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Madagascar

Malaria Operational Plan FY 2024

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

CONTENTS

ABBREVIATIONS

ACT	Artemisinin-based combination therapy
ACCESS	Accessible Continuum of Care and Essential Services
ADC	*Aide clinique*
AI	Active ingredient
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
ASC	*Accompagnateur de santé communautaire*
Bti	*Bacillus thuringiensis israelensis*
cCD	Community-based continuous distribution
c-IPTP	Intermittent preventive treatment for pregnant women at the community level
CHW	Community health worker
CNARP	Centre National d'Application des Recherches Pharmaceutiques
CSB	Centre de Santé de Base/basic health center
CY	Calendar year
DHP	Dihydroartemisinin-piperaquine
DHIS2	District Health Information Software-2
DHS	Demographic and Health Survey
DPLMT	*Direction de la Pharmacie, des Laboratoires et de la Médecine Traditionnelle* (directorate of pharmacy)
EPI	Expanded Program for Immunization
EUV	End-use verification
FETP	Field Epidemiology Training Program
FY	Fiscal year
G2G	Government-to-government
G6PD	Glucose-6-phosphate dehydrogenase
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
HMIS	Health Management Information System
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated net
LMIS	Logistics management information system
LSM	Larval source management
mCCM	Malaria community case management
MDA	Mass drug administration
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
NMP	National Malaria Program

NMSP	National Malaria Strategic Plan
OR	Operational research
OTSS	Outreach training and supportive supervision
PBO	Piperonyl butoxide
PE	Program evaluation
PhaGDis	*Pharmacie de gros de district* (district pharmaceutical depot)
PhaGeCom	Community-managed pharmacy, or
PMI	U.S. President's Malaria Initiative
pro-CCM	Proactive community case management
RAS	Rectal artesunate
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SBC	Social and behavior change
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal malaria chemoprevention
SMS	Short message service
SOP	Standard operating procedures
SP	Sulfadoxine-pyrimethamine
SPAQ	Sulfadoxine-pyrimethamine plus amodiaquine
SPARS	Supervision, Performance Assessment, and Recognition Strategy
TA	Technical assistance
TES	Therapeutic efficacy study
TWG	Technical working group
UCP	*Unité de coordination des projets* (project coordination unit)
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

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

U.S. President's Malaria Initiative

Launched in 2005, the U.S. President's Malaria Initiative (PMI) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 27 countries in Sub-Saharan Africa and 3 programs across the Greater Mekong Subregion (GMS) in Southeast Asia to control and eliminate malaria. Madagascar began implementation as a PMI partner country in fiscal (FY) 2008.

Rationale for PMI's Approach in Madagascar

Madagascar's 29 million residents are at risk for malaria, which is primarily transmitted December–April and caused by *Plasmodium falciparum*; malaria is currently the second most frequent reason for health consultations. Malaria prevalence among children under the age of five is an estimated 7.5 percent, and incidence is an estimated 57 per 1,000 population per year, although the burden is heterogeneous. The total number of malaria cases persistently increased from 2019 to 2021, before decreasing in 2022; however, over 60 percent of cases were recorded in six mostly southern regions in 2022, most of which reported historically high burdens. Although behaviors such as care seeking, testing and treatment, and insecticide-treated net (ITN) use have mostly remained stable, challenges include insecurity, worsening road infrastructure, frequent stockouts, limited human resources, rapid loss of ITN chemical efficacy (often within 12 months of distribution), cyclones, drought, and a challenging political environment.

Overview of Planned Interventions

The proposed FY 2024 PMI funding for Madagascar is $25 million. PMI will support the following intervention areas with these funds.

1. Vector Monitoring and Control

PMI will support the collection of entomological surveillance and monitoring data, which will be shared with NMP and stakeholders to inform vector control activities. PMI will strengthen laboratory and field efforts at the national and district level and facilitate a national vector control working group. PMI will support insecticide procurement and implementation of indoor residual spraying (IRS), progressively transferring responsibility to local actors; procurement and distribution of effective long-lasting ITNs for both control and elimination districts, including new types of ITNs where resistance is detected; and technical assistance and a forum for decision making around larval source management (LSM), leveraging findings from a completed assessment of entomological impacts, feasibility, and acceptability. PMI will continue to strengthen NMP capacity for entomological surveillance and monitoring of the implementation of IRS and LSM activities through technical assistance and strategic discussions to support a longitudinal roadmap for LSM in Madagascar, leveraging experience gained from implementing operational research (OR) . In addition, PMI will support the strengthening of molecular capacities and will partner with local universities to enhance and harmonize entomological activities.

2. Malaria in Pregnancy

PMI supports the Madagascar government's strategy for preventing malaria in pregnancy (MIP), which aligns with World Health Organization (WHO) recommendations for antenatal care (ANC) beginning at 13 weeks of gestation, at least eight contacts with the health system, at least three rounds of intermittent preventive treatment for pregnant women (IPTp), and use of artemisinin-based combination therapy (ACT) to treat pregnant women with malaria beginning in the first trimester. With FY 2024 funds, PMI/Madagascar plans to continue supporting the distribution of ITNs to pregnant women via ANC; IPTp at the health facility and community level; management of malaria illness among pregnant women; and social and behavior change (SBC) to encourage early and regular ANC, IPTp, ITN use, and care seeking for malaria illness among pregnant women.

3. Drug-Based Prevention

PMI has not begun supporting drug-based prevention other than IPTp as a routine intervention for malaria prevention in Madagascar. NMP plans to conduct four cycles of seasonal malaria chemoprevention (SMC) among children between the ages of 5 and 14 in five districts beginning before the start of the peak malaria transmission in 2023 (probably October), funded by the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). NMP has intermittently deployed mass drug administration (MDA) in response to malaria upsurges, including in 2021 and 2022; it is not currently planning any routine MDA for calendar years (CY) 2023–2025. Because NMP's MDA activities have occurred outside the OR context, in alignment with PMI policy, PMI has not supported these efforts. SMC and MDA were not included in the GC7 application to the Global Fund, and further implementation will require funding from other sources.

4. Case Management

Under the anticipated new malaria strategic plan for 2023–2027, PMI will reinforce community-based case management by providing commodities through the last-mile, extending community-level malaria testing and treatment to persons of all ages (malaria community case management [mCCM]), monitoring the efficacy of antimalarial medications, and strengthening laboratory capacity. PMI will also remain engaged in the training of community health workers (CHWs) and health staff, including current and newly recruited public sector staff and private health center staff. PMI will support the Ministry of Health (MOH) to begin diagnosing and treating cases of *Plasmodium vivax*. PMI support will be extended to districts with high malaria burdens that do not currently receive PMI support.

5. Health Supply Chain and Pharmaceutical Management

PMI/Madagascar will support the implementation of Madagascar's stockout reduction initiative (2023–2024) and the new strategic plan to strengthen the supply chain (2023–2027). PMI support will mainly include quantification and supply planning; information systems with deployment of the new electronic logistics management information system across the country; warehousing (at SALAMA); inventory management and distribution to the *pharmacie de gros de district* (district pharmaceutical depot, or PhaGDis); training/refresher training; supportive supervision with the Supervision, Performance Assessment, and Recognition Strategy (SPARS); implementation of two end-use verification (EUV) surveys; and support to the regulatory system and assurance of medicine quality. To address problems related to climate change-driven cyclone activity, PMI will pre-position malaria commodities in PhaGDis in districts with high malaria burdens, difficult access, and vulnerability to cyclones. PMI will continue to strengthen different approaches to last-mile distribution of malaria commodities, good governance, financial management of PhaGDis, and engagement with the private sector to increase its share of the malaria health product market through the total market initiative.

6. Social and Behavior Change

PMI will continue its support for activities designed to support individuals, households, and communities to overcome barriers to the adoption and continued practice of preventive behaviors and malaria care seeking (the "Be M'Ray" approach) through March 2025. With FY 2024 funds, PMI will support NMP to implement "Zero Malaria Starts with Me," an approach to mobilize additional resources and empower communities to take ownership of malaria prevention and care. PMI will collaborate with NMP and Roll Back Malaria (RBM) partners, along with its implementing partners, to continue strengthening community-based SBC approaches for malaria prevention and treatment and to emphasize interpersonal communication methods, with a particular emphasis on community-level management of malaria, implementation of harmonized key messages around malaria prevention, and care seeking at the community and health facility level. PMI will continue to mobilize religious and community leaders as well as civic organizations to support and promote malaria prevention and control, and will collaborate with the Peace Corps on activities to leverage health facilities

as a platform to improve care seeking for and prevention of malaria. Finally, the Global Fund will support NMP's coverage of SBC activities in regions not supported by PMI.

7. Surveillance, Monitoring, and Evaluation

PMI/Madagascar will continue supporting NMP with harmonized objectives to reduce malaria morbidity and mortality. PMI support mainly focuses on strengthening the health information system by providing good quality data to inform decision making and improving the surveillance system to allow more accurate and timely response to malaria upsurges or shocks. PMI will also support NMP to progressively digitalize data systems to improve data use and ensure a more comprehensive and efficient health information system. Existing surveillance systems will be leveraged to routinely track the prevalence of hrp2/3 deletions and genetic markers of antimalarial resistance, and climate data will be integrated into routine systems to facilitate the development of predictive modeling and an early warning system.

8. Operational Research and Program Evaluation

PMI/Madagascar support for program- and policy-relevant OR and program evaluation (PE) intends to test promising new tools and approaches for remote locations; evaluate the scaling of malaria interventions in remote areas; identify effective combinations of interventions to reduce malaria transmission in remote areas and in areas with the highest incidence; identify effective local solutions to vector control and case management challenges; and advance toward malaria elimination. OR activities underway at the time of this writing include evaluation of the model of peer supervision of CHWs and planning for a national health facility survey that will include an assessment of quality and readiness for care as well as estimates of the prevalence of hrp2/3 deletions, G6PD deficiency, and *P. vivax* infection. Reprogramming of FY 2023 funds is planned for an evaluation of the expansion of community-level care, including IPTp at the community level (c-IPTp), mCCM, and proactive community case management (pro-CCM) in 2024. No OR or PE activities are currently planned with FY 2024 funds.

9. Capacity Strengthening

PMI/Madagascar's approach to strengthening capacity includes facilitating increased collaboration with other MOH directorates and government ministries, donors, and the private sector to strengthen the public health system across the country; supporting efforts to improve NMP leadership and technical and organizational capacity; supporting in-country coordination through functional RBM and technical working group platforms; and coordinating investment in surveillance and OR with NMP and the Global Fund to inform policy and strategy decisions. PMI/Madagascar will continue to support these activities through the FY 2024 Malaria Operational Plan (MOP). PMI will also support about 10 intermediate fellows in the Field Epidemiology Training Program (FETP) to bolster epidemiologic capacity at the district level and plan investments through a government-to-government (G2G) mechanism currently under development.

10. Staffing and Administration

The single interagency team led by the U.S. Agency for International Development (USAID) Mission Director or designee consists of a resident advisor representing USAID, a resident advisor representing the U.S. Centers for Disease Control and Prevention, 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.

I. CONTEXT & STRATEGY

1. Introduction

Madagascar began implementation as a PMI partner country in fiscal (FY) 2009. This FY 2024 Malaria Operational Plan (MOP) presents a detailed implementation plan for Madagascar based on the strategies of PMI and the National Malaria Program (NMP). It was developed in consultation with NMP and with the participation of national and international partners. PMI proposes activities that build on investments made by partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). This document provides an overview of the strategies and interventions in Madagascar, describes progress to date, identifies challenges and relevant contextual factors, and provides a description of activities that are planned with FY 2024 funding. For more detailed information on the country context, refer to the country malaria profile, which provides an overview of the country's malaria situation, key indicators, NMP's strategic plan, and the partner landscape.

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

PMI is led by the United States Agency for International Development (USAID) and implemented with the U.S. Centers for Disease Control and Prevention. Launched in 2005, PMI supports the implementation of malaria prevention and treatment measures, such as insecticide-treated nets (ITNs), indoor residual spraying (IRS), accurate diagnosis and prompt treatment with artemisinin-based combination therapy (ACT), intermittent preventive treatment for pregnant women (IPTp), and drug-based prevention, as well as cross-cutting interventions such as surveillance, monitoring, and evaluation (SM&E); social and behavior change (SBC); and capacity strengthening. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria in our generation, with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 27 countries in Sub-Saharan Africa and 3 programs in the Greater Mekong Subregion (GMS) in Southeast Asia to control and eliminate malaria. Over the next five years, PMI aims to save lives, reduce health inequities, and improve disease surveillance and global health security.

Under the strategy, and building on progress already made in PMI-supported countries, PMI will work with national malaria control programs and partners to accomplish the following objectives by 2026:

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

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

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

3. Rationale for PMI's Approach in Madagascar

3.1. Malaria Overview for Madagascar

Madagascar is an island nation with a population of 29 million (National Institute of Statistics 2022). Malaria is primarily transmitted between December and April, and 100 percent of the population is at risk. Malaria was the second most frequent reason for health facility visits and the second most commonly reported cause of in-hospital mortality in Madagascar in 2022 (NMP 2023). The number of facility-reported malaria cases increased from 1.95 million in 2020 to 2.34 million in 2021 before decreasing to 1.67 million in 2022, with reported malaria-related deaths decreasing throughout this period, from 674 in 2020 to 544 in 2021 and 282 in 2022.[1] Malaria prevalence is estimated at 7.5 percent, according to the 2021 Demographic and Health Survey (DHS), and malaria incidence is 57 per 1,000 population per year, according to NMP's 2022 annual report. However, incidence is heterogeneous, with some districts experiencing annual incidence of over 400 per 1,000 population per year and others nearing elimination. The number of districts meeting elimination criteria (defined locally as less than one case per 1,000 population per year) decreased from 10 to 7 between 2020 and 2022.

The primary malaria parasites in Madagascar are *Plasmodium falciparum* and *P. vivax*; nationally, approximately 95 percent of infections are caused by *P. falciparum*. Primary vectors include *Anopheles gambiae s.s.*, *An. arabiensis*, and *An. funestus*. Other potential vectors include *An. coustani* and *An. mascarensis*. Because Madagascar is linked via trade to affected countries, it is considered to be at risk for the introduction of *An. stephensi*, a vector that is resistant to many key insecticides and considered an invasive species in Africa. *Anopheles gambiae s.l.* is the predominant vector, and it has recently exhibited low- to moderate-intensity resistance to deltamethrin and/or permethrin in five districts, although susceptibility was fully restored with piperonyl butoxide (PBO).

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

[1] Source: District Health Information Software-2 (DHIS2) 2023.

3.2. Key Challenges and Contextual Factors

Between 2019 and 2021, the total number of malaria cases persistently increased, before decreasing in 2022. However, certain districts in the southern regions of Atsimo-Atsinanana, Ihorombe, Anosy, Vatovavy, and Fitovinany, as well as in the region of Melaky, experienced their highest incidence in 2022. Six southern regions (Atsimo-Atsinanana, Anosy, Haute Matsiatra, Vatovavy, Fitovinany, and Atsimo-Andrefana) reported over 60 percent of total malaria cases in 2022. Atsimo-Atsinanana alone reported over 34 percent of the country's reported cases. While no formal assessment has been done to determine the causes of these increases, some common factors have been identified: insecurity, poor road infrastructure, frequent stockouts, limited human resources, changes in mosquito behaviors, and rapid loss of ITN efficacy. Despite care-seeking behaviors remaining fairly stable according to DHS 2021 data compared with that of the 2016 Malaria Indicator Survey (MIS), the malaria testing rate among febrile patients increased from 88 percent (2017–2019) to over 95 percent (2020–2022), according to DHIS2. In addition, 20 percent of children with a recent fever had blood taken from a finger or heel for testing according to the 2021 DHS compared with 13 percent reported in the 2018 MICS. This improvement in testing may be due to the improved supply chain and expanded coverage of case management services. Household access to ITNs decreased from 68 percent in the 2016 MIS to 49 percent in 2021, before the 2021 ITN distribution campaign, with ITN use at 48 percent in the 2021DHS. However, some elimination areas were surveyed but did not receive ITNs during the 2021 campaign. Madagascar is recovering from COVID-19 as many services are returning to or exceeding pre-pandemic levels. The PMI program is benefiting from the U.S. government’s global response and recovery framework to COVID-19 (September 2022), which supports a shift to an integrated COVID-19 approach to supply chains, advanced strategies, and risk communication.

Some key additional factors affect health outcomes in Madagascar. First, impacts of climate change regularly manifest as cyclones in the western and eastern areas between November and April and as drought in the south. Five tropical storms landed in the coastal regions between January and early March 2022, affecting almost one million people. More than two-thirds of the population in southern Madagascar need food assistance due to chronic drought. These hazards have negative effects on health outcomes in general and may affect malaria particularly, such as when drought caused populations to flee the Androy region, where malaria incidence is low, to Anosy (Taolagnaro), where malaria incidence is high. More than 60 percent of malaria cases are reported in regions vulnerable to cyclones and food insecurity. Additionally, politics have influenced progress in the fight against malaria. Since its independence in 1960, Madagascar has experienced bloody coups d’etat almost every decade, which slows its development. Since 2014, when the U.S. government resumed official collaboration with the government of Madagascar, six ministers have run the Ministry of Health (MOH), resulting in frequent changes in priorities and staff turnover at the directorate level. Finally, country-level mismanagement of the Global Fund grant led to delays in implementation of Global Fund's New Funding Model 3 (NFM3) activities.

3.3. PMI's Approach for Madagascar

A new national strategic plan for malaria (2023–2027) was developed in December 2022 (final validation expected in July 2023) after an extensive and participatory malaria program review. The new strategy objectives include reducing malaria incidence by 30 percent in 2025 and 50 percent in 2027, and mortality by 50 percent in 2025 and 98 percent in 2027, compared with 2021 levels. The new strategic objectives also include the ambitious goal of eliminating malaria in 50 percent of districts with an annual incidence of less than 1 per 1,000 population by 2025, and in 90 percent of these districts by 2027. This will be achieved by:

- Improving leadership, management, and coordination at all levels;
- Protecting Malagasy people at risk of acquiring malaria with appropriate prevention measures;
- Attaining appropriate malaria prevention and control behaviors among 90 percent of the population;
- Testing 100 percent of suspected malaria cases and treating 100 percent of identified cases;
- Making malaria commodities available in ≥95 percent of health facilities at all levels;
- Providing IPTp3 to at least 65 percent and IPTp1 to 90 percent of pregnant women (with ~30 percent of IPTp2+ doses given at the community level);
- Expanding specific interventions in select districts, such as reactive case detection, extension of malaria community case management for people of all ages, community delivery of IPTp (c-IPTp), proactive community case management (pro-CCM), seasonal malaria chemoprevention (SMC) for children between the ages of 3 months and 14 years, and mass drug administration (MDA);
- Responding to ≥90 percent of urgent or epidemic situations within 15 days of notification;
- Reinforcing the quality of monitoring and evaluation to guide appropriate decisions at all levels, and ensuring adequate classification and response in elimination districts; and
- Reducing transmission in 50 percent of active malaria foci in elimination areas, and bringing all districts with annual incidence of less than 10 per 1,000 population (2021) to the elimination level (annual incidence of less than 1 per 1,000 population).

Madagascar's approach has included prioritizing and leveraging community health services; engaging the private sector to improve access to malaria interventions; and coordinating across sectors, partners, and administrative levels. A new district-level epidemiologic stratification was drafted between September 2022 and June 2023 as part of the 2023–2027 national strategic plan (see the country malaria profile); it will inform the subnational tailoring of interventions.

PMI/Madagascar's approach aligns closely with PMI's strategic focus areas and approaches:

- **Reach the unreached:** PMI supports approximately 18,500 community health workers (CHWs), including expanded activities like c-IPTp and malaria community case management (mCCM) for people of all ages, and delivery of supplies via drones. These efforts will be expanded progressively, as feasible, in areas with the highest burdens.
- **Strengthen community health systems:** PMI supports about 18,500 CHWs to implement expanded activities, including c-IPTp, mCCM for people of all ages, proactive community case management (pro-CCM), and assurance of quality of services at the CHW and facility level with a new supervision model involving CHWs peer supervisors. PMI will contribute to the advancement of the national dialogue around CHW remuneration and updating national CHW registers to reflect their expanding activities.
- **Keep malaria services resilient to shocks:** PM will continue to ensure thoughtful preparation for cyclones through training and coaching; by pre-positioning commodities to serve vulnerable regions; by adapting service delivery schedules; and by ensuring the integration of malaria activities in responses to major health events such as COVID-19.
- **Invest locally:** PMI supports the Leadership Development Program Plus; the establishment of a government-to-government (G2G) funding mechanism with NMP for therapeutic efficacy studies (TES), malaria elimination activities, entomology, working with local research institutions and civil society organizations for service delivery, Roll Back Malaria (RBM) support and coaching; and cross-sectoral targeted leadership and technical training for NMP technicians.
- **Innovate and lead:** PMI supports the progressive transition from standard ITNs to new types of ITNs; the delivery of supplies via drone where cost-efficient; the facilitation of discussions about plans and options for larval source management (LSM); the scaling of mCCM for all age groups based on findings of the PMI-funded mCCM operational research (OR); innovation of approaches for surveillance, including to monitor therapeutic efficacy and prevalence of hrp2/3 deletions; surveillance for *An. stephensi*; multidisciplinary investigations of disease outbreaks; and leveraging a system of integrated biological surveillance to support the monitoring of malaria indicators.

Since 2019, PMI has supported NMP's goal of progressive elimination of malaria as defined in the National Malaria Strategic Plan (NSP) 2018–2022. PMI has supported pilot elimination activities in three districts (Antsiranana I, Antsirabe II, and Faratsiho) focusing on building a strong foundation of malaria prevention, case management with appropriate and high-quality diagnostics, surveillance, and response to upsurges and outbreaks at all levels. PMI supported: the coordination of interventions through an elimination technical working group (TWG) at the national level and in each of the three pilot districts; the implementation of an assessment of high-risk populations in the three districts, which was presented at the American Society of Tropical Medicine & Hygiene (ASTMH) conference; the provision of cyclical training and supervision of health providers via outreach training and supportive supervision plus (OTSS+) on malaria diagnosis and case management; foci investigations in

the three districts; and training for health workers in 14 bordering districts in malaria case management to reduce importation of malaria cases from control districts to pilot elimination sites. PMI will continue to support the anticipated elimination strategy for 2023–2027 and the elimination implementation package in five districts, including two through a G2G mechanism with NMP. PMI currently supports Antsirabe II, Antsiranana I, and Faratsiho; NMP is in the process of selecting two additional districts to support.

Given the challenges with turnover at the central level, poor infrastructure, and natural and sociopolitical disruptions, PMI has been prioritizing strengthening the health systems via local capacity development, reaching the unreached, and innovating. PMI continues to coordinate with key donors and with the in-country RBM partnership through regular calls with the Global Fund and RBM as well as through active participation in the national strategic monitoring committee for community case management. PMI also designed a regional coaching system with NMP to better support the district and health centers. An NMP staff member and a partner collaborate to help regional and district staff quantify commodities, implement resurgence response, and improve reporting. This system has been useful when responding to cyclones and malaria upsurges in the southern regions over the past two years and is a promising approach to localization. PMI also participates in cross-cutting USAID working groups on disaster and epidemic management, gender, and the environment, and collaborates with faith-based organizations. PMI supports NMP to test new tools and processes and scale those that work, such as LSM, c-IPTp, mCCM for all age groups, and pro-CCM; implement new initiatives to reduce stockouts; and adopt evidence-based approaches, such as using data to stratify/segment areas for tailored combinations of interventions.

Finally, due to the high burden of malaria in southeastern Madagascar, particularly in the region of Atsimo-Atsinanana, PMI/Madagascar is transitioning its investments and support to south and southeastern areas, starting with Vangaindrano District in Atsimo-Atsinanana, which has reported up to 15 percent of all malaria cases. PMI will continue to leverage the nonmalaria resources of other donors working in that region, including InterAide, the Global Fund, the World Bank, and USAID, to maximize effectiveness.

3.4. Key Changes in this MOP

This MOP reflects the changes in the 2023–2027 national malaria strategic plan, developed in December 2022, but which had not yet been finalized at the time of this writing. Changes include decentralization of decision making, focus on districts with high malaria burdens, subnational tailoring, consideration of *P. vivax*, extension of community case management to people of all ages, and use of vector control tools such as new types of ITNs such as dual active ingredient (AI), and surveillance for *An. stephensi.*

II. OPERATIONAL PLAN FOR FY 2024

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

PMI supports NMP's national malaria strategic plan (NSP), which promotes an integrated vector management strategy, including vector surveillance, insecticide resistance management, continuous and mass distribution of ITNs, geographically targeted IRS, and LSM. Madagascar recommends both IRS and ITNs as the two main insecticide-based vector control interventions, with an emphasis on using insecticides to which the malaria vectors are susceptible. PMI continues to support entomological monitoring at 11 sentinel sites to evaluate vector bionomics, susceptibility of local vectors to insecticides approved by the World Health Organization (WHO), quality of IRS campaigns, and residual efficacy of insecticides; it also supports entomological surveillance for *Anopheles stephensi* at potential ports of entry and molecular investigation of routine entomological samples that do not amplify in species identification processing. One of these PMI sites is located in an elimination district (Antsiranana I). The Global Fund supports entomology at more than 10 sites depending on the disbursement of funds—14 sites in 8 districts in calendar year (CY) 2022. Starting in 2008, PMI supported focal IRS in 48 communes (on average) in districts with low transmission in the central highlands of Madagascar. Beginning in 2016, PMI shifted its support with blanket IRS in districts with high transmission in coastal regions (average of 5–9 districts per year). In CY 2023, PMI will support the IRS in five districts at district risk/surveillance level 4. The Global Fund supports IRS for response to upsurges and after emergencies such as cyclones. NMP also recommends LSM as a complementary vector control tool to address outdoor biting behaviors; PMI completed an LSM OR study in the districts of Morombe and Ankazobe to determine the entomological outcomes, feasibility, and acceptability of drone-based LSM in rice paddies. Both PMI and the Global Fund support ITN mass distribution campaigns in 111 of 114 districts and routine distribution of ITNs in 101 districts, while PMI supports continuous ITN distribution in 14 districts. The NSP goal is to provide individual and collective protection to at least 90 percent of the population at risk of contracting malaria with an effective vector control intervention. Both PMI and the Global Fund support these vector control intervention efforts in Madagascar. A summary of activities can be seen in the figures below.

Figure 1a. Map of All PMI-Funded ITN Distribution Channels

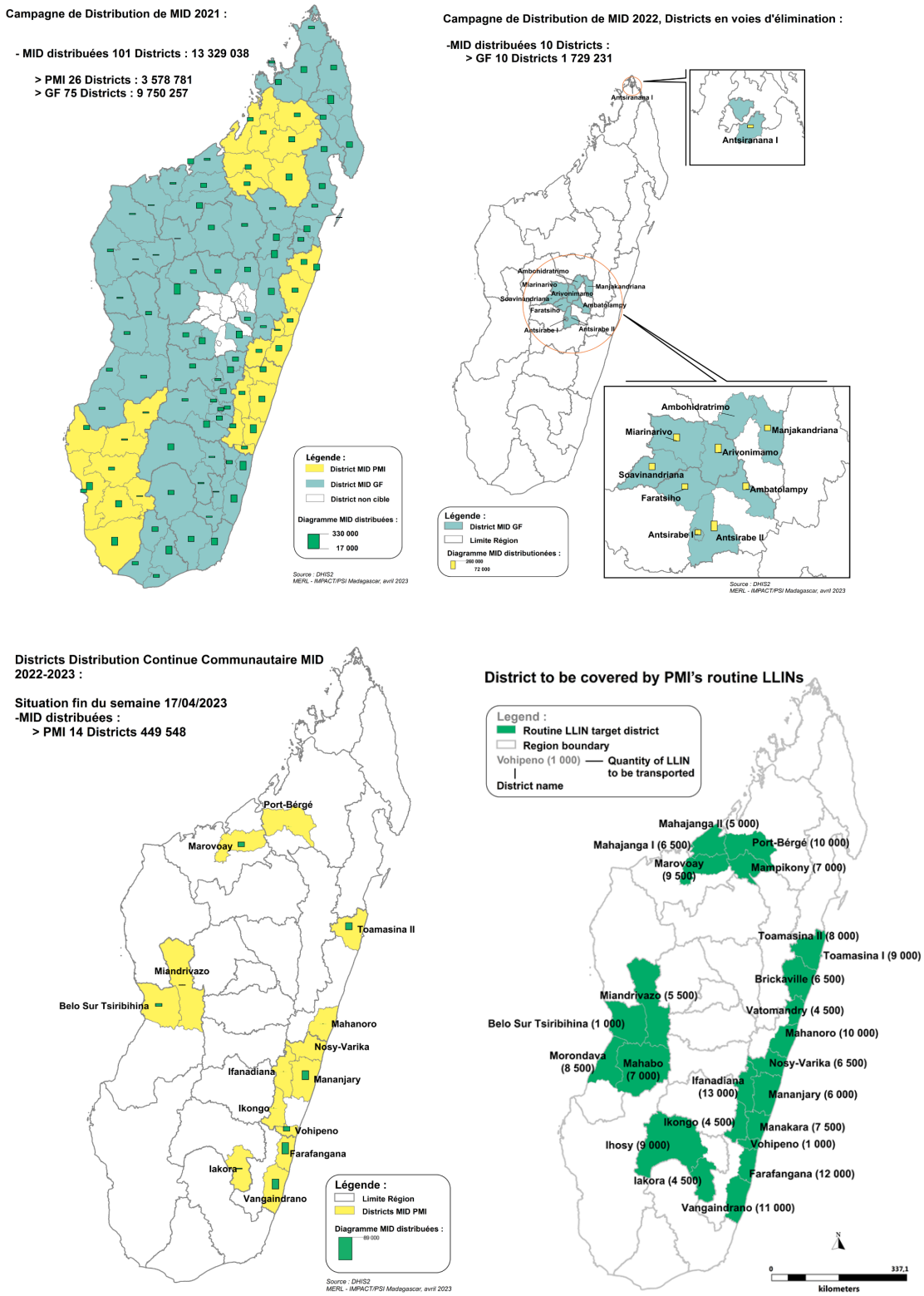


Figure 1b. Map of Entomological Monitoring Sites in Madagascar Funded by PMI and the Global Fund

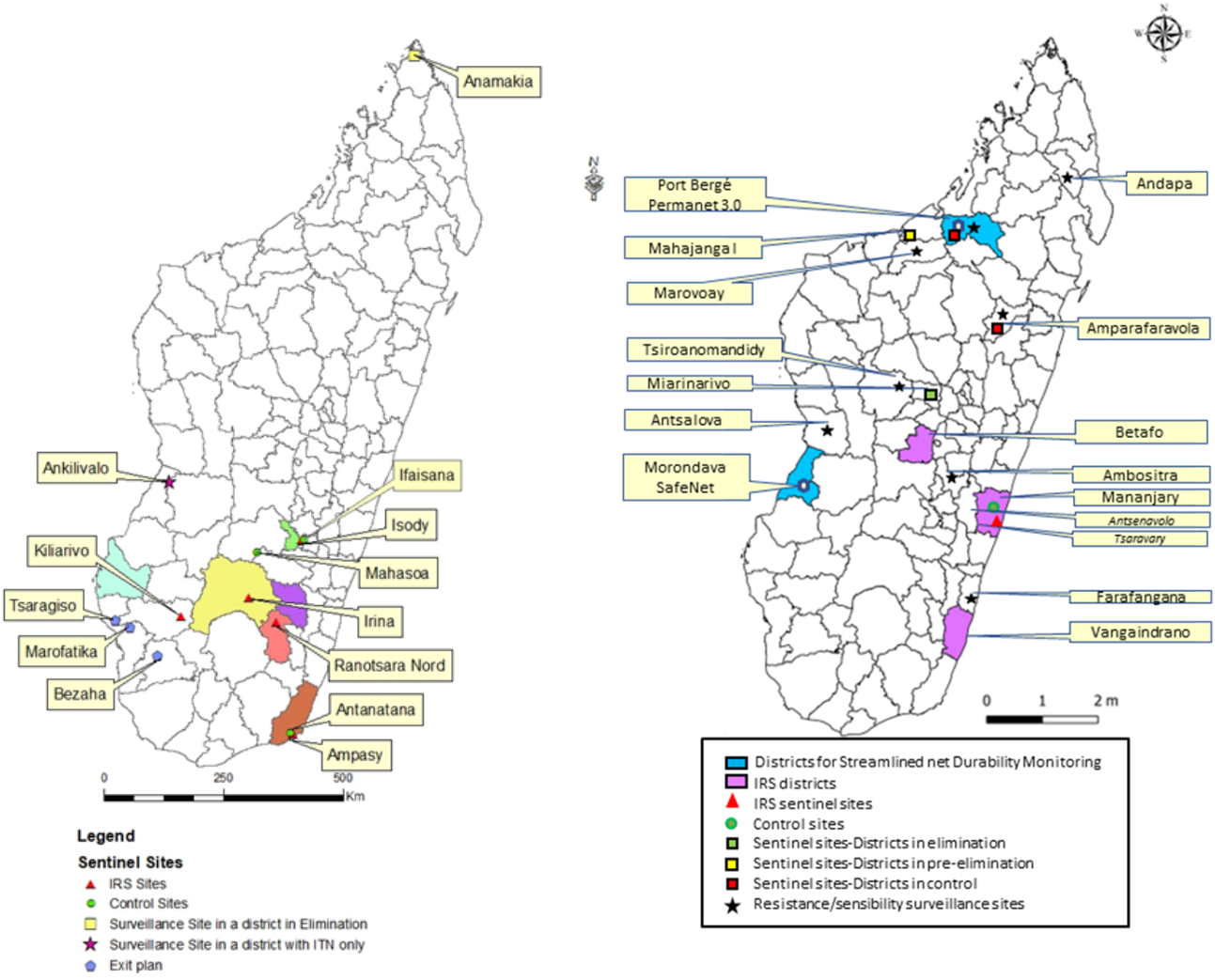


Table 1. ITN Distribution in Madagascar, 2018–2021

Year	District	Mass Campaign	ANC	EPI	School	Community	Other	Brand
2018	106 districts	12,392,831			N/A			Dawa plus Permanet 2.0 SafeNet Yorkool
2019	106 districts		199,788	331,670	N/A			SafeNet Yorkool
2020	101 districts		305,849	636,370	N/A		12,660	SafeNet Yorkool Royal Sentry Olyset plus
2020	12 districts				N/A	735,144		Royal Sentry Olyset plus
2021	12 districts				N/A	51,137		Royal Sentry Olyset plus
2021	101 districts	13,318,689						Yahle Permanet 3.0 Olyset Plus SafeNet
2021	11 districts (emergency)						8,200	SafeNet
2021	101 districts		388,059					SafeNet
2021	101 districts (social marketing)						42,225	SafeNet
2022	10 elimination districts	1,744,068						SafeNet
2022–2023	24 districts		172,500					SafeNet Yahe, generic net
2022–2023	14 districts					702,550		Yahe, generic net
2022	18 districts (emergency)						32,350	Yahe, generic net
2022	101 districts (social marketing)						570,170	Yahe, generic net

ANC: antenatal care: EPI: Expanded Program for Immunization.

1.2. Recent Progress (January 2022–March 2023)

- PMI supported the planning, implementation, and evaluation of IRS in five districts, covering 198,311 structures and protecting 886,329 people during the 2022 spray campaign. For more information about the IRS activity, refer to the 2022 PMI IRS End of Spray Report.
- PMI supported community mobilization and targeted SBC during the IRS activity.
- PMI supported entomology monitoring at 36 sites: one district received ITN, four received IRS with three IRS control sites, 12 sites received LSM with 12 LSM-comparison sites; one site was in an elimination district; and three sites were where IRS had been discontinued.
- PMI supported the implementation of and technical assistance for the planning and distribution of ITNs in a mini-mass distribution campaign in 2022, distributing 1.75 million standard, Global Fund-procured ITNs to 3.4 million people in 10 elimination districts. The activity was conducted in collaboration with the Global Fund and NMP. PMI's financial contribution included support for authentication, training, and payment of allowances for community actors, support for monitoring and supervision across all campaign phases, and development of SBC tools and materials and support for community mobilization campaigns to maintain appropriate ITN-related behaviors. This campaign was digitized, including the collection of distribution and payment data on mobile devices, real-time short message service (SMS) reporting, and real-time sharing of distribution progress through a Microsoft Power BI dashboard and in DHIS2.
- PMI procured 1.1 million ITNs, including 800,000 standard nets and 300,000 PBO nets for continuous distribution channels (community distribution and ANC/immunization channels).
- PMI supported the community-based distribution of 456,000 ITNs, including 56,000 PBO nets in 9 of the 14 targeted districts, to protect over 3 million people; over 10,000 community actors were trained and mobilized for the sensitization and distribution.
- PMI supported a cost and feasibility evaluation of the new continuous community distribution activities (underway at the time of this writing).
- PMI supported the prevention of malaria in pregnancy (MIP) by providing over 172,000 ITNs, including 18,000 PBO nets, in 24 districts to women at their first ANC visit.
- PMI supported streamlined durability monitoring of ITNs from the 2021 mass distribution campaign, including completing the 12-month assessment of PermaNet 3.0 ITNs in Toamasina II District, Yahe LN ITNs in Mananjary District, and SafeNet ITNs in Vangaindrano District.
- PMI supported community SBC activities focused on correct use and care of ITNs and activities focused on mobilization approaches for mass campaigns and community-based distribution to increase the number of household champions correctly using ITNs. For more information, refer to the SBC section below.

1.3 Plans and Justification for FY 2024 Funding

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

1.3.1. Entomological Monitoring

PMI will conduct entomological monitoring at 14 sites in districts receiving ITNs based on past resistance data (one in the elimination district of Antsiranana I); at IRS sites; at associated control sites; and in one elimination district. Activities include vector bionomics, insecticide resistance, larval surveillance, and monitoring of insecticide residual efficacy. Activities for enhanced surveillance of *An. stephensi* will be included in accordance with PMI's *An. stephensi* action plan guidance through molecular analysis of routine samples and larval surveys at points of entry (seaports). Insecticide resistance monitoring will be conducted at 20 sites. By using question-driven entomological monitoring, subsequent data will provide key information to make informed decisions about vector control implementation in Madagascar across the different regions and ecological zones. In support of localization efforts, PMI will continue to provide technical assistance and support to NMP for molecular capacity strengthening and will begin working directly with two local research institutions—the University of Antananarivo and the University of Antsirabe.

Summary of Distribution and Bionomics of Malaria Vectors in Madagascar

As of 2022, while *An. gambiae s.l.* was the primary vector, the *Anopheles* diversity was high across the country, with *An. funestus s.l.* and *An. mascarensis* also known to be vector species. One species, *An. coustani*, has been identified as a potential emerging vector in the country and is commonly found across all ecosystems and with infective sporozoites, suggesting its role in malaria transmission. *An. funestus s.l.* has been found in humid/tropical and equatorial settings as well as in subdesert zones; *An. coustani* has been collected in humid/tropical settings, in a subdesert zone (Bezaha), and in the fringe of the Central Highlands with a tropical high-altitude climate; and *An. mascarensis* has been found predominantly in the Central Highlands in the humid/tropical east and southern subdesert and dry forests, although detection has been reported around the island. *An. gambiae s.l.* is the primary vector that has been collected at all sites using all collection methods for both indoor and outdoor collections. Vector densities and biting rates are highest indoors and outdoors in March and April at all sites. The indoor resting density of *An. gambaie s.l.* was very low (0–1.4 vectors per room per day), and outdoor resting has also been observed. In CY 2022, outdoor resting collections were conducted in eight districts surveyed in the regions of Atsimo-Andrefana and Ihorombe, and all sites had vectors resting outdoors in natural or pit shelters (98.8 percent of vectors were *An. gambiae s.l.* and the remaining were *An. funestus s.l.* and *An. coustani*). *An. gambiae s.l.* biting rates were highest during the first part of the night, as early as 8:00 p.m. and until 11:00 p.m., both indoors and outdoors, regardless of site or intervention used.

Status of Insecticide Resistance in Madagascar

Insecticide-resistance monitoring in Madagascar focuses on insecticides used in ITNs and IRS—the primary vector control interventions. From September 2021 to July 2022, *An. gambiae s.l.* was susceptible to pirimiphos-methyl, clothianidin, and chlorfenapyr at all 13 sites where the tests were conducted. Some degree of susceptibility to pyrethroids (deltamethrin and/or permethrin) remained in 10 districts; however, *An. gambiae s.l.* showed low-to-moderate-intensity resistance to deltamethrin and/or permethrin in five districts. PBO fully restored susceptibility to both pyrethroids tested in the areas of resistance.

1.3.2. Insecticide-Treated Nets (ITNs)

PMI has allocated resources in FY 2023 and 2024 for the procurement and technical assistance (TA) for the country's CY 2024 mass distribution campaign in 101 districts. With FY 2024 funds, PMI will provide technical support for a mini-mass distribution campaign in up to 10 elimination districts in CY 2025 (three years after a mini-campaign was conducted in December 2022 in these 10 elimination districts). In response to evidence of insecticide resistance at select entomology monitoring sites, PMI/Madagascar transitioned to distributing PBO nets in Toamasina II and Port-Berger districts through mass and continuous channels). Evidence of resistance to deltamethrin has expanded to four additional districts (Antsiranana I, Mahabo, Anosy, and Amparafaravola). In these six districts, dual-insecticide ITNs will be distributed across all channels in coordination with the Global Fund. Approximately 11 percent of the nets procured by the Global Fund will be new types. TA will include PMI participation in the *comité national de coordination de la campagne* (national committee for campaign coordination) for donor coordination and resource mobilization. New types of nets (dual-AI) will be distributed in districts with malaria incidence of at least 200 cases per 1,000 population. The majority of these districts are located in the six southern regions that reported 60 percent of malaria cases in 2022 (Atsimo-Atsinanana, Anosy, Haute Matsiatra, Vatovavy, Fitovinany, and Atsimo-Andrefana).

PMI will also support efforts to increase ITN ownership through improved census, quantification, and community mobilization activities, as well as the establishment of a distribution site for each village/fokontany included in the CY 2021 mass distribution campaign. PMI will support NMP's monitoring and evaluation unit to scale digitalization of the reporting system that was successfully piloted during the CY 2021/2022 campaigns and during community-based continuous distribution. The planned digitalization TA will cover all steps of the campaign, from household enumeration to distribution to beneficiaries.

PMI supported the collection of 12-month data points for PermaNet 3.0, Yahe, and SafeNet ITNs in Toamasina II, Mananjary, and Vangaindrano as part of an ITN durability monitoring protocol. PMI is collecting 24-month data in CY 2023, and PMI will continue to support durability monitoring in CY 2024 to complete the 36-month data collection with FY 2023 MOP funding. No FY 2024 MOP resources are allocated for new durability monitoring, pending further PMI guidance.

To maintain appropriate behaviors, PMI will focus its SBC efforts on known facilitators, including self-efficacy and promoting positive social norms around ITN use and care.

PMI/Madagascar will focus its SBC efforts around maintenance and care of ITNs. SBC activities will emphasize the behaviors necessary to obtain and maintain the appropriate number of ITNs in a household.

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

ITN Distribution in Madagascar

In Madagascar, ITNs are distributed via mass campaign every three years. The next mass distribution campaign is planned for CY 2024 (in 101 districts) and CY 2025 (in up to 10 elimination districts). Continuous distribution channels include: (1) community-based distribution using a voucher/coupon system with schools as an entry point for SBC and assessment of ITN coverage, which involves collaboration between the MOH and the Ministry of Education; (2) ANC visits to pregnant women; (3) EPI encounters for fully vaccinated children; and (4) outpatient clinics to children under five years of age. Other channels include social marketing and distribution during emergencies, such as cyclones, to internally displaced people in the south and to key populations, as defined in the NSP.

In CY 2024, 16.2 million ITNs will be distributed in 104 districts, including 2 million planned for distribution in FY 2022 (800,000 standard) and 1.2 million planned for distribution in FY 2023 (dual-AI). PMI will also support distribution-related costs in coordination with the Global Fund. With FY 2024 MOP funds, PMI will procure up to 800,000 new types of ITNs (dual-AI) for community-based continuous distribution (cCD) in up to 14 hard-to-reach districts, as described in the anticipated NSP 2023–2027 (Ikalamavony, Midongy Atsimo, Befotaka, Antanambao Manampotsy, Marolambo, Anosibe An'Ala, Soalala, Analalava, Maintirano, Besalampy, Ambatomainty, Morafenobe, Beroroha, and Manja). The cCD is scheduled for CY 2025 (one year after the 2024 mass distribution campaign).

PMI will continue to support NMP's strategy of transitioning to PBOs and dual-AI ITNs, which began in two districts through cCD in 2020 and mass distribution in 2021. In consultation with the Global Fund, PMI will be distributing dual-AI ITNs in select districts in the south and southeast regions through the 2024 mass distribution campaign based on resistance data and persistently high malaria incidence. The same type of dual-AI ITNs will be distributed in these areas through cCD in CY 2025.

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

Table 2. Streamlined Durability Monitoring

Campaign Date	Site	Brand	Predistribution	12-month	24-month	36-month
August–September 2021	Toamasina II	Permanet 3.0	Feb 2021	Aug 2022	August 2023	Planned
	Vangaindrano	SafeNet	July 2021	Aug 2022	August 2023	Planned
	Mananjary	Yahe	Feb 2021	Aug 2022	August 2023	Planned

1.3.3. Indoor Residual Spraying

In CY 2025, PMI will support the planning, implementation, and evaluation of IRS in approximately five districts using susceptible, WHO-prequalified insecticides: clothianidin, clothianidin + deltamethrin, and organophosphates. Selection of districts and insecticides will depend on entomological data, malaria burden, and other factors, including complementary interventions and accessibility. Additionally, PMI will support NMP's capacity-strengthening efforts and facilitate the graduation of at least one district to NMP implementation of IRS, with limited TA from the partner.

IRS support will include appropriate SBC messages to encourage acceptance of IRS and refraining from washing/plastering walls, along with continued ITN use.

Table 3. PMI-Supported IRS Coverage

Calendar Year	Districts[1]	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)	Insecticide
2022	Ihosy, Iakora, Ivohibe, Isandra, and Taolagnaro	198,311	99%	886,329	Clothianidin + deltametrin, clothianidin, pirimphos-methyl CS
2023[2]	Five districts	~169,810	TBD	~621,436	Clothianidin + deltametrin, clothianidin, pirimphos-methyl CS, broflanilide*
2024[2]	Four districts, plus TA in at least one district	TBD	TBD	TBD	TBD
2025[2]	Four districts, plus TA in at least one district	TBD	TBD	TBD	TBD

[1] Proposed. [2] Planned (target). TA: technical assistance; TBD: to be determined.

IRS Insecticide Residual Efficacy in Madagascar

Wall bioassays were conducted monthly following the CY 2022 IRS campaign. At five months after spraying the results were: 95 percent mosquito mortality for Fludora Fusion (clothianidin + deltamethrin); 91 percent mosquito mortality for Klypson (clothianidin); and 92 percent mosquito mortality for Actellic (pirimiphos-methyl). Residual efficacy monitoring will continue until mortality falls below the 80 percent mortality threshold for two consecutive months.

1.3.4 Other Vector Control

In CY 2022 and CY 2023, PMI supported OR to evaluate the feasibility and impact of LSM in aquatic agriculture in two districts with high malaria burdens where ITN coverage is high; rainy seasons are shorter than six months; and where aquatic agricultural sites are relatively few, fixed, and findable in Madagascar. The key objectives of the study included:

1. Evaluate the cost, feasibility, and acceptability of drone application of larvicide in Madagascar; and
2. Evaluate whether larviciding of aquatic habitats and rice paddies provide additional control of malaria vectors above that obtained through use of pyrethroid-only ITNs (in these locations, vectors remain susceptible to pyrethroids) by reducing larval and adult densities, indoor and outdoor human biting rates, sporozoite rate, and the entomological inoculation rate.

The first phase of the intervention took place from January 2022 to July 2022, and the second phase took place from December 2022 to March 2023. Data analysis for the final reports were in progress at the time of this writing, but NMP wishes to continue LSM in targeted areas when resources are available. PMI plans to use funds to support LSM strategic planning and roadmap development for NMP's LSM implementation based on the results of the validated LSM plans. See the OR section below for details.

2. Malaria in Pregnancy

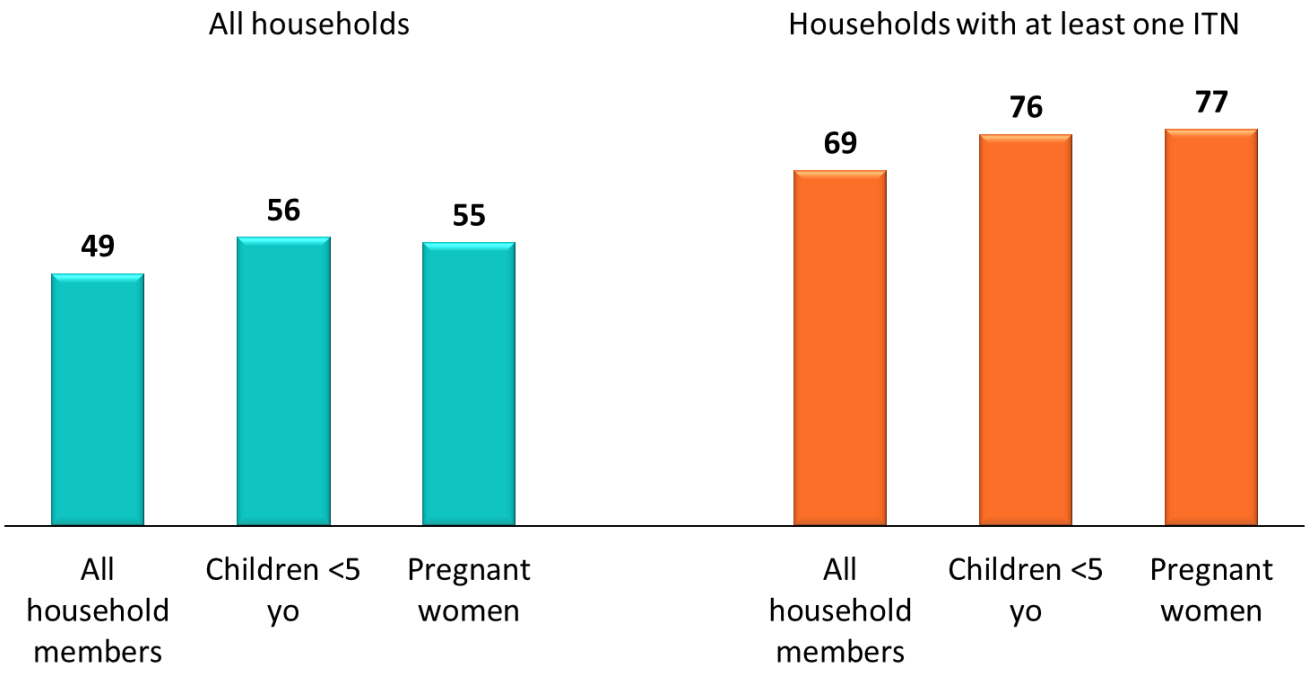
2.1. PMI Goal and Strategic Approach

PMI supports the government's MIP prevention strategy in USAID intervention areas and complements the investments of other partners, such as the Global Fund. MIP interventions in Madagascar include the distribution of ITNs; IPTp at the health facility and community level; management of malaria illness among pregnant women; and SBC to encourage early and regular ANC, IPTp, ITN use and care, and care seeking for malaria illness among pregnant women.

Madagascar's national guidelines align with the 2016 WHO ANC recommendations, which include promoting eight antenatal contacts during pregnancy with ANC beginning by 13–16 weeks of pregnancy, and include providing IPTp via at least three doses of sulfadoxine-pyrimethamine (SP) given at monthly intervals beginning at 13 weeks of pregnancy. NMP is implementing IPTp in 104 districts currently classified as control or pre-elimination districts under its NSP 2018–2022 (anticipated to continue in 104 districts under NSP 2023–2027). In these targeted districts, NMP aims to cover ≥65 percent of pregnant women with IPTp3. In 2020, aligned with WHO guidance, NMP updated its treatment recommendations for uncomplicated MIP to allow for the administration of ACTs to pregnant women during the first trimester.

In the 2021 DHS, ITN use among pregnant women with access to an ITN (77 percent) was higher than among other demographic groups in Madagascar (69 percent overall); however, because of limited ITN access, overall ITN use among pregnant women was only 55 percent.

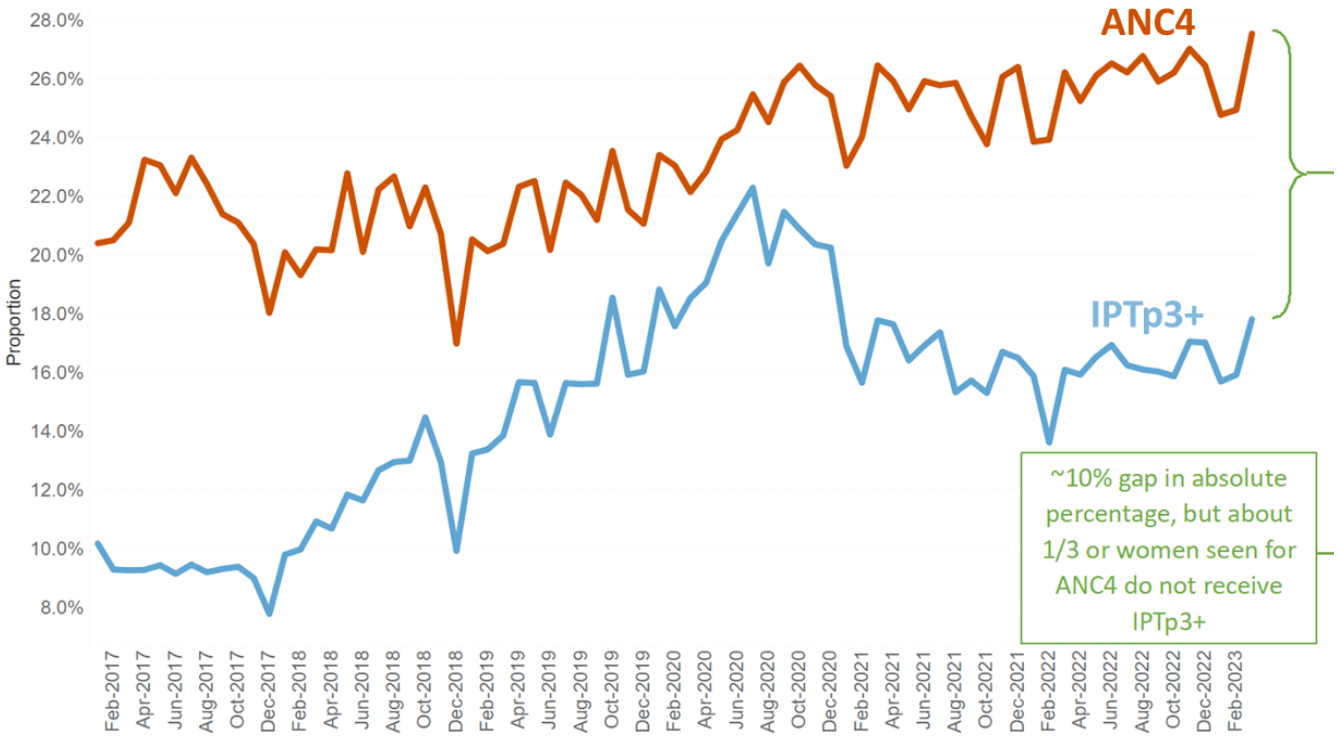
Figure 2. Percent of Household Members Who Slept Under an ITN During the Night Before the Interview



Source: DHS 2021.

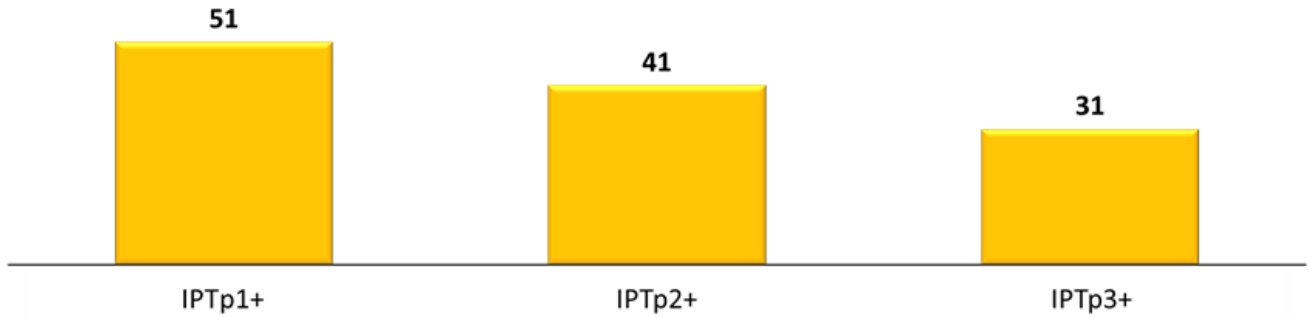
Progress toward NMP's target for IPTp3 remains slow, with substantial gaps between ANC4 visits and IPTp3 delivery. In the DHS 2021, nearly 66 percent of women who had recently given birth but who did not receive IPTp3 reported that the health care provider did not offer one to them.

Figure 3. Trends in Coverage of ANC4 and IPTp3 in Madagascar, February 2017–February 2023



Source: DHIS22 Madagascar.

Figure 4. Percentage of Pregnant Women Receiving at Least 1, 2, or 3 Doses of SP



Source: DHS 2021

Challenges included:

- Funding, including competing priorities among MOH and funders that has led to reprogramming or delays in Global Fund financing allocated for MIP activities, as well as limited NMP funding.
- Limited human resources related to high staff turnover and weaknesses in recruiting, training, and supporting new staff.
- Gaps in support for the prevention of MIP in hospitals and private health facilities.
- Last-mile supply, including:
    - Lack of resources that hamper last-mile delivery of ITNs and printed materials, such as registers, which are heavy and bulky;
    - Frequent stockouts of SP at peripheral facilities for reasons that are not clear; and
    - Limited access to SP and ITN stock data at the level of the *pharmacie de gros de district* (district pharmaceutical depot, or PhaGDis), which would allow for a better understanding of why SP is often stocked out at peripheral health facilities and possible solutions.
- Behaviors, including
    - How hot weather in some areas leads to pregnant women to enter under an ITNs late in the evening; and
    - How, in some areas, women are reluctant to seek ANC during the first half of a pregnancy.
- Data quality and availability, including
    - Different ministry directorates use different definitions of the duration of pregnancy (weeks of amenorrhea versus weeks of pregnancy), which has complicated the integration of training materials;
    - The IPTp3/IPTp3+ indicators are present on two separate registers, and analyses indicate that the data are not recorded correctly in these registers (e.g., often IPTp3 is greater than IPTp3+ in DHIS2); and
    - Data are limited about the reasons providers are sometimes not offering IPTp (e.g., SP stockouts and provider knowledge and behavior), and about levers that may encourage early and repeated ANC visits.

2.2. Recent Progress (January 2022–April 2023)

PMI supported NMP with the following efforts.

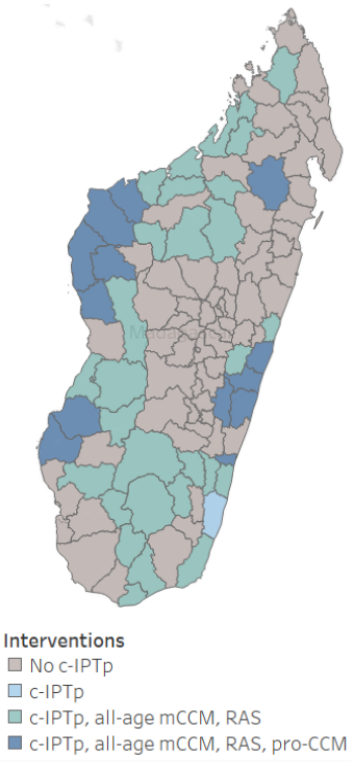
- National level
    - Procurement and distribution of 4.7 million SP tabs (1 million procured by PMI) to all 102 PhaGDis (in 101 control districts), accounting for 100 percent of needs;
    - Reactivation of the MIP technical working group; held two meetings in 2022; and
    - Coordination of technical support and materials among implementing partners to facilitate the extension of c-IPTp.

- District level: Began extending c-IPTp from three districts in early 2022 to 16 districts in combination with all-age malaria case management at the community level and pro-CCM; 24 districts in combination with all-age malaria case management at the community level; and one district without extension of community-based case management.
- Community level: Conducted two supervision visits at c-IPTp sites.

During CY 2023–2024, PMI/Madagascar will support activities to prevent MIP, including monthly provision of SP to pregnant women after the first trimester; provision of ITNs to pregnant women at health facilities during their first ANC and in community settings; and SBC to encourage early ANC, IPTp, ITN use and care, and early care seeking for fever among pregnant women. A health facility survey planned for 2024 will include and assessments of provider knowledge, attitudes, and reported practices related to the prevention and treatment of MIP, and testing of parasites from patient specimens for genetic markers of resistance to SP.

Increasing access to care at the community level is a priority for the MOH, and c-IPTp will be implemented in conjunction with other community-level activities (Figure 5). PMI is supporting the introduction of c-IPTp in 41 districts, the Global Fund will support it in 17 districts, and UNICEF will support it in select districts in the regions of Anosy and Androy in CY 2023. PMI is planning to reprogram funds to evaluate the expansion of community-level care, including c-IPTp, in CY 2024.

Figure 5. Map of Districts Targeted for c-IPTp and Other Enhanced Community-Based Care as of April 2023



2.3. Plans and Justification for FY 2024 Funding

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

PMI plans to continue its support of SP procurement and training and supervision for IPTp in all districts with incidence of ≥1 per 1,000 population; ITN distribution during ANC visits in the 104 districts at district risk/surveillance level 2, 3, and 4; case management for pregnant women with malaria, including ACT use in the first trimester; SBC to increase ITN use; early and monthly ANC seeking among pregnant women; national MIP technical working group meetings; and malaria case management, including among pregnant women in elimination areas. PMI also plans to:

- Continue its support of c-IPTp in 41 districts (the Global Fund is expected to continue financing 17 districts, and UNICEF is planning to support additional districts in two regions), leveraging findings from the anticipated evaluation of community health activities in 2024 to optimize implementation.
- Update MIP documents, such as standard operating procedures, management tools, maternal carnets, referral cards, and training materials to incorporate new recommendations—such as artemether-lumefantrine (AL) during the first trimester; harmonize and integrate them to the extent possible with maternal and child health documents; and disseminate the documents, ensuring last-mile delivery.
- Enhance the capacity of trainers at the central, regional, and district level.
- Train public and private providers at all levels, including hospital- and community-based providers, to improve MIP capacity and share updated recommendations.
- Facilitate the increased use of MIP data for decision making.
- Facilitate relevant knowledge transfer among implementing partners regarding community-based IPTp and related SBC.

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

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

3. Drug-Based Prevention

PMI has not begun supporting drug-based prevention other than IPTp as a routine intervention for malaria prevention in Madagascar. Madagascar's National Malaria Strategic Plan 2018–2022 supports both SMC and MDA, and the updated plan for 2023–2027 is also expected to support them. In the FY 2022 MOP, funding was allocated to assess the pilot implementation of SMC in southern Madagascar; however, the pilot implementation did not occur. In early 2023, NMP began making plans to implement SMC later in 2023 under the Global Fund in five districts (Ankazoabo Atsimo, Beroroha, Ambatomainty, Taolagnaro, and Vangaindrano) among children between the ages of 5 and 14 years. NMP has also

intermittently deployed MDA in response to malaria upsurges, but these efforts have not been supported by PMI to date.

3.1. Seasonal Malaria Chemoprevention

3.1.1. PMI Goal and Strategic Approach

NMP's National Malaria Strategic Plan 2018–2022 supported SMC as a standard intervention among children between the ages of 3–59 months during peak transmission season in areas with highly seasonal malaria transmission, and supported the piloting SMC among children between the ages of 6 and 13 years and adult migrants. In alignment with updated WHO recommendations, the National Malaria Strategic Plan 2023–2027 is expected to support SMC among children at elevated risk for severe malaria up to age 14. As NMP begins implementing SMC later in 2023, it plans to use sulfadoxine-pyrimethamine plus amodiaquine (SPAQ), targeting children between the ages of 5 and 14 for four cycles of SMC in five districts, beginning before the start of peak malaria transmission in 2023 (likely October), and funded by the Global Fund.

PMI supports the use of SMC in accordance with WHO guidance; however, PMI does not yet support the implementation of SMC in Madagascar. PMI provides technical assistance and plans to include monitoring for markers of resistance to SP in the national health facility survey planned for 2024.

3.1.2. Recent Progress (January–April 2023)

- NMP participated in the annual meeting of the SMC Alliance
- Global Fund received budget for implementation in 5 districts among children 5–14 years old in September–October 2023
- SPAQ was purchased for the 2023 campaign.

3.1.3. Plans and Justification for FY 2024 Funding

PMI will continue to provide technical support to NMP as they develop plans to continue or expand SMC. Funds have not been specifically allocated to SMC in this MOP.

3.2. Other Drug-Based Prevention

Madagascar's national strategic plan for 2018–2022 and draft plan for 2023–2027 include the use of MDA during emergency situations or malaria epidemics to be delivered as dihydroartemisinin-piperaquine (DHP) in three monthly rounds to persons older than 2 months of age in the most impacted areas (annual incidence of over 500 cases per 1,000 population). MDA in Madagascar has been supported by the Global Fund. In FY 2024, PMI plans to support a pilot of postdischarge malaria chemoprevention using DHP among young children hospitalized with malaria and anemia in up to two districts (see additional details in the case management section).

3.2.1. PMI Goal and Strategic Approach

PMI does not currently support the implementation of MDA outside the context of OR.

3.2.2. Recent Progress (January 2022–April 2023)

NMP conducted a single round of MDA in six communes in Taolagnaro District in July 2022, and a single round of MDA in seven communes in Ankazoabo District in September 2022, funded by the Global Fund and reaching 57,000 of the 66,000 targeted recipients. Challenges included organizing high-quality cascade training, obtaining and transporting the DHP, and procuring potable water and snacks to be given with the medication.

NMP does not plan to conduct MDA during CY 2023–2025 due to lack of funding. MDA was not included in the GC7 funding request for the Global Fund.

3.2.3. Plans and Justification for FY 2024 Funding

While no funding has been allocated for MDA in MOP 2024, PMI/Madagascar will continue to provide TA regarding decisions to implement and monitor MDA activities planned by NMP.

4. Case Management

4.1. PMI Goal and Strategic Approach

PMI supports all aspects of NMP's approach through support to national-level policy and programmatic activities, commodity procurement, and improvement of facility- and community-level health worker performance. PMI also supports the nationwide procurement of malaria RDTs, ACTs, and injectable and rectal artesunate, accounting for approximately half of the country's needs. PMI's current case management support in Madagascar covers 11 of the country's 23 regions, representing an estimated 13.5 million people, including over 18,000 CHWs, about 3,000 health workers, 1,500 public and private health facilities, and 118 hospitals. PMI also supports outreach training and supportive supervision (OTSS) activities in three elimination districts and four surrounding districts. In addition, PMI has been supporting laboratory technical training, development and implementation of standard operating procedures, and maintenance of laboratory equipment. The Global Fund has been supporting the development and implementation of NMP's plan for laboratory quality assurance/quality control.

NMP's anticipated National Malaria Strategic Plan 2023–2027 and national treatment guidelines promote universal, quality-assured parasitologic testing of all cases of suspected uncomplicated malaria; prompt and effective treatment of confirmed, uncomplicated cases with ACTs; and prereferral treatment or definitive management of patients with severe malaria. Appropriate case management constitutes the second specific objective in the strategic plans: "To test 100 percent of suspected cases by RDT or microscopy, and to treat 100 percent of confirmed cases" at all levels of the health system, including at the community level and in the private sector. This aligns with the WHO's test, treat, and track model. NMP's norms and

directives for malaria case management as of January 2021 require the capacity to diagnose malaria using RDTs at all levels. For the *centres hospitaliers de références du district* (district reference hospitals) and *centres hospitaliers universitaires* (university hospitals), which manage severe malaria cases, RDT diagnostics are to be coupled with microscopy, and they are to provide microscopic follow-up of patients on days 3, 7, and 14 after hospital admission. In elimination districts, all cases are to undergo microscopic confirmation of *Plasmodium* species, if the CSB has microscopy. First-line treatment of uncomplicated malaria is artesunate-amodiaquine (ASAQ) and second-line treatment is AL. According to the country's case management guidelines, *P. vivax* malaria should be treated with ASAQ followed by a 14-day course of primaquine; however, this has not been implemented because of limited availability of microscopy at health facilities to determine parasite species, frequent stockout of primaquine, and lack of glucose-6-phosphate dehydrogenase (G6PD) testing. Thus, *P. vivax* cases and mixed infections receive the same treatment as *P. falciparum* cases. Discussions regarding implementation of radical treatment of *P. vivax* and routine testing for G6PD deficiency have taken place intermittently, and PMI will continue to encourage progress in diagnosis and management of *P. vivax* cases.

The routine system captures cases caused by *P. falciparum* and *non-falciparum* parasites. Data from January to December 2022 show that infections by *non-falciparum* species (based on diagnosis using Pf/PAN RDTs) are being reported from all 23 regions (median percent of cases caused by *non-falciparum* species, by region: 5.2 percent; interquartile range: 3.7–8.4; maximum: 23 percent in Vakinankaratra region).

Table 4. Number of Reported Malaria Cases by RDT Result, 2022

		RDT result					
Region	**Total RDT+**	**Only Pf Line Present**	**%**	**Only Pan-LDH Line Present**	**%**	**Pf and Pan-LDH Lines Present**	**%**
Alaotra Mangoro	122,535	40,026	33	3,810	3	78,699	64
Amoron'i Mania	32,815	15,502	47	4,112	13	13,201	40
Analamanga	38,507	12,444	32	4,999	13	21,064	55
Analanjirofo	42,841	16,687	39	1,855	4	24,299	57
Androy	13,567	8,893	66	1,230	9	3,444	25
Anosy	199,809	86,716	43	7,523	4	105,570	53
Atsimo-Andrefana	134,939	53,073	39	7,097	5	74,769	55
Atsimo-Atsinanana	581,629	268,617	46	15,779	3	297,233	51
Atsinanana	124,985	42,310	34	4,652	4	78,023	62
Betsiboka	49,605	26,540	54	3,071	6	19,994	40
Boeny	50,309	14,940	30	1,771	4	33,598	67
Bongolava	48,987	13,796	28	7,040	14	28,151	57

		RDT result					
Region	Total RDT+	Only Pf Line Present	%	Only Pan-LDH Line Present	%	Pf and Pan-LDH Lines Present	%
Diana	12,638	5,424	43	681	5	6,533	52
Fitovinany	128,526	54,121	42	2,690	2	71,715	56
Haute Matsiatra	178,562	67,521	38	17,736	10	93,305	52
Ihorombe	100,708	37,178	37	4,778	5	58,752	58
Itasy	3,714	1,620	44	210	6	1,884	51
Melaky	65,023	24,778	38	4,133	6	36,112	56
Menabe	78,853	28,423	36	3,561	5	46,869	59
Sava	22,835	10,198	45	730	3	11,907	52
Sofia	122,261	40,336	33	6,302	5	75,623	62
Vakinankaratra	45,162	12,799	28	10,386	23	21,977	49
Vatovavy	146,774	54,726	37	4,123	3	87,925	60

Source: DHIS2 2023.

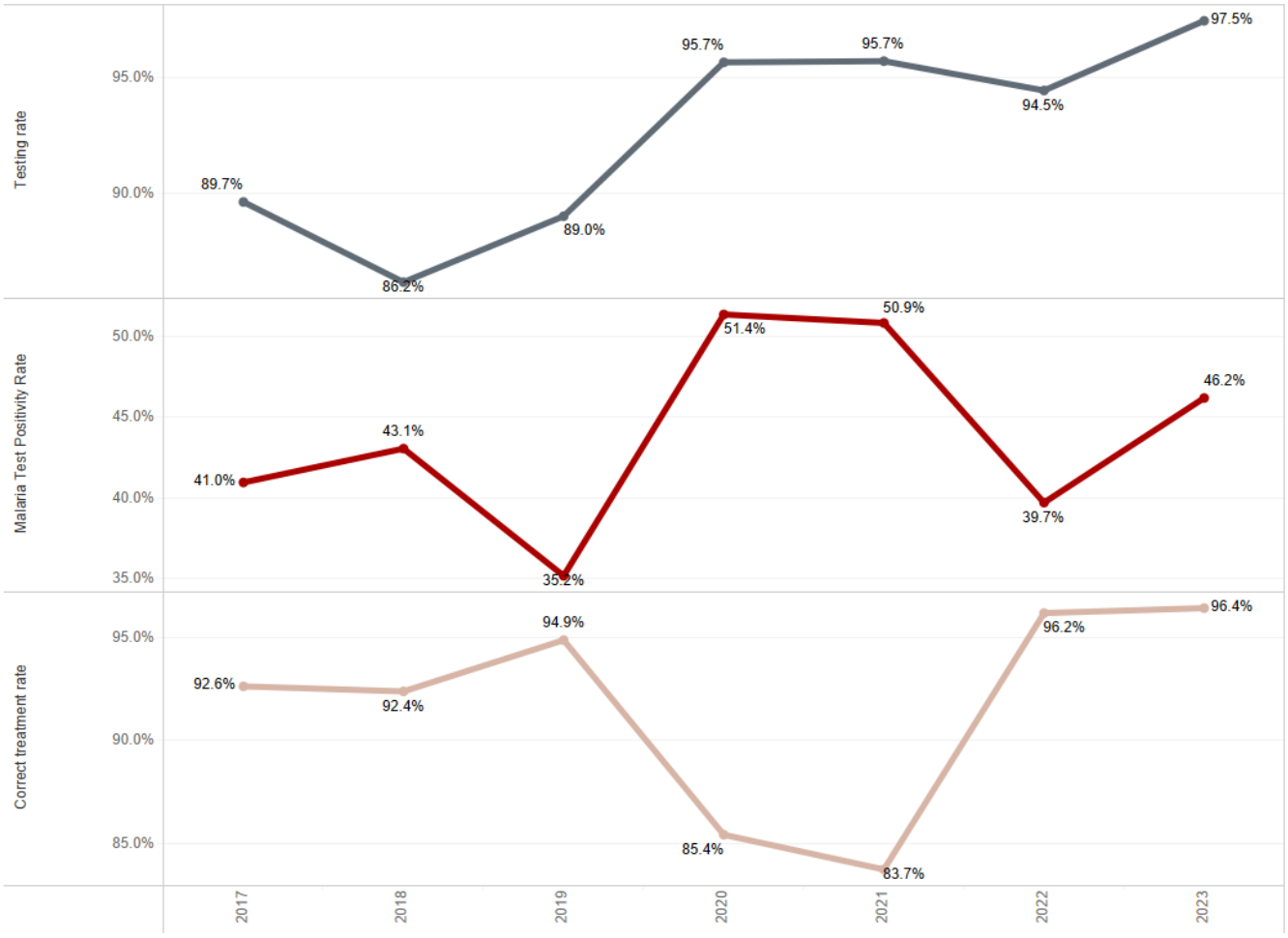
Where possible, severe malaria cases are treated with injectable artesunate followed by a full course of oral ACTs. Rectal artesunate was introduced in 2020 at the community and CSB levels and is being implemented in 53 districts for prereferral treatment of children under six years of age with severe disease. Following WHO guidance in 2022 not to extend the coverage of rectal artesunate due to safety and efficacy concerns, NMP paused the expansion of its rectal artesunate program beyond the locations where it was being deployed at the time. Given the stable or increasing numbers and proportions of severe malaria cases in some areas of Madagascar, particularly among young children, PMI plans to support NMP's goal of reducing malaria morbidity and deaths by piloting postdischarge malaria chemoprevention among children hospitalized with malaria and anemia in select districts with high malaria burdens.

In the 13 districts that were defined as elimination or pre-elimination districts in the 2019 national malaria elimination plan (i.e., they had attained an annual incidence of less than 1 per 1,000 population or a test positivity rate of less than 5 percent), diagnosis is made by RDT at the CSB level, and microscopy is performed for confirmation. Treatment for uncomplicated malaria in these districts includes an ACT plus low-dose primaquine for clearance of gametocytes, except among pregnant or lactating women, who receive only ACT. However, low-dose primaquine is not always given due to stockouts—there was a national stockout of primaquine from February 2022 to March 2023, and microscopy availability remains limited. Since 2021, it has been possible to report treatment with low-dose primaquine in DHIS2. Each malaria case is to be investigated and classified as locally acquired, imported, or recrudescent.

PMI supports reactive case investigation for each case in three districts, which consists of testing the surrounding households of the index case and treating those testing positive.

According to the 2021 DHS, 45 percent of children under five years of age with a febrile illness in the previous two weeks were taken for care, a decrease from 59 percent in the 2016 MIS. Figure 6 shows the evolution of testing rate, positivity rate, and correct treatment rate between 2017 and early 2023. The testing rate for fever cases has been improving since 2018. The treatment of positive cases has remained fairly stable, except during 2020 and 2021, perhaps due to pandemic-related supply issues.

Figure 6. Evolution of Testing, Positivity, and Correct Treatment Rates, 2017 to Early 2023



Madagascar has an extensive CHW program, with about 35,000 CHWs covering all regions. PMI supports about 18,500 CHWs with equipment, training, and supervision. A current challenge faced by the community health system is a lack of coordination among partners regarding approaches, motivation, and tools. To address this, PMI collaborated with USAID's Madagascar Health, Population, and Nutrition Office and other partners to help develop the

Madagascar government's national community health strategy and tools. The community health strategy includes establishing two CHWs per fokontany (i.e., village—the lowest administrative level). There is an initiative underway to formally pay CHWs; several partners are willing to contribute funds if the Madagascar government commits to co-financing. To address staffing gaps at the basic health center level and quality of care at the CHW level, PMI is contributing to the establishment of new categories of staff, including the *aide clinique* (ADC), *accompagnateur en santé communautaire* (ASC), and CHW peer supervisors. ADCs are paramedics or physicians who help CSB staff with clinical activities to improve quality service, as most CSBs are run by a single medical provider. The MOH plans to recruit or retain the ADCs at the end of the PMI project in 2025. ASCs are local technicians who help ensure support to CHWs (supervision of peer supervisors, training, and logistics) and support to CSBs for nonclinical activities, such as reporting and entering data in DHIS2. Each ASC supports 3–8 CSBs and the associated CHWs. The highest-performing CHWs receive additional training to become peer supervisors for the other CHWs in their respective communes. As of April 2023, PMI had trained 314 ADCs, 230 ASCs, and 1,488 CHW peer supervisors. CHWs conduct community sensitization activities on the prevention of communicable diseases, including malaria. They also provide integrated community case management services, including pneumonia, diarrhea, and malaria care for approximately 4.5 million children under five years of age, as well as family planning services. CHWs in approximately 80 districts have been trained on the use of rectal artesunate for the prereferral treatment of children under five years of age with severe disease. Additionally, the draft national malaria strategic plan for 2023–2027 calls for CHWs working in remote, high-burden areas to expand testing and treatment for malaria to people of all ages.

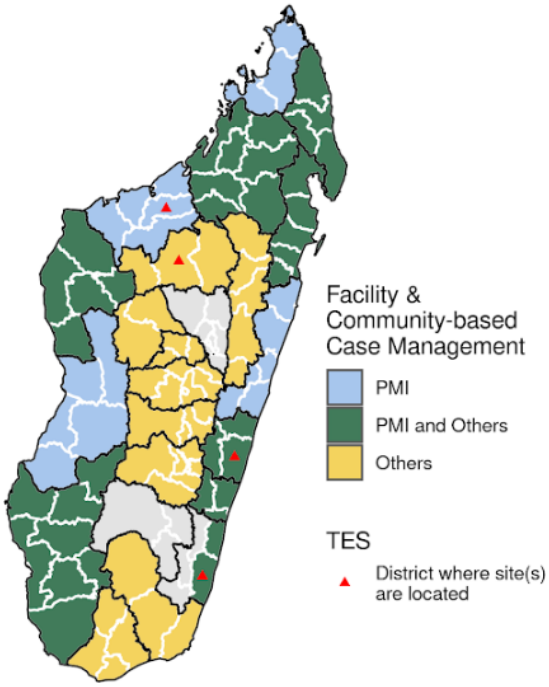
Madagascar has conducted OR studies on both proactive community case management (proCCM), whereby CHWs conducted biweekly household visits to assess fever among all household members and tested for malaria (and treated if positive), and expansion of mCCM to persons of all ages, using PMI funds. From 2017 to 2018, a cluster-randomized trial of proCCM was carried out in Mananjary District in the higher-burden southeast of Madagascar; results from this study indicate that malaria positivity among children under 15 years of age decreased significantly as a result of proCCM.[2] Madagascar has been planning to scale up proCCM, but progress stalled and implementation is now planned for 2024 in 16 districts. From 2019 to 2021, given NMP's interest in expanding mCCM to older age cohorts, PMI supported a cluster-randomized trial of the expansion of mCCM to all ages in Farafangana District in southeast Madagascar. Results indicate that age expansion of community services significantly increases care seeking and use of CHW services among persons in older age groups (manuscript in preparation). Madagascar plans to expand mCCM to all ages in 58 districts starting in 2024.

Private sector facilities (e.g., faith-based and nongovernmental organizations) are more prevalent in urban and peri-urban areas, accounting for approximately 40 percent of service

[2] Ratovoson, R., A. Garchitorena, D. Kassie, et al. 2022. "Proactive Community Case Management Decreased Malaria Prevalence in Rural Madagascar: Results from a Cluster Randomized Trial." *BMC Medicine* 20: 322.

provision in these areas. Guidelines for malaria case management in the private sector mirror guidelines in the public sector, and NMP and the District Health Authority include private providers in malaria case management training. The use of traditional healers and medicines is common in Madagascar's rural areas.

Figure 7. Map of Case Management and Community Health Activities in Madagascar



4.2. Recent Progress (March 2022–March 2023)

Commodities

For all 115 PhaGDis (district commodity warehouses), accounting for 100 percent of needs, PMI supported the distribution of 7.5 million malaria RDTs (including 4.8 million procured by PMI); 3.2 million ACTs (including 2.8 million procured by PMI); almost 320,000 vials of parenteral artesunate (including 240,000 procured by PMI); and 86,000 rectal artesunate suppositories (including 35,000 procured by PMI).

National Level

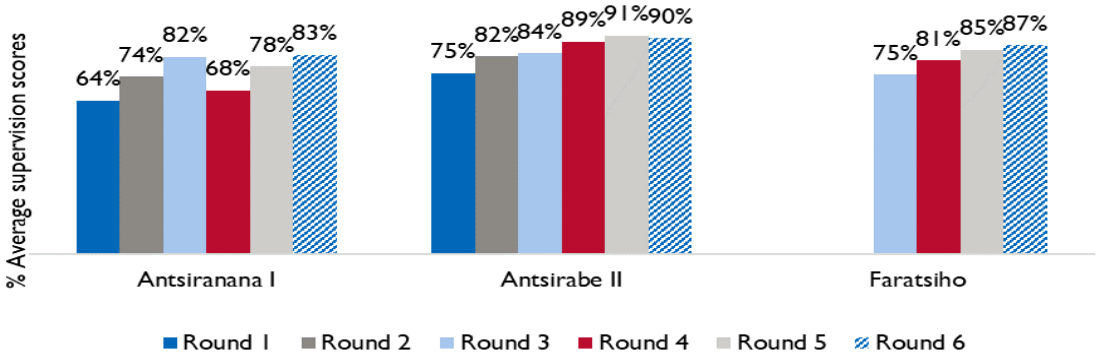
- Along with NMP, PMI supported malaria case management training of 150 health staff, including newly recruited public staff and private sector staff, as well as the training of 2,700 new and 3,400 existing CHWs on integrated community case management.
- PMI supported implementation planning of critical approaches, such as malaria case management for people of all ages at the community level in 58 districts and pro-CCM in 16 districts.
- PMI contributed to the national strategy for laboratory development, including the One Health approach.

- PMI supported WHO-approved External Competence Assessment of Malaria Microscopists training and the accreditation of 12 microscopists, basic refresher training for 32 microscopists, and the training of 7 trainers (high-performing microscopists).
- PMI supported one national-level and two peripheral-level meetings of the elimination TWG.
- PMI supported the national elimination TWG (led by NMP) to organize the annual meeting to share lessons learned and good practices.
- PMI supported post-university training at private centers in 10 districts, led by NMP, funded by the Global Fund ,and implemented by national professors.

Facility Level

- PMI supported the training of 734 health care providers, including on the use of single, low-dose primaquine in elimination areas.
- PMI supported CSBs to conduct 6,800 monthly meetings for CHWs, during which CHWs submitted reports and received case management coaching.
- In Atsimo-Atsinanana Region, in response to high case counts, PMI supported SBC to mobilize and reinforce appropriate case management behaviors among health care providers.
- PMI provided 77 tablets and data credits to 33 facilities, four district health offices, and 20 lab supervisors to improve case and foci management and reporting.
- PMI continued integrating the health network quality improvement system reporting tool into the national DHIS2 platform.
- PMI conducted OTSS in 96 CSBs in the three elimination districts and collected key indicators about quality of case management, including rates of diagnostic testing before treatment and adherence to diagnostic test results; Figure 8 shows the evolution of the performance of health centers in 2022.
- PMI supported private health centers to attend monthly supervision and reporting meetings organized by the district office to submit their reports and to restock malaria commodities, including injectable artesunate. Private health centers contribute up to 22 percent of monthly reports submitted to DHIS2.
- Following the upsurge of malaria in Atsimo-Atsinanana, NMP, with technical support from PMI, carried out training on malaria management for private health centers in five districts.

Figure 8. Average Supervision Scores from Six Rounds of OTSS Conducted in Three PMI-Supported Elimination Districts



Community Level

- PMI supported the development of the national community health strategy, led by the Directorate of Community Health, which was adopted in 2023. It allows for the alignment of all stakeholders related to CHW recruitment, remuneration, and incentives. While CHW remuneration is not codified in the strategy, discussions around plans for CHW remuneration were underway at the time of this writing.
- Along with district authorities, PMI supported on-site supervision through service quality assurance of approximately 17,000 CHWs, corresponding to 92 percent of the CHWs in the PMI-supported areas.
- PMI trained and equipped over 1,400 CHW peer supervisors (high-performing CHWs, each of whom supervise up to 20 other CHWs).
- After a pilot in Farafangana District (2019–2021), PMI supported malaria treatment at the community level for persons of all ages to be adopted into the new community health strategy in 2023, with plans for its implementation in 58 districts.
- PMI continued supporting 36 districts to provide rectal artesunate at the community level to young children with severe malaria.
- PMI helped provide training in mCCM for all age groups to the 26 CHWs in 13 fokontany in the elimination districts of Faratsiho and Antsirabe 2.
- To reinforce SBC, PMI created and printed job aids with key malaria messages for religious leaders, media professionals, and private health professionals.
- PMI created and printed materials for RDT and case management in collaboration with the Global Fund.

Note that recent progress with monitoring antimalarial efficacy and the TES approach is presented in the plans and justification for FY 2024 funding section below. Additionally, plans for a national health facility assessment in 2024, including assessments of the prevalence of *P. vivax* infection, G6PD deficiency, hrp2/3 deletions, and genetic markers of resistance to antimalarial medications, are described in the OR/program evaluation (PE) section below.

Challenges have included the highly centralized nature of many of the activities; human resources (turnover and insufficiently trained staff); lack of means to adequately compensate or motivate CHWs; functionality of infrastructure, including roads and transportation systems to facilitate care seeking, referrals, supply, and upkeep of facilities and equipment; insufficient supplies for quality malaria care at some private and public facilities, partially related to complex administrative processes for requesting supplies and reimbursement for retrieving them; incomplete data for decision making; and delayed care seeking, self-treatment, and care seeking from traditional healers.

4.3. Plans and Justification for FY 2024 Funding

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

National-Level Case Management Activities

PMI will continue to train CHWs and health facility staff, including current and newly recruited public sector staff and staff from private facilities and hospitals, and help develop laboratory capacity through training and supply (for microscopy and molecular methods) as described in the recent progress section. PMI will also continue the full integration of the CommCare system into the national DHIS2 system and the extension of the current 36 covered districts.

PMI will support case management and reactive case detection in five elimination districts. In MOP 2023, support for two elimination districts was planned to be awarded through a G2G mechanism; anticipated delays in finalizing this mechanism suggest that these funds will not be fully spent in CY 2024 and will be applied to elimination activities in these districts in CY 2025. Elimination activities will be supported through an implementing partner in three districts with FY 2024 funds.

Currently, PMI, along with some of USAID's other health programs, is the only donor for community-level malaria management. In FY 2024, PMI will prioritize districts with high malaria burdens, including those in the south and southeast that do not currently receive PMI support, for case management and community case management activities.

Additionally, PMI will:

- Continue supporting the MOH to plan for the expansion of malaria case management to persons of all ages at the community level in 58 districts, and pro-CCM in approximately 16 districts;
- Support TES at four sites, including two funded through a G2G mechanism;
- Begin to routinely assess the prevalence of hrp2/3 deletions and genetic markers of drug resistance using samples collected from approximately 22 reference health facilities;
- Support training and implementation of postdischarge malaria chemoprevention using DHP for young children hospitalized with malaria and anemia (anticipating two districts for the pilot phase); and
- Support training and the procurement supplies, including some *P. vivax*-specific RDTs, G6PD deficiency test kits, and primaquine to begin curative treatment for *P. vivax* infections.

Commodities

PMI will continue supporting the procurement and distribution of commodities for malaria case management as described in the recent progress section. When combined with support from the Global Fund, national needs for RDTs and ACTs are met with no gaps. PMI will procure 500,000 ACT doses; 20,000 vials of injectable artesunate; and 4,000 doses of DHP. In addition, PMI will provide some diagnostic and treatment commodities for *P. vivax* infections, including approximately 700,000 Pf/Pv RDTs, 28,000 primaquine tablets, and G6PD deficiency analyzers and test strips for approximately 10 health facilities in one district with a high burden of *non-falciparum* malaria infections. PMI will closely monitor the pipeline and national stock levels before placing these orders. The quantification of DHP and G6PD tests and controls will be factored into the November 2023 review of quantification and updated in the FY 2025 MOP's gap analysis.

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

Facility Level

PMI/Madagascar will continue to support routine training for new and existing health care providers, including for management of severe malaria; outreach training and supportive supervision for health facilities; and support for laboratory capacity as described in the recent progress section.

Additionally, because of persistently high malaria burdens coupled with high rates of malnutrition among young children in southern and southeastern Madagascar, PMI/Madagascar will begin postdischarge malaria chemoprevention using DHP for young children hospitalized with malaria and anemia in up to two districts in this area.

Community Level

As described in the recent progress section, PMI will continue its efforts to reinforce the quality of malaria management at the community level by supporting the supervision and refresher training of approximately 18,500 CHWs, focusing on data quality and improving case management; supporting a quality assurance model that includes the enlistment of and the provision of support to CHW peer supervisors; and supporting the use of rectal artesunate for young children with severe malaria in approximately 58 districts.

If compensation for CHWs is endorsed by the Madagascar government, PMI plans to provide financial support toward CHW compensation (see the capacity strengthening section [9.3] for details).

Continuing work that was beginning at the time of this writing, PMI plans to expand its geographic shift to additional dIstricts in the relatively high-burden southern and southeastern regions, and continue supporting mCCM for people of all ages in approximately 58 districts and pro-CCM in approximately 16 districts. These activities will be co-funded by other USAID funding streams.

PMI will contribute to SBC training and refresher training for new and existing CHWs to improve skills for managing fever and malaria, including in Atsimo-Atsinanana, which had not previously been supported by PMI/Madagascar.

The Peace Corps volunteers will assist with SBC activities to improve case management and support ANC and IPTp where possible.

Case Management Elimination Activities

PMI will continue to support elimination activities in five districts, including the procurement of single, low-dose primaquine as part of the treatment of *P. falciparum* infections; associated training and supervision of health care providers; and support for high-quality and timely reporting and investigations of cases and foci. PMI will continue to provide technical assistance and will procure commodities and provide training for rapid testing and curative treatment for *P. vivax* infections in at least one district, as mentioned above.

Monitoring Antimalarial Efficacy

In addition to supporting the monitoring of antimalarial resistance through TES approximately every two years, with plans to fund two TES sites via a G2G mechanism in FY 2024, PMI/Madagascar plans to include assessments of the prevalence of genetic markers of resistance to ACTs, SP, and DHP as part of a national health facility survey in CY 2024, and to add routine surveillance for genetic markers of antimalarial resistance as part of other surveillance work occurring in a network of CSB-Rs (see the OR/PE section [8.2] and the SM&E section [7.3]).

Table 5. Ongoing and Planned Therapeutic Efficacy Studies

Year	Site Name	Treatment Arm(s)	Plan for Laboratory Testing of Samples
Ongoing Studies			
2022–2023	Mananjary	ASAQ, AL	In private laboratory in Lille, France
2022–2023	Maevatanana	ASAQ, AL	In private laboratory in Lille, France
2022–2023	Marovoay	ASAQ, AL	In private laboratory in Lille, France
2022–2023	Vangaindrano	ASAQ, AL	In private laboratory in Lille, France
Planned Studies (funded with previous or current MOP)			
2025	Southern (2 sites)	ASAQ, AL	In-country at Institut Pasteur de Madagascar
2025	Northern (2 sites)	ASAQ, AL	In-country at Institut Pasteur de Madagascar

AL: artemether-lumefantrine; ASAQ: artesunate-amodiaquine.

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

5. Health Supply Chain and Pharmaceutical Management

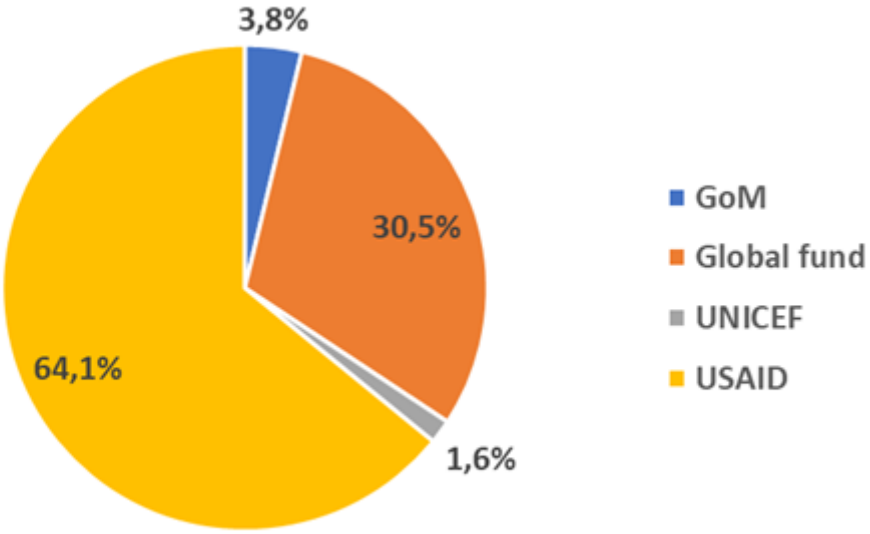
5.1. PMI Goal and Strategic Approach

PMI's goal is to support the continuous availability of life-saving and quality malaria commodities across all sectors and segments of the Malagasy population (anticipated National Malaria Strategic Plan 2023–2027). NMP's objective is for 95–100 percent of facilities to report no stockouts of malaria commodities by 2027 (95 percent for ACT, 98 percent for SP, and 100 percent for injectable artesunate) in accordance with PMI's stockout reduction strategy. In coordination with the Global Fund, PMI continues to support NMP to improve the supply chain at the national, regional, district, facility and community level, including the procurement of antimalarial commodities and the provision of relevant TA. While the central medical store—SALAMA—distributes all commodities to the 114 districts, PMI supports TA in 14 regions (Atsinanana, Vatovavy, Fitovinany, Vakinankaratra, Amoron'i Mania, Haute-Matsiatra, Atsimo-Andrefana, Menabe, Melaky, Boeny, Sofia, Analanjirofo, Diana, and Sava), reaching approximately 15.7 million individuals (projection from the *Recensement général de la population et de l'habitat* 2018). PMI/Madagascar aims to implement the Madagascar Stockout Reduction Strategy (target of less than 10 percent stockout at the facility level (i.e., community-managed pharmacy, or PhaGeCom) and leverage supply chain TA from the MOH through the *Unité de coordination des projets* (projects coordination unit, or UCP, financed by the Global Fund, to ensure national coverage, including in elimination areas.

5.2. Recent Progress (October 2022– March 2023)

PMI/Madagascar aims to improve malaria commodity availability at service delivery sites (health facility and CHW sites) through forecasting and supply planning, management information systems, technical assistance for warehousing and distribution, direct warehousing, and delivery of commodities to health sites., including last-mile delivery in select areas using drones.

Figure 9. NMP RBM Partners Contribution for Antimalarial Commodities Procurement in CY 2022



Progress includes:

- PMI leveraged the United Nations Children's Fund (UNICEF), USAID (nonmalaria resources), and the United Nations Population Fund to complete the national supply chain assessment, the findings of which are being used to develop a first-ever, five-year national supply chain strategy (to be completed by September 2024).
- PMI provided technical and financial support to NMP to develop a stockout reduction plan for malaria commodities aimed at reducing stockout rates at the facility level [PhaGeCom] by 10 percent by 2024.
- PMI supported partnerships with SALAMA for storage and transportation of commodities to PhaGDis during routine distribution based on quarterly distribution plans and emergency distribution as required.

- PMI conducted a national quantification of malaria products in May 2022 and a quantification review in November 2022. Results were disseminated during an RBM meeting and used for resource mobilization with PMI, the Global Fund, UNICEF, and the Madagascar government. As a result, 100 percent of malaria commodities needed for CY 2022 have been covered with direct contributions from PMI, the Global Fund, UNICEF, and MOH.
- PMI supported the development and submission of 12 procurement plans and monitoring for malaria reports.
- PMI supported the updating of the revised manual for the management of health commodities, including for malaria; training curricula for health commodity managers; and subsequent cascade training at the district and commune level for CSBs and CHWs.
- The supply chain committees in all 114 districts (comprising 115 PhaGDis) are functional. PMI continued to support the central PSM committee at NMP to collect and analyze quarterly requisitions and logistics management information system (LMIS) data from the 114 districts to generate accurate, efficient, and timely distribution plans and organize virtual validation meetings. Twenty-four virtual meetings to validate district malaria commodity orders were completed. These meetings, involving the district PSM committees and donors, increased the ability of district PSM teams to understand their data and make informed decisions about the supply of commodities.
- PMI continued to leverage the Global Fund and other USAID health community platforms for the implementation of the last-mile distribution strategy using cash incentives provided by the Global Fund to transport malaria commodities from PhaGDis to CSB/Pha-Ge-Com in all 78 PMI-supported districts. One hundred percent of the 196 requests for reimbursement of storage fees for PhaGDis were processed, in addition to 72 percent (1,537 of 2,142) requests for transportation reimbursement from PhaGeCom (CSBs).
- To ensure coverage of hard-to-reach communities (to reach the unreached), PMI leveraged other USAID programs to scale-up the delivery of commodities by drone, including malaria, family planning, maternal and child health and nutrition, and vaccines (routine vaccines and COVID-19 vaccines). In FY 2022, USAID leveraged other donors to support operating six drones to deliver these products to CSBs in nine districts (Maroantsetra, Mananara nord, Andapa, Antalaha, Toamasina II, Mandritsara, Port Bergé, Befandriana nord, Bealanana. In CY 2022, the drones delivered 45,000 polio vaccine doses, 32,000 malaria rapid diagnostic tests, 10,000 antimalarial treatments, and 10,000 doses of COVID-19 vaccine. Two people from the MoH and the *Direction de la Pharmacie, des Laboratoires et de la Médecine Traditionnelle* (directorate of pharmacy, or DPLMT) were identified as focal points for the drone project and are involved in decision making, coordination of the project, and implementation of new take-off sites.

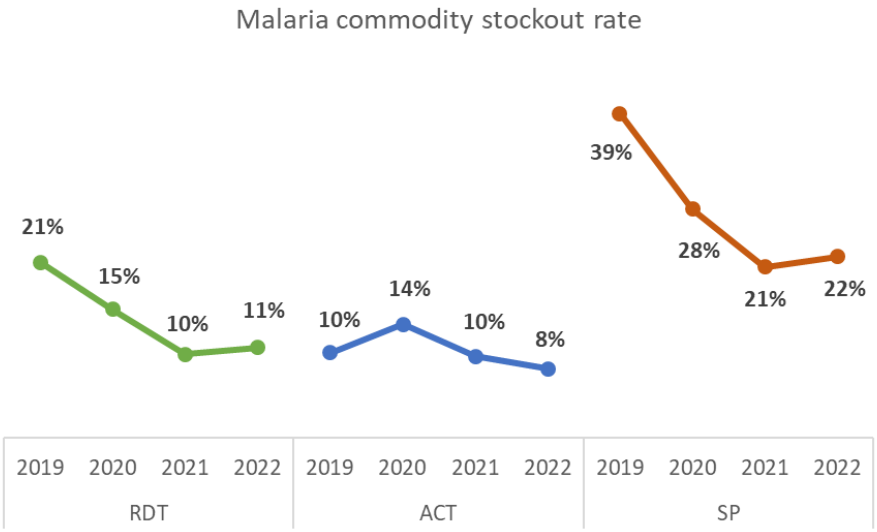
- PMI supported the emergency delivery of nearly 475,000 ACT treatments, 72,000 vials of injectable artesunate, and 740,000 RDTs to 26 districts affected by cyclones.
- PMI continued to implement SPARS, a quality improvement approach for the management of stocks, at all 78 PhaGDis that were using it already; 81 percent of PhaGDis had a SPARS composite score of 90 percent or higher (compared with 27 percent in FY 2021) and were classified as “performing.” None were classified as “weak” (score of 75 percent or less) compared with 29 percent (23 PhaGDis) in 2020 and 5 percent (four PhaGDis) in 2021.
- PMI completed two end-user verification (EUV) surveys (May 2022 and October 2022) and shared data with RBM and the USAID/Accessible Continuum of Care and Essential Services (ACCESS) project for corrective action. NMP and DPLMT are progressively taking leadership roles in the EUV process (planning and data collection, analysis, and dissemination).
- PMI supported health management teams from regions and districts to conduct on-the-job supportive supervision and training. Over 6,000 supervision visits were conducted with USAID/IMPACT, USAID/ACCESS and UCP/Global Fund support to different levels of commodity management structures aimed at strengthening capacity to execute the standard operating procedures for stock management, use LMIS tools, update the average monthly consumption to correctly estimate needs, and use the report/order forms for resupply.
- PMI continued to monitor the implementation of the malaria market assessment action plan; NMP's technical team and private sector partners conducted 10 meetings, resulting in the effective completion of 70 percent of activities.
- PMI supported the National Drug Quality Control Laboratory (a division of the National Medicines Regulatory Agency of the Madagascar directorate) to initiate a postmarketing surveillance system, including a risk-based assessment protocol for malaria, products related to family planning and maternal and child health and nutrition, and the development of standard operating procedures. In accordance with the protocol, the collection of reproductive health and antimalarial medicines samples began in 7 of Madagascar’s 11 regions.
- Leveraging other non-USAID malaria funds, PMI supported a study tour in February 2023 by the *Agence des médicaments de Madagascar* team to the Ethiopia Food and Drugs Authority in Addis Ababa to learn from their best practices, opportunities, and challenges regarding regulation and quality assurance of medical products.
- PMI supported the integration of malaria commodity supply management in CommCare and trained users in 15 districts in four regions (Analanjirofo, Atsinanana, Atsimo-Andrefana, Fitovinany, and Vatovavy).
- PMI provided supply chain management tools, such as stock cards, to 916 CSBs and 4,866 CHWs.

- PMI supported preparatory work for the implementation of the new DHIS2-compatible LMIS tool, including the selection of the new LMIS tool to be procured by the Global Fund:
    - Facilitated in-country discussions to advance the procurement and rollout of Open LMIS, a tool selected by the MOH for LMIS, including development and Global Fund validation of the terms of reference and technical specifications for the service provider company to support the rollout; and
    - Funded a study tour to Malawi (leveraging other USAID health funding) for members of the MOH LMIS TWG to learn about implementing Open LMIS.

Progress toward reducing malaria commodity stockouts has generally continued, although stockout rates have remained above 10 percent (the Madagascar stockout reduction initiative goal): between 2021 and 2022, stockouts increased from 10 to 11 percent for RDTs and 21 to 22 percent for SP, but decreased from 10 to 8 percent for ACTs.

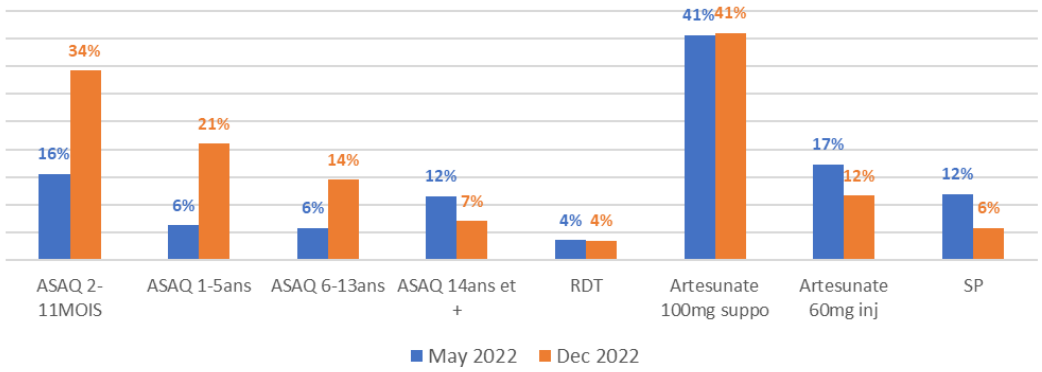
The increase of reported stockouts may be due to staff turnover as well as the nonalignment of the SALAMA cyclic distribution plan to transmission.

Figure 10. Evolution of Malaria Commodity Stockouts, 2019–2022



Source: DHIS2 2022.

Figure 11. Evolution of Stockouts on the Day of EUV Visits in May and December 2022



5.3. Plans and Justification with FY 2024 Funding

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

PMI/Madagascar will continue to support core supply chain activities as described in the recent progress section. PMI will support the implementation of the Madagascar stockout reduction initiative for 2023–2024 and the new supply chain strengthening strategic plan for 2023–2027 developed using the findings from the national supply chain assessment from July 2022, with financial and technical contributions from USAID/PMI, UNICEF, the United Nations Population Fund, and the Global Fund.

PMI support will mainly include quantification and supply planning using the new quantification analytic tool; information systems with effective deployment of the new electronic logistics management information system across the country; warehousing (at SALAMA); inventory management and distribution to PhaGDis; training/refresher training of supply chain actors at all levels in collaboration with the MOH's *Bureau regional des formations* (regional training offices) and *Direction de la pharmacie, des laboratoires et de la médecine traditionnelle* (directorate for pharmacy, laboratories, and traditional medicine); continued implementation of SPARS by the MOH regional and district management teams; technical supply chain support for PhaGDis and PhaGeCom; two EUV surveys; regulatory support such as digitization of the registration of medications; TA for assurance of quality medicines; and continued postmarket surveillance for malaria products.

Given Madagascar's vulnerability to climate change, with cyclones coinciding with the season of high malaria transmission, PMI will support the pre-positioning of malaria commodities in districts (PhaGDis) with high malaria burdens and in areas that are difficult to access and that are vulnerable to cyclones. PMI will support advocacy and resource mobilization from RBM partners (Global Fund, UNICEF, and WHO) and the World Bank for the rehabilitation of

PhaGDis in these districts to increase their resilience to shocks and to accommodate the increased volume of health and malaria products they will receive.

PMI will continue to strengthen different approaches to last-mile distribution of malaria commodities and the capitalization of the results and lessons learned from pilot approaches to define a common national strategy: reimbursement of storage and transportation costs by the Global Fund, transport from the central level to the CSBs by SALAMA with United Nations Population Fund, distribution from the PhaGDis level to the CSBs by the local private sector, and USAID/PMI-funded delivery of health commodities to select CSBs using drones.

PMI will continue to strengthen the good governance and financial management of PhaGDis by supporting annual financial audits, training and coaching of MOH auditors, and follow-up on audit recommendations. PMI will continue to support engagement with the private sector to increase its share of the malaria health product market through the total market initiative and the accreditation and professionalization of drug depots to serve poor people in remote areas with quality medicines and services.

SBC is planned to increase demand for and uptake of malaria care seeking and treatments.

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

6. Social and Behavior Change

6.1. PMI Goal and Strategic Approach

PMI will support NMP in the development and implementation of the national malaria communication plan, an essential component of malaria prevention and intervention. In addition, PMI will support the design and implementation of the grassroots campaign approach “Zero Malaria Starts with Me” by the established SBC working group. The campaign aims to keep the subject of malaria high on the political agenda, mobilize additional resources, and empower communities to take ownership of malaria prevention and care.

Implementation will be effected at the regional and district level, adapted to local contexts and guided by the campaign, which will build on current SBC activities as well as the BEM’Ray approach, an umbrella communication strategy implemented since 2021 that incorporates key health behavior messaging, including malaria prevention. The Zero Malaria Starts with Me campaign will focus on increasing knowledge and adoption of preventive behaviors among community members, use of malaria commodities for prevention, appropriate treatment of malaria by CHWs, and support for partner coordination. Finally, PMI supports the development of SBC materials in local languages, tailoring messages to different audiences and adapting ongoing malaria SBC program implementation, including in the southeast, which has a relatively high malaria burden.

At the central level, PMI supports activities designed to strengthen capacity, including stakeholder coordination and the development of materials and relevant guidelines.

PMI will continue to ensure that CHWs and health facility staff have access to and use SBC materials and tools standardized across malaria partners.

PMI collaborates with Peace Corps volunteers to promote malaria prevention activities in the communities where they are posted.

6.2. Recent Progress (January 2022–April 2023)

PMI/Madagascar, PMI partners, and NMP supported the implementation of the following SBC activities:

- Providing mobilization tools and resources through several channels, including:
    - Health care providers to provide malaria prevention messaging to patients and to provide malaria services respectfully;
    - Primary public schools to support appropriate behaviors around ITN use and care among students and their households and communities;
    - Interpersonal communication via community and religious leaders, women's groups, and other avenues;
    - Mass media, including radio spots, mobile video with local actors, print media, and other means to improve behaviors around malaria prevention; and
    - Large events, such as World Malaria Day 2022 and IRS activity closeouts, reinforcing social and community mobilization to widely disseminate malaria prevention messages.
- Reinforcing household-level behavior: The number of *household champions,* or those with gains in knowledge about malaria prevention who can demonstrate correct ITN use exceeded the 2022 target of 120,492, with 137,361 households obtaining champion status.
- Conducting trainings:
    - Trained regional and district health care providers on the SBC strategy; and
    - Trained journalists to help sensitize the public to key malaria messaging by improving the quantity and likely the quality of malaria reporting via mass media.
- Advocating to empower actors at the regional, district, and community level to take measures to control and progress toward malaria elimination.
- Responding to elevated case counts in Atsimo-Atsinanana: Reinforcing messages around prompt care seeking and consistent ITN use at the household level.
- Conducting ITN community mobilization:
    - Supported CHWs to encourage the proper use and maintenance of ITNs through interpersonal communication and home visits;
    - Continued community sensitization on ITN use after ITN distribution activities;
    - Promoted school-based SBC activities to help identify households needing ITNs and strengthened outreach communication;

- Reinforced enhanced communication around the consistent use of ITN in areas affected by natural disasters/cyclones;
- Developed revised/updated SBC materials to focus on ITN care for the continuous distribution activities.

Behaviors around ITN care and use have changed slightly. ITN ownership, access, and use have fluctuated over the past five national surveys, with all three indicators lower in 2021 than in the 2016 MIS, and use decreasing to match access rates for the first time since the 2008–2009 survey (Figure 12). This decrease in ownership and access may reflect the timing of the survey, which was conducted shortly before the 2021 mass ITN distribution campaign; the local practice of preserving new ITNs rather than hanging them because they are considered to be “extra” or “reserve” nets; and difficulties hanging a sufficient number of nets in a small house. The 2021 DHS also reveals a slight decrease in reported overall ITN use among children and pregnant women to 56 and 55 percent, respectively, compared with 73 and 69 percent, respectively, in the 2016 MIS (Figure 13).

Figure 12. Trends in ITN Ownership, Access, and Use

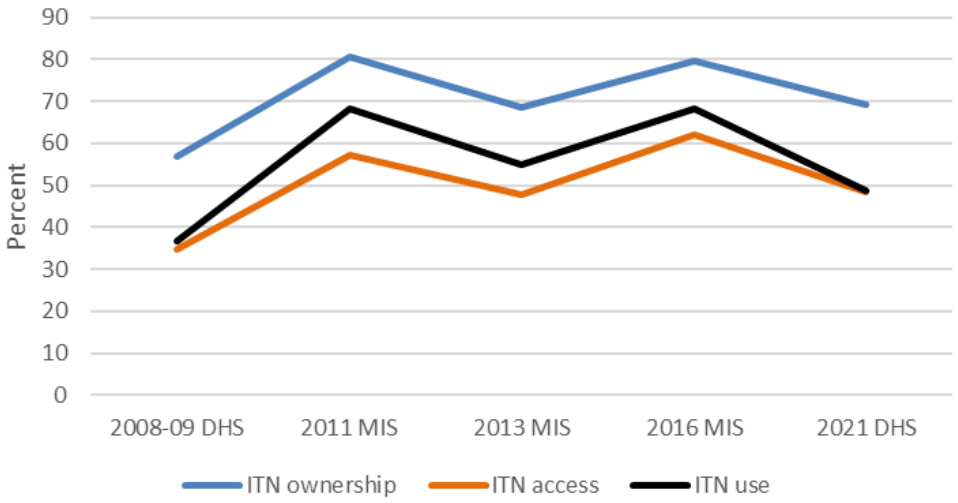
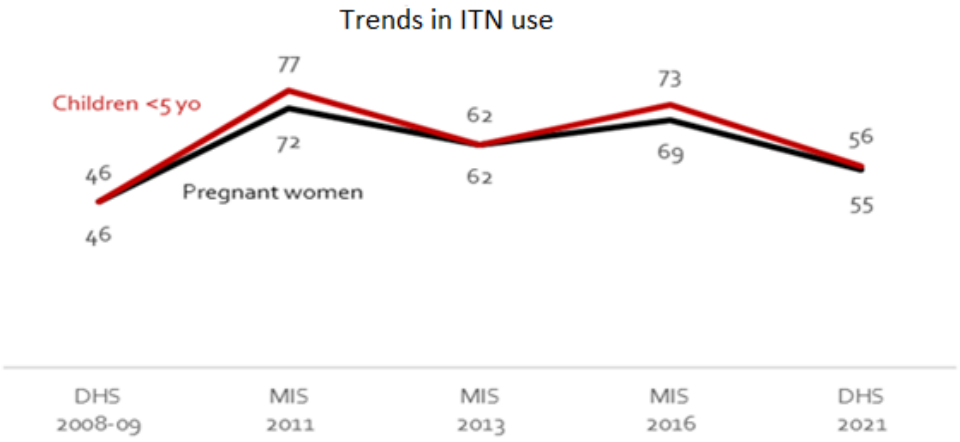


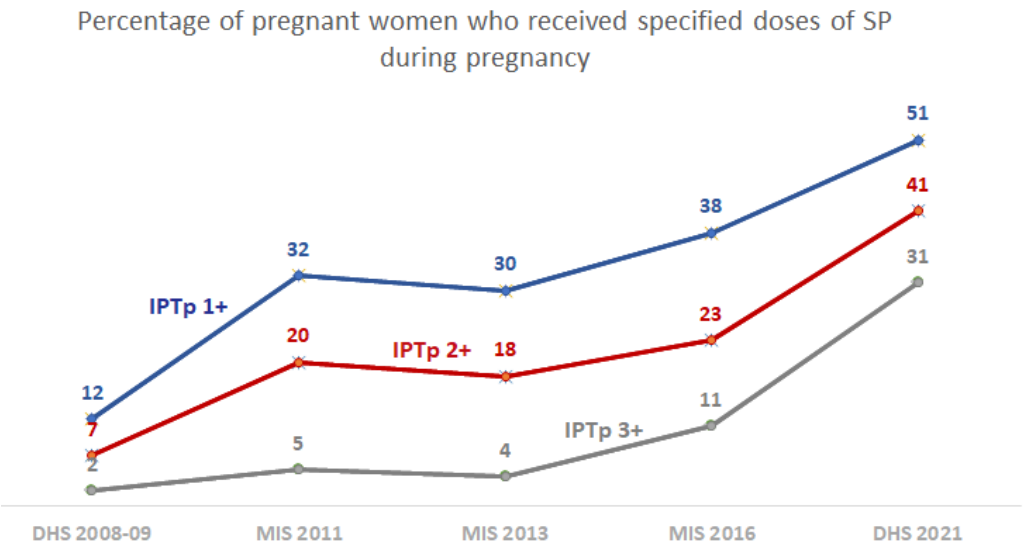
Figure 13. Trends in ITN Use Among Children Under Five Years of Age and Pregnant Women



- IRS acceptance and coverage:
    - Educated and sensitized communities in preparation for the 2022 IRS campaign to reduce IRS refusals. For more information see the 2022 End of Spray Report; and
    - Engaged and trained community leaders and actors;
    - Adapted SBC materials and disseminated them through multiple channels.
- MIP:
    - Supported training of CHWs by health providers on SBC during monthly meetings at the health facility;
    - Supported CHWs to improve early and monthly ANC attendance and IPTp uptake through interpersonal communication, home visits, and health center referrals; and
    - Supported health care providers to encourage pregnant women to attend ANC at health facilities beginning in their first trimester and to provide respectful care.

According to the DHS 2021, IPTp3+ coverage increased to 31 percent compared with 11 percent in MIS 2016, but this remains below the national target of 65 percent. Site visits suggested limited health care provider familiarity with IPTp guidelines, which may contribute to the gap between ANC attendance and IPTp uptake.

Figure 14. Trends in IPTp Coverage

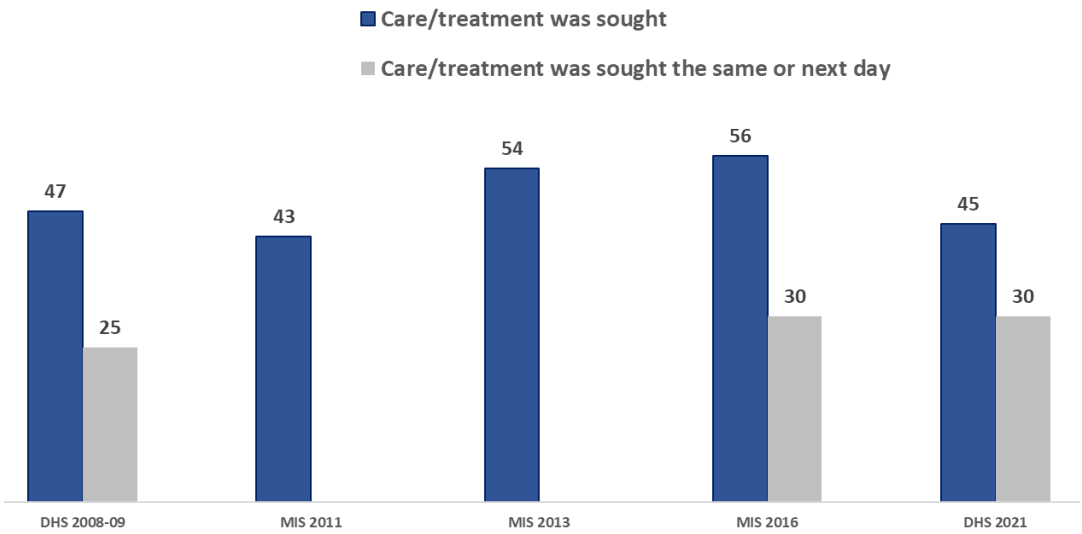


Case Management

PMI supported activities through interpersonal communication and community mobilization at the CHW and CSB levels. In addition, in the highest-burden region of Atsimo-Atsinanana, PMI provided posters to help increase sensitization for fever care seeking among community beneficiaries. Findings during a site visit to Atsimo-Atsinanana in April 2023 suggest that late care seeking and self-medication by community members are among the main case management challenges.

In the 2021 DHS, 45 percent of children under five years old with a fever sought care/treatment, and 30 percent of them sought care/treatment the same day and or the following day from a health care provider (a CSB or CHW). The use of traditional healers is common in Madagascar's rural areas. Respondents mainly sought advice or treatment for fever in the public health sector, especially among children for whom care had been sought. Public health centers offer free antimalarial medicines, facilitating care seeking.

Figure 15. Trends in Care Seeking for Fever Among Children Under the Age of Five



PMI provided support to an integrated project focused on community-level delivery of health services, including for malaria. Findings from site visits also showed limited knowledge among community members that malaria services are free.

Various approaches are used to increase the demand for and use of health services and products. Depending on the region, channels include home visits, broadcasting SBC messages from vehicles, using local mass media, distributing print materials such as banners, posters, and flyers, and organizing live events, such as skits, typically in conjunction with market days.

Elimination

Progress with SBC activities in elimination areas includes social and community mobilization. Partners engaged MOH officials in an effort to disseminate messages before and during the first mass ITN mass campaign (December 2022–January 2023) in elimination districts. PMI continued to support malaria elimination activities in the districts of Antsirabe II and Faratsiho in Vakinankaratra Region, and in Antsiranana I in Diana Region through training aimed at maintaining behaviors among community members, especially moving/migrant populations, and strengthening SBC capacity among health care providers.

Other key progress anticipated for the remainder of CY 2023–2024 includes:

- PMI will support NMP to develop the national malaria SBC plan to align with the 2023–2027 national malaria strategy.
- PMI will contribute to a review of SBC activities to understand what partners and other donors are doing in Madagascar and how that compares with activities being conducted elsewhere; to learn from and/or support those efforts; to determine opportunities for future SBC investments; to guide decisions around creating integrated versus standalone SBC projects; to review recent SBC research studies; and to analyze and consolidate SBC-related lessons learned from recent investments in maternal and child health, including malaria.
- PMI will support the design and implementation of malaria messaging and toolkits for the ITN mass distribution campaign anticipated for CY 2024.
- PMI will conduct a rapid assessment of potential ITN misuse in the fishing industry; the results will inform reorientation or review of SBC messaging.
- PMI will collaborate with the Peace Corps to update malaria sensitization materials and messages that volunteers will use at the community level.

6.3. Plans and Justification with FY 2024 Funding

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

Based on the inputs from Madagascar's SBC working group, DHS 2021 results, and site monitoring visits, PMI will continue to support the implementation of SBC approaches such as interpersonal communication, home visits, and use of mass and mid-media to address community behaviors where behavioral gaps have been identified (such as ITN use, early care seeking for fever, and low usage of IPTp) and will contribute to the improvement of behaviors. SBC activities will address identified barriers to desired behaviors, such as reserving new ITNs for later use, late entry under ITNs, use of self-treatment or traditional treatments, disrespectful behavior by health care providers, lack of confidence in providers and test results, and fees for malaria care at public facilities. These activities will be implemented using the Zero Malaria Starts with Me approach, will consider outreach and awareness activities at all administrative levels, and will include collaboration with various community actors and government entities, such as the ministries of education and environment, to advance malaria prevention and elimination efforts. Based on NMP requests, PMI/Madagascar will help ensure that SBC activities have specific, measurable objectives to help maintain behaviors; are adapted to local contexts; and include support to reinforce capacity of the SBC technical working group. PMI/Madagascar also aims to intensify SBC activities to achieve behavioral objectives throughout intervention areas but particularly in areas with high transmission, such as southeastern Madagascar; to adapt SBC to address behavioral gaps in elimination districts; and to intensify and tailor SBC activities in areas affected by natural disasters.

ITNs

According to recent data and site visits, there is a need to reinforce messaging on ITN use and care at the beneficiary and service provider levels. PMI will work with implementing partners and NMP to address reluctance to hang new ITNs (due to a cultural tendency to reserve/protect new items until the items they are intended to replace are thoroughly worn) and to use ITNs regularly and before mosquitos begin biting each evening (a challenge in many areas where people stay outdoors late into the evening to remain cooler). In collaboration with the Peace Corps, PMI will support community mobilization on appropriate ITN use and care.

To support the next mass ITN campaign, scheduled for CY 2024, PMI will support the design and refinement of distribution strategies to try to improve behaviors related to ITN distribution, and will develop campaign messages to address identified barriers to ITN access and use. Following the campaign, PMI will support the implementation of harmonized SBC messages to strengthen and maintain favorable behaviors around consistent use and care of ITNs, including messaging to be used during cCD activities. PMI will also work with Peace Corps volunteers on ITN care messaging. PMI will continue to support the design and implementation of targeted SBC for increased use of ITNs among key populations, including pregnant women, agricultural workers, and others.

MIP

SBC messages and approaches will target pregnant women and health care providers to increase early and monthly ANC and IPTp uptake. Rates of early ANC remain low, in part because women tend to want to hide their pregnancies for as long as possible. This in turn leaves fewer months in which the pregnant women can receive IPTp doses. However, gaps between ANC and IPTp3 suggest provider-side barriers as well, including SP stockouts at the peripheral level, and surely also include structural barriers such as distance to care. PMI will continue to support the design and implementation of targeted SBC for increased use of ITNs during pregnancy and will reinforce MIP SBC through CHVs and health care providers.

Case Management

Social norms and ease of access to traditional medicine and self-medication are among the challenges to early care seeking at the community level; people tend to seek care at health centers after a condition becomes serious. Further, there are challenges related to lack of confidence in the basic health centers because of poor quality of service. PMI will support raising awareness that malaria services are provided free-of-charge at the health facility and CHW levels.

SBC activities related to case management at the health facility and CHW levels will aim to continue reinforcing confidence in malaria diagnostics. These activities will be integrated into interventions to improve the competence of health care providers to manage fever and malaria, with an emphasis on southeastern Madagascar at the community level. Other efforts will, through interpersonal communication with CHWs, aim to increase community members' confidence in their ability to seek care for fever. PMI will also continue to support community-level SBC activities led by CHWs to encourage early diagnosis and treatment of MIP.

Service Delivery

Barriers to care seeking include distance to the health center; limited awareness that malaria services are free-of-charge; low numbers of health care staff, which can reduce service quality; and discrimination and demands for payment during consultations. PMI plans more specific training to increase the provision of respectful and free malaria-related care.

Elimination

Challenges to the implementation of elimination SBC include insufficient resource mobilization; limited involvement of local health authorities in the implementation of the strategy (e.g., training, monitoring, and reporting); and slow adoption and acceptance of the elimination strategy (e.g., active case detection) in the current PMI-supported elimination districts.

PMI will reinforce messages and strategies for elimination districts, including:

- Collaboration with the Peace Corps to support SBC activities around ITN maintenance and care (e.g., sewing, washing, and drying); and
- Community-based SBC, including home visits and community meetings during market days.

Priorities

While PMI supports SBC activities that promote the uptake and maintenance of all key malaria interventions, behaviors to be prioritized in FY 2024 are outlined in Table 6.

Table 6. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Humanization of care at the community level	CHWs, health care providers	All current PMI focus regions, elimination districts, and Atsimo-Atsinanana region	● Orientation sessions for heads of basic health centers for health care providers to improve provider-patient interactions ● Production and use of instructional videos
Consistent ITN use and maintenance	All household members; pregnant women	All current PMI focus regions, elimination districts and Atsimo-Atsinanana Region	● Interpersonal communication with CHWs to focus on increasing use and improving understanding how best to maintain ITNs to maximize durability and effectiveness ● Conducting home visits and community dialogues ● Delivering messages about ITN use through mid-media channels such as radio and awareness campaigns ○ For households to increase use and maintenance of ITNs ○ For CHWS and health care providers to convey strong messages on how best to use and maintain ITNs to maximize their durability and effectiveness
Early and prompt care seeking within 24 hours of signs and symptoms of malaria	Household members; parents and caretakers of children (under five years of age, school-aged); pregnant women; CHWs; new health care providers	All current PMI focus regions, elimination districts, and Atsimo-Atsinanana Region	● Conducting community- and household-level interpersonal communication through continuous engagement with nongovernmental organizations and CHWs ● Providing training and refresher training for existing and new health care providers and CHWs to improve their competence to manage fever and malaria ● Continuing to reinforce confidence in malaria diagnostics and encouraging use of ACTs following positive RDT results

ACT: artemisinin-based combination therapy; CHW: community health worker; ITN: insecticide-treated net; RDT: rapid diagnostic testing.

Additional Support Activities

To strengthen NMP's SBC capacity, PMI plans to support the participation of NMP's SBC focal point at the annual RBM SBC conference. In addition, the results/recommendations from the 2023–2024 SBC evaluation will be used to inform SBC activities.

7. Surveillance, Monitoring, and Evaluation

7.1. PMI Goal and Strategic Approach

PMI supports NMP to implement surveillance to track trends and allow for the early detection of malaria epidemics and response to outbreaks. In areas approaching elimination (annual incidence of less than 1 per 1,000 population), individual-level reporting has started, although data quality remains limited, and reactive case detection is planned. PMI prioritizes the effective use of data to inform programming and expand data use at the peripheral levels of the health system, including at the community level.

In support of NMP's strategy and needs, PMI and NMP have prioritized the integration of data on the DHIS2 platform and the training of SM&E personnel to support the health management information system (HMIS) and analyze and interpret surveillance data.

In addition, PMI supports NMP to implement malaria surveillance involving health providers and CHWs in three elimination districts by digitizing the notification system, conducting case investigations within 7 days of notification, and treatment of cases within the foci within 15 days of detecting the index case.

7.2. Recent Progress (January 2022–April 2023)

National level

PMI supported NMP to:

- Develop the National Strategic Plan for Malaria 2023–2027 and the associated evaluation plan;
- Conduct the Malaria Program Review;
- Organize quarterly meetings of the SM&E technical working group;
- Develop and disseminate quarterly malaria bulletins and weekly malaria analyses used during RBM meetings; and
- Support the annual national malaria scientific conference.

Regional level

PMI supported NMP to:

- Support the malaria coaching system to improve the quality and use of data (264 coaching contacts during 2022);
- Conduct semiannual data validation meetings in the 14 PMI-supported regions; and
- Train 60 supervisors at the regional and district levels in malaria SM&E.

District level

PMI supported NMP to:

- Support district teams to improve visualization and use of malaria data;
- Conduct semiannual supervision and malaria routine data quality assessment in two districts with data quality concerns;
- Expand the use of the malaria scorecard and dashboard;[3] and
- Train 49 district malaria focal points on malaria SM&E

Facility level

PMI supported NMP to:

- Support data visualization and use during monthly meetings with CHWs;
- Evaluate the introduction of electronic reporting at the facility level in two districts; and
- Print and distribute reporting tools.

Community level

PMI supported NMP to:

- Expand use of CommCare on smartphones at the CHW level and tablets at the peripheral health center level, with almost 4,000 users as of March 2023;
- Print and distribute reporting tools; and
- Conduct approximately 2,200 data quality assessments for approximately 12 percent of CHWs in PMI-supported regions.

The report from DHS 2021 was also released during this period. Key findings are presented by technical area in this MOP and in the Madagascar country profile.

Additionally, PMI anticipates conducting two evaluations in 2024: (1) a national health facility survey to assess quality of and readiness for care, prevalence of hrp2/3 deletions, prevalence of G6PD deficiency, and burden of infections caused by *P. vivax*; and (2) using reprogrammed MOP 2023 funds, an evaluation of Madagascar's expanded community health activities, including c-IPTp, passive malaria case management for persons of all ages, and proactive malaria case management.

[3] At the time of this writing, the MOH planned to begin managing these tools and to extend them to all regions, encompassing both malaria and maternal and child health activities.

Challenges and Lessons Learned

Several activities planned at the district and community levels were not executed due to delays in data transmission and funding. Empowerment of local actors to provide high-quality supervision, analyze data, and make decisions can lead to more timely and effective actions. Fears around device and power failures has led to requirements to enter all data from CommCare and other digital tools on paper forms, sometimes in triplicate.

7.3. Plans and Justification with FY 2024 Funding

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

Planned activities build on those in the FY 2023 Madagascar MOP, with an increased focus on decentralizing surveillance capacity and data analysis and use:

- Advocate for increased collaboration between the directorates managing data at the national level to harmonize processes and datasets, increase efficiency, and increase access to data among key stakeholders.
- Reinforce capacity for management and supervision of those in charge of surveillance at all levels, including harmonization of supervision tools.
- Improve the processes, tools, and supervision to guarantee complete, accurate, and timely reports at all levels and reduce the burden on those reporting the data. While there is interest in expanding digitization of surveillance activities, plans to scale CommCare, IDSR reporting by short message service (SMS), and other digital tools will depend on higher-level ministry decisions.
- Support better visualization, interpretation, and use of malaria data for decision making:
    - Support the MOH with the process of completing facility geo-coordinates to DHIS2;
    - Support the integration of climate data into DHIS2 to facilitate predictive modeling and the development of malaria warning systems; and
    - Support the use of malaria dashboards at the district and health facility level to improve data analysis and use for decision making.
- Improve data collection, sharing, and use for elimination:
    - Advocate for and provide technical support as needed to improve access to data about case and foci investigations and response; and
    - In areas approaching elimination: Ensure that all confirmed and treated cases are documented, analyzed, and classified within 48 hours; and improve the system of detection and response to outbreaks within seven days.
- Monitor the efficacy of antimalarial medications through a TES to be jointly implemented by NMP and a partner.

- Test blood spots routinely collected from febrile patients at 22 reference health facilities for hrp2/3 deletions and markers of resistance to antimalarial medications, leveraging an existing surveillance platform and providing information that may help inform the selection of TES sites and the choice of antimalarial medications.
- Reinforce entomological surveillance, including increased surveillance for *An. stephensi*, and insecticide-resistance monitoring.
- Support NMP to investigate and respond to upsurges in malaria cases.
- Support assessments of service needs and uptake among key populations.

Table 7. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic Health Survey (DHS)		X				
Household Surveys	Malaria Indicator Survey (MIS)						P
Household Surveys	Multiple Indicator Cluster Survey (MICS)					P[1]	
Household Surveys	EPI survey		X				
Health Facility Surveys	Service Provision Assessment (SPA)	X					
Health Facility Surveys	Service Availability Readiness Assessment (SARA) Survey	X				*	
Health Facility Surveys	Other Health Facility Survey	X				P	
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)	X			P		P
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System						
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System (eLMIS)	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Other	EUV	X	X	X	P	P	P
Other	School-based Malaria Survey						
Other	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey	X	X				
Other	Malaria Impact Evaluation						
Other	Entomologic Monitoring Surveys	X	X	X	P	P	P
Other	Evaluation of proactive case management and the introduction of rectal artesunate prereferral treatment among children under 6 years of age			P			
Other	Evaluation of the use of CommCare app at community level			X			

[1] Non-PMI funded activities; X = completed activities; P = planned activities. HMIS: health management information system.

8. Operational Research and Program Evaluation

NMP's objective for OR/PE is to provide evidence-based information to guide decision making and policy updates. PMI support for program and policy-relevant OR and PE intends to:

- Test promising new tools and approaches for remote locations;
- Evaluate the scale-up of malaria interventions in remote areas;
- Identify effective combinations of interventions to reduce malaria transmission in remote areas and in those with the highest incidence of malaria;
- Identify effective local solutions to vector control and case management challenges; and
- Help Madagascar advance toward malaria elimination.

8.2. Recent Progress (January 2022–May 2023)

PMI supported the following OR/PE projects:

- A study of the effectiveness of age-extended community case management of malaria. PMI piloted the extension of malaria treatment at the community level to all age groups in Farafangana District and initiated field monitoring with the participation of all stakeholders, including MOH directorates, local authorities, nongovernmental organizations, PMI, and the RISE project. The pilot ended in 2021; preliminary results were presented to PMI and NMP in April 2022, and final reports were under development at the time of this writing. This study was funded with FY 2018 country funds and FY 2018 PMI core funds. PMI is supporting NMP to begin expanding

community case management to all ages in nonstudy areas (58 districts planned; approximately 40 to be supported by PMI). Manuscripts were in draft form at the time of this writing.

- A study of the feasibility, acceptability, and entomological impacts of using drones to map habitats and apply larvicide (*Bacillus thuringiensis israelensis*, Bti) bi-weekly throughout the rainy season to rice paddies within 1 kilometer of human settlements in Ankazobe and Morombe districts began in January 2022. Assessment of changes in malaria prevalence was discontinued because of insufficient statistical power to detect a change. Larviciding and entomological monitoring continued until July 2022. A series of focus group discussions was held among rice field owners, rice field workers, and general community members in November 2022 to assess perceptions of larviciding with Bti and drones. Because excess Bti was available due to challenges estimating needs before the study began, larviciding and entomological monitoring was restarted in December 2022 and continued through March 2023. Data analysis is in process at the time of this writing for the two phases of larviciding and for the acceptability of the study.
- Evaluation of the peer supervision model for CHWs. Madagascar was selected to participate in a PMI core-funded OR priority study to understand factors and processes associated with successful supervision of CHWs. Between January 2022 and May 2023, national and international institutional review boards identified partners and wrote and approved the protocol, staff were trained, and the study commenced in May 2023, with national-level in-depth interviews of key stakeholders completed at the time of this writing.
- Planning began for a national health facility survey to assess quality of and readiness for care, prevalence of hrp2/3 deletions, prevalence of G6PD deficiency, and burden of infections caused by *P. vivax*, using MOP FY 2022 funds. The standardized health facility survey protocol was adapted to the country context and approved by the local institutional review board; preparations for supplies, logistics, and data collection are underway at the time of this writing. Although this survey was anticipated to begin in February 2023, challenges procuring key supplies required the study's postponement. The survey is now expected to begin in January 2024 to align with the next malaria transmission season.
- The evaluation of the SMC pilot anticipated to take place in 2022–2023 was canceled because the pilot implementation of SMC did not occur.
- Additional monitoring and evaluation activities are presented elsewhere in this MOP, such as a TES described in the case management section and the cost-effectiveness of the cCD strategy described in the vector control section.

Additionally, PMI plans to reprogram funds from MOP 2023 to evaluate in 2024 the processes, costs, and feasibility of the expanded community-level activities planned by NMP (c-IPTp, age-expanded passive community-level case management, and proactive case management) to help inform adjustments in implementation and plans for further scale-up.

Table 8. PMI-Funded OR/PE Studies in Madagascar

Recently Completed OR/PE Studies	Status of Dissemination	Start Date	End Date
Effectiveness of age-extended community case management of malaria	Baseline survey published; endline results in final analysis; topline results shared with MOH and community	October 2019	November 2021
Ongoing or Planned OR/PE Studies	**Status**	**Start Date**	**End Date**
Entomological, feasibility, and acceptability analysis of LSM in Morombe and Ankazobe	Intervention has finished; final data collection in course	Jan 2023	May 2023
Evaluation of CHW peer supervision (core-funded)	Institutional Review Board approval obtained; study underway as of May 2023	May 2023	Anticipated in October 2023
Evaluation of expanded community health activities (c-IPTp, all-age community case management, proactive case management)	Planning phase	Anticipated in May 2024	Anticipated in October 2024

CHW: community health worker; c-IPTP: intermittent preventive treatment for pregnant women at the community level; LSM: larval source management; OR: operational research: PE: program evaluation.

Table 9. Non-PMI funded Operational Research/Program Evaluation Studies Planned/Ongoing in Madagascar

Source of Funding	Implementing institution	Research Question/Topic	Current Status/Timeline
NIH/Case Western Reserve	CNARP	Comparison of Pf/PAN and Pf/Pv RDTs versus polymerase chain reaction; prevalence of G6PD deficiency in Mandoto/Vakinarara	To begin late April 2023
NIH/Case Western Reserve	CNARP	Metabolism of primaquine (Ranomafana and Mananjary districts)	In course
Horizon Europe/United Kingdom Research and Innovation	Institut Pasteur de Madagascar, Armauer Hansen Research Institute	Serological testing and treatment for *Plasmodium vivax*: from a cluster-randomized trial in Ethiopia and Madagascar to a mobile technology-supported intervention	To begin May 2023

CNARP: *Centre National d'Application des Recherches Pharmaceutiques*; G6PD: glucose-6-phosphate dehydrogenase; NIH: National Institutes for Health; RDT: rapid diagnostic test.

8.3. Plans and Justification with FY 2024 Funding

The FY 2024 funding tables contain a full list of OR/PE activities that PMI proposes to support in Madagascar with FY 2024 funding.

PMI/Madagascar plans to fund NMP's OR/PE priorities that were discussed during MOP 2024 preparations through modifications to activities planned in MOP 2022 (inclusion of MIP-related knowledge and attitudes in the health facility survey planned for FY 2024) and reprogramming of MOP 2023 funding (evaluation of expansion of community-level care). Thus, no OR/PE activities are proposed with FY 2024 funding.

9. Capacity Strengthening

9.1. PMI Goal and Strategic Approach

NMP's aims to strengthen capacity to effectively implement the national malaria strategy and meet its goal of progressive elimination of malaria in Madagascar, with a focus on decentralizing decision making and implementation and improving financial and logistics management capacity and technical expertise. PMI/Madagascar's approach includes facilitating increased collaboration with other MOH directorates and government ministries, donors, and the private sector to strengthen the public health system across the country; supporting efforts to strengthen NMP leadership and technical and organizational capacity; supporting in-country coordination through the RBM platform and technical working groups; supporting the effort to provide regular malaria-related coaching to regional actors; and coordinating investments in surveillance and OR with NMP and the Global Fund to inform policy and strategy decisions. The Field Epidemiology Training Program (FETP) was established in Madagascar in 2022 to train district-level actors; PMI/Madagascar has provided technical support and plans to fund up to 10 participants in 2024. PMI/Madagascar, together with implementing partners, also supports the U.S. Peace Corps' efforts to strengthen Madagascar's health systems; volunteers were not present in Madagascar during most of 2020–2021 but began returning to the country in 2022.

9.2. Recent Progress (January 2022–April 2023)

PMI recently supported the following capacity-strengthening activities:

- The attendance of 325 national-, regional-, and district-level NMP staff (48 percent women) for technical and leadership training, the Leadership Development Program Plus; monitoring and evaluation training in Burkina Faso and in-country; ITN distribution, including planning, coordination, and implementation; research methods; 12 persons receiving WHO's External Competence Assessment of Malaria Microscopists certification; entomology training in Dakar; molecular and morphological entomology training for NMP and partner staff; annual meeting of the SMC Alliance; and the annual meeting of the American Society of Tropical Medicine and Hygiene.

- Providing technical support to the FETP frontline program, which serves district-level participants, and trained 39 persons during this period; coordinated funding to meet an urgent funding gap.
- Conducting weekly RBM meetings and regular meetings of technical working groups.
- Sharing weekly SITREP during RBM meetings discussing malaria data trends, outbreaks, and responses.
- Conducting intermittent meetings (typically quarterly or semesterly) of technical working groups (e.g., vector control, OR, surveillance, TES, MIP, SM&E, and malaria supply chain).
- Supporting NMP staff to write scientific abstracts and papers.
- Continuing the processes required to establish a G2G mechanism initially to be used to fund elimination activities, TES, and the procurement of laboratory supplies for NMP.
- Decentralizing some of the management of funding, such as for supervision, response, and community dialogue.
- Provision of 264 coaching support sessions to staff in 114 districts in 22 regions (addressing malaria case counts and trends, commodity stocks and expiry, management of upsurges, and other anomalies).
- Shifting toward community management of malaria among persons of all ages, training actors at all levels (15 at the central level, 39 at the regional and district levels, and 531 at the facility level.
- Coordinating across PMI partners and increasing budgets to expand malaria control in south/southeastern Madagascar, where approximately half of the cases occur, and to prepare and respond to cyclones and outbreaks.

In addition to supporting training on malaria, leadership, data, and health systems at all levels, in CY 2023–2024, PMI plans to:

- Support and facilitate coordination meetings with the Madagascar government and partners through a newly established working group to advance planning for the sustainable and equitable payment of CHWs.
- Support and facilitate coordination meetings to plan effective LSM, in accordance with the National Strategic Plan 2023–2027.
- Provide financial, technical, and logistical support for the training of the third and fourth FETP-Madagascar cohorts to increase epidemiologic capacity at the district level.
- Support the malaria coaching program, which provides technical and logistical support to regional and district-level actors prior to cyclones and malaria high transmission peaks.
- Continue to work to establish and enhance the mission localization agenda, including the G2G mechanism.
- Continue to support efforts to decentralize decision making and response.
- Support the U.S. Peace Corps program, permitting volunteers to work with local actors to increase capacity and prevent malaria.
- Support NMP to write scientific abstracts and papers.

- Support various leadership and technical training, including participation in international workshops and meetings and increased opportunities for e-learning.
- Support the establishment and functionality of a NMP regional surveillance coordinator for each of the four newly-defined epidemiologic strata to lead surveillance activities and prepare and respond to anomalies at decentralized levels.

Challenges include a lack of policies, systems, and funds to support CHWs; insufficient funds to equip and repair facilities; complex processes required to establish a G2G mechanism; and inconsistencies in per diem rates across funding and technical partners, leading to uneven participation in capacity-strengthening activities. Plans to increase virtual/digital training options have stalled because local actors strongly prefer in-person training.

9.3. Plans and Justification with FY 2024 Funding

In addition to continuing to support the activities listed in section 9.2, PMI will:

- In coordination with the Madagascar government and partners, and in alignment with future national policy, begin remunerating CHWs;
- Increase support to the FETP-Madagascar program to increase epidemiologic capacity at the peripheral level, including supporting up to 20 training participants; and
- Support NMP's regional surveillance coordinators to lead malaria control activities in each epidemiologic stratum.

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

10. Staffing and Administration

The single interagency team led by the USAID Mission Director or their designee consists of a resident advisor representing USAID, a resident advisor representing the U.S. Centers for Disease Control and Prevention, 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	2023	2024	2025
Total country population	30,262,243	31,173,136	32,111,448
Total population at risk for malaria	30,262,243	31,173,136	32,111,448
PMI-targeted at-risk population	30,262,243	31,173,136	32,111,448
Population targeted for ITNs	25,804,614	26,581,333	27,381,431
Continuous distribution needs			
Channel 1: ANC	791,944	851,666	914,266
Channel 1: ANC type of ITN	PBO and Single Pyrethroid	Dual AI and Single Pyrethroid	Dual AI and Single Pyrethroid
Channel 2: EPI	825,748	850,603	876,206
Channel 2: EPI type of ITN	PBO and Single Pyrethroid	Dual AI and Single Pyrethroid	Dual AI and Single Pyrethroid
Channel 3: School	N/A	N/A	N/A
Channel 3: School type of ITN			
Channel 4: Community	958,658	0	1,485,978
Channel 4: Community type of ITN	PBO and Single Pyrethroid	Dual-AI and Single Pyrethroid	Dual-AI and Single Pyrethroid
Channel 5: Social marketing	572,532	601,159	631,217
Channel 5: Type of ITN	Single Pyrethroid	Single Pyrethroid	Single Pyrethroid
Channel 6: Emergency	302,574	302,574	302,574
Channel 6: Type of emergency	Single Pyrethroid	Single Pyrethroid	Single Pyrethroid
Estimated Total need for continuous channels	3,451,456	2,606,002	4,210,241
Mass campaign distribution needs			
Mass distribution campaigns	0	16,244,148	0
Mass distribution ITN type		Dual-AI and Single Pyrethroid	Dual-AI and Single Pyrethroid
Estimated total need for campaigns	0	16,244,148	0
Total ITN need: Continuous and campaign	**3,451,456**	**18,850,150**	**4,210,241**
Partner contributions			
ITNs carried over from previous year	1,146,994	469,662	0

ITNs from government	0	0	0
Type of ITNs from government			
ITNs from Global Fund	1,674,124	662,790	
Type of ITNs from Global Fund	Single Pyrethroid	Single Pyrethroid	
ITNs from other donors	0	0	0
Type of ITNs from other donors			
ITNs planned with PMI funding	1,100,000	2,000,000	800,000
Type of ITNs with PMI funding	PBO and Single Pyrethroid	Dual-AI and Single Pyrethroid	Dual-AI
Total ITNs contribution per calendar year	**3,921,118**	**3,132,452**	**800,000**
Total ITN surplus (gap)	**469,662**	**(15,717,698)**	**(3,410,241)**

Note: The gap analysis was based on the draft stratification as of May 2023. The stratification methodology was updated on June 7, 2023, which resulted in slightly different numbers of districts in each risk stratum. The risk stratification is discussed in the information note, which contains the version used for this gap analysis. The current (as of June 9, 2023) stratification is presented in the Country Profile.

Table A-2. RDT Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	30,262,243	31,173,136	32,111,448
Population at risk for malaria	30,262,243	31,173,136	32,111,448
PMI-targeted at-risk population	30,262,243	31,173,136	32,111,448
RDT needs			
Total number of projected suspected malaria cases	5,141,544	5,387,525	5,537,845
Percent of suspected malaria cases tested with an RDT	100%	100%	100%
RDT needs (tests)	**5,191,046**	**5,438,615**	**5,589,724**
Needs estimated based on other			
Partner contributions (tests)			
RDTs from government	0	0	0
RDTs from Global Fund	7,498,109	0	0
RDTs from other donors	132,500	0	0
RDTs planned with PMI funding	2,500,000	2,500,000	700,000
Total RDT contributions per calendar year	**10,130,609**	**2,500,000**	**700,000**
Stock balance (tests)			
Beginning balance	5,715,150	10,654,713	7,716,098
- Product need	5,191,046	5,438,615	5,589,724
+ Total contributions (received/expected)	10,130,609	2,500,000	700,000
Ending balance	**10,654,713**	**7,716,098**	**2,826,374**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	2,595,523	2,719,308	2,794,862
Total surplus (gap)	**8,059,190**	**4,996,790**	**31,512**

Table A-3. ACT Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	30,262,243	31,173,136	32,111,448
Population at risk for malaria	30,262,243	31,173,136	32,111,448
PMI-targeted at-risk population	30,262,243	31,173,136	32,111,448
ACT needs			
Total projected number of malaria cases	2,378,575	2,323,738	2,210,086
Total ACT needs (treatments)	**2,401,899**	**2,346,203**	**2,231,297**
Select data source	Demographic and HMIS data		
Partner contributions (treatments)			
ACTs from government			
ACTs from Global Fund	3,114,288	0	0
ACTs from other donors	45,000	0	0
ACTs planned with PMI funding	971,250	2,000,000	500,000
Total ACTs contributions per calendar year	**4,130,538**	**2,000,000**	**500,000**
Stock balance (treatments)			
Beginning balance	4,784,236	6,512,875	6,166,672
- Product need	2,401,899	2,346,203	2,231,297
+ Total contributions (received/expected)	4,130,538	2,000,000	500,000
Ending balance	**6,512,875**	**6,166,672**	**4,435,375**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	1,200,949	1,173,101	1,115,649
Total surplus (gap)	**5,311,926**	**4,993,571**	**3,319,726**

Table A-4. Inj. Artesunate Gap Analysis Table

Calendar Year	2023	2024	2025
Injectable artesunate needs			
Projected number of severe cases	69,440	66,885	63,157
Projected number of severe cases among children	45,761	44,077	41,620
Average number of vials required for severe cases among children	194,570	187,412	176,965
Projected number of severe cases among adults	23,679	22,808	21,536
Average number of vials required for severe cases among adults	213,111	205,270	193,828
Total injectable artesunate needs (vials)	**407,681**	**392,682**	**370,794**
Select data source			
Partner contributions (vials)			
Injectable artesunate from government	0	0	0
Injectable artesunate from Global Fund	935,615	0	0
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	0	189,000	20,000
Total injectable artesunate contributions per calendar year	**935,615**	**189,000**	**20,000**
Stock balance (vials)			
Beginning balance	600,844	1,128,778	925,096
- Product need	407,681	392,682	370,794
+ Total contributions (received/expected)	935,615	189,000	20,000
Ending balance	**1,128,778**	**925,096**	**574,302**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	203,840	196,341	185,397
Total surplus (gap)	**924,938**	**728,755**	**388,905**

Table A-5. RAS Gap Analysis

Calendar Year	2023	2024	2025
Artesunate suppository needs			
Number of severe cases expected to require prereferral dose (or expected to require prereferral dose based on number of providers for the service)	8,722	8,401	7,933
Total artesunate suppository needs (suppositories)	**15,741**	**15,162**	**14,317**
Select data source			
Partner contributions (suppositories)			
Artesunate suppositories from government	0	0	0
Artesunate suppositories from Global Fund	0	0	0
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	44,000	0	0
Total artesunate suppositories available	**44,000**	**0**	**0**
Stock balance (suppositories)			
Beginning balance	48,502	76,761	61,598
- Product need	15,741	15,162	14,317
+ Total contributions (received/expected)	44,000	0	0
Ending balance	**76,761**	**61,598**	**47,281**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	7,871	7,581	7,159
Total surplus (gap)	**68,890**	**54,017**	**40,123**

Table A-6. SP Gap Analysis Table

Calendar Year	2023	2024	2025
Total country population	30,262,243	31,173,136	32,111,448
Total population at risk for malaria	30,262,243	31,173,136	32,111,448
PMI-targeted at-risk population	30,262,243	31,173,136	32,111,448
SP needs			
Total number of pregnant women	1,161,208	1,196,160	1,232,164
Percent of pregnant women expected to receive IPTp1	53%	55%	57%
Percent of pregnant women expected to receive IPTp2	40%	43%	45%
Percent of pregnant women expected to receive IPTp3	30%	32%	35%
Percent of pregnant women expected to receive IPTp4	2%	2%	2%
Total SP needs (doses)	**1,467,099**	**1,599,848**	**1,737,994**
Select data source			
Partner contributions (doses)			
SP from government	0	0	0
SP from Global Fund	2,121,583	0	0
SP from other donors	0	0	0
SP planned with PMI funding	0	1,650,000	900,000
Total SP contributions per calendar year	**2,121,583**	**1,650,000**	**900,000**
Stock balance (doses)			
Beginning balance	1,869,800	2,524,284	2,574,436
- Product need	1,467,099	1,599,848	1,737,994
+ Total contributions (received/expected)	2,121,583	1,650,000	900,000
Ending balance	**2,524,284**	**2,574,436**	**1,736,442**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	733,550	799,924	868,997
Total surplus (gap)	**1,790,734**	**1,774,512**	**867,445**

Table A-7. SMC Gap Analysis Table

Calendar Year	2023	2024	2025
Total population in the SMC-targeted age range	1,107,598	1,140,937	1,175,279
SMC drug (SP+AQ) needs			
National population 5–15 years targeted for SMC	284,542	293,107	301,929
National population 12–59 months targeted for SMC	N/A	N/A	N/A
Total national population targeted for SMC	**284,542**	**293,107**	**301,929**
National population 5—15 years targeted for SMC	284,542	293,107	301,929
PMI population 12–59 months targeted for SMC	N/A	N/A	N/A
Total PMI population targeted for SMC	**284,542**	**293,107**	**301,929**
Total SP+AQ needs (co-blisters)	**1,308,893**	**1,348,291**	**1,388,874**
Partner contributions (co-blisters, national)			
SP+AQ carried over from previous year	0	383,607	0
SP+AQ from government	0	0	0
SP+AQ from Global Fund	1,692,500	0	0
SP+AQ from other donors	0	0	0
SP+AQ planned with PMI funding	0	0	0
Total SP+AQ contributions per calendar year	1,692,500	383,607	0
Total SP+AQ surplus (gap)	**383,607**	**(964,684)**	**(1,388,874)**

Table A-8. Primaquine Gap Analysis Tables

Calendar Year	2023	2024	2025
Total country population	30,262,243	31,173,136	32,111,448
Total population at risk for malaria	30,262,243	31,173,136	32,111,448
PMI-targeted at-risk population	30,262,243	31,173,136	32,111,448
Primaquine needs			
Total projected number of malaria cases	2,378,575	2,323,738	2,210,086
Total projected number of Pf cases	2,283,432	2,230,789	2,121,682
Total projected number of Pv cases	47,571	46,475	44,202
Total projected number of mixed cases (Pf + Pv)			
Total primaquine needs (tablets)	**5,710**	**5,117**	**4,585**
Needs estimated based on HMIS data	Combined with demographic data		
Partner contributions (tablets)			
Primaquine from government	0	0	0
Primaquine from Global Fund	56,000	0	0
Primaquine from other donors	0	0	0
Primaquine planned with PMI funding	40,000	0	28,000
Total primaquine contributions per calendar year	**96,000**	**0**	**28,000**
Stock balance (tablets)			
Beginning balance	0	90,290	85,173
- Product need	5,710	5,117	4,585
+ Total contributions (received/expected)	96,000	0	28,000
Ending balance	**90,290**	**85,173**	**108,588**
Desired end of year stock (months of stock)	6	6	6
Desired end of year stock (quantities)	2,855	2,558	2,293
Total surplus (gap)	**87,435**	**82,615**	**106,296**