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Uganda

Malaria Operational Plan FY 2023

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This FY 2023 Malaria Operational Plan (MOP) has been approved by the Acting U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans relies on the final FY 2023 appropriation from U.S. Congress. Any updates will be reflected in revised postings.

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

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ABBREVIATIONS

ACT	Artemisinin-based Combination Therapy
AL	Artemether-lumefantrine
ANC	Antenatal Care
ASAQ	Artesunate-amodiaquine
CDC	Centers for Disease Control and Prevention
CHEW	Community Health Extension Worker
DHIS2	District Health Information System 2
DHMT	District Health Management Teams
EPI	Expanded Program on Immunization
FCDO	Foreign Commonwealth & Development Office (UK)
FY	Fiscal Year
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
HMIS	Health Management Information System
iCCM	Integrated Community Case Management
IDRC	Infectious Diseases Research Collaboration
IPTp	Intermittent Preventive Treatment for Pregnant Women
IRS	Indoor Residual Spraying
ITN	Insecticide-treated Mosquito Net
LLIN	Long-lasting Insecticide-treated Net
MIP	Malaria in Pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
NMCD	National Malaria Control Division
OR	Operational Research
PBO	Piperonyl Butoxide
PE	Program Evaluation
PMI	U.S. President's Malaria Initiative
PNFP	Private Not-for-Profit
RDT	Rapid Diagnostic Test
SBC	Social and Behavior Change
SMC	Seasonal Malaria Chemoprevention
SM&E	Surveillance, Monitoring, and Evaluation
SP	Sulfadoxine-pyrimethamine
TES	Therapeutic Efficacy Study
TWG	Technical Working Group
UMRESP	Uganda Malaria Reduction and Elimination Strategic Plan
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development

VCD	Vector Control Division
VHT	Village Health Team
WHO	World Health Organization

EXECUTIVE SUMMARY

To review specific country context for Uganda, please refer to the Country malaria profile, which provides an overview of the country malaria situation, key indicators, the National Malaria Control Division's (NMCD) strategic plan, and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, the U.S. President's Malaria Initiative (PMI) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, End Malaria Faster, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in sub-Saharan Africa and three programs across the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Uganda began implementation as a PMI partner country in fiscal year (FY) 2006.

Rationale for PMI's Approach in Uganda

Progress in malaria control in Uganda has been remarkable but has recently stalled, in line with global trends. The Uganda Malaria Reduction and Elimination Strategic Plan (UMRESP) 2021–2026 aims to re-ignite progress by addressing programmatic gaps, using a stratified approach to deploy tailored interventions and mitigate emerging threats. The UMRESP and PMI's strategy are well aligned. PMI/Uganda will contribute to their shared objectives by focusing on the high burden regions of Acholi, Busoga, Karamoja, Lango, and West Nile, prioritizing interventions at the community and household levels, deploying new available tools and generating evidence for additional ones, and investing in more local partners. PMI will scale down indoor residual spraying (IRS) activities and use resulting savings to implement this new direction.

Overview of Planned Interventions

The proposed FY 2023 PMI funding for Uganda is $31 million. PMI will support the following intervention areas with these funds:

1. Vector Monitoring and Control

PMI supports the continuous distribution of insecticide-treated mosquito nets (ITNs) at antenatal care (ANC) and Expanded Program on Immunization (EPI) clinics and provides operational support to mass net campaigns. PMI will continue to conduct entomological monitoring in the same 19 districts to collect and use data on IRS insecticide residual efficacy, vector bionomics, and insecticide resistance. When it comes to ITNs, PMI will transition from procuring piperonyl butoxide nets to the newer dual active ingredient nets to mitigate insecticide resistance. After nine years of

supporting IRS in 10 eastern districts, PMI will scale down this spray program to five to seven districts to ensure sufficient funds are available to focus on other priorities.

2. Malaria in Pregnancy

In addition to procuring ITNs and distributing them at ANC clinics, PMI supports the NMCD to distribute a minimum of three doses of intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP). PMI also advocates for the Government of Uganda to continue procuring SP, promote early ANC attendance through social and behavior change (SBC) efforts, and strengthen ANC provider capacity to optimize the quality of services. PMI will maintain its malaria in pregnancy (MIP) support and will expand its reach by systematically addressing barriers to IPTp uptake and other MIP services. To reach this goal, PMI will target poorly performing communities to implement targeted SBC strategies in line with the Mass Action Against Malaria initiative. PMI will also expand the number of facilities that conduct outreach events and will pilot community pregnancy mapping by community health workers, locally known as village health teams (VHTs), who will report this information back to health facilities to facilitate outreach.

3. Drug-Based Prevention

PMI does not currently support seasonal malaria chemoprevention (SMC) in Uganda. However, the NMCD is conducting an SMC pilot in the Karamoja region, in collaboration with the Malaria Consortium and with funding from the Bill and Melinda Gates Foundation. Preliminary results show good coverage and protective effect, and PMI is closely following the study's progress.

4. Case Management

PMI promotes quality case management in public and private health facilities and procures commodities for private not-for-profit (PNFP) facilities. PMI also supports integrated community case management (iCCM) in 19 high burden districts and is contributing to the pilot roll-out of a paid cadre of health workers in charge of supervising VHTs. At the national level, PMI will continue to provide technical assistance for the development and updating of clinical guidelines, for technical working groups, and laboratory strengthening. PMI will also fill all commodity gaps for PNFPs, implement system strengthening interventions to incentivize quality case management and reporting among private for-profit health facilities, and establish evidence-based approaches such as mapping of for-profit facilities to track licensure and performance. iCCM scale-up will be a priority for PMI, including increased supervision frequency and a programmatic pilot to evaluate the feasibility of expanding these services to children up to 14 years old. PMI will also implement a Therapeutic Efficacy Study in 2022.

5. Health Supply Chain and Pharmaceutical Management

PMI provides technical assistance to the NMCD and district health management teams (DHMTs) to improve the supply chain for malaria commodities, properly quantify needs, acquire accurate stocks, and minimize stockouts. PMI will continue to support current activities, including forecasting and supply planning, management information systems, warehousing and distribution, delivery of commodities to the last mile, and end use verification surveys.

6. Social and Behavior Change

PMI will continue to support social and behavior change (SBC) activities that promote uptake of all key malaria interventions, with a focus on correct and consistent net use, prompt care-seeking for fever, and early and frequent ANC attendance. PMI will seek to collect more data on factors that affect these behaviors both from the community and provider perspective, and will continue to bolster capacity for the design, implementation, and evaluation of SBC activities at all levels of the health system.

7. Surveillance, Monitoring, and Evaluation

In Uganda, PMI and the NMCD prioritize surveillance, monitoring, and evaluation (SM&E) interventions that address the challenges of data underutilization; low private sector reporting; and inadequate epidemic prevention, preparedness, and response. With FY 2023 funding, PMI will increase investments to strengthen surveillance at lower-level public and private health facilities and in the community, and will increase the frequency of data review meetings from quarterly to monthly, to facilitate consistent reporting and data use. This support will focus on high burden regions, while national level interventions will aim to close system gaps for surveillance strengthening.

8. Operational Research and Program Evaluation

PMI supports the NMCD to continuously inform malaria control strategies through the testing of new tools and approaches, as well as the evaluation of programmatic results. PMI collaborates with other partners with complementary scopes and resources to implement the country's operational research (OR) agenda and answer shared priority questions. No OR or program evaluation (PE) is planned under this Malaria Operational Plan (MOP), but PMI will continue to leverage the strong research capacity in Uganda and support research funded through other sources.

9. Capacity Strengthening

PMI's capacity strengthening strategy supports a whole of society, multi-sectoral approach to improve health service delivery. Future support will focus on strengthening the capacity of local partners through direct support or sub-awards, with a focus on strengthening financial management. PMI will also provide small grants to community service organizations with the goal of helping build leadership and accountability.

I. CONTEXT AND STRATEGY

1. Introduction

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

2. U.S. President's Malaria Initiative

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

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

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

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

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

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

3. Rationale for PMI's Approach in Uganda

3.1. Malaria Overview for Uganda

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

Uganda's entire population is considered at risk for malaria, with 95 percent in areas of stable transmission and 5 percent in areas of unstable transmission. Transmission varies significantly among regions, with the northern regions of Acholi, Karamoja, Lango, and West Nile, as well as the eastern region of Busoga, carrying the highest burden. *Plasmodium falciparum* accounts for 97 percent of malaria infections, and the principal malaria vectors are *An. funestus* s.l. and *An. gambiae* s.l.

Uganda has made significant progress in malaria control in partnership with PMI, the Global Fund, the UK Foreign Commonwealth & Development Office (FCDO), research institutions, and other stakeholders. Nearly three-quarters (72 percent) of the population has access to bed nets, with an access:use ratio generally between 0.8 and 1; care-seeking for children under five years of age is 87 percent (Malaria Indicator Survey [MIS] 2019); 97 percent of malaria cases are confirmed with a diagnostic test; and non-adherence to test results (treatment of negative tests) dropped nationally from over 50 percent in 2017 to 10 percent in 2019, and 3 percent in PMI focus districts in 2021

(HMIS). Malaria prevalence in children under five years of age decreased from 45 percent in 2009 to 9 percent in 2019 (MIS 2019), and all-cause child mortality decreased from 128 to 64 deaths per 1,000 live births between 2006 and 2016 (Demographic and Health Survey [DHS] 2016), further reducing to 46 deaths per 1,000 live births in 2021 (Annual Health Sector Performance Report 2020/21).

Despite remarkable progress at the health facility level, community health services, which report 16 percent of malaria cases, have seen gaps in coverage, consistency, and reporting. Overall progress has stalled in line with global trends, with global incidence rates hovering around 230 cases per 1,000 population at risk, and global death rates have remained at around 60 deaths per 100,000 population at risk since 2015. Emerging challenges such as confirmed vector resistance to pyrethroids and organochlorines across the country and climate change exacerbate the stalled progress. Examples of the latter include increases in average temperatures in semi-arid areas, increases in the frequency of hot days, decreases in the frequency of cold days, more frequent and longer lasting droughts, and less predictable and less evenly distributed rainfalls. Rising temperatures and prolonged intermittent rains in the past three years, combined with a humid equatorial climate and numerous swamps throughout the country, are thought to contribute to recent upsurges in malaria cases. Despite investments in vector control and case management being relatively uninterrupted by COVID-19, there have been interruptions in service delivery, and malaria incidence per 1,000 population increased from 192 in 2017 to 292 in 2020, and to 302 in 2021 (Annual Health Sector Performance Report 2020/21).

The new Uganda Malaria Reduction and Elimination Strategic Plan (UMRESP) 2021–2025, which is the result of coordinated efforts among the National Malaria Control Division (NMCD), PMI, WHO, the Global Fund, and other strategic partners, aims to overcome these challenges and reduce malaria morbidity by 50 percent and mortality by 75 percent by 2025. This plan uses a stratified approach to ensure appropriate tailoring of interventions for the various epidemiologic contexts and has four objectives: universal coverage of quality services (including in the private sector), robust data management and use, behavioral change, and multisectoral collaboration for an enabling environment. The UMRESP also aims to move from malaria control to elimination in targeted districts with less than 5 percent malaria prevalence.

3.2. Key Challenges and Contextual Factors

The epidemiology of malaria continues to change due population growth, population movement, vector resistance to insecticides, and climate shifts which are leading to weather variability. The immediate result is the plateauing of progress since 2019, and more frequent epidemics in areas of unstable and low transmission such as in late 2021

into early 2022, affecting 40 districts, including IRS districts in the eastern region and those in the southwestern Kigezi region.

This stalled progress is exacerbated by chronic underfunding of the Ugandan health sector, contributing to a weak health system. The budget for the health sector has never reached the Abuja Declaration target of 15 percent of the national budget; in fact, it has declined from 8.9 percent in 2010 to 6.1 percent in 2021.

On the programmatic front, there are capacity gaps at the district and community levels. For example, the Division of Child Health, which leads the implementation of integrated community case management (iCCM), aimed to cover 79 percent of districts in 2020. However, only 59 percent of districts were reached in 2021, with significant issues related to service dependability and accountability. Quality of service at the community and lower-level health facilities, as well as at private health facilities, continues to suffer due to inadequate supply of commodities and lack of supportive supervision. Inadequate reporting to the District Health Information System 2 (DHIS2), suboptimal real-time quality data, and the limited capacity for data analysis and use are additional challenges shared by lower-level health facilities, community health services, and private-for-profit facilities.

COVID-19 brought additional challenges, including prolonged lockdowns, a slowdown of economic activity, limited transportation, and fear to seek health care, which further disrupted already fragile services due to inadequate coordination and leadership at the lower levels of government.

3.3. PMI's Approach for Uganda

Despite the challenges described above, the NMCD, PMI, the Global Fund, and other partners operating in the malaria space in Uganda are encouraged by their new coordinated plans to tackle persistent and emerging issues with innovative strategies and tools. The UMRESP 2021–2025 and PMI's 2021–2026 strategy are well aligned in their objectives of reducing malaria morbidity and mortality.

The UMRESP outlines tailored interventions which are based on different malaria epidemiological strata, ensuring that intervention packages are adapted to the particular characteristics and challenges of a given region. With this approach, the NMCD plans to reach at least 90 percent of vulnerable populations with quality preventive and curative services, with a focus on improving engagement with the private sector and scaling up community health services. PMI plans to operationalize this strategy in high burden areas with an emphasis on community interventions, private sector engagement, and the implementation of the Mass Action Against Malaria initiative's multi-sectoral approach to promote positive behavior change at the household and individual level.

In addition to improving the coverage of quality iCCM, the UMRESP proposes to strengthen community health systems through harnessing community-based behavioral change actions and strengthening HMIS data collection, quality, and use in facilities and at the community level. For PMI/Uganda, this translates into scaling up iCCM and supporting the development of a national Community Health Strategy. PMI planned to support the pilot of the Community Health Extension Worker (CHEW) Strategy, starting in May 2022, to improve community services, reporting, supply chain, and referral. The CHEWs for this pilot have all been recruited. Additionally, Uganda submitted a request to Gavi, the Vaccine Alliance, to provide catalytic funding for the payment of CHEWs and village health teams (VHTs), and this is under discussion. Meanwhile, the National Community Health Strategy is ready for final review and approval by the Ministry of Health (MOH).

Almost all strategic objectives in the UMRESP aim to increase the resiliency of malaria services by improving coverage and knowledge, establishing robust surveillance, and implementing a coordinated, multisectoral response. In addition to continuing to ensure continuity of services and adapting malaria SBC approaches to emerging threats, PMI will support this strategy by deploying new ITNs to mitigate insecticide resistance, and closely monitoring drug and insecticide resistance as well as ITN durability.

The sixth strategic objective of the UMRESP highlights the importance of local investment. Specifically, it promotes an enabling environment through strong human resources and institutional capacity, as well as improved governance, coordinated partnership, and multi-sectoral collaboration. PMI aims to complement this effort by increasing investments in local partners to 20 percent of its budget by 2027, and by engaging new private sector partners that are joining the fight against malaria, such as Zero Malaria Business Leadership Initiative, Malaria Free Uganda, and Rotary-led Malaria Partners International.

Strategies for innovation are outlined in the UMRESP, which calls for supporting learning, adaptation, innovation, best practices, and operational research (OR). PMI is leading in this area with the implementation of research such as the housing modification study, durability monitoring, and Therapeutic Efficacy Studies (TES), and is fully prepared to support the launch of the new malaria vaccine if doses become available for Uganda.

Where further evidence is needed to guide the implementation of interventions that are included in the UMRESP, PMI encourages the support of other partners whose scope is better suited to implementing investigational tools and approaches, for synergy of investments.

3.4. Key Changes in this MOP

PMI intends to gradually scale down IRS coverage with the goal of decreasing the IRS budget to $10 million in this MOP, and to shift resulting savings to community programming. This will include the scale-up of iCCM and an increase in the frequency of supervision and data review meetings from quarterly to monthly. PMI also plans to implement Mass Action Against Malaria initiative actions at the village and household level to shift mindsets from thinking of malaria as a low-risk disease that the government and partners have the responsibility to control, to viewing it as a serious threat to community and personal health and resilience, which every individual is responsible and accountable for. Similarly, PMI plans to strengthen accountability within local and community government structures and support national and local leadership for program planning, implementation, and reporting. Cost savings will also enable a shift from piperonyl butoxide (PBO) ITNs to dual active ingredient ITNs for continuous net distribution. PMI will also invest more in the private sector at the facility and health system levels and aims to increase investments in local partners from 10 percent to 20 percent by 2027.

II. OPERATIONAL PLAN FOR FY 2023

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

The UMRESP 2021–2025 promotes an integrated vector management strategy, including vector surveillance, insecticide resistance management, continuous and mass distribution of ITNs, geographically targeted IRS, and larval source management. PMI supports the use of all these interventions, with the exception of larval source management. For ITNs, PMI provides operational support for mass coverage campaigns in addition to supporting continuous distribution channels, including antenatal care (ANC) and Expanded Program on Immunization (EPI), which complements Global Fund and other donor support. PMI supports continuous ITN distribution in 63 percent of districts while the Global Fund supports 37 percent of districts. PMI has been implementing IRS in 10 high burden districts since 2015 in support of the NMCD strategy. PMI also provides technical assistance to the NMCD for Global Fund-supported IRS activities that will start in November 2022 in 13 districts. PMI supports entomological monitoring in 19 districts, which includes some or all of the following activities in each district: insecticide decay rate testing, bionomics monitoring, insecticide resistance monitoring, Centers for Disease Control and Prevention (CDC) bottle intensity bioassays, and oxidase enzyme testing.

Figure 1. Map of Vector Control Activities in Uganda, 2022

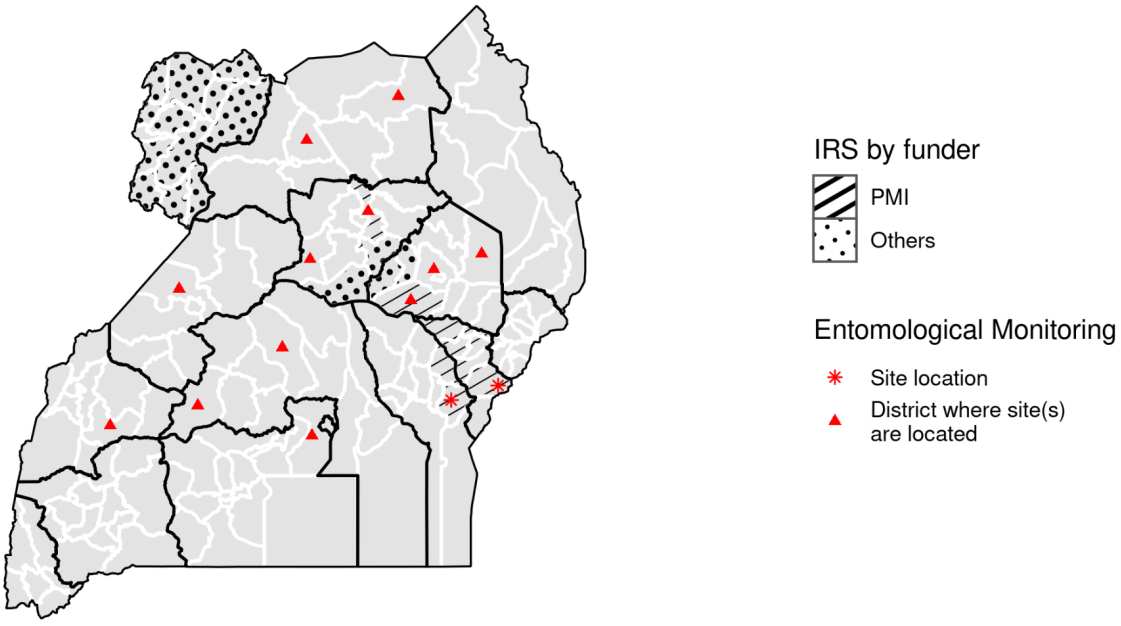
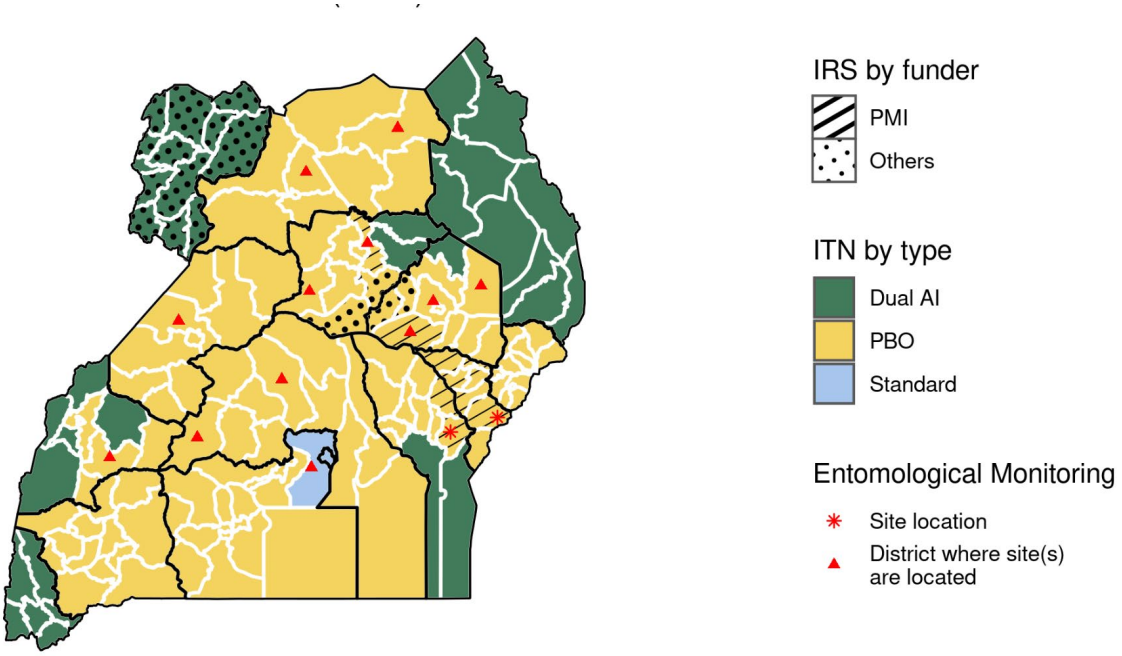


Figure 2. Map of Vector Control Activities in Uganda, 2024



1.2. Recent Progress (between March 2021 and March 2022)

PMI achieved the following results in the past year:

- Supported entomological monitoring in 29 sentinel sites in 22 districts, in collaboration with the MOH NMCD and Vector Control Division (VCD). Activities included monitoring for insecticide resistance, vector bionomics, insecticide residual efficacy, and ITN durability. For more information about entomological monitoring, please refer to the 2020 Entomological Report.
- Supported community-based entomology activities in the former FCDO-supported districts through on-the-job training of vector control officers, community volunteers (mosquito collectors), and through the supply of reagents. PMI also trained 12 vector control officers on data entry into the MOH's DHIS2 platform and supported data analysis at the district level for decision-making.
- Trained four VCD staff on various malaria vector molecular analyses and equipped the national-level insectary with laboratory equipment and reagents. In addition, four VCD staff, three NMCD staff, and five insectary technicians received on-the-job mentoring in insecticide resistance testing and advanced entomological techniques as well as on protocols for IRS quality assurance; species identification, preservation, and dissection; and laboratory assays.
- Trained entomological staff of the Infectious Diseases Research Collaboration (IDRC), a local research institution, on the use of bottle bioassays for

insecticide resistance monitoring in selected sentinel sites. PMI also provided reagents for IDRC's entomological activities.

- Supported the procurement and distribution of PBO ITNs to pregnant women in 63 percent of districts through continuous distribution via ANC and EPI, in line with national policy and guidelines. The Global Fund covered the remaining districts.
- Provided technical assistance and operational support, in collaboration with the NMCD, the Global Fund, and the Against Malaria Foundation, for the 2020–2021 ITN mass distribution campaign, which distributed three types of ITNs (standard, PBO, and dual active ingredient) nationwide.
- Supported ITN durability monitoring for PermaNet 3.0® and Royal Guard® ITNs distributed in 2020 as part of the mass campaign and completed the baseline and 12-month assessments.
- Supported national-level SBC activities to improve demand for ITNs, increase appropriate use, promote care, and mitigate against misuse. For more information, please refer to the SBC section.
- Developed IRS sustainability plans in the six districts where FCDO supported IRS, including strategies for epidemiological and entomological surveillance, good coverage of ITNs, case management with adequate availability of commodities, and robust SBC. PMI is now monitoring the implementation of these plans.
- Supported the planning, implementation, and evaluation of the seventh year of IRS in 10 districts during the period of March 1–27, 2021, covering 1,294,515 structures and protecting 4,466,905 people. For more information about IRS, please refer to the most recent End of Spray Report.
- Provided technical assistance to the NMCD, the Global Fund principal recipient, and district health offices for planning and training for the first Global Fund-sponsored spray campaign in Uganda, which will target 13 districts in 2022 over a two-year period. This will include nine districts in West Nile (Adjumani, Arua-Peri, Koboko, Madi-Okolo, Maracha, Moyo, Obongi, Terego, and Yumbe) and four former IRS districts in the east (Amolatar, Dokolo, Kaberamaido, and Kalaki), which will be sprayed with Fludora Fusion.
- Trained and engaged community members/other cadres in 10 PMI-funded districts to support IRS mobilization and spray activities.

1.3. Plans and Justification for FY 2023 Funding

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

1.3.1. Entomological Monitoring

Uganda will continue to support entomological monitoring activities as described in the Recent Progress section.

Summary of Distribution and Bionomics of Malaria Vectors in Uganda

As of 2021, the primary vector is *Anopheles gambiae* s.l. and the secondary vector is *Anopheles funestus*. Peak transmission season is from April to July. The preferred biting location of the primary vector is indoors, based on human-adjusted biting behavior index. The preferred resting location is indoors, and the peak biting time is from midnight to early morning, depending on location. The preferred hosts are humans. There is a higher abundance of *An. gambiae* s.l. over *An. funestus* throughout the country.

Status of Insecticide Resistance in Uganda

In 2021, *An. gambiae* s.l. remained susceptible to pirimiphos-methyl, chlorfenapyr, and clothianidin in all districts where tests were performed. *Anopheles gambiae* s.l. was resistant to the three pyrethroids tested (alpha-cypermethrin, deltamethrin, and permethrin) at all sites, though resistance intensity was highly variable. Synergist tests performed with PBO partly or fully restored pyrethroid susceptibility, indicating at minimum a partial role of mixed function oxidases in the resistance that was phenotypically expressed. Encouragingly, pre-exposure to PBO fully restored susceptibility in Apac, where PBO nets have been distributed. However, according to the LLIN [long-lasting insecticide-treated net] Evaluation in Uganda Project (LLINEUP), over a 25-month period, PBO content for two types of PBO nets declined by 58 to 55 percent, and subsequent mosquito deaths dropped from 100 percent to 78 and 46 percent. No susceptibility tests were conducted with *An. funestus* s.l. in 2021 due to difficulties collecting and rearing larvae in all eight study districts.

1.3.2. ITNs

PMI will support the procurement and distribution of dual active ingredient ITNs through continuous distribution via ANC and EPI. This is a shift from previous years where PMI focused on procurement of PBO ITNs. This shift is being made due to concerns over insecticide resistance and PBO durability, as well as a decrease in the cost of new dual active ingredient ITNs. The MOH plans to conduct the next net Universal Coverage Campaign from mid-2023 through early 2024, which will be supported with previous year’s MOP funds with technical and operational assistance. PMI will also continue to support SBC to improve use and care of ITNs and to minimize misuse. Given PMI's ongoing durability monitoring study that is focused on the newest nets available, including the dual active ingredient nets that PMI is planning to transition to, PMI does not plan to support additional durability monitoring for this MOP.

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

ITN Distribution in Uganda

In Uganda, ITNs are distributed via mass campaigns every three years. Continuous distribution channels are distribution to pregnant women at ANC and to children at EPI, in addition to school-based distribution to grades 1 and 4 every year. PMI and the Global Fund support ITN distribution at ANC/EPI, while the Global Fund alone will support school-based distribution of approximately 400,000 ITNs in Acholi and Lango regions. Schools were closed for the last two years (2020–2021) due to COVID-19. They re-opened in January 2022, and micro-planning is underway to distribute ITNs via schools in 2022/2023.

Uganda will transition to predominantly PBO ITNs for its 2023–2024 mass distribution campaign, though there are also plans to distribute some dual active ingredient nets in select districts, based on resistance data. Though PMI will fully cover the 63 percent of districts it is responsible for when it comes to continuous distribution via ANC and EPI, there is nonetheless an estimated gap of approximately 100,00 ITNs for the 37 percent of districts covered by the Global Fund in 2024. PMI will continue to discuss this with the Global Fund and other donors to ensure this gap is covered.

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

Table 1. Standard Durability Monitoring

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
November 2020	Apac	PermaNet® 3.0 & ®Royal Guard	February 2021	December 2021–January 2022	Planned	Planned
November 2020	Mubende	Permanet® 3.0 & Royal Guard®	February 2021	December 2021–January 2022	Planned	Planned

1.3.3. IRS

In calendar year 2024, PMI will support the planning, implementation, and evaluation of the ninth year of IRS using an organophosphate insecticide, unless new IRS insecticides currently in the pipeline come onto the market before then. PMI will also provide technical assistance to the NMCD and district health officers in Global Fund-supported spray districts. PMI plans to scale back its IRS program, which is currently the largest PMI-funded spray program in Africa, to ensure sufficient funds are available to focus on other priorities, including iCCM. As such, PMI will spray ten districts in 2022, seven to nine in 2023, and five to seven in 2024 with FY 2023 MOP funds. The exact

number of districts, structures, and people PMI will cover following IRS scale down is still under discussion with the implementing partner and the NMCD. PMI will work to ensure the districts where IRS is withdrawn will receive new nets in the 2023–2024 Universal Coverage Campaign and will continue entomological monitoring in these districts. The IRS withdrawal districts will also be targeted for iCCM and enhanced commodity support to manage any potential rebound. As PMI begins to scale back its IRS program, it will utilize lessons learned from its withdrawal over time, as well as lessons from FCDO's withdrawal, which was completed in 2022, to inform future implementation.

Table 2. PMI-Supported IRS Coverage

Calendar Year	District	Structures Sprayed (#)	Coverage Rate	Population Protected (#)	Insecticide
2021	Budaka, Bugiri, Butaleja, Butebo, Kibuku, Lira, Namutumba, Pallisa, Serere, and Tororo	1,046,384	93 percent	3,803,915	Neonicotinoid
2022	Budaka, Bugiri, Butebo, Butaleja, Kibuku, Lira, Namutumba, Pallisa, Serere, and Tororo	1,125,143	90 percent +	3,993,894	Neonicotinoid
2023	TBD 7-9 Eastern Uganda districts	800,000	90 percent +	3.2M	Pirimiphos-Methyl
2024*	TBD 5-7 Eastern Uganda districts	650,000	90 percent +	2.6M	Pirimiphos-Methyl

*Planned

IRS Insecticide Residual Efficacy in Uganda

Wall bioassays were conducted monthly following the 2021 IRS campaign at four sites. The monitoring for insecticide decay rate showed that Fludora Fusion on average stayed effective on sprayed surfaces between seven and nine months in Tororo and Bugiri, and between six and eight months in Serere and Lira, depending on the wall surface type sprayed.

2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

The UMRESP 2021–2025 aims for a minimum coverage of 85 percent for malaria in pregnancy (MIP) interventions, which consists of IPTp, use of ITNs, and early malaria diagnosis and prompt treatment. Uganda has adopted the WHO guidelines for IPTp, where treatment with sulfadoxine-pyrimethamine (SP) is given to pregnant women who test negative for HIV at every ANC contact from 13 weeks' gestational age, every four weeks until delivery. For pregnant women living with HIV, the recommended malaria prophylaxis is a daily dose of cotrimoxazole. PMI supports the NMCD to promote the provision of a minimum of three doses of IPTp. National guidelines recommend the

provision of the first dose of IPTp, iron, folic acid, and mebendazole at the first ANC contact between weeks 13-16, and at the second and third ANC contacts at 20 and 26 weeks, respectively. SP is recommended to be administered as directly observed therapy.

PMI continues to advocate for the Government of Uganda to procure low-dose folic acid (or iron and folate combination tablets, with 60 mg/day iron and 0.4 mg/day of folate) as recommended by the WHO. PMI supports the NMCD to ensure that SP is maintained on the free medicines list and is repackaged to fit health facility needs by local manufacturers. PMI also supports proper quantification of SP for health facilities nationwide as well as redistribution of SP among health facilities to balance stock levels.

In collaboration with the NMCD, the MOH Reproductive Health Division, and other development partners, PMI promotes stakeholder coordination through joint monthly technical working group (TWG) meetings at the national level, as well as district meetings, quarterly ANC sub-committee meetings, and biannual stakeholders' meetings. Together, these partners monitor the provision of quality services at ANC through integrated supportive supervision. PMI supports the NMCD and the Reproductive Health Division to strengthen capacity and quality assurance for MIP in public and private facilities and at the community level through the provision of updated guidelines, standard operating procedures, and tools; training; onsite mentorship and coaching; continuous medical education; and integrated supportive supervision. In addition to the distribution of ITNs at ANC, PMI supports the NMCD and district health management teams (DHMTs) to improve effective and timely case management, and early referral of severe malaria in pregnancy cases. PMI also engages health facility workers and VHTs in outreach activities to support early ANC contacts and to address cultural beliefs and practices that effectively delay women's first ANC visit, making it difficult to complete the recommended eight ANC contacts and six IPTp doses. For example, in some cultures, a pregnant woman presenting to ANC before the pregnancy is visible is considered abnormal.

Other remaining key challenges include the inadequate number of health workers at ANC facilities especially at lower levels where they are unable to conduct daily ANC clinics to provide greater flexibility for pregnant women. Moreover, some health facilities lack clean drinking water and cups to administer SP as directly observed therapy.

2.2. Recent Progress (between March 2021–March 2022)

Despite not having a mechanism to directly support MIP services at the health facility and community level for most of 2021, PMI continued supporting the MIP TWG and the NMCD coordination committee to promote the three-pronged MIP approach. PMI also continued distributing PBO ITNs to pregnant women in two-thirds of public sector health

facilities and 100 percent of PNFP facilities. Finally, PMI continued to analyze factors affecting late ANC attendance to be better equipped to address them.

HMIS 2020 shows that the IPTp 3+ (three dose) coverage reached 50 percent in PMI focus districts, outperforming the national average of 41 percent (MIS 2019).

2.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of MIP activities that PMI proposes to support in Uganda with FY 2023 funding: see www.pmi.gov/resources/malaria-operational-plans-mops.

PMI will continue to provide technical and financial support to the monthly MIP TWG meetings, as well as working with the USAID Family Health team, to support the MOH Division of Child Health and the quarterly ANC TWG for effective collaboration and implementation of the Reproductive, Maternal, Newborn and Child Health guidelines.

PMI will continue to support NMCD and DHMTs in implementing MIP in five high burden focus regions through integrated malaria management training of health workers and VHTs, as well as integrated supportive supervision and onsite mentorship, including MIP. PMI, in collaboration with NMCD, DHMTs, and health facility in-charge, will also continue supporting MIP grand rounds for pre-service training institutions and regional referral hospitals. In addition to distributing dual active ingredient nets at ANC and procuring cups and water for directly observed therapy, PMI will keep supporting continuous quality improvement of MIP services to increase the uptake of IPTp at every antenatal contact, and support DHMTs and facilities to improve the quality of reporting, analysis, and data use for IPTp 3+. PMI will also support the distribution of SP in smaller packages to better meet the needs of facilities requiring smaller quantities, and to ensure its continued availability.

PMI will use routine health facility data to identify villages and parishes with low numbers of pregnant women attending ANC and reach them with proven SBC interventions, Mass Action Against Malaria activities, and the Malaria Smart Household approaches to address both supply- and demand--side challenges, including provider attitudes, to minimize missed opportunities and improve IPTp coverage. In PMI focus regions, PMI plans to optimize the number of ANC contacts by expanding the number of facilities that engage in community outreach in poorly performing communities. This approach also addresses the limited availability of ANC clinic days in health facilities (usually just one or two days a week, resulting in crowding and long wait times for pregnant women). PMI, in coordination with DHMTs, will also support malaria point of service corners in ANC to minimize missed opportunities for IPTp. To complement community outreach, PMI will pilot the NMCD strategy of community pregnancy mapping in some of the districts offering iCCM. Trained and equipped VHTs will identify

pregnant women during their home visits and refer them for ANC. During their monthly data review meetings, these VHTs will also provide this list of pregnant women from the communities to health facility workers to facilitate their outreach activities.

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

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

3. Drug-Based Prevention

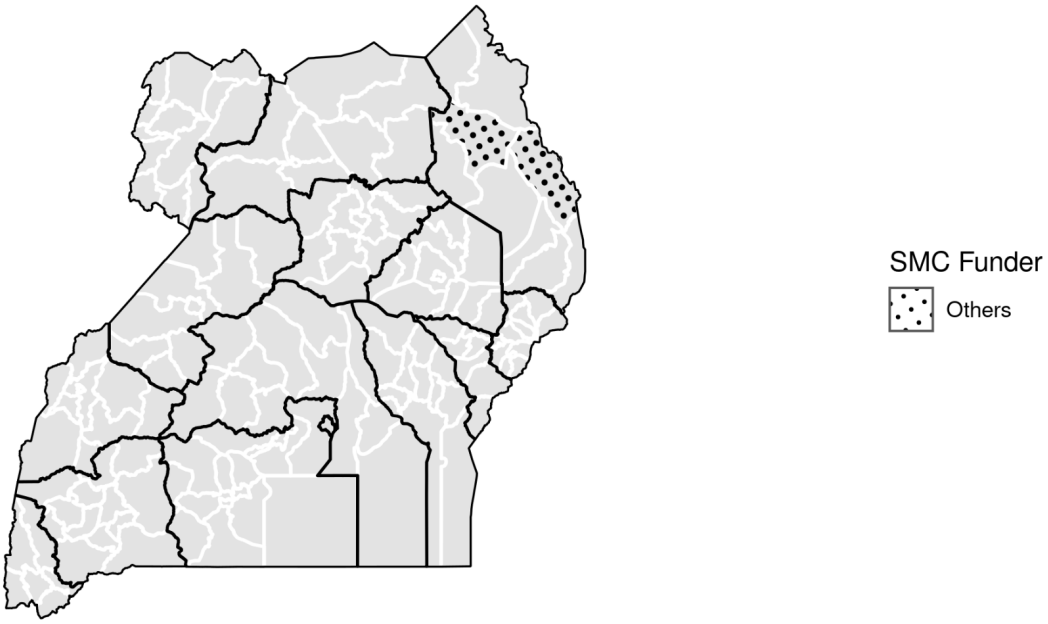
3.1. Seasonal Malaria Chemoprevention

PMI Goal and Strategic Approach

PMI does not currently support seasonal malaria chemoprevention (SMC) in Uganda. However, the NMCD, in collaboration with the Malaria Consortium, is carrying out a pilot SMC project, funded by the Bill and Melinda Gates Foundation, in the districts of Kotido and Moroto, located in Karamoja. Karamoja was selected for this pilot due to its rainfall pattern, which consists of one wet season from May to September. This rainy season is associated with 60 percent of Karamoja's malaria transmission and is thus similar to the malaria seasonality seen in the Sahel region. Karamoja also has the highest malaria prevalence in the country at 34 percent, and has faced persistent cultural and infrastructural barriers to the effective utilization of conventional malaria interventions. The objectives of the pilot are to assess the effect of SMC on malaria incidence, its feasibility and acceptability, and its cost effectiveness, and to monitor and document the prevalence of resistance markers for SP and amodiaquine (AQ) when used for SMC for a prolonged period at a large scale.

The pilot started in May 2021 and was scheduled to end in May 2022. It will be delivered through five cycles (once a month from May to September) of SP-AQ to children 3 to 59 months. Results are still being analyzed, but preliminary findings show coverage similar to what was seen in the Sahel, good acceptability, and good protective effect of SP-AQ. The NMCD plans to scale up SMC implementation to all districts in Karamoja by 2023 if final pilot results support this. PMI is closely following progress to see if this pilot will lead to policy changes.

Figure 3. Map of SMC Implementation in Uganda



4. Case Management

4.1. PMI Goal and Strategic Approach

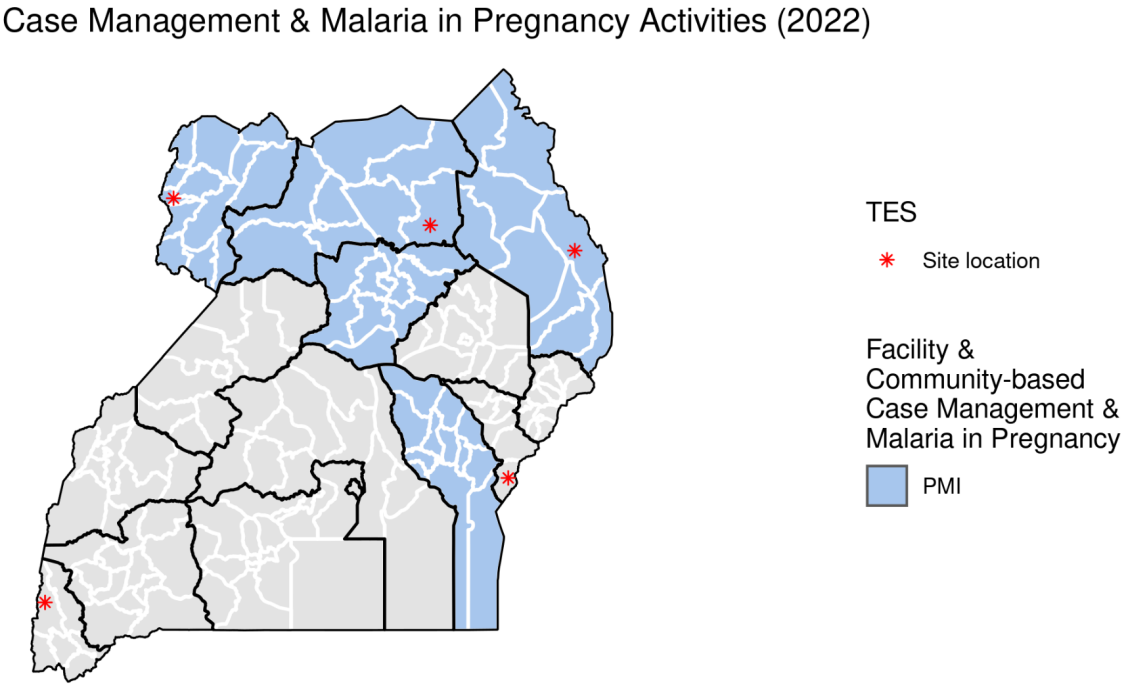
The UMRESP 2021–2025 strategic objective for case management is to accelerate access to malaria curative services to achieve universal coverage in all eligible populations by 2025. Specifically, the NMCD aims for 90 percent of malaria cases to be appropriately managed in public and private facilities and at the community level. The UMRESP includes an additional objective that specifically targets the private sector and aspires to enhance the quality of malaria services in at least 80 percent of private health facilities managing malaria, as well as to improve service delivery coordination, information management, and sustainability of the private health sector.

PMI supports all aspects of the NMCD strategy on case management. In five high burden regions, PMI works to strengthen quality diagnostics and case management at health facilities and in the community through training and supportive supervision. PMI also supports the UMRESP's second strategic objective by strengthening private sector capacity in coordination, advocacy, and resource mobilization, as well as the accreditation and regulatory environment. PMI supports nationwide procurement of malaria rapid diagnostic tests (RDTs), ACTs, and injectable artesunate for PNFP health facilities, which account for 14 percent of all facilities in Uganda.

Currently, PMI, the Global Fund, UNICEF, and other organizations support iCCM, together covering 46 percent of the country. PMI's contribution is in 19 high burden districts with the provision of training, supportive supervision, and facilitation for VHTs to

attend monthly data review meetings. PMI contributed to the Investment Case for Integrated Community Case Management of Childhood Illness 2021–2026 and supports its implementation. PMI currently does not pay VHTs but is supporting the ministry and development partners to roll out the CHEW strategy where the government will pay CHEWs a monthly stipend to provide supervision and mentorship to VHTs. PMI is collaborating with the USAID Family Health and Health Systems Strengthening teams to fund the pilot implementation of the CHEW strategy in four districts.

Figure 4. Map of Case Management, Community Health, and Malaria in Pregnancy Service Delivery Activities in Uganda



4.2. Recent Progress (between March 2021 and March 2022)

National-level Case Management Activities

Recent technical support for case management has stalled due to a PMI project transition. During the transition, central-level policy documents supported by PMI were handed over to the government. PMI staff also continued to be involved in TWGs and coordination meetings to support the NMCD and partners.

Commodities

- Supported the procurement and distribution of 2,003,325 malaria RDTs for PNFP health facilities, accounting for approximately 14 percent of national needs
- Supported the procurement and distribution of 1,505,220 ACTs for PNFP facilities, accounting for approximately 14 percent of national needs

- Supported the procurement of 500,000 and distribution of 302,465 vials of parenteral artesunate for PNFP health facilities, accounting for approximately 14 percent of national needs

Facility Level
Over the past five years, PMI built facility-level capacity to manage malaria in the midwestern, central, and West Nile regions and has now transitioned its support to the high burden regions of Acholi, Busoga, Karamoja, and Lango. PMI also maintained its support to West Nile due to persistently high prevalence and a desire to further understand and address unique socio-cultural determinants that are driving the malaria epidemic in this region. Most of the transitioning was realized during the past year during which PMI directly funded few routine facility case management activities. The PMI project transition included the handover of clinical guidelines and tools to health facilities with the aim of sustaining programmatic gains. PMI also supported the training of 2,439 health workers under USAID integrated health mechanisms.

Community Level
Although no routine community interventions were funded in the recent past, PMI staff engaged in activities to improve coordinated efforts to incentivize VHTs, and have been working toward the goal of paying them salaries in the future. PMI also contributed to the roll-out of the CHEW pilot project to gather evidence regarding the feasibility and potential impact of scaling up this approach.

To improve community reporting, PMI is working with the Family Health and Health Systems Strengthening teams to support a community-level reporting dashboard to monitor data completeness and accuracy at the district level. The dashboard has visuals which support improved utilization of community data. A community health workers registry, established to house a master list of community health workers, will be taken to scale in 15 districts and will include capacity assessments as well as geo-referencing to locate community health workers, and map out coverage within the population. There are plans to link this registry to the reporting system to track VHT reporting in the future.

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

4.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of case management activities that PMI proposes to support in Uganda with FY 2023 funding: see www.pmi.gov/resources/malaria-operational-plans-mops.

National-level Case Management Activities
PMI will continue to provide technical assistance for the development, updating, and dissemination of clinical guidelines, quality assurance manuals, and other relevant case management policy and training documents. In addition to supporting and participating in case management TWGs, PMI will support the NMCD to carry out WHO malaria microscopy certification and competency assessments, and to develop a malaria microscopy slide bank at the national Malaria Reference Laboratory. PMI will also implement systems strengthening interventions as outlined in the NMCD private sector strategy to incentivize quality case management in private health facilities.

Commodities
PMI will continue to fill all commodity gaps for PNFP health facilities.

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

Facility Level
In PMI's five high burden focus regions of Acholi, Busoga, Karamoja, Lango, and West Nile, PMI aims to maintain the gains achieved through prior support and will fund the training of health workers, on site mentorship, and supervision for the management of uncomplicated and severe malaria. PMI will support grand-rounds in regional universities and regional referral hospitals, as well as train pre-service personnel on national guidelines. When it comes to the private sector, in addition to training and supervision, PMI will implement evidence-based approaches such as mapping of private facilities to accurately enumerate licensed private sector providers and track their performance. Moreover, PMI will promote strong linkages between private facilities and regulatory structures, and incentive programs for their adherence to case management guidelines and reporting into the national health information system.

Community Level
At the community level, PMI will support iCCM scale-up in select target sub-counties in the Acholi, Busoga, Karamoja, Lango, and West Nile regions. PMI carried out a cost-effectiveness study considering the malaria burden, all-in cost per person reached, access to health facilities, and availability of key malaria treatments to determine priority districts to be targeted for iCCM.

Where VHTs cannot implement iCCM due to unavailability of non-malaria commodities, PMI will support stand-alone malaria community case management (mCCM), while continuing to advocate for the adequate supply of commodities for diarrhea and pneumonia. In selected districts, the Ministry of Education and the NMCD will collaborate to expand iCCM/mCCM efforts, targeting children up to 14 years old in a programmatic pilot that will test, treat and track febrile children in schools. The goal is to

evaluate the feasibility of covering children older than five years of age and to generate learnings towards scaling up this strategy.

PMI will increase the frequency of VHT supervision visits to monthly and will provide VHTs a transportation stipend, lunch allowance, and other non-monetary incentives, in addition to supporting the CHEW strategy. PMI will work with the NMCD to finalize the districts and the exact number of VHTs that will be supported for iCCM/mCCM.

In hotspot areas and upsurge situations, PMI will conduct active follow-up of severe malaria cases from health facilities and provide them, their families, and communities with comprehensive malaria prevention tools and SBC messages, as well as testing and treatment if positive for malaria. PMI also plans to second a community surveillance expert at the NMCD to strengthen data reporting and analysis at the community level for prompt detection of upsurges.

Monitoring Antimalarial Efficacy

PMI plans to conduct a TES in 2022 in a minimum of three sites and up to five sites, pending funding availability. With FY 2023 funds, PMI plans to conduct a TES in three sites.

Table 3. Ongoing and Planned Therapeutic Efficacy Studies

Ongoing Therapeutic Efficacy Studies (TES)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2022	Busia	AL, ASAQ	TBD
2022	Arua	AL, As-Pyr	TBD
2022	Agago	AL, DP	TBD
2022	Kanungu	AL, As-Pyr	TBD
2022	Moroto	AL, ASAQ	TBD
Planned TES			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
TBD	TBD	TBD	TBD

AL = artemether-lumefantrine; ASAQ = artesunate-amodiaqiune;
DP = dihydroartemisinin-piperaquine; As-Pyr = pyronaridine-artesunate; TBD = to be determined
* Proposed start date is in 2022

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

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

PMI provides technical assistance to the NMCD, DHMTs, and health facilities to improve supply chain management and develop accurate stock inventories of

artemether-lumefantrine, RDTs, SP, ITNs, and severe malaria drugs. PMI also provides technical assistance to the MOH's quantification and procurement planning unit to support proper quantification of malaria commodities. PMI's supply chain activities take place at the national level, which is in line with the UMRESP 2021–2025. Uganda is implementing the PMI stockout reduction strategy. However, stockout rates range from 10.7 percent to 19.3 percent depending on the commodity, which is still above the desired target of 10 percent. More details are available in the country profile.

5.2. Recent Progress (between March 2021 and March 2022)

PMI's principal supply chain investments, aimed at improving malaria commodity availability at facility and community health delivery sites, include forecasting and supply planning, management information systems, warehousing and distribution technical assistance, direct warehousing and delivery of commodities to health sites, and end-use verification. For ACTs, RDTs, and SP—the three commodities tracked as part of the stockout reduction strategy—baseline stockout rates were eight percent for ACTs, 11 percent for RDTs, and 23 percent for SP at the start of 2021. During the year, stockout rates averaged 10.7 percent for ACTs, 18.9 percent for RDTs, and 19.3 percent for SP. By early 2022, ACT stockout rates increased from 8 percent at baseline to 9.6 percent, RDT stockout rates increased from 11 percent at baseline to 16.3 percent, and SP stockout rates slightly decreased from 23 percent at baseline to 22.8 percent in the last year. There are two primary reasons for this overall decrease in commodity availability. The first is a malaria upsurge experienced in 40 districts in the country from September 2021 to March 2022, resulting in higher consumption of commodities. The second was a major enterprise resource planning system malfunction at the National Medical Stores that resulted in delays in the delivery of commodities to health facilities between September and October 2021.

5.3. Plans and Justification with FY 2023 Funding

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

Uganda will continue to support supply chain system strengthening activities including forecasting and supply planning, management information systems, warehousing and distribution technical assistance, direct warehousing and delivery of commodities to health sites, and end use verification as described in the recent progress section.

6. Social and Behavior Change

6.1. PMI Goal and Strategic Approach

PMI's support to the NMCD's SBC strategy contributes to strategic objective 3 of the UMRESP 2021–2025, which aims to reach 90 percent of the population with knowledge while promoting utilization of correct malaria prevention, control, and management measures. At the national level, PMI works with the NMCD, SBC TWG, and the Department of Health Promotion, Education, and Communication (DHPEC) to design and standardize SBC interventions for roll-out at national, district, and community levels, and to develop relevant national policy documents and plans. PMI is currently supporting ongoing efforts to revise the SBC strategy and other relevant guidelines to align with the UMRESP. At the district level, PMI supports the adaptation of the national SBC strategy to local contexts, development of work plans and materials, and partner coordination efforts. PMI is also working with DHMTs, sub-county, parish, and local council leaders and opinion leaders to implement SBC activities per national guidelines.

PMI supports data-shaped, coordinated communication and non-communication interventions which are deployed across PMI geographic focus areas. Communication interventions include development and roll-out of SBC communication tools for mass, digital, and alternative media, as well as those used for interpersonal communication (IPC). Non-communication interventions include the use of behavioral science and community engagement. This involves working with communities to ensure community-led diagnosis and implementation. Through partnerships with local media and community-based organizations, and collaboration with community volunteers, PMI supports the NMCD's efforts to use these approaches to promote correct and consistent ITN use and care, prompt care-seeking for fever, uptake of RDTs and IPTp, and provider adherence to diagnostic results for treatment with ACTs.

In terms of capacity strengthening, PMI supports training and mentorship of health workers, local leaders, VHTs, and opinion leaders in current SBC practices to expand the pool of SBC knowledge at the individual and community level. Finally, in line with the monitoring and evaluation framework of the UMRESP, PMI supports the generation, analysis, and translation of malaria SBC evidence. This is done through waves of behavioral sentinel surveys in 15 districts, which are implemented via easily digestible formats, tailored to multiple audiences, and used to inform near real-time adaptations to malaria SBC program implementation.

6.2. Recent Progress (between March 2021 and March 2022)

SBC activities supported by PMI include:

- Mass media

- IPC
- Community mobilization.
- Information, i.e. data collection activities and communication technology, which includes the use of information communication technology tools and digital platforms targeted in particular to youth, a large population in Uganda (the 2014 Uganda population census showed that 78 percent of the population is below 30 years of age). Digital platforms used include hotlines, chatbots, and SMS short codes. Social media platforms used include Facebook, WhatsApp, and Twitter.
- Capacity strengthening of national district and community stakeholders on SBC messaging and best practices

In the last year, PMI assisted the NMCD to finalize the SBC strategy of the UMRESP 2021–2025 and the SBC implementation plan 2021–2025. Finalization of the SBC strategy is still in process. PMI also provided technical assistance through thematic working groups at the MOH/NMCD. PMI supported audience co-creation and consultation sessions at the community level, the findings of which helped inform malaria SBC programming. As a result, shifts in the NMCD's SBC programming include:

- Reduction of message clutter through the implementation of a "one stop shop" approach that integrates malaria programming with other health interventions, making key messages such as those on proper net use, care and repair, early diagnosis and proper treatment of malaria, and malaria in pregnancy more salient in ongoing and planned interventions.
- Reduction of the "intention–action" gap by identifying tipping points that can move audiences through the various stages of behavior change including awareness, comprehensive knowledge, risk perception, intention to act, and action.
- Acknowledgment among malaria partners of the need for a diverse channel mix for reaching audiences but with emphasis on interventions that can trigger meaningful conversations and referral.

PMI faced the following challenges per intervention area:

ITNs

- Low risk perception, especially in the dry season where people do not see mosquitoes. There is a need to raise and sustain the risk perception in periods leading up to and during rainy seasons.
- Lack of user-friendly nets given to households which are nomadic in nature (e.g., mobile pastoralist communities in Karamoja), and the nature of housing (*manyattas*) which makes it hard to use both round and rectangular nets.

There is a need to continue deploying community-driven approaches to come up with appropriate innovations for net use.

- Gender norms which elevate women's malaria risk. The recent PMI-supported baseline assessment showed that women married to fishermen in fishing communities tend to go to bed late, after waiting for their husbands to return from the fishing expeditions, which exposes them to mosquito bites. In these communities, it is common for women to wait for their husbands' permission before hanging up the nets that were provided to them.
- In some homes, less vulnerable household members (men) tend to be given preference for net use over more vulnerable members. The recent PMI-supported baseline assessment showed that men get to use nets available in the household before the children under five years of age do.
- Additional barriers faced by socially excluded populations. For example, the recent PMI-supported baseline assessment revealed that widowed mothers were less likely to use ITNs as compared to married mothers, which shows a correlation between female-headed households and reduced net use (AOR: 0.46, $p<0.01$). The reasons cited for non-ITN use were related to knowledge, negative attitudes, self-efficacy, collective efficacy, and exposure. Specifically, access to ITNs and net care behavior—including tying up a net when not in use, handling the net gently, keeping it away from children and pests, washing it with mild soap in a basin, and repairing tears—were cited for non-ITN use. Therefore, there is a need to ensure that programming around ITNs intentionally addresses the needs of socially excluded people in the communities.
- Limited net hanging and repair skills.

MIP

- Negative social and cultural norms relating to pregnancy, e.g. many cultures do not promote disclosure of one's pregnancy before "showing," and some pregnant women are not allowed to leave home without the permission of their partners. Consequently, many women report late for ANC, leading to low IPTp completion rates.
- Missed opportunities at the facility, where a health worker does not provide IPTp or women are not informed of the importance of completing ANC visits and taking IPTp.
- Formal ANC at health facilities competing with informal ANC options, especially in communities where traditional birth attendants (TBAs) are still common. In such communities, pregnant women often rely on TBAs for care and only visit the health facility in the case of a complication or an emergency.
- Low uptake of ANC services among pregnant teenage girls. Teenage pregnancies draw a lot of stigma both in the communities and health facilities.

As such, many teenage girls opt out of accessing ANC services at health facilities, choosing less stigmatizing environments such as those provided by the traditional birth attendants.

- Existence of alternatives to IPTp. For example, communities in Karamoja have local/traditional substitutes for IPTp which are claimed to be effective, and as such, pregnant women see no need to take IPTp.
- Inaccessibility of health facilities for by pregnant women. In some communities, lack of transport and lack of proper clothing are barriers to ANC attendance.
- Poor customer care skills among some health workers. Some health workers have been reported to be rude, which discourages pregnant women from accessing ANC services. Other issues noted from the audience co-creation sessions include poor management of client flow during the ANC days and lack of differentiated services for specific groups such as teenage mothers.

Case Management

- Low risk perception, especially among people considered to be less vulnerable to malaria, e.g. men
- Poor customer care skills among health workers which makes the health facilities less attractive
- Availability of seemingly better and convenient services in the communities, e.g. those offered by drug shops (including self-medication) and local herbs which some communities believe to be effective
- Repeated disappointments at health facilities, e.g., absence of health workers or reported (artificial and real) stockouts
- Missed opportunities at the health facilities. For example, health workers commonly only focus on the person who is presented as the patient, e.g. a child, and fail to inquire whether the mother who brought the child has any symptoms of fever.
- Lack of adherence to treatment
- Limited knowledge by the community of the signs and symptoms of malaria. Sometimes individuals think they are suffering from minor ailments that require painkillers or herbs, leading to late reporting for care
- Improper diagnosis by providers who lack appropriate knowledge and counseling tools.

Cross-cutting

- Gap between intention to act and actual adoption of desired malaria prevention and management behaviors and practices. There is a need to find tipping points that can move audiences through the various stages of behavior change: awareness, comprehensive knowledge, risk perception,

intention to act, and action. There is also a need to continue to integrate behavioral science in SBC work to bridge the "intention–action gap" through use of positive deviants, social proof, norm signaling, messenger effect, and bundling of services.

6.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of SBC activities that PMI proposes to support in Uganda with FY 2023 funding: see www.pmi.gov/resources/malaria-operational-plans-mops.

While PMI supports SBC activities that promote the uptake and maintenance of all key malaria interventions, the three behaviors outlined in Table 4 below will be prioritized with FY 2023 funds. PMI will continue to use the best communication channels identified through the PMI-supported SBC baseline assessment, which are radio, health workers, and IPC (especially for engaging key influencers such as political leaders, cultural and religious leaders, parents, and health workers). Other communication channels include social media, TV, and print materials. This multi-channel approach incorporates channel preferences across target audiences, hence the need to assess and monitor such variations to improve targeted intervention.

Table 4. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Correct and consistent net use	Pregnant women, mothers of children under five, men (male partners), heads of households, and health workers	National, regional, and district level	• Conduct community- and household-level IPC informed by data on correct and consistent net use • Provide technical assistance to media stations to produce and air radio shows and spots promoting correct and consistent net use nationally and regionally • At the district level, provide on-the-job mentoring for health workers to promote net distribution, along with correct and consistent net use messages
Prompt care-seeking for fever for children under five years of age	Mothers of children under five years of age, men (male partners), heads of households, and health workers	National	• Conduct community and household level IPC informed by data on prompt care-seeking • Promote improved quality of care at health facilities through community health action groups and VHTs • Provide technical assistance to media stations for production and airing of radio shows and spots to promote prompt care-seeking
Early and frequent ANC attendance	Pregnant women, mothers of children under five years of age, men (male	National	• Conduct community and household level interpersonal communication informed by data on early and frequent ANC attendance

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
	partners), heads of households, and health workers		• Promote improved quality of care at health facilities through community health action groups and VHTs • Provide technical assistance to media stations to produce and air radio shows and spots promoting early and frequent ANC attendance

More data are needed on the specific behavioral factors associated with prompt care-seeking and net use on the patient side, and those factors associated with provider behavior for diagnosis and treatment of malaria. Through ongoing programs for community IPTp outreach and expanded iCCM, PMI will determine specific determinants for the community and providers.

There is also a need for continued SBC capacity strengthening at both the national and district levels, with increased level of effort at the community level. To bolster the NMCD capacity for the planning, design, implementation, and evaluation of SBC activities, PMI will continue to support:

- Coordination at the national level through targeted support to improve the effectiveness of the SBC TWG
- District-specific SBC focal persons to increase coordination and ensure the impact of SBC investments
- Capacity strengthening of key players and stakeholders for effective SBC design, implementation, and evaluation
- Capacity strengthening for NMCP staff on the use of data (e.g., from the expanded SBC module in MIS) to inform SBC program priorities and strategies.

7. Surveillance, Monitoring, and Evaluation

7.1. PMI Goal and Strategic Approach

In Uganda, PMI collaborates with the NMCD, the Global Fund, and other partners in providing technical assistance and resources for surveillance, monitoring, and evaluation (SM&E) activities. In support of the NMCD strategy and needs in Uganda, PMI and the NMCD have prioritized interventions that address the challenges of underutilization of data at health facility and community levels; low private sector reporting; and inadequate epidemic prevention, preparedness, and response. In FY 2023, PMI will increase investments in strengthening surveillance at lower-level facilities and in the community to ensure consistent reporting and data use, including increasing the frequency of data review meetings from quarterly to monthly.

7.2. Recent Progress (between March 2021 and March 2022)

PMI supported the following activities:

Central Level

- Supported national-level surveillance capacity strengthening and HMIS strengthening, and promoted HMIS data use by funding four Field Epidemiology Training (FETP) fellows assigned to the M&E unit at the NMCD. Part of these fellows' duties included drafting Uganda's quarterly malaria bulletin, which contributes to PMI's general support for a national synthesis of HMIS data to ensure that high quality and meaningful information is shared among all partners. Additionally, these fellows conducted outbreak investigations, risk assessments, program evaluations, and quality assurance projects aimed at answering questions of concern to the NMCD and PMI.
- Participated in the NMCD's SM&E TWG to ensure coordination of data collection, use, and decision-making across partners.
- Supported the finalization of the M&E plan for the UMRESP 2021–2025.
- Contributed to two USAID/Uganda Mission-wide mechanisms focused on data collection and use. These projects helped promote reporting of malaria indicators, among others, and enhanced evidence-based programming. They also supported M&E needs under the UMRESP, including collecting and tracking data on key program indicators, conducting data quality assessments, and assisting with the development of performance management plans and external project evaluations.

District Level

- Funded a baseline assessment to establish the current status of malaria trends, practices, and capacity at different levels of the health system to better understand the UMRESP gaps that PMI's flagship activity, planned to start in early 2022, could address.
- Supported a field investigation of the 2021–2022 malaria upsurge in eastern and southwestern districts to inform medium- and long-term response efforts. This exercise involved the review of health facility records, key informant interviews with health workers and community members, focus group discussions, and environmental assessments.

Facility and Community Level

- Transferred guidelines and tools developed with PMI support, such as normal channel development guides created in collaboration with district management teams, to health facilities to ensure they have continued access to these resources.

- Supported preparations for the pilot roll-out of the CHEW strategy, including developing a training curriculum with a monitoring and evaluation component and an evaluation framework.

The main challenge PMI is continuing to face, and which could affect SM&E progress, is the inconsistent availability of data collection tools which the government and other non-PMI partners offer. To address this challenge at the community level, the MOH Division of Health Information and Development partners piloted a digital community health tool in three districts with the goal of rolling out digital tools for community health workers. Based on the results of this pilot, and learning from the experience of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), PMI will consider supporting digitalization of community reporting with the help of this tool in selected communities where iCCM is implemented.

7.3. Plans and Justification with FY 2023 Funding

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

PMI plans to maintain investments in SM&E at the national, district, and health facility levels, with a focus on lower-level and private health facilities. In accordance with the country's efforts to strengthen community health systems, PMI will increase investments to improve data reporting and use, including increasing the frequency of data review meetings from quarterly to monthly at the community level, and introducing digital tools where appropriate. With the support of a community surveillance expert seconded to the NMCD, PMI aims to develop a culture of data reporting and use, which includes supporting health facilities and communities to understand the malaria epidemiology of their catchment area so that they can quickly interpret and respond to any changes in trends.

PMI's SM&E support at the district, health facility, and community levels will focus on the high burden regions of Acholi, Busoga, Karamoja, Lango, and West Nile, while national-level interventions will aim to close system gaps for national surveillance strengthening.

Table 5. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025	2026
Household Surveys	Demographic Health Survey			P				
Household Surveys	Malaria Indicator Survey (MIS)				P			
Household Surveys	Multiple Indicator Cluster Survey (MICS)							
Household Surveys	EPI survey							
Health Facility Surveys	Service Provision Assessment (SPA)							
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey							
Health Facility Surveys	Other Health Facility Survey							
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)			P		P		P
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System							
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)	X	X	X	P	P	P	P
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System (eLMIS)	X	X	X	P	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System							
Other	End-user Verification	X	X	X	P	P	P	P
Other	School-based Malaria Survey							
Other	Knowledge, Attitudes and Practices Survey; Malaria Behavior Survey			P				
Other	Malaria Impact Evaluation							
Other	Entomologic Monitoring Surveys	X	X	X	P	P	P	P

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

8. Operational Research and Program Evaluation

8.1. PMI Goal and Strategic Approach

Under strategic objective 4 of the UMRESP, the NMCD prioritizes support for learning, adaptation, innovation, best practices, and OR. This includes updating and disseminating its malaria OR agenda and research plan; collaborating with relevant institutions to conduct research, as well as documenting and disseminating research findings to promote their use; and conducting pilot studies on innovative tools and delivery approaches. The NMCD also aims to implement periodic evaluations and reviews such as midterm and program reviews for the strategic plan, as well as quarterly and annual reviews at the national and sub-national level; and will use findings to strategize and refocus programming.

PMI supports the NMCD to continuously inform malaria control strategies through testing of current tools and recent advances. PMI aims to help answer shared priority research questions and collaborate with other partners with complementary scopes and resources to implement the country's malaria OR agenda.

8.2. Recent Progress (between March 2021 and March 2022)

A recently completed study funded by PMI, the Bill and Melinda Gates Foundation, and Rotary Malaria Partners International aimed to evaluate the impact of proactive iCCM on maintaining the gains of IRS. Although this study findings did not show that proactive iCCM helped maintain the gains of IRS, it did demonstrate iCCM's potential impact on reducing the case management load at the facility level, on increasing IPTp4 uptake as a result of counseling in the community and early referral of pregnant women to ANC, and on improving VHT performance.

During this period, PMI also continued to support a core-funded housing modification study. The completed pilot phase had the objective to assess the acceptability, feasibility, cost, and entomological impact of four types of housing modifications. All four types of modifications were found to be acceptable to the community and resulted in significant reductions in mosquito densities. Following the pilot, two types of housing modifications (full screening and eave tubes) were selected, based on high ranking on feasibility, durability, and costing, for further evaluation in a large-scale trial beginning in 2022. The trial will evaluate the impact of the two housing modifications on malaria incidence, malaria and anemia prevalence, and entomological outcomes, and will continue to assess feasibility, durability, acceptability, and cost-effectiveness of these interventions in the context of PBO nets as the standard malaria intervention (control).

Table 6. PMI-Funded Operational Research/Program Evaluation Studies in Uganda

Recently Completed OR/PE Studies	Status of Dissemination	Start Date	End Date
Phase I: Impact of IRS with and without mass drug administration on malaria Phase II:* A pilot intervention to assess the impact, feasibility, and cost-effectiveness of Proactive Community Treatment (ProAct or ProCCM) as a post-IRS transition strategy compared to standard iCCM as a way to maintain the gains from IRS with or without mass drug administration	Phase I: Results shared with stakeholders and published[1,2] Phase II: Results shared with stakeholders; manuscript under development	Phase 1: November 2016 Phase 2: April 2019	Phase 1: April 2019 Phase II: August 2021
Ongoing or Planned OR/PE Studies	**Status**	**Start date**	**End date**
Impact of housing modification combined with PBO ITNs on the reduction of malaria burden. Evaluation of the epidemiological and entomological effectiveness, cost-effectiveness, feasibility, and acceptability of housing modification.	Pilot completed; trial field data collection ongoing	August 2020	August 2023

*Funded in collaboration with Rotary Malaria Partners International and the Bill and Melinda Gates Foundation.
[1]Wanzira et al. Community facilitators and barriers to a successful implementation of mass drug administration and indoor residual spraying for malaria prevention in Uganda: a qualitative study. Malaria Journal (2018) 17:474.
[2]Mulebeke et al. Implementing population-based mass drug administration for malaria: experience from a high transmission setting in North Eastern Uganda. Malaria Journal (2019) 18:271.

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

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
National Institutes of Health, Bill & Melinda Gates Foundation	Infectious Diseases Research Collaboration (IDRC), University of California San Francisco (UCSF), London School of Hygiene and Tropical Medicine, Liverpool School of Tropical Medicine (LSTM)	Impact of Pyriproxyfen LLINs (Royal Guard®) versus PBO LLINs (PermaNet 3.0®) on malaria incidence in Uganda: a cluster-randomized trial (LLINEUP2)	12-month survey completed, 24-month survey planned for November 2022–February 2023
National Institutes of Health	IDRC, UCSF	Program for Resistance, Immunology, Surveillance and Modeling of Malaria (PRISM) in Uganda	Ongoing until 2024

8.3. Plans and Justification with FY 2023 Funding

No OR/PE activities are proposed with FY 2023 funding. However, PMI will continue to work with the NMCD and partners to leverage the strong in-country capacity for research so Uganda can be well positioned to address key questions of global interest such as those related to the new malaria vaccine and to housing modification. Building the capacity of relevant districts to implement research activities and to advocate for

malaria research questions at the top of district priority lists remains an integral part of PMI-supported OR.

9. Capacity Strengthening

9.1. PMI Goal and Strategic Approach

The MOH's plan for health systems strengthening, including community health systems, is articulated in national legal and policy frameworks, namely the National Development Plan III, National Health Plan III, and the MOH Strategic Plan—whose strategic actions are outlined in the multisectoral Programme Implementation Action Plans, under the Human Capital Development Program.

In alignment with the UMRESP, PMI's capacity strengthening strategy in Uganda supports a whole-of-society approach to improve health service delivery systems. A strong national malaria program requires a multi-sectoral approach with coordination and malaria service delivery strengthened at the national, regional, district, community, and household level. PMI funding will continue to support the collection, analysis, and use of epidemiological, entomological, and behavioral surveillance data. PMI will also support the health workforce through technical assistance, including training, mentoring, and coaching, and secondment of experts in critical technical areas, such as community malaria surveillance, to the NMCD. PMI will strengthen the capacity of local partners to implement PMI programs through direct support and/or sub-awards. This support will mainly focus on grant and financial management, with the goal of incrementally increasing support when justified by progress and performance. PMI will also provide small grants to community service organizations through a grants under contract mechanism. In addition to supporting community malaria interventions, these grants will help build leadership and accountability systems, which PMI will continuously monitor.

9.2. Recent Progress (between March 2021 and March 2022)

In 2021, PMI supported the completion of the UMRESP 2021–2025. PMI also continued to support virtual mentorships for health workers, which helped maintain communication in the midst of lockdowns and to sustain gains in routine ITN distribution through ANC and uptake of IPTp. These virtual mentorships continued to complement existing approaches, and as COVID-19 lockdown restrictions were gradually relaxed and later removed, they were replaced with physical on-the-job mentorships and training. Virtual mentorships underscored the need to continue working to improve internet connectivity in health facilities as virtual collaboration becomes a critical part of capacity strengthening efforts. At the district level, PMI continued to support onsite and virtual supportive supervision and mentorship as COVID-19 restrictions allowed. PMI supported national-level surveillance capacity-strengthening, HMIS strengthening, and promoted HMIS data use by funding four FETP fellows assigned to the monitoring and

evaluation unit at the NMCD. The fellows continued supporting the NMCD during outbreak investigations, risk assessments, and program evaluations. The FETP fellows provided needed support in the upsurge detection and response in eastern Uganda. PMI also continued supporting ITN distribution through Peace Corps affiliate organizations.

9.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of capacity strengthening activities that PMI proposes to support in Uganda with FY 2023 funding: see www.pmi.gov/resources/malaria-operational-plans-mops.

PMI/Uganda will continue to support capacity strengthening activities as described in the recent progress section.

PMI will support a locally driven capacity-strengthening approach to collect and use reliable, quality data for improved decision-making and will explore strategies for domestic resource mobilization leveraging private sector investment.

PMI will support DHMTs to design a demand-side approach that incentivizes private sector malaria prevention and care providers to participate in supportive supervision, reporting, and capacity-strengthening efforts. Activities will include a combination of evidence-based approaches to private sector engagement through participatory design, such as mapping; local incentive programs for case management guideline adherence; and strengthening linkages to national regulatory structures for accreditation for high-performing providers.

10. Staffing and Administration

A minimum of three health professionals oversee PMI in Uganda. 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 one or more locally hired experts known as Foreign Service Nationals. The PMI interagency team works together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners.

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	45,422,152	46,784,817	48,148,003
Total population at risk for malaria	45,422,152	46,784,817	48,148,003
PMI-targeted at-risk population	45,422,152	46,784,817	48,148,003
Population targeted for ITNs	45,422,152	46,784,817	48,148,003
Continuous Distribution Needs			
Channel 1: ANC	1,719,966	1,809,587	2,058,327
Channel 1: ANC Type of ITN	PBO	Dual AI and PBO	Dual AI and PBO
Channel 2: EPI	1,643,934	1,693,181	1,925,920
Channel 2: EPI Type of ITN	PBO	Dual AI and PBO	Dual AI and PBO
Channel 3: School	853,198	878,793	905,157
Channel 3: School Type of ITN	PBO	Dual AI and PBO	Dual AI and PBO
Channel 4: Community			
Channel 4: Community Type of ITN			
Channel 5: Emergency response	304,900	308,220	304,900
Channel 5: Type of ITN	PBO	PBO	PBO
Estimated Total Need for Continuous Channels	4,521,998	4,689,782	5,194,304
Mass Campaign Distribution Needs			
Mass distribution campaigns		28,219,686	
Mass distribution ITN type		PBO	
Estimated Total Need for Campaigns	0	28,219,686	0
Total ITN Need: Continuous and Campaign	**4,521,998**	**32,909,468**	**5,194,304**
Partner Contributions			
ITNs carried over from previous year	1,494,546	0	0
ITNs from Government	0	0	0
Type of ITNs from Government	PBO	PBO	PBO
ITNs from Global Fund	1,057,517	15,092,749	4,094,304
Type of ITNs from Global Fund	PBO	PBO	PBO
ITNs from other donors	0	13,000,000	0
Type of ITNs from other donors		PBO	
ITNs planned with PMI funding	1,584,674	1,005,729	1,100,000
Type of ITNs with PMI funding	PBO	Dual AI	Dual AI
Total ITNs Contribution Per Calendar Year	**4,136,737**	**29,098,478**	**5,194,304**
Total ITN Surplus (Gap)	**(385,261)**	**(3,810,990)**	**0**

Table A-2. RDT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	45,422,152	46,784,817	48,148,003
Population at risk for malaria	45,422,152	46,784,817	48,148,003
PMI-targeted at-risk population	45,422,152	46,784,817	48,148,003
RDT Needs			
Total number of projected suspected malaria cases	41,995,788	43,633,644	41,145,742
Percent of suspected malaria cases tested with an RDT	86%	87%	81%
	4,199,579	**4,363,364**	**4,114,574**
RDT Needs (tests)	**40,511,127**	**42,145,561**	**37,237,184**
Select Data Source			
Partner Contributions (tests)			
RDTs from Government	0	0	0
RDTs from Global Fund	37,012,876	13,403,061	34,094,842
RDTs from other donors	0	0	
RDTs planned with PMI funding	1,250,000	1,500,000	3,723,718
Total RDT Contributions per Calendar Year	**38,262,876**	**14,903,061**	**37,818,561**
Stock Balance (tests)			
Beginning Balance	15,625,150	13,376,899	0
- Product Need	40,511,127	42,145,561	37,237,184
+ Total Contributions (received/expected)	38,262,876	14,903,061	37,818,561
Ending Balance	**13,376,899**	**(13,865,601)**	**581,376**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	10,127,782	10,536,390	9,309,296
Total Surplus (Gap)	**3,249,118**	**(24,401,991)**	**(8,727,920)**

Table A-3. ACT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	45,422,152	46,784,817	48,148,003
Population at risk for malaria	45,422,152	46,784,817	48,148,003
PMI-targeted at-risk population	45,422,152	46,784,817	48,148,003
ACT Needs			
Total projected number of malaria cases	16,398,482	16,077,924	15,573,075
Retreatment for the first treatment failure	983,909	964,675	934,385
epidemic response	1,639,848	1,607,792	1,557,308
Total ACT Needs (treatments)	**19,022,239**	**18,650,392**	**18,064,767**
Select Data Source			
Partner Contributions (treatments)			
ACTs from Government	1,560,000	1,560,000	1,560,000
ACTs from Global Fund	22,520,066	12,118,036	15,746,288
ACTs from other donors	0	0	0
ACTs planned with PMI funding	95,000	1,678,520	1,806,477
Total ACTs Contributions per Calendar Year	**24,175,066**	**15,356,556**	**19,112,764**
Stock Balance (treatments)			
Beginning Balance	9,779,250	14,932,077	11,638,242
- Product Need	19,022,239	18,650,392	18,064,767
+ Total Contributions (received/expected)	24,175,066	15,356,556	19,112,764
Ending Balance	**14,932,077**	**11,638,242**	**12,686,239**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	4,755,560	4,662,598	4,516,192
Total Surplus (Gap)	**10,176,517**	**6,975,644**	**8,170,047**

Table A-4. Inj. Artesunate Gap Analysis Table

Calendar Year	2022	2023	2024
Injectable Artesunate Needs			
Projected number of severe cases	695,978	673,426	652,280
Projected number of severe cases among children	562,136	543,921	526,842
Average number of vials required for severe cases among children	3	3	3
Projected number of severe cases among children between 20kg and <35kg	89,228	86,337	83,626
Average number of vials required for severe cases among children between 20kg and <35kg	6	6	6
Projected number of severe cases among adults	44,614	43,168	41,813
Average number of vials required for severe cases among adults	12	12	12
Epidemic response	69,598	67,343	65,228
Total Injectable Artesunate Needs (vials)	**3,032,857**	**2,934,582**	**2,842,435**
Select Data Source			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	2,718,489	2,174,440	2,547,806
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	150,000	550,000	283,100
Total Injectable Artesunate Contributions per Calendar Year	**2,868,489**	**2,724,440**	**2,830,906**
Stock Balance (vials)			
Beginning Balance	902,946	738,578	528,437
- Product Need	3,032,857	2,934,582	2,842,435
+ Total Contributions (received/expected)	2,868,489	2,724,440	2,830,906
Ending Balance	**738,578**	**528,437**	**516,907**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	758,214	733,645	710,609
Total Surplus (Gap)	**(19,636)**	**(205,208)**	**(193,702)**

Table A-5. RAS Gap Analysis Table

Calendar Year	2022	2023	2024
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose (or expected to require pre-referral dose based on number of providers for the service)	130,612	132,864	128,901
Projected number of severe cases among children 2 months - 2.9 years	80,425	81,812	79,372
Average number of suppositories required for each prereferral severe cases	1	1	1
Projected number of severe cases among children 3 years to 5 years	50,187	51,052	49,530
Average number of suppositories required for each prereferral severe cases	2	2	2
Total Artesunate Suppository Needs (suppositories)	**180,798**	**183,916**	**178,431**
Select Data Source			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	265,651	243,835	248,834
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	0	0	0
Total Artesunate Suppositories Available	**265,651**	**243,835**	**248,834**
Stock Balance (suppositories)			
Beginning Balance		84,853	144,771
- Product Need	180,798	183,916	178,431
+ Total Contributions (received/expected)	265,651	243,835	248,834
Ending Balance	**84,853**	**144,771**	**215,174**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	45,200	45,979	44,608
Total Surplus (Gap)	**39,653**	**98,792**	**170,566**

Table A-6. SP Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	45,422,152	46,784,817	48,148,003
Total Population at Risk for Malaria	45,422,152	46,784,817	48,148,003
PMI Targeted at Risk Population	45,422,152	46,784,817	48,148,003
SP Needs			
Total Number of Pregnant Women	1,451,238	1,505,301	1,549,162
Percent of pregnant women expected to receive IPTp1	93%	95%	99%
Percent of pregnant women expected to receive IPTp2	90%	95%	99%
Percent of pregnant women expected to receive IPTp3	70%	85%	90%
Percent of pregnant women expected to receive IPTp4	65%	75%	80%
Total SP Needs (doses)	**4,614,936**	**5,268,555**	**5,700,916**
Select Data Source			
Partner Contributions (doses)			
SP from Government	5,010,144	5,010,144	5,010,144
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	**5,010,144**	**5,010,144**	**5,010,144**
Stock Balance (doses)			
Beginning balance	585,867	981,075	722,663
- Product Need	4,614,936	5,268,555	5,700,916
+ Total Contributions (Received/expected)	5,010,144	5,010,144	5,010,144
Ending Balance	**981,075**	**722,663**	**31,891**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	1,153,734	1,317,139	1,425,229
Total Surplus (Gap)	**(172,659)**	**(594,475)**	**(1,393,338)**

Table A-7. SMC Gap Analysis Table

Calendar Year	2022	2023	2024
Total population in the SMC targeted age range	538,072	828,457	865,200
SMC Drug (SP+AQ) Needs			
National population 3-11 months targeted for SMC	24,751	38,109	39,799
National population 12-59 months targeted for SMC	99,005	152,436	159,197
Total national population targeted for SMC	**123,757**	**190,545**	**198,996**
PMI population 3-11 months targeted for SMC	0	0	0
PMI population 12-59 months targeted for SMC	0	0	0
Total PMI population targeted for SMC	**0**	**0**	**0**
Total SP+AQ Needs (co-blisters)	**786,463**	**1,210,899**	**1,264,604**
Partner Contributions (co-blisters, national)			
SP+AQ carried over from previous year	0	0	0
SP+AQ from Government	0	0	0
SP+AQ from Global Fund	786,463	1,210,899	1,264,604
SP+AQ from other donors	0	0	0
SP+AQ planned with PMI funding	0	0	0
Total SP+AQ Contributions per Calendar Year	786,463	1,210,899	1,264,604
Total SP+AQ Surplus (Gap)	**0**	**0**	**0**