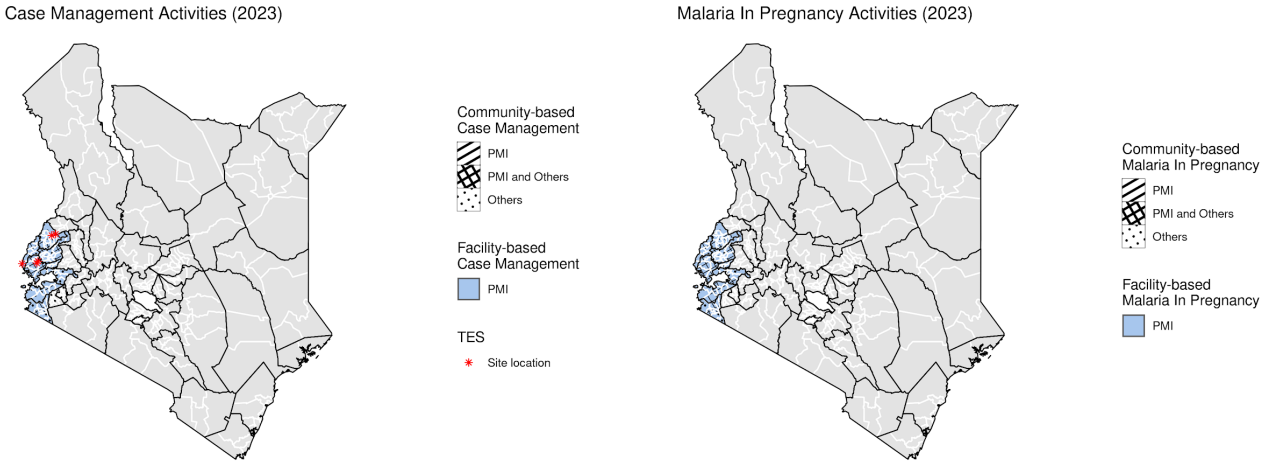
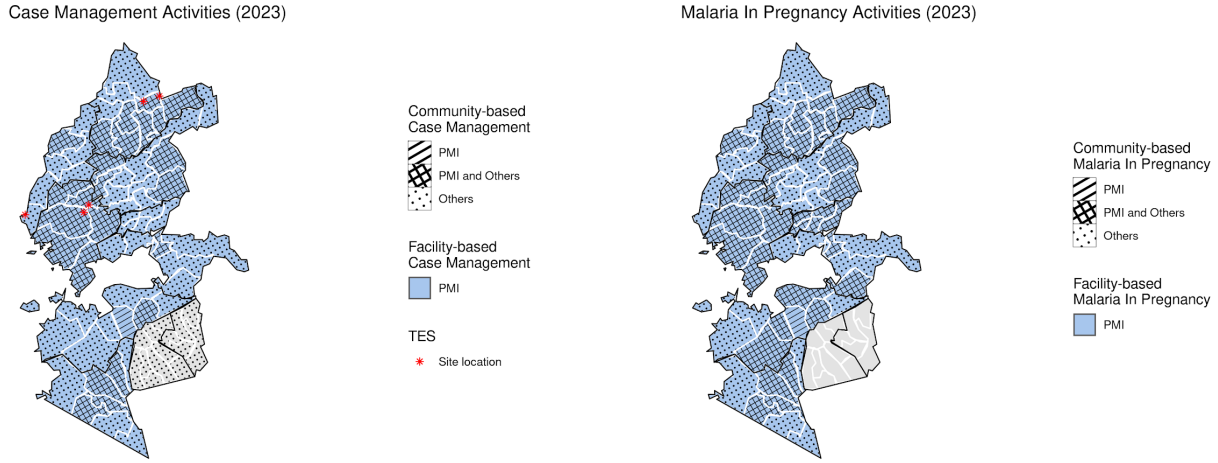


Figure 3b. Map of Case Management, Community Health, and Malaria in Pregnancy Service Delivery Activities in the Lake Endemic Counties in Kenya



4.2. Recent Progress (April 2022–March 2023)

National-Level Case Management Activities

- Supported the DNMP to identify gaps in the malaria case management module in the Kenya Medical Training College diploma level preservice curricula for clinical and nursing officers, pharmaceutical and laboratory technologists, and health records and information officers. The recommended addenda to the curricula were endorsed at a special case management CoE meeting; implementation by the training institutions is pending.
- Supported the DNMP to convene a two-day quality assurance meeting to review performance of quality assurance initiatives in the counties.

- Facilitated the DNMP to conduct quarterly county-level malaria supportive supervision for CHMTs and training and supportive supervision of eight county reference laboratories in the lake-endemic counties.
- Convened the DNMP meeting to validate Health Network Quality Improvement System dashboard indicators for the county, subcounty, facility, and community checklists.
- Developed and submitted the national malaria slide bank protocol for ethical review.
- Supported the DNMP to draft a malaria clinical mentorship guidelines and toolkit.
- Facilitated quality assurance training for 20 laboratory staff by the National Malaria Reference Laboratory.
- Supported administrative and operational aspects of TES implementation.

Commodities

- In FY 2022, supported the procurement of 8.7 million and delivery of 3.7 million malaria RDTs for nationwide use, accounting for approximately 44 percent of need.
- In FY 2022, supported the delivery of 3.9 million ACT treatments for nationwide use, accounting for approximately 74 percent of need.
- In FY 2022, supported the procurement of 903,500 and delivery of 436,500 vials of parenteral artesunate for nationwide use, accounting for approximately 30 percent of need.

County/Subcounty Level

- Oriented 120 health managers from lake-endemic counties on TrainSMART to facilitate the tracking of training data and inform capacity-strengthening needs among health care workers.
- Supported CHMTs to conduct 13 subcounty supervisory visits in three counties: Busia (2), Migori (8), and Vihiga (3).
- Supported Bungoma and Homa Bay counties to convene malaria technical working groups and establish subcommittees for malaria thematic areas.
- Contributed to annual work plan development in the lake endemic counties (July 2022 to June 2023), ensuring the prioritization of malaria case management activities.

Facility Level

- Facilitated the county malaria mentors to train 90 health care workers on malaria case management and 31 health care workers on case management of severe malaria.
- Facilitated the county and subcounty mentors to conduct mentorship on malaria case management at 492 health facilities.
- Facilitated the county and subcounty mentors to conduct mentorship on severe malaria case management at 70 health facilities.
- Facilitated CHMT and subcounty health management teams to conduct targeted quarterly clinical supportive supervision at 436 health facilities and 9 CHUs.

Community Level

- Facilitated subcounty health management teams to train 509 CHVs on CCMm.
- Distributed two MOH tools—CHV Daily Activity Register (MOH 648) and CHU Daily Activity Register Monthly Summary (MOH 748)—to 159 lake-endemic CHUs.

4.3. Plans and Justification for FY 2024 Funding

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

National Level Case Management Activities

PMI will continue to support guidelines development, case management CoE, and the diagnostic external quality assurance program and microscopy proficiency testing for the lake endemic counties as described in the recent progress section.

Commodities

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

Facility Level

PMI will continue to support the training and supervision of health care workers on malaria case management, including severe malaria; strengthen facility-level data capture and use; and improve case management processes aimed at improving outcomes, as described in the recent progress section.

Community Level

PMI will continue to support CCMm activities for all ages; the integration of CCMm with iCCM platforms; and data capture, reporting, and use at the community level, as described in the recent progress section. Of note, Kenya was selected as a USAID Primary Impact partner country. As part of this partnership, a phased introduction of primary care networks is planned across Kenya. USAID will support seven counties: Transzoia, Nakuru, Kajiado, Tharaka Nithi, Turkana, and Kakamega—one of the PMI focus counties. PMI intends to leverage this platform in Kakamega to ensure full coverage of CCMm and other behavioral approaches to enhance the consistent use of mosquito nets among at-risk groups and to increase the uptake of IPTp among pregnant women.

Private Sector

PMI will endeavor to expand capacity-strengthening efforts for malaria case management beyond the public sector, including the private sector through mentorship, continuous medical education sessions, and the provision of guidelines to private health care facilities.

Monitoring Antimalarial Efficacy

Table 4. Ongoing and Planned Therapeutic Efficacy Studies*

Ongoing Therapeutic Efficacy Studies			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2021–2022	Siaya, Bungoma	AL, DP	KEMRI Wellcome Trust—Kilifi
2022	Siaya, Busia	AL, DP	KEMRI Wellcome Trust—Kilifi
Planned TESs (funded with previous or current MOP)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2024	TBD—lake endemic zone	AL, TBD (DP v. AP)	KEMRI Wellcome Trust—Kilifi

Note: The evaluation of molecular markers of drug resistance for planned TES did not include markers associated with SP resistance in 2016, but the 2021 and 2022 studies include Pfdhps and Pfdhfr gene mutations.
AL: artemether-lumefantrine; AP: artesunate-pyronaridine; DP: dihydroartemisinin-piperaquine; KEMRI: Kenya Medical Research Institute; SP: sulfadoxine-pyrimethamine; TBD: to be determined

Lessons learned in recent studies include using established medical research institutions with TES experience for both the field epidemiology (study implementation and sample collection) and molecular laboratory work. Institutions should have the following in-house:

- Scientific ethics and regulatory compliance structures that include a federal-wide assured institutional review board;
- Protocol approval, export, and import mechanisms that are in compliance with Pharmacy and Poisons Board (PPB)requirements;
- Mature community engagement platform;
- Human resources processes to support the hiring of dedicated study staff;
- Biospecimen storage facilities;
- Data management systems and staff; and
- Logistical infrastructure, including sample exportation, drug importation, and procurement systems for internationally procured commodities.

Over the long-term, the DNMP's priority is to house the molecular capacity for TES within the National Malaria Reference Laboratory It will therefore continue its approach to TES implementation that includes components of molecular laboratory capacity strengthening that are aligned to the PARMA platforms and protocols to ensure compatibility for long-term partnerships and reciprocal support within the network.

See the SBC section for details on challenges and opportunities to improve intervention uptake and maintenance.

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

PMI supports the sixth objective of KMS 2019–2023, which aims to ensure the uninterrupted supply of malaria medicines, diagnostic test kits, and ITNs to populations experiencing vulnerability and who are at risk of malaria, and to improve the use of supply chain data for informed decision making. PMI also supports the PPB and National Quality Control Laboratory in strengthening the country's regulatory system, ensuring the availability of safe and efficacious malaria medicines for the Kenyan population. To enhance commodity accountability, transparency, and visibility for the last-mile delivery of commodities, PMI invests in third-party verification to assess risk and to monitor and evaluate performance along the supply chain.

PMI complements the Kenyan government's strategy on supply chain management by investing at the national level in governance, policy, and legislation priorities, and by providing technical assistance to the eight counties with high malaria burdens, which account for 70 percent of the country's malaria commodity needs. PMI collaborates with the DNMP and the Global Fund in the development of the annual procurement and supply plan and pipeline monitoring for malaria commodities.

The 2020 Kenya malaria risk map and county profiles showed a decline in malaria prevalence and shifts in malaria transmission, with a 40 percent reduction of the population living in areas with a high malaria risk. A notable decline in malaria cases and consumption of AL in malaria elimination and counties with low risk has also been observed. To avoid wastage through expiries, PMI funded the DNMP to develop a commodity management handbook to guide inventory management by malaria risk category. Considerations for elimination counties include stocking two (one adult and one pediatric) instead of four weight bands of AL, and placing these commodities in high volume and strategically located facilities. The automated outputs from the malaria dashboard in the KHIS are also used to monitor stock levels in the elimination counties.

5.2. Recent Progress (April 2022–March 2023)

PMI's principal supply chain investments focused on strengthening the oversight capacity of the national procurement and supply management unit at the DNMP and the technical leadership capacity for malaria commodity security, and improving malaria commodity security and accountability at the subnational level, including the following activities.

National Level

- Participated in quarterly procurement and supply management CoE meetings and monthly commodity management subcommittee meetings.
- Developed a five-year (2023–2027) forecast and supply plan for malaria commodities.
- Conducted regular monitoring of the pipeline and managed the ordering of malaria commodities for all public health facilities.
- Enhanced the KHIS malaria commodity dashboard by developing linkages with the Logistics Management Information System (LMIS) of the Kenya Medical Supplies Authority (KEMSA) to improve the ordering process.
- Developed a handbook to guide commodity management practices by epidemiological zone and provided direction on the use of outputs from the malaria dashboard for decision making.
- Supported the completion of the ITN risk matrix on the malaria commodity dashboard to identify facilities with accountability issues for follow up.
- Delivered technical support for the writing of the health products and technology module in the Global Fund's Grant Cycle 7.
- Provided technical input on user and process requirements for the development, validation, and piloting of a mass net digital platform to support the 2023/2024 mass net campaign.
- Cohosted pharmacovigilance/postmarketing surveillance technical working group meetings with the PPB.
- Revised the PPB's standard operating procedure on the investigation of product quality complaints.

County Level

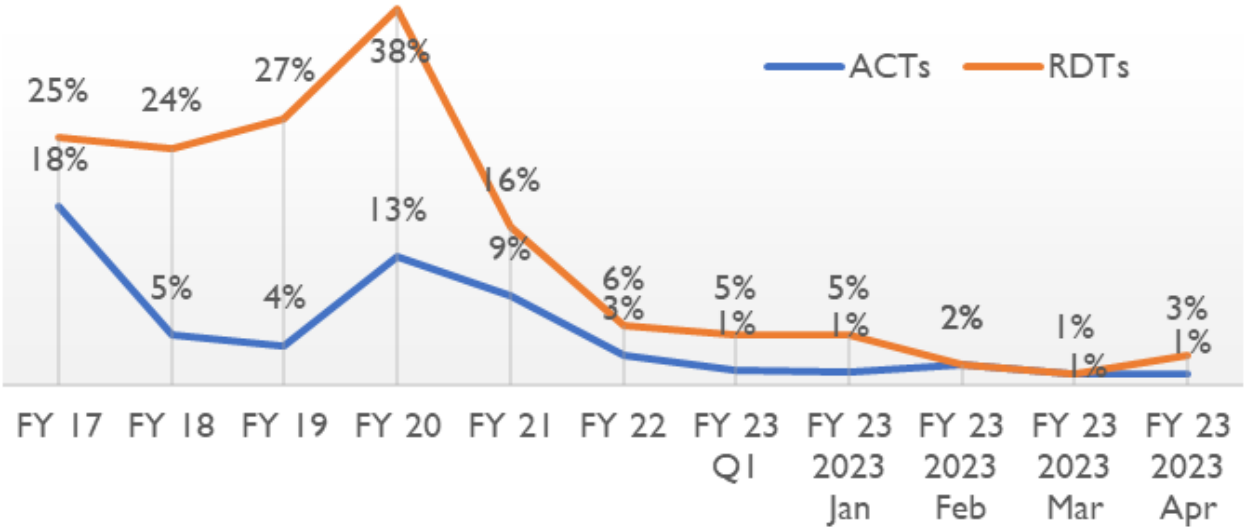
- Conducted supply chain monitoring and verification site visits to 3,353 health facilities in the 36 counties where continuous net distribution occurs, including the lake endemic counties.
- Conducted quarterly stock status review meetings at the county and subcounty level for the eight lake endemic counties.
- Undertook third-party monitoring activities for malaria commodities across the supply chain.
- Participated in the biannual county malaria reviews to provide highlights and technical information on the malaria supply chain and to develop and review action plans with county pharmacists and lab technologists across 47 counties.

Key Achievements

- Developed and ratified the malaria product catalog and achieved consensus on malaria diagnostic test kits product specifications.
- Streamlined the submission of county malaria orders with over 90 percent of counties adhering to the county order schedule, thereby improving planning and coordination between KEMSA and the Mission for Essential Drugs and Supplies (MEDS).
- Attained and maintained a 100 percent logistics data reporting rate for the eight lake endemic counties as of the end of March 2023.
- Presented three abstracts at the Fourth Kenya National Malaria Forum held in February 2023.
- Provided technical leadership for the annual forecasting and supply planning for malaria commodities, totaling $174,210,024 for the 2023–2027 period.
- Coordinated inter- and intracounty redistribution of malaria commodities worth $359,972 to mitigate stockouts and prevent expiries.
- Enhanced ITN accountability by supporting the transition from a standalone data capture tool (net pack record) to MOH 743, achieving a transition rate of 94 percent nationally and 99 percent in the lake endemic reporting rate by the end of March 2023.
- Conducted support supervision visits that observed a high availability of inventory management tools—with bin card availability for AL 6x4, AL 6x1, injectable artesunate, mRDT, and ITN, at 96, 96, 94, 93, and 75 percent, respectively in the most recent round of supervision.
- Supported the Federation of Kenya Pharmaceutical Manufacturers to revamp their website (https://www.fkpm.info.ke/), which serves as a platform for sharing best practices and providing resources and information related to the local manufacture of essential medicines, including antimalarials.
- Conducted third-party verification of U.S.government-funded malaria commodities to identify reporting and storage loss risks. The verification reports showed that RDTs in nonlake endemic counties were at the highest risk for reporting and storage. The biggest contributor to storage risk was poor recordkeeping, where capture of transactions was incomplete, leading to an imbalance between physical stock on the day of visit and bin card record. The driver for high reporting risk was inconsistency between data captured on the daily activity register and the monthly summary form.

Figure 4 shows a progressive decline in the proportion of public health facilities with stockouts of AL and RDTs in the eight lake endemic counties with the highest malaria burden, which account for more than 70 percent of the country's malaria commodity needs.

Figure 4. Percentage of Health Facilities in Lake Endemic Counties with ACT and RDT Stockouts

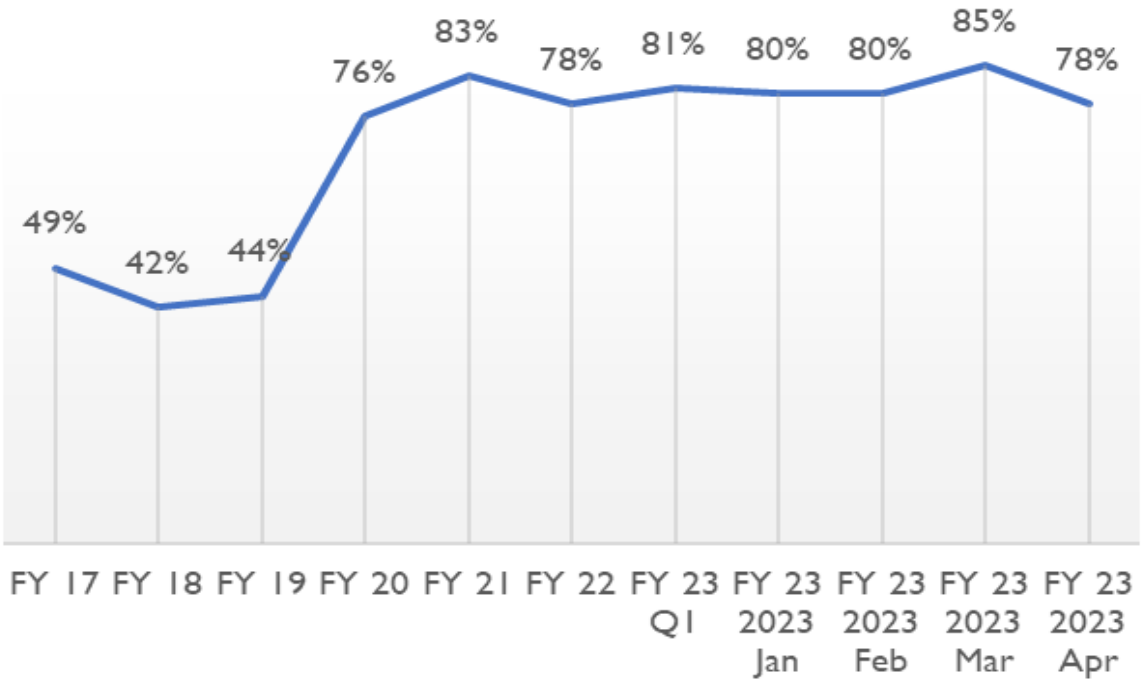


SP for IPTp is procured by the Kenyan government. From April 2022 to February 2023 stockouts remained below 20 percent in the 14 counties that received IPTp, rising to 34 percent in April 2023. Reasons for the stockouts include the Kenyan government procuring lower quantities of SP in 2022–2023 than was planned and delaying the release of government funds in the new fiscal year, which delayed timely procurement and delivery.

The near-zero stockouts of ACTs and RDTs at public health facilities demonstrate that facilities are capable of testing and treating suspected malaria cases, and confirm that inventory management practices have improved, which can be attributed to sustained PMI investments in forecasting and quantification; improved forecasting accuracy coupled with effective coordination for procurement planning by the DNMP, the Global Fund, and PMI; regular pipeline monitoring; the use of supply chain data for decision making; and the redistribution of excess stocks to understocked health facilities.

Figure 5 illustrates improvements over time between service and LMIS data in the KHIS, demonstrating improved adherence to treatment guidelines by frontline health workers.

Figure 5. Percentage of Monthly Malaria Commodity Summary Reports with No Variance Between Malaria Patients Treated and AL Dispensed in Lake Endemic Counties



PMI plans to continue investing in health supply chain and pharmaceutical management and will support the following activities for the remainder of FY 2023 and FY 2024:

- Writing the health products and technologies module of the Global Fund Cycle 7 application and developing the procurement and supply management plan to support procurement of malaria commodities for the 2024–2027 period;
- Finalizing automation of the KEMSA LMIS ordering module and supporting its deployment with county and subcounty commodity managers;
- Disseminating the malaria product catalog to guide procurement specification decisions at the national and county level;
- Automating the malaria commodity quantification and pipeline monitoring tool;
- Automating and enhancing the monthly malaria stock status report;
- Transitioning from routine distribution of pyrethroid to PBO nets for the remaining 21 out of 29 counties;
- Developing a generic postmarket surveillance protocol for medical devices, including mRDTs;
- Training of postmarket surveillance staff on the revised standard operating procedure for investigating malaria product quality complaints;
- Supporting PPB, the National Quality Control Laboratory, and the DNMP to train pharmacy personnel from eight malaria endemic counties on antimalarial medicine screening using Minilabs;®
- Supporting PPB to update the dashboard/platform for the registration of malaria pharmaceutical products;

- Supporting PPB to constitute and orient expanded pharmacovigilance/postmarket surveillance technical working group members (the terms of the current members are coming to an end); and
- Collaborating with the Federation of Kenya Pharmaceutical Manufacturers to develop a strategic plan to guide and advocate for resources to support efforts of local manufacturers for medical products, including malaria commodities.

5.3. Plans and Justification with FY 2024 Funding

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

Planned activities align with KMS 2019–2023 and the National Health Products and Technology Supply Chain Strategic Plan and will build on previous investments aimed at creating more efficient supply chain processes through automation. Utilizing open source digital platforms will reduce the carbon footprint and promote the institutionalization of system-strengthening processes.

Activities will include:

- Providing technical and logistical support for the continued functionality of the procurement and supply management CoE and the commodity management subcommittees.
- Providing mentorship and on-the-job training for commodity managers on good inventory management practices.
- Supporting counties to fully transition from manual to automated KEMSA LMIS systems for placement of malaria orders.
- Supporting third-party monitoring of malaria commodity distribution and the development of cost-effective and sustainable strategies to address supply chain accountability challenges.
- Conducting evidence and action dissemination workshops at the county level to share third-party monitoring and supervision findings and develop action plans to address existing gaps.
- Training commodity managers on the use of automated forecasting, supply planning, and pipeline monitoring tools for malaria commodities.
- Sensitizing local manufacturers on requirements for achieving Global Malaria Program GMP and WHO primaquine of antimalarials.
- Revising the malaria commodity data capture and reporting tools for health facilities and community units.

Supply Chain Elimination Activities

Supply chain elimination activities will include revising the commodity management handbook to include specific guidance on inventory management practices for elimination and counties at low risk, such as ordering one pediatric and one adult formulation of AL to minimize wastage due to expiries and identifying strategic locations for the placement of antimalarials, which facilities situated in counties with low risk can draw from as needed.

6. Malaria Vaccine

Kenya is one of the three countries that participated in the Malaria Vaccine Implementation Programme with the RTS,S malaria vaccine. Through the program, the vaccine was piloted in 26 subcounties, and an additional 25 subcounties served as comparator districts. In January 2022, Kenya received funding to support the deployment of the vaccine in the 25 comparator subcounties, and implementation started in March 2023. The malaria vaccine in Kenya is deployed in health facilities as a part of the routine EPI for infants at 6, 7, 9, and 24 months of age.

6.1. PMI Goal and Strategic Approach

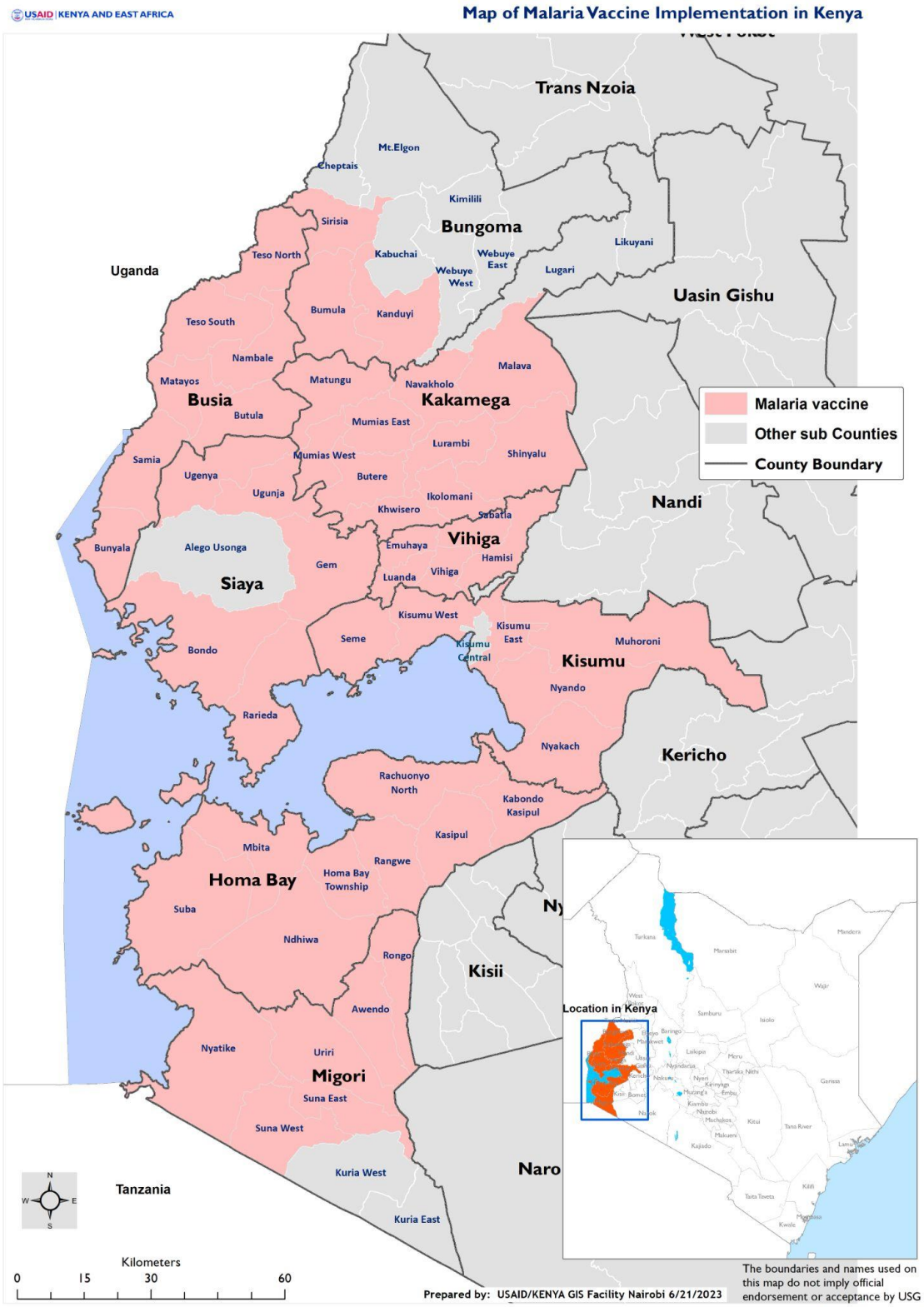
The PMI goal in Kenya regarding the malaria vaccine is to support the Ministry of Health for its strategic deployment as a complementary tool to existing core interventions, including technical assistance to the DNMP as it engages with the EPI to strategically use data to decide where to expand the malaria vaccine. Vaccine implementation is led by the national EPI, thus PMI will work with the DNMP and national immunization colleagues to provide complementary support in the planning, delivery, and monitoring of vaccine deployment, including support to maximize uptake of the vaccine without adversely affecting coverage of other malaria interventions.

6.2. Recent Progress (April 2022–March 2023)

In September 2022, Kenya successfully applied to Gavi to support the continued deployment of the malaria vaccine in the pilot and comparator subcounties to ensure uninterrupted access when the Malaria Vaccine Implementation Programme ends. Kenya applied to Gavi to support the procurement and deployment of the RTS,S vaccine in additional subcounties with a high burden of malaria, but the expansion of the program beyond the current vaccination footprint in Kenya is contingent on improvements in malaria vaccine supply availability.

As of February 2023, 1.1 million doses of vaccine had been administered to eligible children, with 385,894 children receiving at least one dose, and 94,443 children completing all four doses.

Figure 6. Map of Malaria Vaccine Plans in Kenya



6.3. Plans and Justification for FY 2024 Funding

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

The malaria vaccine in Kenya is deployed in health facilities as a part of routine EPI service delivery and complemented by periodic intensification of routine immunization activities. Kenya will maintain the current scope of deployment in 51 subcounties in western Kenya until vaccine supply improves and the program can be expanded to cover all of western Kenya. All targeted areas are priority PMI subcounties where other service delivery interventions are deployed. All malaria vaccine procurement will be supported by UNICEF with Gavi funding. New SBC investments will include the malaria vaccine as an additional prevention tool.

See the SBC section for details on challenges and opportunities to improve intervention uptake and maintenance.

7. Social and Behavior Change

7.1. PMI Goal and Strategic Approach

PMI's SBC funding in Kenya fully aligns with and contributes to the attainment of the DNMP's objective to increase utilization of appropriate malaria interventions in Kenya to at least 80 percent by 2023, including support for implementation of four key strategies: (1) strengthening structures for the delivery of advocacy, communication, and social mobilization interventions at all levels, including strengthening capacity and providing mentorship and technical assistance to counties; (2) strengthening program communication for increased utilization of malaria interventions at the household level through the use of multichannel approaches that combine mass media, interpersonal communication, and structural interventions to promote new or modified behaviors; (3) increasing intersector advocacy and collaboration for malaria interventions by strengthening coordination of malaria advocacy activities with the aim of fostering strong linkages between the national and county governments and across health and nonhealth sectors; and (4) strengthening community-based SBC communication activities for all malaria interventions and ensuring the participation of local communities in malaria control initiatives through existing local networks, such as religious institutions.

Nationally, PMI provides technical assistance and support for capacity-strengthening activities and coordination and development of mass and multimedia media materials and relevant tools and guidelines through the SBC CoE. At the county level, PMI supports the eight lake endemic counties to develop county health communication implementation plans and provide technical assistance for coordination and material development and adaptation to fit the local context. County SBC activities are implemented at the community and health facility level. Through partnerships with local community-based organizations and collaboration with local leaders and CHVs, PMI supports the DNMP and Division of Health Promotion's efforts to expand the use of multichannel approaches that combine mass media, interpersonal communication, and

structural interventions to increase adoption and maintenance of key malaria prevention and treatment behaviors. The targeted priority behaviors include correct and consistent ITN use, early and frequent ANC attendance, and prompt and appropriate care seeking. PMI also supports efforts to understand and address provider attitudes, norms, and beliefs that may impact the delivery or quality of malaria services received at health facilities and to strengthen service communication among health care workers and CHVs. While PMI supports some elimination-related activities as described in the surveillance, monitoring, and evaluation section, PMI's support for elimination-related SBC is limited to its national technical support through the SBC CoE.

7.2. Recent Progress (April 2022–March 2023)

PMI has provided support at the national and subnational level for capacity strengthening, SBC implementation, and evidence generation.

Capacity Strengthening

- Supported the functioning of the SBC CoE and associated strategic planning, such as the finalization and dissemination of the Kenya Malaria Social and Behavior Change Strategy 2022–2027, which emphasizes community engagement, strengthening community capacity, and the use of human-centered design and the community action cycle to empower communities to identify solutions and design interventions to promote the adoption and maintenance of key behaviors.
- Strengthened subnational capacity for conducting effective meetings through support for the county malaria technical working groups and establishment of health facility management committees in 32 subcounties.
- Supported implementation of the malaria community action cycle in 144 health facilities and 288 CHUs in eight counties and supported the adaptation of the approach by health promotion advisory committees.
- Engaged with other stakeholders to train 1,394 CHVs and assistants on SBC.
- Supported the DNMP to develop an interpersonal communication and counseling training guide that has been used to train 80 malaria mentors and supported mentorship of 73 health care providers from 26 health facilities.
- Supported 18 initial and follow-up fishbowl sessions at 14 health facilities with health care workers and community members to discuss challenges and identify areas for strengthening. During these group discussions, participants share their perspectives and experiences to facilitate shared understanding and to work together to identify solutions to challenges.

SBC Implementation

- To facilitate community engagement activities, PMI supported activities in 32 subcounties of the eight lake endemic counties, encompassing 144 health facilities and 288 CHUs, leveraging the work of 2,880 CHVs. PMI supported 72 MCATs and CHVs to carry out the implementation of community-level activities, including having malaria conversations with 874,884 households and engaging 58,587 community members in dialogues. Target behaviors for these interventions include correct and consistent ITN use, early and frequent ANC attendance, and prompt and appropriate care seeking. The intended audience includes household heads and pregnant women.
- PMI supported mass media activities to promote priority malaria prevention and treatment behaviors through radio, Magnet Theater, and World Malaria Day celebrations, including interactive radio talk shows that allowed audience members to call or message the speakers for real-time engagement. The range of the targeted radio stations covers about seven million people. Target behaviors for these interventions were correct and consistent ITN use, early and frequent ANC attendance, and prompt and appropriate care-seeking and the target audience includes household heads and pregnant women.

Evidence Generation

PMI supported Kenya Malaria Behavior Survey 2022 implementation, data interpretation, and report writing.

Despite the important progress made, important challenges remain to maximally deploy and utilize malaria preventive and curative interventions, including:

- **ITNs:** In the lake endemic counties, rates of ITN ownership and use are high, at 88 and 75 percent, respectively, but the national ownership rate is lower because distribution is focused in areas with higher burdens.

- **MIP:** IPTp uptake in lake endemic counties has improved, with 71 percent of women in lake endemic areas where the intervention is deployed receiving one or more doses, but receipt of three or more remains low at 38 percent (KDHS 2022) due in part to late ANC attendance and provider barriers such as SP stockouts.

- **Vaccine:** The vaccine has been effectively deployed in Kenya, but challenges related to adherence to the fourth dose remain. While implementation of the vaccine is appropriately led by the EPI, key SBC messages need to be reinforced through the malaria service delivery platforms, such as inclusion of the malaria vaccine in the list of promoted malaria prevention behaviors.

- **Case management:** Care-seeking rates are relatively high: 74 percent of children with fever in the prior two weeks in lake endemic areas reportedly sought care. Nevertheless, only 64 percent of respondents in the Kenya Malaria Behavior Survey had comprehensive knowledge related to malaria care seeking and treatment, demonstrating the need for continued investment in SBC.
- **Service delivery:** Care provision and adherence to case management guidelines at health facilities or by CHVs is relatively high, with 91 percent of children with fever receiving ACT (KMIS 2022). However, the 2022 Kenya Health Facility Assessment identified areas for strengthening, particularly related to the testing of febrile patients as only 63 percent of febrile patients were tested for malaria.
- **Elimination:** No specific SBC activities are currently planned for implementation in elimination areas. PMI's support for elimination-related SBC is limited to its national technical support through the SBC CoE.

7.3. Plans and Justification with FY 2024 Funding

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

In FY 2024, PMI will fund the following activities:

- Convening regular meetings of the national SBC CoE and county technical working groups;
- Providing technical support for the maintenance of updated SBC packages, such as the inclusion of the malaria vaccine as a recommended prevention intervention;
- Continuing implementation of mass and mid media, such as radio spots and programs promoting vector control measures, including potential responses to *An. stephensi*;
- Expanding MCAT support to new health facilities in PMI priority counties while maintaining the functioning of existing MCATs and CHUs;
- Continuing implementation support for interpersonal communication activities, including those targeting religious congregants and male partners of pregnant women; and
- Strengthening community-level SBC activity data collection and use.

Priorities

While PMI supports SBC activities that promote the uptake and maintenance of all key malaria interventions, FY 2024 funds will prioritize promoting care-seeking behaviors for young children and ANC attendance:

Table 5. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Prompt care-seeking for fever for children under five years of age	Caregivers of children under 5 years of age	8 lake endemic counties	● Conduct community and household level IPC informed by data in prompt care-seeking through MCATs and CHVs. ● Strengthen quality of care offered at community and health facility level through continued training of CHUs and malaria mentors and through broader service delivery and supply chain strengthening. ● Include care-seeking messages in radio programming.
Early and frequent ANC attendance	Women of child-bearing age, male partners of women of child-bearing age; health care providers	8 lake endemic counties	● Conduct community and household interpersonal communication through MCATs and CHVs, including continuing activities that engage men to create more enabling environments for ANC attendance. ● Work with religious and administrative leaders to continue to promote ANC attendance. ● Strengthen quality of antenatal care through broader service delivery and supply chain strengthening. ● Carry out trainings for newly qualified staff on MIP guidelines and policies ● On the job sessions with health workers providing MIP services

Additional Support Activities

No additional SBC data collection activity beyond the routine monitoring of SBC implementation is planned for FY 2024. Instead, the focus will be on the use of the 2022 Malaria Behavior Survey results and the qualitative provider assessment study findings to inform programmatic implementation.

There is a need for continued SBC capacity strengthening at both the national and subnational level, with greater emphasis at the subcounty level. To bolster capacity for the planning, design, implementation, and evaluation of SBC activities, PMI will continue to support:

- Functionality of national SBC CoE and county technical working groups to advance the SBC agenda;
- Functionality of MCATs with health promotion advisory committees providing support to maintain the units while expanding to new health facilities;

- Capacity strengthening of key players and stakeholders for effective SBC design, implementation, and evaluation; and
- Capacity strengthening for the DNMP staff on the use of data, particularly from the 2022 data collection activities, to inform SBC program priorities and strategies.

8. Surveillance, Monitoring, and Evaluation

8.1. PMI Goal and Strategic Approach

Objective 5 of KMS 2019–2023 is to strengthen malaria surveillance and use of information to improve decision making for program performance. The related third objective is to establish systems for malaria elimination in targeted counties[2] by 2023. PMI is supporting the DNMP to develop a case-based surveillance system within the KHIS that will be able to support active case detection, notification, investigation, and response systems for elimination in these counties.

In Kenya, PMI SM&E support is aligned to the malaria monitoring and evaluation plan for 2019–2023. PMI collaborates with the DNMP and WHO to provide technical assistance and with Global Fund to fund SM&E activities.

PMI and the DNMP have prioritized the following activities:

- Strengthen malaria surveillance through the use of the KHIS to obtain essential malaria surveillance data. Surveillance and data use improvements will include:
    - Updating the tools of the KHIS to strengthen malaria data collection and standardize information collected nationwide by all facilities;
    - Conducting data quality assessments across the 47 counties (all referral hospitals plus two subcounty hospitals, two health centers, and one dispensary per county) to inform required improvements in the KHIS system;
    - Creating a functional health supply chain portal in the KHIS to make quality malaria commodity data available for decision making;
    - Establishing a case-based surveillance system to support active case detection, notification, investigation, and response systems for elimination in targeted counties;
    - Conducting annual malaria health facility assessments;
    - Conducting TES for ACTs every two years; and
    - Conducting periodic countrywide assessments of health providers and laboratories for malaria diagnosis.
- Conduct and facilitate health facility surveys and community surveys, including the Malaria Indicator Survey; the post-mass long-lasting insecticide-treated net survey; and KDHS.

[2] Counties targeted for elimination are Nyeri, Nyandarua, Laikipia and Kirinyaga

- Strengthen malaria epidemic preparedness and response structures by conducting an annual review, convening planning meetings (including setting thresholds) and quarterly epidemic monitoring and detection review meetings, and conduct post-epidemic evaluations.
- Increase the use of malaria data for decision making by:
    - Developing malaria surveillance bulletins and profiles as well as policy briefs;
    - Conducting regular subnational stratification for targeting of interventions;
    - Strengthening engagement with county-level decision makers to enhance evidence-based decision making;
    - Establishing and maintaining a forum to promote the sharing of findings and progress updates of malaria research and nonresearch data;
    - Establishing an online tool to track the use of malaria surveillance data for decision making at the subnational level on a semiannual basis;
    - Training subnational teams to manage and use data for decision making with a focus on inpatient data; and
    - Establishing a malaria intelligence hub as a one-stop shop for all malaria and related data, including climate data, survey and routine data, repositories of information, program reports, guidelines, and tools. The hub will be interactive and be able to provide descriptive and predictive analytics.
- Monitor the efficacy and effectiveness of vector control tools and technologies and entomological surveillance as captured under the “other vector control” section.

8.2. Recent Progress (April 2022–March 2023)

Central Level

To strengthen capacity at the national level to collect, analyze, and use routine malaria data, PMI supported the following activities:

- The malaria subnational tailoring exercise to consolidate programmatic data, build assumptions, and conduct modeling;
- Planning and convening of the fourth National Malaria Forum in February 2023 to bridge the gap between research, policy, and implementation;
- Development of comprehensive national malaria surveillance guidelines;
- Technical guidance for the Global Fund Cycle 7 grant application for the surveillance, monitoring, evaluation, and operations research (SMEOR) module;
- Data review meetings convened by the DNMP in the four epidemic-prone counties of Marsabit, Samburu, Turkana, and Baringo;
- Quarterly SM&E CoE and operational research CoE meetings;
- Development of the Kenya malaria annual report; and
- Development of a digital solution based on unstructured supplementary service data to support household registration, distribution of ITNs to beneficiaries, and payment of allowances to health workers, CHVs, and others involved in the mass ITN distribution campaign planned for 2023/2024.

To strengthen the overall Health Information System to generate quality data for malaria, PMI supported:

- The development of data documentation job aids for all malaria registers and summary tools;
- the finalization of the malaria module in the KHIS, which includes visualizations and outputs derived from several sources of malaria service delivery and logistics data in the KHIS; and
- The revision of the MOH inpatient discharge summary tool.

To support the establishment of structures and systems for malaria elimination, PMI supported;

- **Quarterly malaria elimination CoE meetings.** The CoE brings together officials from the DNMP, the four counties targeted for malaria elimination, and other stakeholders (WHO, PMI, PMI implementing partners) to plan for and coordinate all activities around malaria elimination at the county and national level to accelerate the establishment of systems for malaria elimination in the four targeted counties.
- **Development, pretesting, and field deployment of malaria elimination readiness tools, and the subsequent malaria elimination baseline assessment report writing.** The baseline report identified gaps in human resources and health systems that would hinder malaria elimination efforts and priority actions at the national and county level to mitigate these gaps. The priority actions are outlined in the malaria elimination implementation plan, described below.
- **Finalization of the malaria elimination implementation plan, which was launched by the MOH during the 2023 World Malaria Day commemoration.** The plan outlines the priority actions that need to be undertaken at various levels to actualize the malaria elimination objective:
    - Establish structures at the national and county levels to coordinate and drive the implementation of the elimination agenda;
    - Develop capacity for malaria elimination;
    - Establish active case detection, notification, investigation, and response systems for elimination in targeted counties;
    - Strengthen quality assurance for diagnosis, treatment, and entomology to enhance surveillance; and
    - Strengthen SBC for malaria elimination.

County Level

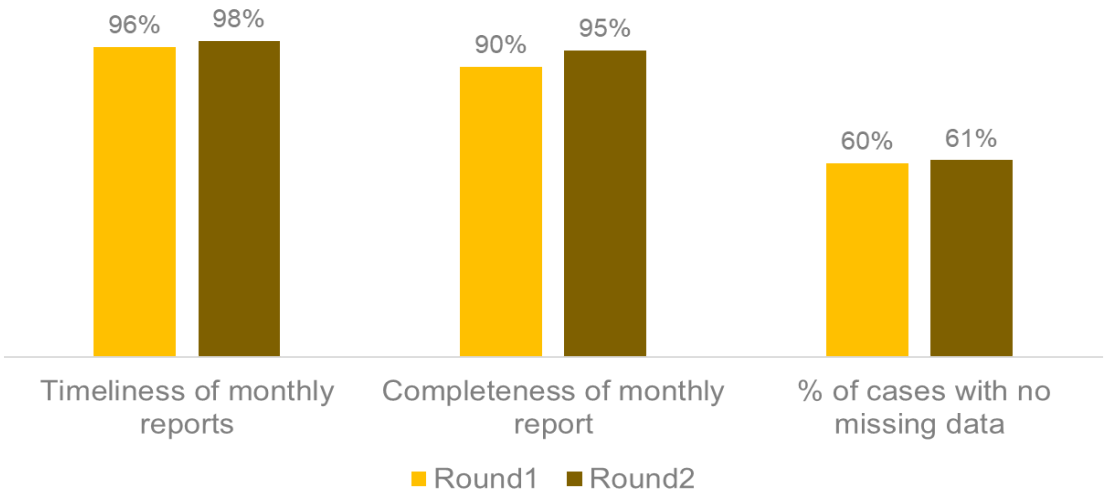
To strengthen county, subcounty and health facility capacity to collect, analyze, and use routine malaria data, PMI supported:

- Quarterly county-level malaria technical working group meetings, including documentation and follow-up actions;
- Training of 39 additional SM&E mentors, including seven lecturers from Maseno University, bringing the total number of trained mentors to 215;
- Mentorship to over 420 health facilities with data quality and/or SM&E concerns in the eight focus counties and ICD-11 mentorship for 280 health workers in the focus counties to undertake retrospective entry of inpatient data;
- Sub County-level data review meetings in 32 subcounties of the eight focus counties.
- Malaria routine data quality assessment (mRDQA) in 198 health facilities across the eight focus counties; and
- Technical input for the pilot implementation of the electronic Community Health Information System (eCHIS) in Vihiga County in western Kenya.

Summary of Findings from the mRDQA[3]

There was a slight improvement in the completeness and timeliness of malaria data (MOH 705A [monthly outpatient summary form for children under the age of five] and 204A [outpatient daily register for children under the age of five]), as shown in Figure 7a.

Figure 7a. Completeness and Timeliness of Malaria Data

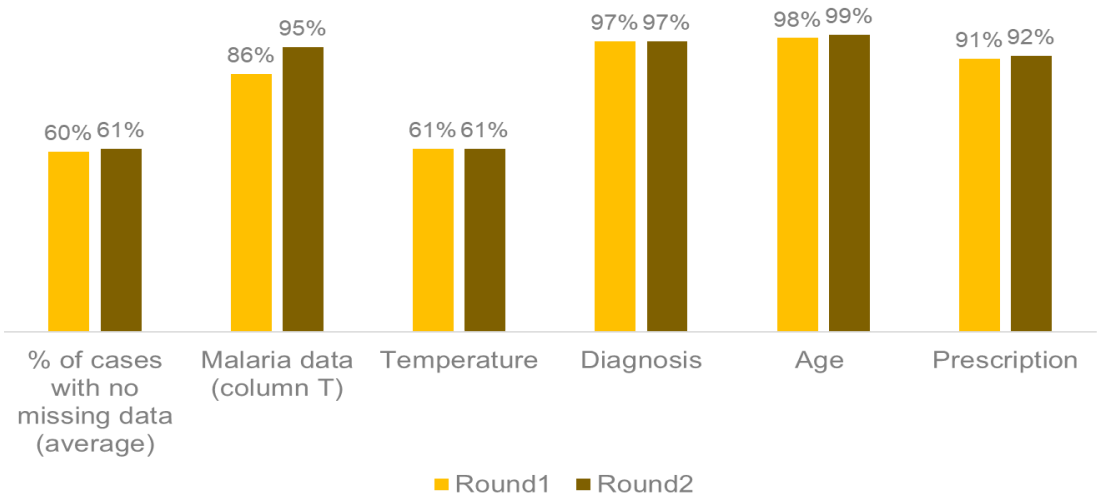


Source: MOH 705A and 204A.

[3] Round 1: February–August 2022; round 2: October–November 2022.

Failure to document temperature is the main cause of missing data in MOH 204A (see Figure 7b).

Figure 7b. Percentage of Cases with No Missing Data



Source: MOH 204A.

Availability for all of the health information system tools was generally higher in the second round (Figure 7d) of mRDQA than in the first round (Figure 7c). In the second round, all health facilities had the outpatient department register and all except for 3 percent in Bungoma County had the monthly report form.

Figure 7c. Percentage Availability of Registers and Summary Forms in mRDQA Round 1

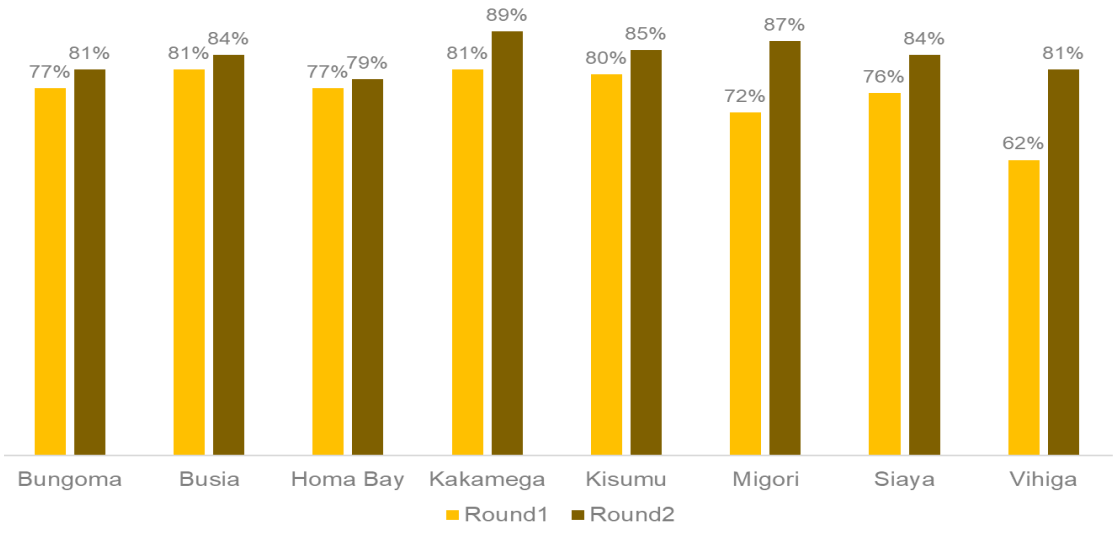
Source register/ summary form	Counties							
	Bungoma	Busia	Homa Bay	Kakamega	Kisumu	Migori	Siaya	Vihiga
OPD register (MOH 204A)	100	100	96	97	100	96	97	100
Monthly report (MOH 705A)	100	100	79	100	100	96	97	100
Laboratory register (MOH 240)	93	86	69	74	43	83	74	53
Laboratory summary form (MOH 706)	100	100	54	91	57	78	84	89
Daily activity register	100	100	83	97	100	100	97	100
Malaria commodity form	97	100	88	89	100	100	97	100

Figure 7d. Percentage Availability of Registers and Summary Forms in mRDQA Round 2

Source register/ summary form	Counties							
	Bungoma	Busia	Homa Bay	Kakamega	Kisumu	Migori	Siaya	Vihiga
OPD register (MOH 204A)	100	100	100	100	100	100	100	100
Monthly report (MOH 705A)	97	100	100	100	100	100	100	100
Laboratory register (MOH 240)	73	91	60	58	69	92	85	100
Laboratory summary form (MOH 706)	86	95	60	71	69	92	69	100
Daily activity register	100	100	95	97	100	100	100	100
Malaria commodity form	100	100	100	100	95	100	100	100

Improvements were observed in all eight lake endemic counties between the two mRDQA rounds in the county weighted average scores across all the data quality dimensions (see Figure 7e).

Figure 7e. County Weighted Average Scores for Malaria Data Quality



Key challenges to SM&E

- Inadequate availability of MOH registers that capture malaria data, including the outpatient registers and summary forms.
- Slow transition from ICD-10 to ICD-11, limiting capture of inpatient malaria data.
- Change in county leadership and structures following the 2022 general elections that disrupted implementation of planned activities.
- Staff turnover and attrition among trained SM&E mentors.

PMI plans to support the following activities with remaining FY 2023 and FY 2024 funds:

- Finalizing the national malaria surveillance guidelines;
- Supporting the Global Fund Cycle 7 grant-making process and incorporating findings from the malaria subnational tailoring exercise;
- Printing and disseminating malaria data documentation job aids;
- Finalizing and disseminating the malaria elimination readiness assessment report;
- Disseminating findings of the synthesis of malaria transmission risk with stakeholders at the quarterly SME CoE meeting;
- Conducting the 2024 health-facility assessment planned for January/February 2024;
- Conducting the end-term evaluation of KMS 2019–23;
- Developing the new KMS and monitoring and evaluation plan;
- Providing training on ICD-11 and the in-patient discharge summary; and
- Implementing the 2024 post-mass long-lasting Insecticide-treated net survey following the 2023/2024 ITN campaign.

8.3. Plans and Justification with FY 2024 Funding

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

With FY 2024 funding, PMI will:

- Provide logistical and technical support for the 2025 Kenya MIS. This activity will be co-funded by PMI and the Global Fund and led by the MOH and Kenya National Bureau of Statistics.The annual nationwide malaria health facility assessment will be conducted by the DNMP with funding support from the Global Fund. PMI support is subject to further approval.
- Provide continued support at the county and national level for the implementation of the malaria health management information system (HMIS), including
    - Conducting a data review and analysis through quarterly review meetings;
    - Automating national and county malaria information products;
    - Subcounty and county health offices performing routine data quality monitoring;
    - Increasing availability and use of inpatient data by supporting migration from ICD-10 to ICD-11; and
    - Delivering data analytics and visualizations and strengthening the Community Health Information System (eCHIS), and leveraging the HMIS-strengthening efforts supported by USAID, the Global Fund, and the Kenyan government.

PMI will provide technical assistance to the DNMP and the four targeted counties (mentioned above) in their efforts toward malaria elimination, including defining country requirements for enhanced surveillance in elimination settings and establishing a case-based surveillance system for elimination settings.

Table 6. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic Health Survey			X			
	Malaria Indicator Survey (MIS)	X					P
	Post Mass LLIN Survey			X		P	
	Multiple Indicator Cluster Survey (MICS)						
	EPI survey						
Health Facility Surveys	Service Provision Assessment						
	Service Availability Readiness Assessment survey						
	Health Facility Assessment			X	P	P	P
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies	X	X	X		P	
	Support to Parallel Malaria Surveillance System						
	Support to HMIS	X	X	X	X	P	P
	Support to Integrated Disease Surveillance and Response (IDSR)	X*	X*	X*	X*	P*	P*
	Electronic Logistics Management Information System (eLMIS)	X	X	X	X	P	P
	Malaria Rapid Reporting System						
Other	EUV						
	School-based Malaria Survey						
	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey			X			
	Malaria Impact Evaluation						
	Entomologic Monitoring Surveys	X	X	X	X	P	P

*Non-PMI funded activities; HMIS: health management information system; P: planned activities; X: completed activities.

9. Operational Research and Program Evaluation

9.1. PMI Goal and Strategic Approach

PMI contributes technical and logistical support for the DNMP's biennial operational research prioritization exercise and technical inputs to a broad array of academic-, private-, public-, and other donor-implemented operational research activities via the DNMP's quarterly operational research CoE. However, PMI has not directly supported operational research in Kenya in recent years and does not plan to directly support operational research projects with FY 2024 funding. For program evaluation, PMI 2021 funds supported the mid-term evaluation of KMS 2019–2023, and recommendations will be combined with the FY 2022-funded end-term evaluation to inform the development of the new Kenya Malaria Strategy at the end of calendar year 2023.

9.2. Recent Progress (April 2022–March 2023)

PMI provided technical and logistic support to the DNMP's operational research workshop in April 2022.

PMI has not supported any ongoing or recently completed operational research or program evaluations.

Table 7. Non-PMI-Funded Operational Research/Program Evaluation Studies Planned/Ongoing in Kenya

Source of Funding	Implementing institution	Research Question/Topic	Current Status/Timeline
Bill & Melinda Gates Foundation	Swiss Tropical and Public Health Institute	Subnational tailoring of malaria interventions	Ongoing; ending 2023
Bill & Melinda Gates Foundation/Global Fund	KEMRI–Wellcome Trust, MOH	Malaria molecular surveillance for HRP2/3 deletions and antimalarial resistance markers	Ongoing
Bill & Melinda Gates Foundation/USAID Innovative Vector Consortium	KEMRI–Wellcome Trust, LSTM, CDC	Attractive targeted sugar baits evaluation	Ongoing; ending 2024
Unitaid	KEMRI–Wellcome Trust, University of Notre Dame, CDC	Spatial repellents evaluation	Ongoing; ending 2024
WHO	CDC, WHO	RTS,S vaccine program evaluation	Ongoing; ending TBD
Medicines for Malaria Venture	Strathmore University, Kenya MOH/DNMP, Kenya Medical Supplies Authority, Migori and Homa Bay Counties	Pilot of multiple first-line therapy	Ongoing; ending 2023

CDC = Centers for Disease Control; DNMP: Division of National Malaria Program; KEMRI: Kenya Medical Research Institute; MOH: Ministry of Health; RTS,S: RTS,S/AS01; WHO = World Health Organization.

9.3. Plans and Justification with FY 2024 Funding

No operational research/program evaluation activities are planned with FY 2024 funding.

10. Capacity Strengthening

10.1. PMI Goal and Strategic Approach

PMI Objective in Support of the DNMP

PMI funds the DNMP's overall program management; coordination with multisectoral stakeholders; strengthening of linkages between national and county governments; and ensuring that DNMP staff have the skills, capacity, and operating environment to effectively fulfill their mandate for successful implementation of KMS 2019–2023. PMI also supports the DNMP's domestic resource mobilization efforts by strengthening capacity for program-based budgeting at the national and county levels and by costing various interventions and county annual work plans. Additional support for the DNMP and county staff is provided through the advanced and frontline training programs of the Field Epidemiology Laboratory Training Program (FELTP). PMI funds a WHO national program officer to provide technical recommendations to the DNMP. PMI also supports the DNMP's approach to establishing elimination structures in four select counties.

DNMP's Objective

Objective 6 of KMS 2019–2023 is to provide leadership and management for optimal implementation of malaria interventions at all levels and to achieve all objectives by 2023. This objective, which will be updated in KMS 2024–2028, addresses leadership, partnerships, and coordination at all levels to provide a comprehensive strategy implementation environment and the resources necessary to achieve the stategy's goals and objectives.

DNMP's Approach

To achieve the sixth objective of KMS 2019–2023, the DNMP is prioritizing the following activities:

- Aligning malaria governance and legislation to constitutional mandates and core functions;
- Strengthening partnerships and coordination for malaria program management;
- Strengthening capacity for malaria programming at the national and country level;
- Strengthening resource mobilization initiatives for malaria;
- Enhancing malaria commodity security at all levels; and
- Strengthening the use of supply chain data for decision making.

The DNMP is also providing leadership and coordination to ensure malaria prevention and control services are delivered equitably and efficiently at all health facilities in malaria endemic and epidemic regions of the country. The KMS 2019–2023 outlines the structure, terms of reference, and membership for the malaria health sector working committee and CoEs, whose roles include technical, operational, and strategic oversight of KMS 2019–2023. The DNMP has appointed focal persons responsible for each objective to work collaboratively with stakeholders as part of the CoEs. Through these structures, the DNMP seeks to:

- Strengthen staff capacity through technical assistance offered in collaboration with other malaria partners, including through attendance and presentation at selected malaria conferences;
- Improve efficiency and absorption in the use of earmarked resources and advocate for sustainable investment of malaria interventions at the national and county level;
- Provide a safe and secure environment for meetings and interactions with stakeholders, and leverage technology for communication and data acquisition;
- Strengthen linkages between national and county levels of government to ensure standardized and harmonized policy implementation and delivery of malaria services; and
- Coordinate with other ministries and agencies, including regulatory bodies, the private sector, universities, civil society organizations, and relevant ministries to advance the malaria agenda and harmonize prevention and control efforts.

10.2. Recent Progress (April 2022–March 2023)

PMI-supported capacity-strengthening efforts and progress made are reflected in several technical areas across this document. Additional activities not previously listed include:

- Provided technical assistance to the eight focus counties to develop the health section of the county integrated development plans and annual work plans;
- Supported counties in the development of malaria fact sheets to inform county leadership on the progress in the fight against malaria, which were used as a tool to advocate for county authorities to increase the malaria budget allocation;
- Supported malaria endemic counties with the finalization and enactment of the County Health Services Bill, Community Health Services Bill, and Facility Improvement Fund bill, which aim to ring fence funds to support malaria services and payment of stipends for CHVs;
- Supported two residents of FELTP to strengthen technical and scientific capacity at the national and county level; and
- Supported one WHO national program officer, who contributed to the subnational tailoring; provided technical input for the quarterly CoEs across all technical focus areas and the TES; and coordinated engagement of WHO technical experts to facilitate consensus-building discussions on policy issues, including RDT procurement specifications.

To continue building on investments in capacity strengthening, PMI plans to support the following activities for the remainder of FY 2023 and FY 2024:

- Strengthen management and technical capacity of newly assigned national- and county-level malaria program staff to perform their core functions as outlined in KMS 2019–2023;
- Monitor and analyze data to support budget expansion and absorption for malaria program activities at the national and county level;
- Finalize the investment case for malaria at the national level, including activity-based costing and activity-based management;
- Support the costing and financial narrative of the Global Fund Grant Cycle 7 proposal.
- Support the end-term review of KMS 2019–2023 and the development of KMS 2024–2028, including the financial sustainability plan;
- Support the MOH to implement and monitor primary health care implementation in select counties (Kakamega);
- Support public financial management assessments in the lake endemic counties to identify capacity gaps in planning, budget formulation, execution, monitoring, and training staff to analyze health expenditures.
- Support the USAID Mission's private sector health strategy to address policy and legislative barriers that hinder access to strategic program health services, including malaria, in the private sector, and strengthen government oversight of and engagement with the private health care market to improve quality of care (test and treat) in the private sector through existing regulatory platforms/frameworks;
- Strengthen technical and scientific capacity at the national and county levels through engagement of FELTP staff in malaria data management and interpretation to inform prioritization of malaria interventions in the counties;
- Train county and subcounty staff in malaria-focused epidemiology, surveillance, data management, and analysis through the FELTP Frontline Program—a three-month course that allows residents of the program to apply intensive classroom learning to mentored on-the-job projects, with proven impact on various aspects of malaria service delivery; and
- Continue support for the WHO national program officer, who will provide technical assistance to CoEs, end-term review, and planning for the new strategic plan during this reporting period.

10.3. Plans and Justification with FY 2024 Funding

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

PMI will continue to support capacity-strengthening activities as described in the recent progress section and elimination activities as described in the SM&E section. In addition, with the return of the Peace Corps to Kenya for the first time since 2014, PMI will once again support up to three Peace Corps volunteers to focus on malaria in Western Kenya, starting with FY 2023 MOP reprogramming and FY 2024 MOP funding.

11. Staffing and Administration

A minimum of five health professionals oversee PMI in Kenya. 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 local experts hired by USAID, known as *foreign service nationals.* The PMI interagency team works together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners.

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	51,525,576	52,504,410	53,436,407
Total population at risk for malaria	37,128,732	36,753,087	37,405,485
PMI-targeted population at risk for malaria	37,128,732	36,753,087	37,405,485
Population targeted for ITNs	37,128,732	25,640,985	26,263,979
Continuous distribution needs			
Channel 1: ANC	1,167,048	885,945	916,846
Channel 1: ANC type of ITN	PBO and single pyrethroid	Dual active ingredients	Dual active ingredients
Channel 2: EPI	1,120,290	818,782	847,757
Channel 2: EPI type of ITN	PBO and single pyrethroid	Dual active ingredients	Dual active ingredients
Channel 3: School	-	-	-
Channel 3: School type of ITN			
Channel 4: Community	-	-	-
Channel 4: Community type of ITN			
Channel 5: Type of ITN			
Estimated total need for continuous channels	2,287,338	1,704,727	1,764,604
Mass campaign distribution needs			
Mass distribution campaigns	17,938,268	0	0
Mass distribution ITN type	PBO and single pyrethroid		
Estimated total need for campaigns	17,938,268	0	0
Total ITN need: Continuous and campaign	**20,225,606**	**1,704,727**	**1,764,604**
Partner contributions			
ITNs carried over from previous year	2,446,777	959,439	754,712
ITNs from government	0	0	0
Type of ITNs from government			
ITNs from Global Fund campaign	11,215,001	0	0

Type of ITNs from Global Fund	Single pyrethroid		
ITNs from other donors	0	0	0
Type of ITNs from other donors			
ITNs planned with PMI funding campaign	4,064,254	-	-
ITNs planned with PMI funding routine	800,000	1,500,000	1,500,000
Type of ITNs with PMI funding	PBO	Dual active ingredients	Dual active ingredients
Total ITNs contribution per calendar year	**18,526,032**	**2,459,439**	**2,254,712**
Total ITN surplus (gap)	**959,439**	**754,712**	**490,108**
Total ITN surplus (gap) mass	**(2,659,013)**		

Table A-2. RDT Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	51,525,576	52,504,410	53,436,407
Population at risk for malaria	37,128,732	36,753,087	37,405,485
PMI-targeted population at risk for malaria	37,128,732	36,753,087	37,405,485
RDT needs			
Total number of projected suspected malaria cases	13,180,272	13,919,489	13,937,242
Percent of suspected malaria cases tested with an RDT	65%	68%	70%
RDT needs (tests)	**8,567,177**	**9,395,655**	**9,756,069**
Needs estimated based on a combination of health management information system and consumption data			
Partner contributions (tests)			
RDTs from government	2,416,111	3,000,000	3,000,000
RDTs from Global Fund	3,137,837	0	4,000,000
RDTs from other donors	0	0	
RDTs planned with PMI funding	0	8,000,000	5,500,000
Total RDT contributions per calendar year	**5,553,948**	**11,000,000**	**12,500,000**
Stock balance (tests)			
Beginning balance	5,970,804	2,957,575	4,561,920
- Product need	8,567,177	9,395,655	9,756,069
+ Total contributions (received/expected)	5,553,948	11,000,000	12,500,000
Ending balance	**2,957,575**	**4,561,920**	**7,305,851**
Desired end of year stock (months of stock)	9	9	9
Desired end of year stock (quantities)	6,425,383	7,046,741	7,317,052
Total surplus (gap)	**(3,467,807)**	**(2,484,821)**	**(11,201)**

Table A-3. ACT Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	51,525,576	52,504,410	53,436,407
Population at risk for malaria	37,128,732	36,753,087	37,405,485
PMI-targeted population at risk for malaria	37,128,732	36,753,087	37,405,485
ACT needs			
Total projected number of malaria cases	4,217,687	4,315,041	4,181,173
Total ACT needs (treatments)	**4,238,545**	**4,313,895**	**4,169,104**
Total need adjusted to reflect a 20% increment (treatments)	**5,086,254**	**5,176,674**	**5,002,925**
Needs estimated based on consumption data			
Partner contributions (treatments)			
ACTs from government	0	1,600,000	2,000,000
ACTs from Global Fund	2,450,000	3,310,000	1,000,000
ACTs from other donors	0	0	0
ACTs planned with PMI funding	320,010	0	1,000,000
Total ACT contributions per calendar Year	**2,770,010**	**4,910,000**	**4,000,000**
Stock balance (treatments)			
Beginning balance	7,409,802	5,093,558	4,826,884
- Product need	5,086,254	5,176,674	5,002,925
+ Total contributions (received/expected)	2,770,010	4,910,000	4,000,000
Ending balance	**5,093,558**	**4,826,884**	**3,823,959**
Desired end of year stock (months of stock)	9	9	9
Desired end of year stock (quantities)	3,178,909	3,235,421	3,126,828
Total surplus (gap)	**1,914,649**	**1,591,462**	**697,131**

Table A-4. Inj. Artesunate Gap Analysis Table

Calendar Year	2023	2024	2025
Injectable Artesunate Needs			
Projected number of severe cases	173,336	178,223	171,826
Projected number of severe cases among children < 5 years	69,335	71,289	68,730
Average number of vials required for severe cases among children < 5 years	4	4	4
Projected number of severe cases among children 5–15 years	62,401	64,160	61,857
Average number of vials required for severe cases among children 5–15 years	5	5	5
Projected number of severe cases among adults ≥15 years	41,601	42,773	41,238
Average number of vials required for severe cases among adults ≥15 years	9	9	9
Total injectable artesunate needs (vials)	**963,754**	**990,913**	**955,347**
Total need adjusted to reflect a 20 percent increment (vials)	**1,156,505**	**1,189,096**	**1,146,416**
Needs estimated based on consumption data			
Partner contributions (vials)			
Injectable artesunate from government	344,300	500,000	500,000
Injectable artesunate from Global Fund	0	490,000	400,000
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	500,000	300,000	300,000
Total injectable artesunate contributions per calendar year	**844,300**	**1,290,000**	**1,200,000**
Stock balance (vials)			
Beginning balance	1,056,483	744,278	845,183
- Product need	1,156,505	1,189,096	1,146,416
+ Total contributions (received/expected)	844,300	1,290,000	1,200,000
Ending balance	**744,278**	**845,183**	**898,766**
Desired end of year stock (months of stock)	9	9	9
Desired end of year stock (quantities)	722,816	743,185	716,510
Total surplus (gap)	**21,463**	**101,998**	**182,256**

Table A-5. SP Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	51,525,576	52,504,410	53,436,407
Total population at risk for malaria	37,128,732	36,753,087	37,405,485
PMI-targeted population at risk for malaria	37,128,732	36,753,087	37,405,485
SP needs			
Total number of pregnant women	476,674	495,807	510,001
Percent of pregnant women expected to receive IPTp1	71%	74%	77%
Percent of pregnant women expected to receive IPTp2	59%	62%	65%
Percent of pregnant women expected to receive IPTp3	47%	50%	53%
Percent of pregnant women expected to receive IPTp4	28%	31%	34%
Total SP needs (doses)	**977,181**	**1,075,900**	**1,167,902**
Needs estimated based on other (specify in comments)			
Partner contributions (doses)			
SP from government	1,200,000	1,333,333	1,400,000
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	**1,200,000**	**1,333,333**	**1,400,000**
Stock balance (doses)			
Beginning balance	291,788	514,607	772,040
- Product need	977,181	1,075,900	1,167,902
+ Total contributions (received/expected)	1,200,000	1,333,333	1,400,000
Ending balance	**514,607**	**772,040**	**1,004,137**
Desired end of year stock (months of stock)	9	9	9
Desired end of year stock (quantities)	732,886	806,925	875,927
Total surplus (gap)	**(218,279)**	**(34,886)**	**128,211**