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Madagascar

Malaria Operational Plan FY 2022

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This FY 2022 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 2022 appropriation from U.S. Congress. Any updates will be reflected in revised postings.

This document was prepared in the early months of 2021 as the COVID-19 pandemic continued to evolve worldwide, including in PMI-focus countries. The effects of the pandemic on malaria control and elimination work in 2022 are difficult to predict. However, because U.S. Congressional appropriations for PMI are specific to work against malaria and any appropriations for work against the COVID-19 are specific for that purpose and planned through separate future U.S. Government planning processes, this FY 2022 MOP will not specifically address the malaria-COVID-19 interface and will reassess any complementary work through timely reprogramming in countries.

CONTENTS

ABBREVIATIONS

ACCMID	Assistant Communal pour la Campagne MID
ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
BMGF	Bill & Melinda Gates Foundation
CCD	Community-based continuous distribution
CCM-malaria	Community case management of malaria
CDC	U.S. Centers for Disease Control and Prevention
CSB	*Centre de santé de base/*Basic Health Center
CY	Calendar year
DEPSI	Department of Studies and Information System Planning
DHIS	District Health Information System
DHP	Dihydroartemisinin-piperaquine
DHS	Demographic and Health Survey
DM	Durability monitoring
DQA	Data Quality Assessment
ECAMM	External competency assessment for malaria microscopists
eLMIS	Electronic Logistics Management Information System
EPI	Expanded Program for Immunization
EUV	End-User Verification
FY	Fiscal year
G2G	Government-to-Government
GAS	*Gestion et Achats de Stock* (Supply chain sub-committee)
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
HLC	Human landing collections
HMIS	Health Management Information System
HSS	Health systems strengthening
iCCM	Integrated Community Case Management
IDSR	Integrated Disease Surveillance and Response
IPTp	Intermittent preventive treatment for pregnant women
IR	Indoor resting collections
IRM	Insecticide resistance monitoring
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
NMCP	National Malaria Control Program
NMS	National Malaria Strategy

NSP	National Strategic Plan
OR	Operational research
ORC	Outdoor resting collections
OTSS	Outreach Training and Supportive Supervision
PBO	Piperonyl butoxide
PE	Program evaluation
PECADOM	*Prise en charge à domicile* (Proactive Community Case Management)
Pha-G-Com	*Pharmacie de Gestion de Communauté*
Pha-G-Dis	*Pharmacie de Gestion des Districts*
PMI	U.S. President's Malaria Initiative
Pro-CCM	Proactive community case management of malaria
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
RHIS	Routine Health Information System
S&ME	Surveillance, monitoring, and evaluation
SBC	Social and behavior change
SMC	Seasonal Malaria Chemoprevention
SP	Sulfadoxine-pyrimethamine
SP/AQ	Sulfadoxine-pyrimethamine + amodiaquine
SPARS	Supervision, Performance Assessment and Recognition strategy
TA	Technical assistance
TES	Therapeutic Efficacy Studies
UCP	*Unité de Coordination de Programme*
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Madagascar to end malaria. PMI has been a proud partner of Madagascar since 2008, helping to decrease child death rates by 37 percent (PMI Annual Report to Congress, April 2021) through investments totaling almost $338 million.

The proposed PMI fiscal year (FY) 2022 budget for Madagascar is $25 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Madagascar using FY 2022 funds. Developed in consultation with the national malaria control program (NMCP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Madagascar as well as other donors and partners.

Malaria remains the fourth leading cause of mortality and the fourth most frequent reason for health facility visits in Madagascar (NMCP 2019). The entire population is at risk for the disease; however, risk is heterogeneous across the country. Since 2017, the number of districts meeting elimination or pre-elimination criteria (1 case per 1,000 population per year) increased from 9 to 13. During this same time, however, Madagascar has experienced steady increases in confirmed malaria cases from 795,527 in 2017 to 1.95 million in 2020. These increases are focused in select communities of 40 districts (21 supported by PMI) and are likely multifactorial in nature. The following factors potentially contributed to increases in reported malaria cases: increased care-seeking, improved reporting, more favorable transmission dynamics (e.g., climate, land use, asymptomatic infections), vector behavior change (e.g., increased outdoor biting), and challenges implementing prevention and control activities due to remote locations and geographic or security barriers. Malaria-related deaths, which increased from 629 in 2017 to 927 in 2018, decreased to 657 in 2019 and remained at about this level in 2020 (NMCP 2020).

PMI will support investments in the following intervention areas with FY 2022 funds:

Vector control

Progress in FY 2020:

- Procured and distributed 42,000 Piperonyl butoxide (PBO) insecticide-treated mosquito nets (ITNs) and 744,276 standard ITNs through continuous distribution channels, in addition to the procurement of 3,677,000 ITNs for the 2021 ITN mass distribution campaign.
- Conducted entomological monitoring, including insecticide resistance testing, longitudinal monitoring, and insecticide efficacy evaluations for indoor residual spraying.
- Implemented IRS reaching approximately 203,513 structures and protecting about 833,483 people.

Proposed investments with FY 2022 funding:

- Procurement and distribution of 820,000 standard ITNs for continuous distribution, 100,000 next generation nets for select high-transmission districts with reported pyrethroid resistance, and 800,000 standard ITN as initial contribution to ITN mass distribution campaign 2024.

- Entomological monitoring, including insecticide resistance testing, longitudinal monitoring, and insecticide efficacy evaluations for IRS.
- Continued support for IRS in up to 5 high burden districts, targeting approximately 200,000 structures.

Case Management

Progress in FY 2020:

- 145 health facility laboratories in 59 districts of 13 regions received outreach training and supportive supervision (OTSS) malaria visits.
- Contributed to integrated training of over 25,000 community health volunteers (CHVs) in 10 regions who provide SBC to promote early care seeking and prevention behaviors.
- Trained 84 laboratorians on a malaria diagnostic refresher training.
- Completed a therapeutic efficacy study of first- and second-line antimalarials in four sites.
- Launched pre-referral treatment with rectal artesunate for severe malaria among children under five years of age in remote, high-transmission areas.

Proposed investments with FY 2022 funding:

- Support improvement of malaria case management with an emphasis on service delivery in public and private health facilities, including the scale-up of proactive community case management (*prise en charge a domicile or* PECADOM) in some areas.
- Technical assistance for improvement of pre-referral treatment with rectal artesunate among children under five years of age with severe disease, including tracking.
- Continue to support messages and development of materials related to malaria through community-based approaches through CHVs, activities to help promote prevention, and care among school-aged children.

Malaria in Pregnancy

Progress in FY 2020:

- ITN continuous distribution through antenatal care (ANC) clinics
- Support for scale-up of community-based IPTp (TIPTOP)

Proposed investments with FY 2022 funding:

- Support MIP efforts in Madagascar including ANC supervisory visits
- Procurement and distribution of ITNs to pregnant women through routine distribution at ANC

Seasonal malaria chemoprevention (SMC)

Progress in FY 2020

- None. This is a new activity in the revised NSP 2018-2022

Proposed investments with FY 2022 funding:

- Provide technical assistance to the NMCP to implement SMC as operational research in high burden districts in the South. Procurement of SMC commodities and implementation costs will be funded via the Global Fund.

Supply Chain

Progress in FY 2020:

- Improved quantification and supply chain and analysis through technical assistance.
- Support for Integrated Logistics System to ensure monthly reporting and distribution to the last mile.

Proposed investments with FY 2022 funding:

- Strengthen forecasting, supply planning, strategy, and planning in country storage and distribution, monitoring and evaluation, as well as human resources capacity building and support to management information systems, such as electronic Logistics Management Information System.
- Support to the NMCP to conduct quantification exercises and the quarterly review of the supply plan to improve coordination and procurement planning across all partners.

Surveillance, Monitoring and Evaluation

Progress in FY 2020:

- DHIS2 was rolled out nationwide to include community and hospital settings in addition to health facility sectors.
- Improved use of surveillance data to reduce delays in outbreak response.

Proposed investments with FY 2022 funding:

- Support the continued scale-up and improvement of DHIS2 reporting and use for analysis.
- Continue to strengthen Madagascar's ability to analyze and disseminate Surveillance, monitoring, and evaluation- (SM&E)-related information for decision-making, hold regular meetings, and attend technical working groups to review and discuss SM&E activities, and make regular SM&E supervisory visits to the field.

Program Evaluation and Operational Research

Progress in FY 2020:

- PMI supported OR to assess the effectiveness of community case management of malaria (CCM-malaria) for all ages. Baseline survey and analysis completed, and the intervention launched in October 2020.
- Larval source management assessment concept note is under development.

Proposed investments with FY 2022 funding:

- Support Year 2 of larvicide source management intervention based on feasibility assessment of potential sites.

Social and Behavioral Change

Progress in FY 2020:

- SBC associated with the distribution of 786,276 nets through continuous distribution channels.
- Community SBC activities were focused on correct and consistent ITN use and care, prompt care-seeking after the onset of fever, reactive case detection in elimination districts and acceptance of IRS in targeted districts.

Proposed investments with FY 2022 funding:

- SBC activities to promote prompt care seeking, encourage ANC care and IPTp, assure the acceptance of IRS, and facilitate correct and consistent use of ITNs.
- SBC activities to promote preventative and curative malaria-related behaviors including prompt care seeking for fever upon onset of signs and symptoms of malaria.

HSS general/other

Progress in FY 2020:

- Supported the NMCP to lead its own therapeutic efficacy studies in two districts, to complement the PMI-funded TES via an implementing partner (Government-to-Government relationship pilot).
- Supported Leadership Development Program Plus leadership training for key NMCP staff.

Proposed investments with FY 2022 funding:

- Continue to support Leadership Development Program Plus training for NMCP staff.

I. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Madagascar to end malaria. PMI has been a proud partner of Madagascar since 2008, helping to decrease child death rates by 37 percent [PMI Annual Report to Congress, April 2021] through investments totaling almost $338 million.

Madagascar at a Glance

- **Geography:** Madagascar is an island nation situated in the Indian Ocean approximately 400 kilometers off the southeast coast of the African continent. It measures 587,000 square kilometers and elevation ranges from sea level at the coast to over 1,800 meters in parts of the central highlands
- **Climate and Malaria Transmission Seasonality:** There are two seasons in Madagascar separated by about a month of transition. The cool, dry season extends from approximately June through September, and the warm, rainy season from December through April. During the warm season, tropical depressions in the southern Indian Ocean can result in cyclones, particularly on the eastern side of the island
- **Population in 2021:** 28,121,820 (Ministry of Health National Census 2018)
- **Population at Risk of Malaria:** 100%
- **Principal Malaria Parasites:** *Plasmodium falciparum*
- **Principal Malaria Vectors:** *An. gambiae* s.s., *An. Arabiensis,* and *An. funestus*
- **Malaria Case Incidence per 1,000 Population: 71.6** (Madagascar HMIS, 2020)
- **Under-Five Mortality Rate:** 50.7 (World Bank, 2019)
- **World Bank Income Classification and GDP:** Madagascar is a low-income country with a GDP per capita income of ~US$ 460.8 (World Bank, 2019**)**
- **Government Health Budget: 6.65% (MOH 2019)***
- **Trafficking in Persons Designations, 2018-2020:** Madagascar was classified as a Tier 2 country in 2019 (Trafficking in Persons Report 2019, US Department of State)
- **Malaria Funding and Program Support Partners Include:**
  - U.S. President's Malaria Initiative (PMI)
  - Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund)
  - World Health Organization (WHO)
  - United Nations Children's Fund (UNICEF)
- **PMI Support of National Malaria Control Strategy:** PMI operates both nationally and in support of the NMCP planning, policies, and malaria commodities (diagnostics, drugs, insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS), and others) and with direct program support in 10 regions of the country covering a population of approximately 13,500,000 (DHIS2). PMI also supports elimination activities in 2 districts**. PMI Investments:** Madagascar began implementation as a PMI focus country in FY

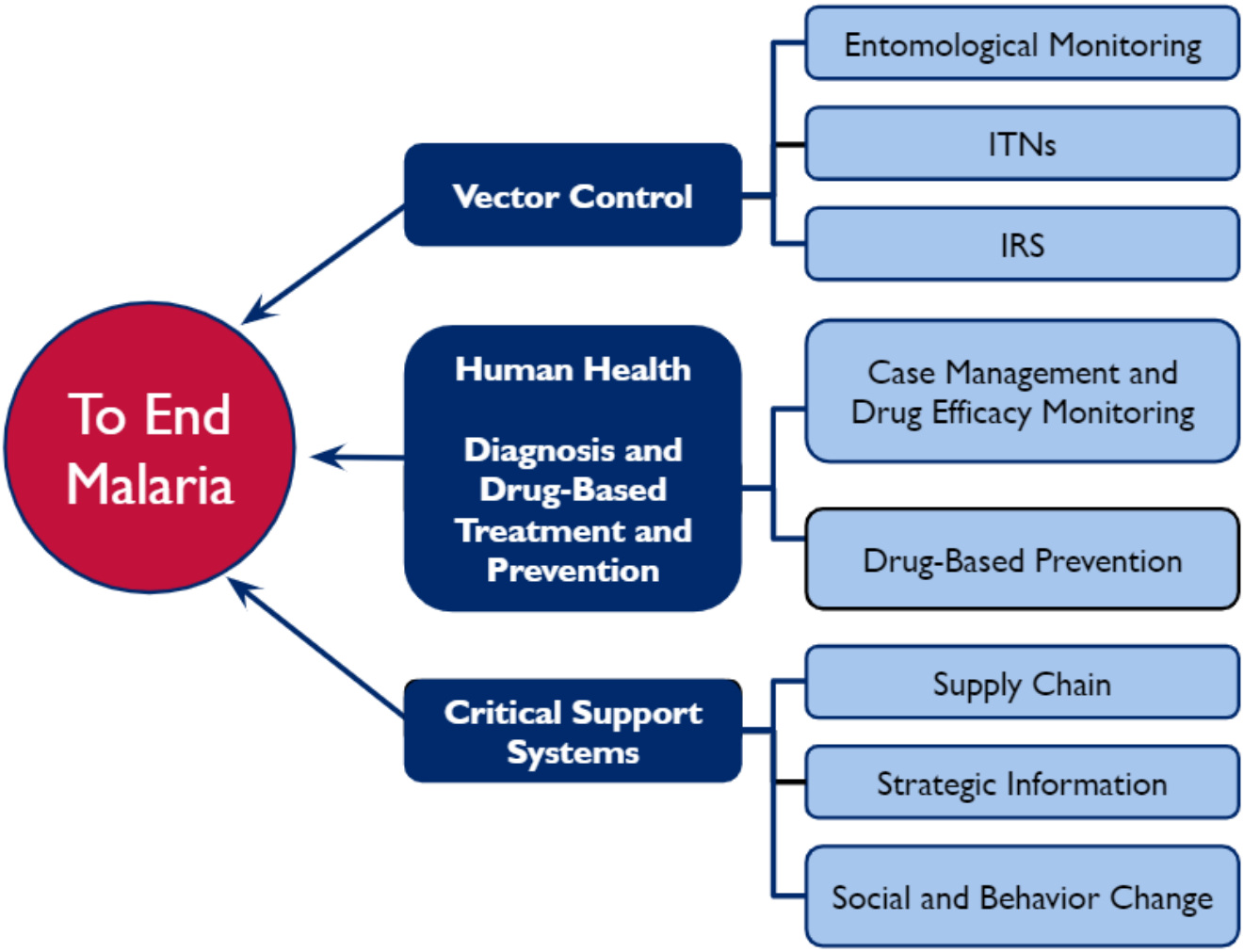
2008. The proposed FY 2022 PMI budget for Madagascar is $25 million; this brings the total PMI investment to nearly $363 million.

** 6,65% reported in 2019 (MOH PDSS 2020-2024)*

The proposed PMI fiscal year (FY) 2022 budget for Madagascar is $25 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Madagascar using FY 2022 funds. Developed in consultation with the national malaria control program (NMCP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Madagascar as well as other donors and partners.

PMI organizes its investments around the activities below, in line with the Madagascar National Malaria Strategy (NMS) 2018–2022.

Figure 1. PMI's approach to end malaria[1]



Building and strengthening the capacity of Madagascar's people and institutions—from the central level to communities—to effectively lead and implement evidence-based malaria control and elimination activities is paramount to PMI. The majority of PMI's planned support for FY 2022, across the areas of vector control, human health, and critical support systems such as supply chain, contains elements of capacity building and system strengthening. PMI/Madagascar will continue to rely on and engage with local partners such as *Institut Pasteur de Madagascar*. Finally, PMI/Madagascar will continue to rely on private sector partnerships, such as telecommunication companies.

[1]A number of actions are crosscutting in nature. For example, social and behavioral change (SBC) is embedded in all vector control and human health work; program evaluation (PE) and operational research (OR) are relevant in all of the field work; finance and management support and the introduction of new tools/interventions are critical for all programs; and elimination requires work across the full spectrum of transmission.

II. MALARIA SITUATION AND PROGRESS

Malaria remains the fourth leading cause of mortality and the fourth most frequent reason for health facility visits in Madagascar (NMCP 2019). The entire population is at risk for the disease; however, risk is heterogeneous across the country. Since 2017, the number of districts meeting elimination or pre-elimination criteria (one case per 1,000 population) increased from 9 to 13. During this same time, however, Madagascar has experienced steady increases in confirmed malaria cases from 795,527 in 2017 to 1.95 million in 2020. These increases are focused in select communities of 40 districts and are likely multifactorial in nature. The following factors potentially contributed to increases in reported malaria cases: increased care-seeking and malaria detection with rapid diagnostic test (RDTs) (2.2 million suspected cases reported 2017, 2.6 million in 2018, 3.2 million in 2019 and nearly 4 million in 2020), rapid loss of insecticide efficacy on ITNs distributed during the 2018 mass campaign (according to preliminary durability monitoring results), more favorable transmission dynamics (e.g., climate, land use, asymptomatic infections), vector behavior change (e.g., increased outdoor biting), and challenges implementing prevention and control activities due to remote locations and geographic or security barriers. Malaria-related deaths, which increased from 629 in 2017 to 927 in 2018, decreased to 657 in 2019 and remained at about this level in 2020 (NMCP 2020). A Demographic and Health Survey (DHS) with a malaria module is ongoing and will provide updated prevalence and behavior data.

Figure 2. Trends in malaria prevalence

% Children 6 to 59 months of age who tested positive for malaria by microscopy/RDT (Malaria Indicator Survey [MIS] 2011–2016)

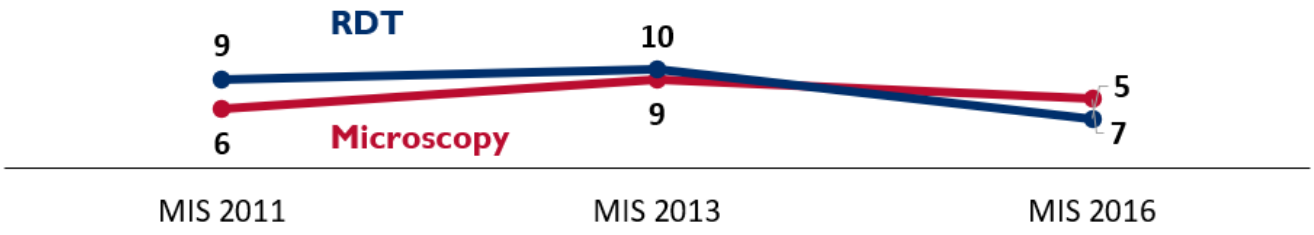


Figure 3. Malaria prevalence by geographic area

Children 6 to 59 months of age who tested positive for malaria by microscopy (MIS 2016)

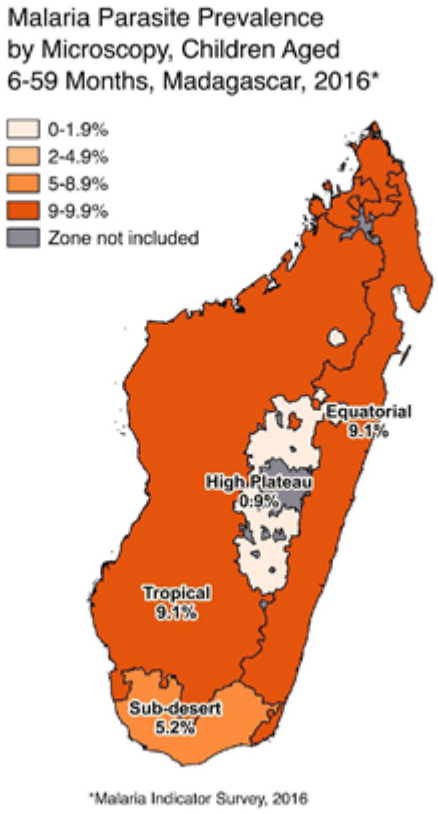


Table 1. Key indicators from demographic health surveys (DHS) and malaria indicator surveys (MIS)

Indicator	DHS 2008-2009	MIS 2011	MIS 2013	MIS 2016	MICS* 2018
% Households with at least one ITN	57	81	69	80	78
% Households with at least one ITN for every two people	19	33	29	44	41
% Population with access to an ITN	35	57	48	62	62
% Population that slept under an ITN the previous night	37	68	55	68	56
% Children under five years of age who slept under an ITN the previous night	46	77	62	73	62
% Pregnant women who slept under an ITN the previous night	46	72	62	69	61

Indicator	DHS 2008-2009	MIS 2011	MIS 2013	MIS 2016	MICS* 2018
% Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought[1]	47	43	54	56	48
% Children under five years of age with a fever in the last two weeks who had a finger or heel stick	n/a	6	13	16	13
% Children receiving an ACT among children with a fever in the last two weeks who received any antimalarial drug	5	19	54	17	29
% Women who received two or more doses of IPTp during their last pregnancy in the last two years[2]	7	20	18	23	29
% Women who received three or more doses of IPTp during their last pregnancy in the last two years[2]	n/a	n/a	n/a	11	25
<5 mortality rate per 1,000 live births	72	n/a	n/a	n/a	59
% Children under five years of age with parasitemia by microscopy	n/a	6	9	7	n/a
% Children under five years of age with parasitemia by RDT	n/a	9	10	5	n/a
% Children under five years of age with severe anemia (Hb<8gm/dl)	2	1	4	2	n/a

* MICS = Multiple Indicator Cluster Survey

Note: DHS/MICS surveys are generally fielded during the dry season, whereas MIS surveys are deliberately fielded during the high transmission season, which should be taken into consideration when interpreting these indicators

[1]Note that this indicator has been recalculated according to the newest definition, care or treatment from any source excluding traditional practitioners wherever possible

[2]Note that this indicator has been recalculated according to the newest definition (at least the specified number doses of SP/Fansidar from any source) wherever possible

Table 2. Evolution of key malaria indicators reported through routine surveillance systems

Indicator	2016	2017	2018	2019	2020
# Suspect malaria cases[1]	1,667,277	2,181,219	2,606,443	3,183,805	3,970,573
# Patients receiving diagnostic test for malaria[2]	1,496,990	1,974,518	2,290,797	2,855,995	3,798,824
Total # malaria cases[3]	N/A	N/A	N/A	N/A	N/A
# Confirmed cases[4]	*471,599*	*795,527*	*965,390*	991,740	1,950,471
# Presumed cases[5]	N/A	N/A	N/A	N/A	N/A
% Malaria cases confirmed[6]	N/A	N/A	N/A	N/A	N/A
Test positivity rate (TPR)[7]	32%	40%	42%	35%	51%
Total # under five years of age malaria cases[8]	165,723	266,222	309,331	318,489	618,242
% Cases in children under five years of age[9]	35%	33%	32%	32%	32%
Total # severe cases[10]	5,261	27,385	34,845	37,306	65,707
Total # malaria deaths[11]	449	629	927	657	674
# Facilities reporting[12]	2,958	3,085	3,156	3,400	3,495
% Data completeness[13]	91%	95%	95%	94%	97%

1 Number of patients presenting with signs or symptoms possibly due to malaria (e.g., fever); 2 RDT or microscopy, all ages, outpatient and inpatient; 3 Total reported malaria cases; all ages, outpatient and inpatient, confirmed and unconfirmed cases; 4 Diagnostically confirmed; all ages, outpatient and inpatient; 5 Clinical/presumed/unconfirmed; all ages, outpatient and inpatient; 6 # confirmed cases divided by total # cases; 7 Confirmed cases divided by # patients receiving a diagnostic test for malaria (RDT or microscopy); 8 Outpatient and inpatient, confirmed and unconfirmed; 9 Total # <5 cases divided by total # of cases; 10 "severe" means "hospitalized for malaria"; 11 All ages, outpatient, inpatient, confirmed, and unconfirmed; 12 Total # of health facilities reporting data into the District Health Information System (HMIS)/District Health Information System 2 (DHIS2) system that year; 13 # monthly reports from health facilities divided by # health facility reports expected

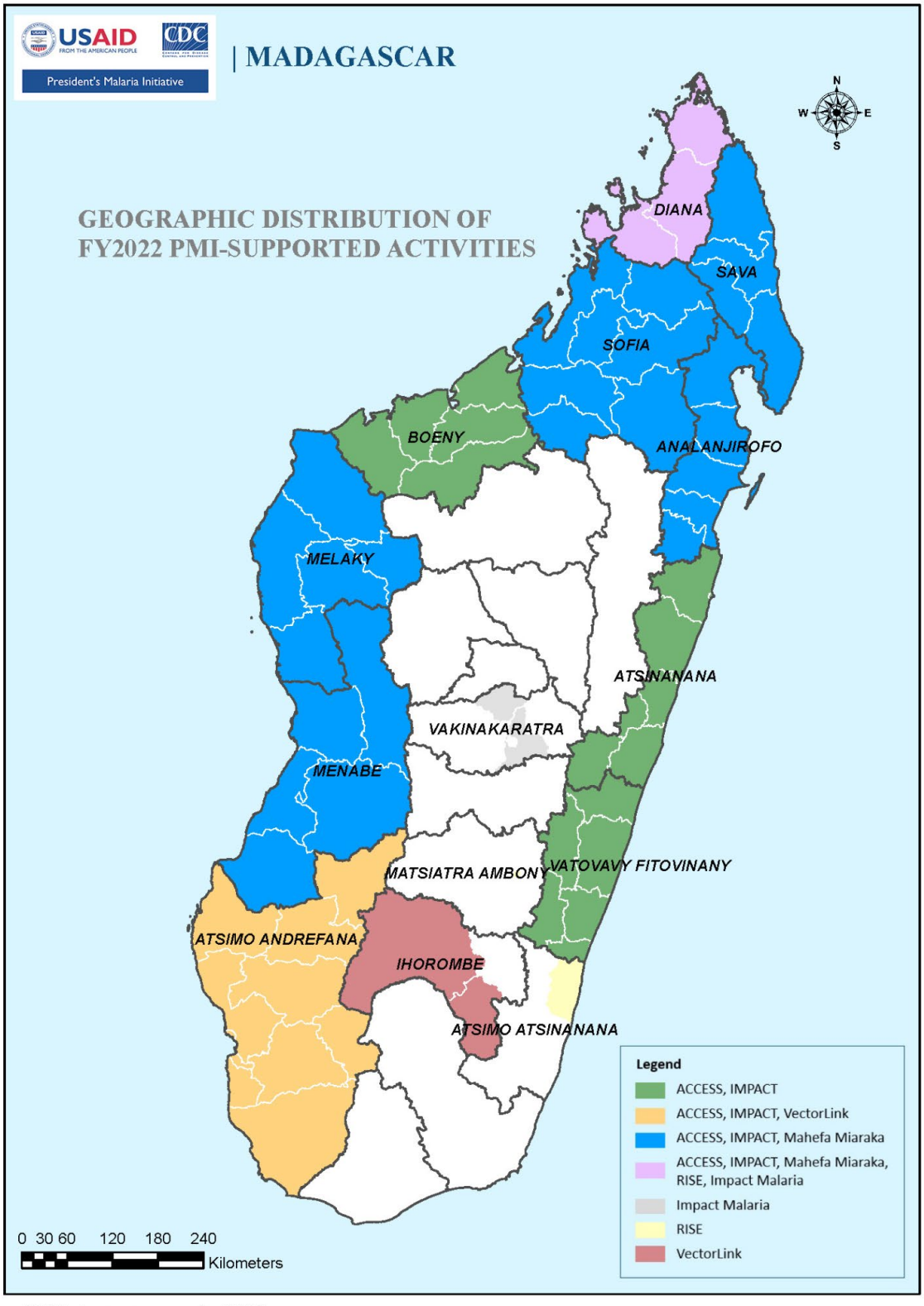
III. OVERVIEW OF PMI'S SUPPORT OF MADAGASCAR'S MALARIA STRATEGY

Malaria rates are heterogeneous across Madagascar and the National Strategic Plan (NSP) 2018–22 reflects the need for different approaches by endemicity. In higher-burden zones, strategies focus on control whereas in low-burden zones the focus is on elimination activities. The malaria elimination strategy 2019–2022 aims to ensure prompt and correct management of every case and to detect, notify, investigate, record, and respond to every case. It also aims to protect high-risk populations and to ensure that the entire population adopted favorable behavior. PMI is supporting the NMCP in implementing the elimination plan in two pilot districts of Antsiranana I and Antsirabe II, based on the finding of a feasibility assessment.

In June–July 2020, the NMCP conducted a midterm evaluation of its malaria National Strategic Plan (NSP 2018–2022) with technical support from WHO Africa Region, PMI, Global Fund, and Roll Back Malaria (RBM) Madagascar to review progress and challenges and update the plan as needed. Reviewers highlighted that 24 districts recorded a 40 percent decrease in reported malaria cases in 2019 compared with 2018, and 24 districts reported zero malaria-related deaths in 2019. In addition, the number of elimination/pre-elimination districts (one case/1,000 people) increased from nine in 2017 to 13 in 2019. However, malaria cases for the country nearly doubled from 2019 to 2020; much of the increase was driven by focused clusters in 40 districts (21 PMI-supported districts). Thus, the NMCP adjusted the following key objectives of the NSP: reduce malaria mortality by one-third and malaria morbidity by 50 percent from 2018 levels by 2022. The NMCP also initiated a mass drug administration in the highest burden areas.

PMI and the Global Fund are the two major donors supporting the NMCP to implement the NSP 2018-22. PMI and the Global Fund coordinate closely to leverage resources for maximum coverage of malaria prevention and control activities across the country. PMI and the Global Fund are conducting a mapping exercise to improve efforts to coordinate resources and avoid duplication of efforts.

Figure 4. Map of target areas for PMI interventions



IV. PARTNER FUNDING LANDSCAPE

PMI emphasizes the importance of partner alignment for malaria control, recognizing that different partners bring complementary expertise and resources. In recent years, PMI, the Global Fund, and the Bill & Melinda Gates Foundation (BMGF) have harmonized financial, supply chain, and programmatic data. In particular, PMI and the Global Fund agreed to a harmonized financial taxonomy to aid comparison of our investments to better identify potential overlap or gaps.

Due to the U.S Government FY budget cycle and approximate timing of annual appropriations, PMI MOP resources fund activities that largely occur during the following FY. For example, this FY 2022 MOP is anticipated to largely fund implementation of activities starting in 2023. Global Fund resources are based on the calendar year (CY) and planned for a three-year grant cycle. Most partner country governments and other partners also budget based on the CY.

The tables below summarize contributions by key external partners and partner country governments in CYs 2020–2022, providing insight into total country investments. As new grants funded through the Global Fund 2021–2023 grant cycle are just beginning, or will begin later in 2021, Global Fund country investments may still evolve in some countries. The partner country government invests substantial funding into the national-to-local infrastructure and service delivery that benefits malaria programs and many others. However, it is not always possible to attribute funding for malaria specifically from the partner country government without a standardized method. There may be similar challenges for attributing other partner funds.

Table 3a. Annual budget by Level 1 category for FY 2019/CY 2020

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Crosscutting and HSS[3]	Total Per Funder
PMI	$10.7M	$7.6M	$0.7M	$2.1M	$1.6M	$3.4M	$26.1M
Global Fund	$22.9M	$12.3M	$0.0M	$0.5M	$0.8M	$4.4M	$40.9M
Govt	0	0	0	0	0	0	$0
Total Per Category	$33.6M	$19.9M	$0.7M	$2.6M	$2.4M	$7.8M	$67.0M

Table 3b. Annual budget by Level 1 category for FY 2020/CY 2021

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Crosscutting and HSS[3]	Total Per Funder
PMI	$12.8M	$5.9M	$0.9M	$2.4M	$1.1M	$2.8M	$25.9M
Global Fund	$3.0M	$1.5M	$0.4M	$0.2M	$0.4M	$2.4M	$7.9M
Govt	0	0	0	$0.25M	0	$0.008M	$0.258M
Total Per Category	$15.8M	$7.4M	$1.3M	$2.85M	$1.5M	$5.208M	$34.058M

Table 3c. Annual budget by Level 1 category for FY 2021/CY 2022

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Crosscutting and HSS[3]	Total Per Funder
PMI	$9.9M	$7.8M	$1.3M	$1.7M	$1.0M	$3.3M	$25.0M
Global Fund							$0.0M
Govt	0	0	0	0	0	0	$0.0M
Total Per Category	$9.9M	$7.8M	$1.3M	$1.7M	$1.0M	$3.3M	$25.0M

1. Drug-based prevention, including seasonal malaria chemoprevention (SMC) and malaria in pregnancy (MIP) where applicable; 2. Covers management of in-country warehousing and distribution of malaria commodities, except for ITNs, which are separately captured under Vector Control; 3. HSS = health systems strengthening.

Table 4a. Annual budget, breakdown by commodity, FY 2019/CY 2020

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$1.7M	$2.5M	$5.8M	$1.0M	$1.4M	$0.1M			$12.5M
Global Fund[3]	$1.3M	$20.3M	$0.0M	$5.1M	$5.6M				$32.3M
Govt[4]	0	0	0	0	0	0	0	0	$0.0M
Total	$3.0M	$22.8M	$5.8M	$6.1M	$7.0M	$0.1M	$0.0M	$0.0M	$44.8M

Table 4b. Annual budget, breakdown by commodity, FY 2020/CY 2021

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs*	RDTs	Severe Malaria	SMC-Related	IPTp**-Related	Total
PMI[2]		$4.8M	$2.8M	$0.3M	$1.0M	$0.3M			$9.2M
Global Fund[3]				$0.4M	$0.5M			$0.3M	$1.2M
Govt[4]	0	0	0	$0.125	$0.125	0	0	0	$0.250M
Total	$0.0M	$4.8M	$2.8M	$0.825M	$1.625M	$0.3M	$0.0M	$0.3M	$10.850M

* Artemisinin-based combination therapies

** Intermittent preventive treatment for pregnant women

Table 4c. Annual budget, breakdown by commodity, FY 2021/CY 2022

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$3.8M		$3.9M	$0.5M	$1.1M	$0.2M			$9.5M
Global Fund[3]									$0.0M
Govt[4]	0	0	0	0	0	0	0	0	$0.0M
Total	$3.8M	$0.0M	$3.9M	$0.5M	$1.1M	$0.2M	$0.0M	$0.0M	$9.5M

Note: Categories reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative but may continue to evolve. 1. IRS insecticide: for PMI, commodity costs may be inextricable from IRS implementation costs in historical data—field identified as ND where this is the case. 2. PMI commodity costs are fully loaded, including costs for the ex-works price of the commodity, quality control, freight, insurance, and customs. 3. Global Fund commodity costs in the table above only include ex-works commodity value—additional costs include quality control, freight, insurance, and customs.

The Ministry of Health (MOH) annual budget is around 7 percent of the Madagascar Government budget. The NMCP's share of the MOH budget is approximately $14,000 annually, which is exclusively allocated on operations; the programmatic activities are mainly supported by external donors, mainly PMI and the Global Fund.

Figure 5. PMI and Global Fund Funding Cycle Alignment

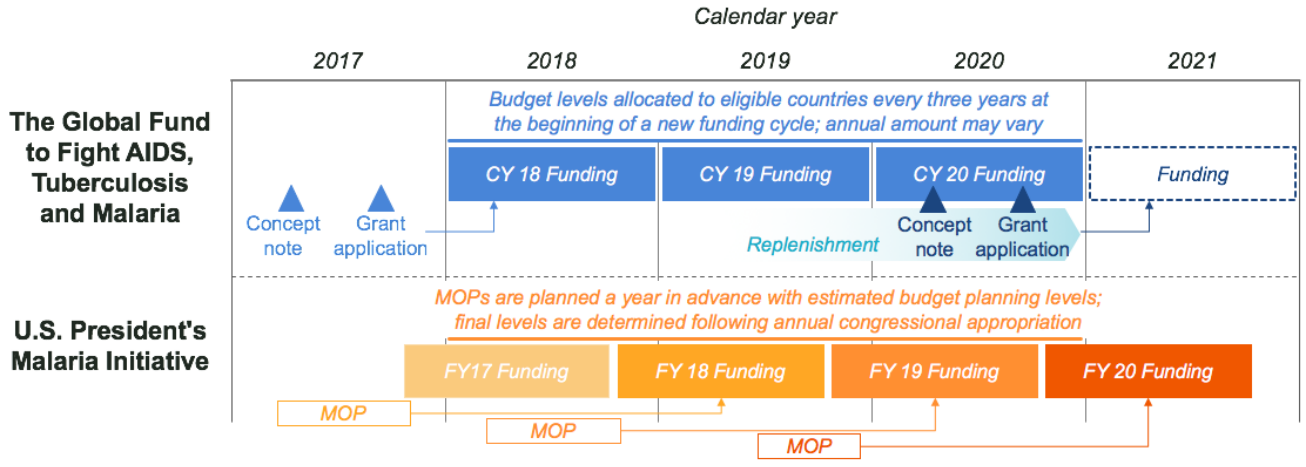


Figure 5 illustrates the annual cycle of PMI funding and the MOP implementation year. Annual PMI country budget allocations depend largely on the U.S. Congress' total overall malaria funding appropriation to USAID in a given fiscal year, as well as other considerations (e.g., previous funding levels, activity and program pipelines, other donor contributions, known commodity needs/gaps, progress on ongoing PMI-supported activities, clear evidence of continued government commitment to malaria control).

V. ACTIVITIES TO BE SUPPORTED WITH FY 2022 FUNDING

The FY 2022 budget tables contain a full list of activities that PMI proposes to support in Madagascar with FY 2022 funding. Please visit www.pmi.gov/resource-library/mops for these FY 2022 budget tables. Key data used for decision-making for this MOP planned investments is provided in Annex A of this document.

ANNEX A: INTERVENTION-SPECIFIC DATA

This section outlines key data that helped inform decision-making around FY 2022 MOP funding allocations to PMI-supported activities.

1. VECTOR CONTROL

NMCP Objective

Under the revised NSP 2018–2022, Madagascar recommends both IRS and ITN as two major interventions using chemical insecticides for vector control, along with entomological monitoring, throughout the 101 control districts, based on the 2019 NSP stratification. The NMCP also recommends larvicides as a complementary vector control tool to address mosquito behavior change. The NSP prevention objective is to protect at least 90 percent of the population in targeted areas with universal coverage of ITN and ensure a minimum 85 percent of spray coverage with high-quality IRS operations in targeted districts. In an effort to mitigate insecticide resistance, entomological monitoring data, including insecticide susceptibility data, are used to inform insecticide selection for both IRS and ITN interventions. Both PMI and the Global Fund support various aspects of vector control interventions in Madagascar.

NMCP Approach

In the revised NSP 2018-2022, Madagascar has adopted one ITN for every two persons to achieve universal coverage for the 101 districts targeted for ITNs. Madagascar also supports continuous distribution through community channels and routine ITN distribution channels (via antenatal care [ANC] and Expanded Program for Immunization [EPI] visits). Other channels include social marketing and distribution during emergency contexts (outbreak, natural disasters, etc.). In 2019, Madagascar introduced Piperonyl butoxide (PBO) ITNs in two districts to integrate new insecticide tools to prevent malaria. The next mass ITN campaign is scheduled for August 2021.

Select high-burden malaria districts receive IRS in addition to ITN distribution. PMI supports blanket IRS and has been spraying in the southwestern coastal districts since 2018. Districts targeted for blanket IRS are selected by in-country stakeholders due to their high malaria burden despite universal ITN coverage. The NMCP, with Global Fund financing, implements focalized IRS for malaria outbreak response. The NMCP also recommends focalized IRS in districts approaching elimination but has yet to implement this for lack of resources.

Finally, NMCP recommends complementary vector methods, including larviciding to respond to changing mosquito behavior patterns, although at the present time only PMI is supporting a larviciding pilot program evaluation in two high transmission districts.

PMI Objective in Support of NMCP

PMI's goal in Madagascar is to support the NMCP achieving malaria vector control universal coverage defined as universal access to and use of appropriate interventions by populations at risk of malaria. This involves access to and use of ITNs, including procurement, warehousing, transportation to distribution sites during mass campaigns, and continuous distribution (facility- and community-based), plus related SBC. PMI leverages Global Fund resources to support distribution to beneficiaries during mass campaigns. PMI also supports blanket IRS in high-burden districts that are selected based on epidemiological and entomological data. In addition, PMI supports entomological monitoring, including mosquito resting traps and insecticide resistance testing in multiple sentinel sites throughout the country and durability monitoring on cohorts of ITNs distributed during mass campaigns.

PMI is planning a feasibility assessment of larvicides as complementary vector control methods in two high transmission settings.

PMI-Supported Recent Progress (CY 2020)

- Successfully completed an IRS campaign in 93 communes in four districts in the Southwest Region with blanket IRS (Toliary II, Sakaraha, Betioky, Ampanihy districts) and one district in Ihorombe Region (Ihosy). Through the 2020 IRS campaign 203,513 housing structures were sprayed, protecting 833,483 residents.
- Trained 1,114 individuals, of whom 259 (23.2 percent) were women, to deliver safe and effective IRS. There were 705 spray operators, of whom 83 (11.8 percent) were women.
- Conducted entomological monitoring including baseline data and monitored the residual efficacy rate through cone bio-assays. Additionally, monthly longitudinal vector surveillance, data and insecticide resistance monitoring was conducted at 13 sentinel sites.
- Supported ITN durability monitoring at the 24-month follow-up in four districts (Farafangana, Bekily, Maintirano, and Fort Dauphin) following the 2018 mass distribution campaign.
- Distributed 786,276 ITNs in 12 high transmission districts, including 42,000 PBOs in one district through community continuous distribution channel.
- Contributed to the distribution of 85,000 ITNs (10,000 from PMI) in 41 districts that reported substantial increase in malaria cases.
- In collaboration with NMCP, developed a program evaluation strategy for implementing larviciding in Morombe and Ankazobe high malaria burden districts.

PMI-Supported Planned Activities (CY 2021 with currently available funds)

- Conduct insecticide resistance monitoring in in 13 districts, and monthly vector bionomics monitoring in 13 sites, plus two sites (in two districts) targeted for larviciding.
- Conduct IRS quality assurance and decay rate cone bioassay monitoring in five districts.
- Support ITN mass campaigns including distribution of 13,703,700 ITN (3,677,000 ITNs were procured by PMI), storage/warehousing, and technical assistance.
- Support procurement, storage, and distribution of 1.3 million ITNs via community and routine channels.
- Support ITN durability monitoring at the 36- month follow up in four districts (Farafangana, Bekily, Maintirano, and Fort Dauphin) following the 2018 mass distribution campaign, as well as the baseline for streamlined durability monitoring for the 2021 mass campaign cohort.
- Conduct IRS in five districts in November and December 2021.
- Under leadership of the NMCP, pilot community-based entomological surveillance in four TBD districts.
- Conduct larval surveillance for *Anopheles stephensi* in urban locations with high likelihood of introduction.
- Gather medical entomology researchers from NMCP, universities, and research institutes for a symposium on ongoing entomological surveillance methods and projects in Madagascar to ensure that there is no duplication of research efforts and ultimately to develop partnerships and collaborations and strengthen the national capacity for medical entomology in country.

- Conduct larviciding assessment and larviciding of rice paddies in two districts selected in consultation with NMCP, Morombe and Ankazobe, where there is high malaria burden, sites are accessible, availability of rainfall/epidemiological data, rainy seasons under six months so entire season can be covered, and non-implementation of IRS. For this activity, larval habitats will be identified using satellite drone enabled imagery and field confirmation and geolocation of larval habitats. Biolarvicide will be applied to all larval habitats in the selected study sites using drones biweekly throughout the entire duration of the rainy season.

1.1. ENTOMOLOGICAL MONITORING

Key Goal

Determine the geographic distribution, bionomics, and insecticide resistance profiles of the main malaria vectors in the country to inform vector control decision-making.

Key Question 1

Where is entomological monitoring taking place, what types of activities are occurring, and what is the source of funding?

Supporting Data

In Madagascar, entomological monitoring sentinel sites were selected based on IRS activities and have been designated as IRS sites, IRS exit sites, and control sites.

Table A-1. Entomological Monitoring Activities Planned for 2021

Site	District	Activities	Supported by
Fenerive Est	Fenerive Est	HLC, IRC, ORC, IRM	PMI
Vavatenina	Vavatenina	HLC, IRC, ORC, IRM	PMI
Ampasimpotsy	Manakara	HLC, IRC, ORC, IRM	PMI
Marofarihy (control)	Manakara	HLC, IRC, ORC, IRM	PMI
Tsaragiso	Toliary II	HLC, IRC, ORC, IRM	PMI
Bezaha	Betioky	IRM	PMI
Sakaraha	Sakaraha	HLC, IRC, ORC, IRM	PMI
Marofatika (control)	Toliary II	HLC, IRC, ORC, IRM	PMI
Irina	Ihosy	HLC, IRC, ORC, IRM	PMI

Site	District	Activities	Supported by
Ranotsara Notrd	Iakora	HLC, IRC, ORC, IRM	PMI
Mahasoa (control)	Ambalavao	HLC, IRC, ORC, IRM	PMI
Anamakia	Antsiranana I (Diego)	HLC, IRC, ORC, IRM	PMI
Ankilivalo	Mahabo	HLC, IRC, ORC, IRM	PMI
Farafangana	Farafangana	HLC, IRC, ORC, IRM, DM	PMI
TBD*	Morombe	L	PMI
TBD*	Ankazobe	L	PMI

* Sites ending further discussion with NMCP; HLC=human landing collections, IRC=indoor resting collections; ORC=outdoor resting collections (conducted using clay pots or pit shelters), IRM=insecticide resistance monitoring; L=larviciding; DM=durability monitoring.

Figure A-1. Map of Entomological Sentinel Sites in 2020

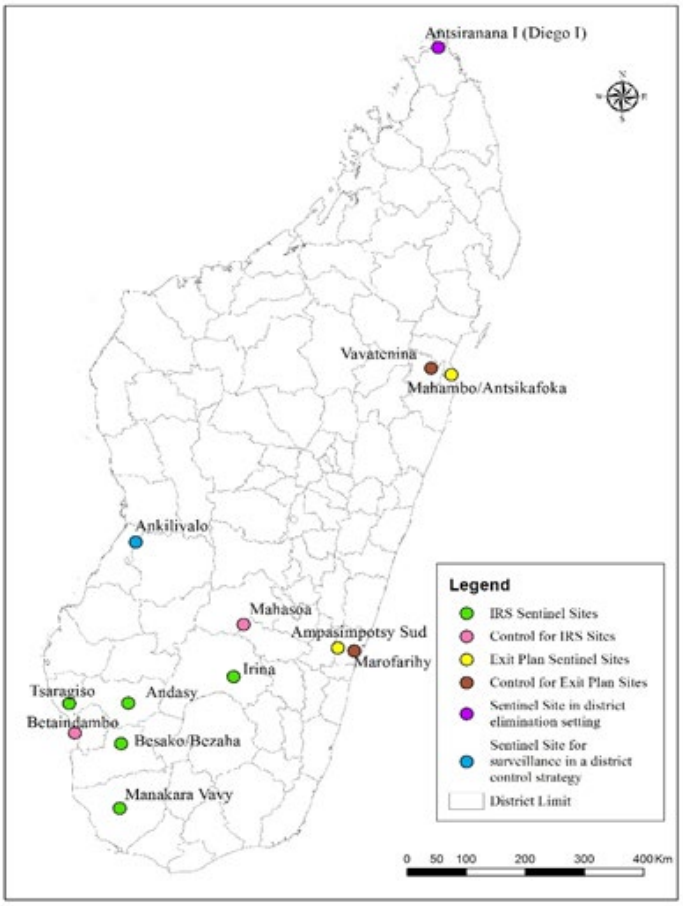


Table A-2. Distribution and Bionomics of Malaria Vectors

IRS/ Control	Site/ District	Vector*	Season (month)	Preferred Biting Location	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR
IRS	Tsaragiso	**_An. gambiae_ s.l.**	July-Augus	Outdoor (0.59)	9:00 p.m.-01:00 a.m.	Outdoor	N/A	0.0
IRS	Tsaragiso	_An. funestus_ s.l.	July-August	Equal (0.50)	10:00 p.m.-01:00 a.m.	Outdoor	N/A	0.0
IRS	Bezaha	**_An. gambiae_ s.l.**	July-August	Outdoor (0.60)	9:00 p.m.-01:00 a.m.	Outdoor	N/A	N/A
IRS	Bezaha	_An. funestus_ s.l.	July-August	NA	10:00 p.m.-01:00 a.m.	NA	N/A	N/A
IRS	Irina	**_An. gambiae_ s.l.**	July-August	Outdoor (0.79)	9:00 p.m.-01:00 a.m.	Outdoor	N/A	N/A
IRS	Irina	_An. funestus_ s.l.	July-August	Outdoor (1.00)	10:00 p.m.-01:00 a.m.	NA	N/A	N/A
IRS	Manakaravavy	**_An. gambiae_ s.l.**	July-August	Outdoor (0.80)	9:00 p.m.-01:00 a.m.	NA	N/A	N/A
IRS	Manakaravavy	_An. funestus_ s.l.	July-August	Outdoor (1.00)	10:00 p.m.-01:00 a.m.	NA	N/A	N/A
Control	Betaindambo	**_An. gambiae_ s.l.**	July-August	Outdoor (0.61)	11:00 p.m.-02:00 a.m.	NA	N/A	0.0
Control	Betaindambo	_An. funestus_ s.l.	July-August	NA	10:00 p.m.-01:00 a.m.	NA	N/A	0.0
Control	Mahasoa	**_An. gambiae_ s.l**	July-August	Indoor (0.52)	11:00 p.m.-02:00 a.m.	Outdoor	N/A	NA
Control	Mahasoa	_An. funestus_ s.l.	July-August	Indoor (0.56)	10:00 p.m.-01:00 a.m.	Indoor	N/A	N/A

*Primary vector listed first, in bold, followed by secondary vectors

** Marked as N/A if data is unavailable

Additional information can be found in the PMI VectorLink Madagascar Annual Report for 2019/2020.

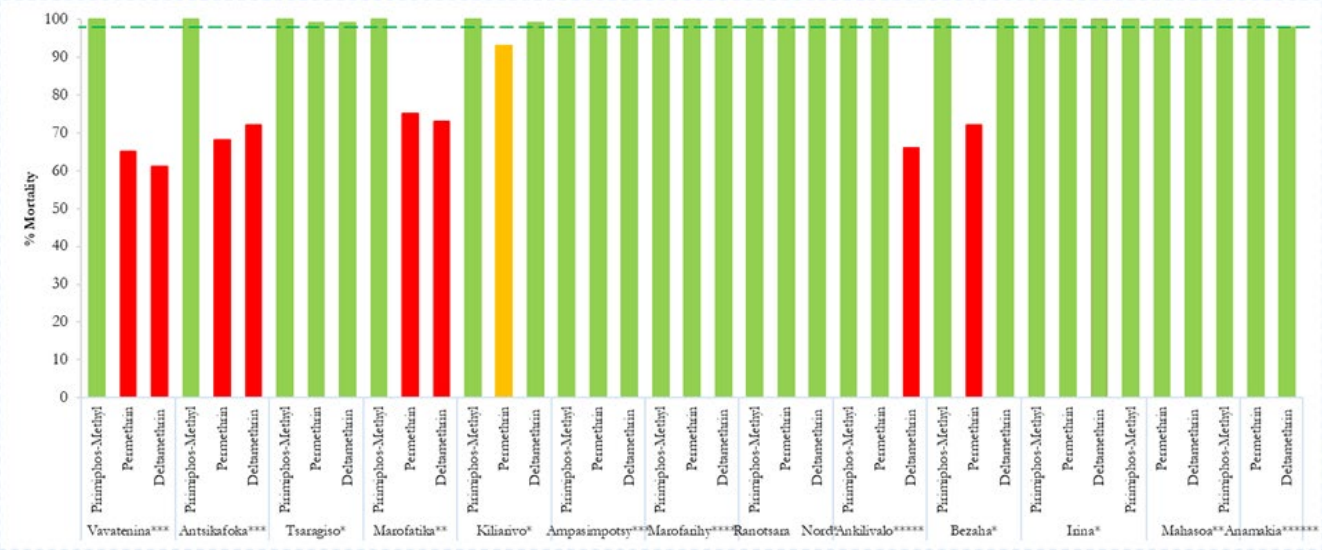
Key Question 2

What is the current insecticide resistance profile of the primary malaria vectors?

Supporting Data

Insecticide resistance monitoring, which included susceptibility tests, and PBO synergist tests were conducted on *An. gambiae* s.l. in 11 sites in 2020. Full susceptibility of *An. gambiae* s.l. to pirimiphos-methyl and clothianidin was detected in all testing sites. Resistance to pyrethroids deltamethrin and permethrin was detected in a few sites although pyrethroid susceptibility remains in several sites. In all locations where resistance was confirmed PBO restored full susceptibility to both permethrin and deltamethrin. These data are being used in ITN decision making about selection and distribution.

Figure A-2. Percentage mortality of *An. gambiae* s.l. when exposed to pirimiphos-methyl, permethrin, and deltamethrin in WHO tube tests in 2020.



*IRS sites; ** Control for IRS sites, *** Exit Plan sites, **** Control for Exit Plan sites, *****No-IRS sites in control strategy district, ******No-IRS & no- LLIN sites in elimination setting district

Figure A-3. Percentage mortality of *An. gambiae* s.l. to deltamethrin and permethrin alone and following exposure to PBO using WHO tube tests in 2020

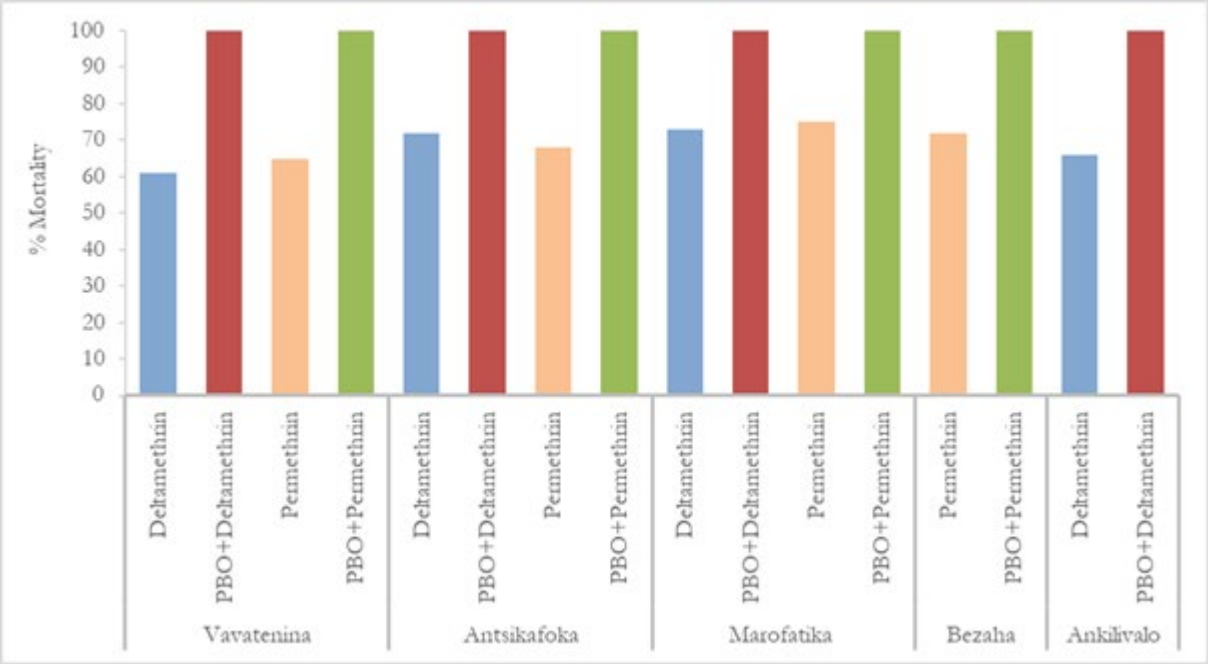


Figure A-4. Percentage mortality of *An. gambiae* s.l. following exposure to clothianidin 2 percent in 2020

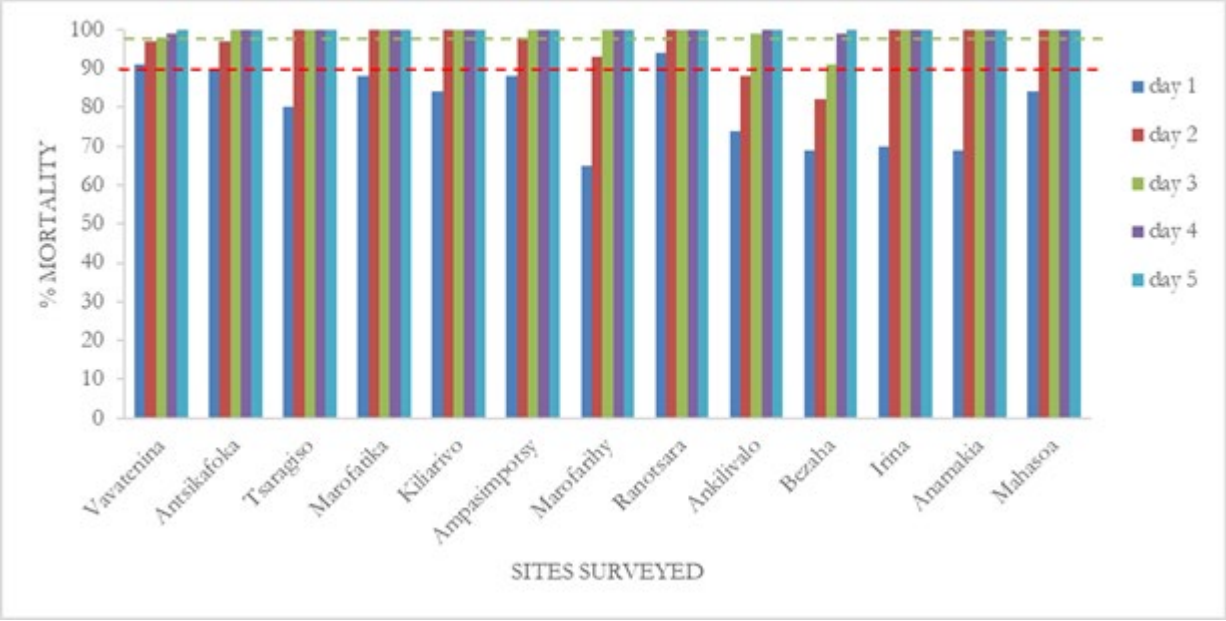
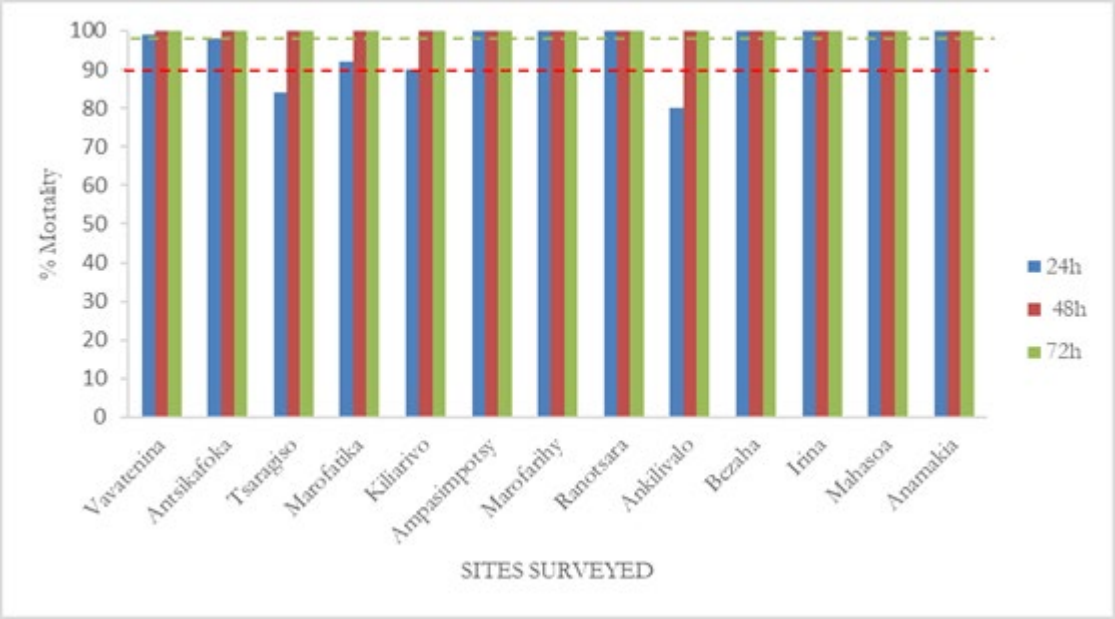


Figure A-5. Percentage mortality of *An. gambiae* s.l following exposure to chlorfenapyr (100 UG/bottle) using CDC bottle bioassay in 2020



Conclusions for Entomologic Monitoring Investments

- In all sentinel sites in Madagascar in 2019 and 2020 *An. gambiae* s.l. and *An. funestus* were found to bite predominantly outdoors. These data suggest the potential use of complementary vector control measures which target both indoor and outdoor biting mosquitoes, such as larviciding. PMI is supporting larviciding activities in 2021 and 2022 and these data will be used to determine feasibility of larviciding in other locations around the country as well.
- *An. gambiae* s.l., *An. funestus* s.l., *An. mascarensis,* and *An. coustani* were detected in all sites at different proportions. *Anopheles coustani* has been found to be sporozoite positive in Madagascar in recent years and is implicated as a vector. *Anopheles funestus* s.l. was found in the humid/tropical sites as well as in subdesert zones. *Anopheles gambiae* s.l. is the dominant vector collected in all sites using all collection methods for both indoor and outdoor collections.
- Limited molecular and insectary capacity impact turnaround time for reporting entomological indicators to NMCP. Investments in building molecular capacity may result in improved entomological indicators such as preferred host and sporozoite rates. Given the widespread distribution and collection of *An. coustani* and *An. mascarensis*, molecular assays may be used to further understand the role of these species in *Plasmodium* transmission.
- Sporozoite detection of both *P. falciparum* and *P. vivax* in malaria vectors in Madagascar may further elucidate transmission patterns.
- *An. gambiae* s.l. was susceptible to pirimiphos-methyl, clothianidin, and chlorfenapyr in all sites, including IRS sites and moderate pyrethroid resistance was detected subnationally, and monitoring of allelic frequency of genetic markers of resistance could be used to further determine patterns in insecticide resistance.

- Cone bioassays conducted during the 2020 IRS campaign indicated good quality of spray with 100 percent mortality of *An. gambiae* s.l. after 24-hour post exposure for all structures tested and sprayed with Actellic 300 CS and Fludora Fusion and after 48 hours for those sprayed with SumiShield 50 WG.
- Insecticide decay rate was monitored monthly for all three insecticides used and showed 100 percent mortality three months after IRS was conducted (residual efficacy is still ongoing). In the previous year, efficacy of all insecticides lasted over six months.
- Fumigant effect was assessed with all three insecticides used for IRS. Fumigant effect showed100 percent mortality of *An. gambiae* s.l. with Actellic 300 CS, but no fumigant effect was observed in sites sprayed with Sumishield 50 WG and Fludora Fusion, clothianidin based insecticides.
- PBO pre-exposure was able to recover susceptibility to pyrethroids and these data can be used to determine appropriate ITN selection and distribution.
- PMI plans to withdraw the entomological surveillance in IRS Exit Plan sites and support the NMCP to continue epidemiology surveillance and implement other activities as planned in the IRS exit plan.
- The results of the various studies will contribute to the malaria program review and revision of development of the new strategy (NSP 2023-2027) for vector control. Ensure entomological surveillance coverage represents country epidemiology facies will be critical.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.2. INSECTICIDE-TREATED NETS (ITNs)

Key Goal

Achieve high coverage and usage of effective ITNs in endemic PMI-supported areas and maintain high coverage and use with consistent ITN distribution via mass campaigns, community- and facility-based channels and social marketing.

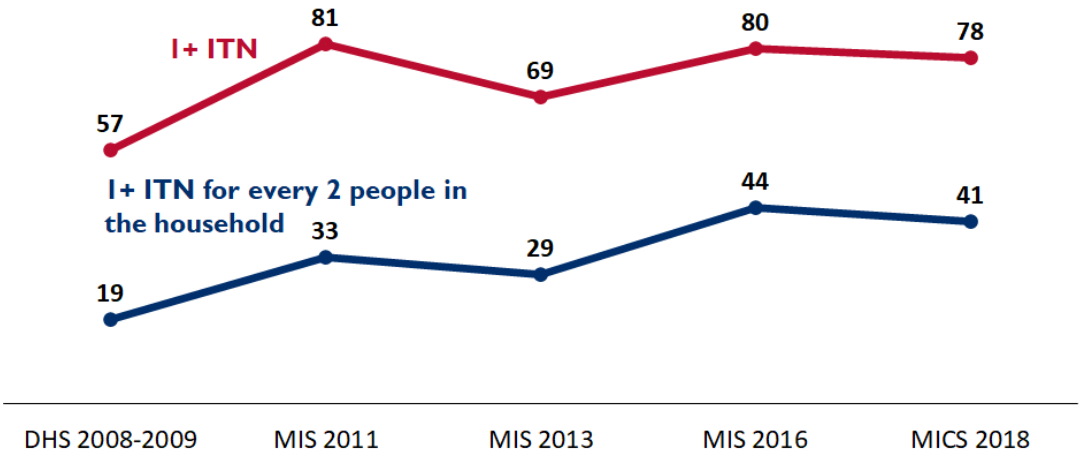
Key Question 1

How has net ownership evolved since the start of PMI in the country?

Supporting Data

Figure A-6. Trends in ITN ownership

Percentage of households that own ITNs



Overall, ITN ownership in Madagascar has been increasing. In 2013, ITN ownership dipped; this likely reflects the period of U.S. government restrictions in Madagascar which limited PMI's ability to work with the MOH on ITN and malaria prevention campaigns. PMI will continue to support technical assistance for ITN campaigns in addition to other distribution methods including routine (e.g., first ANC visit, immunization and ill-child outpatient visits) and community-based programs. As part of the 2021 mass ITN distribution campaign, PMI will also support efforts to increase ITN ownership through improved census, quantification, community mobilization activities and establishing a distribution site for each *fokontany*. In FY 2022, PMI will also support the 2024 mass campaign preparation, including an initial procurement of 800,000 ITNs.

Key Question 2a

What proportion of the population has access to an ITN? Of those who have access, what proportion of the population reports using an ITN?

Figure A-7. Trends in ITN access and use

Percentage of household population with access to an ITN and percentage of those who slept under an ITN the night before the survey

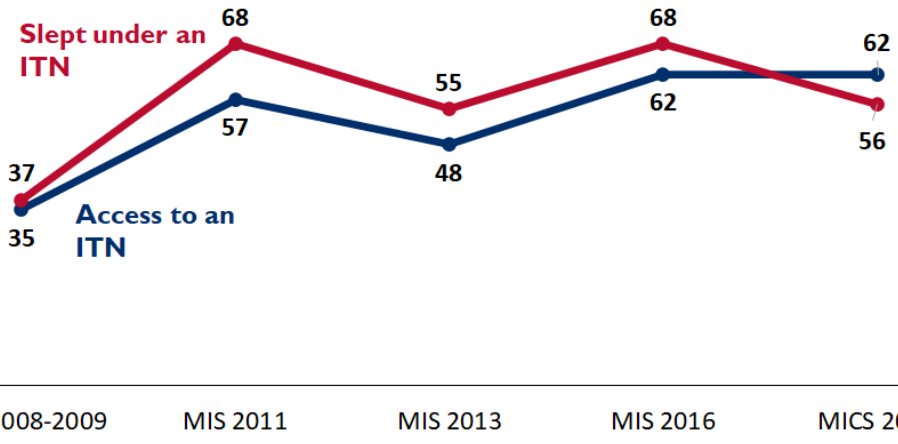
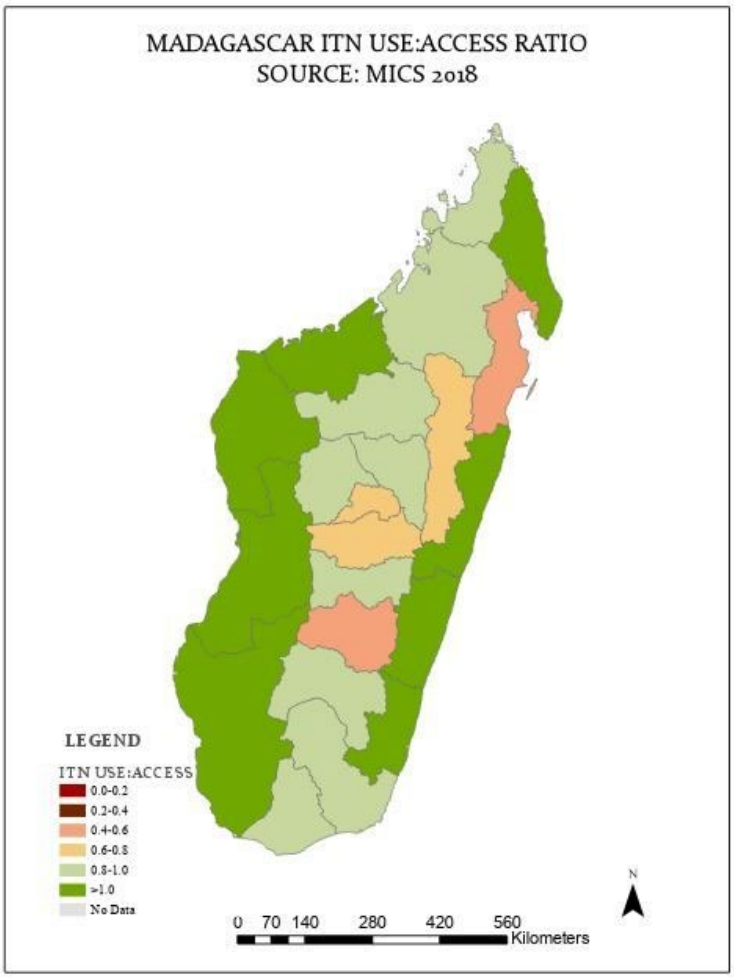


Figure A-8. Country map from ITN access and use report



Madagascar has a strong culture of ITN use. The use:access ratio in the 2018 MICS was 92 percent. To maintain behaviors around use and assure proper care, PMI will focus its SBC efforts on known facilitators, including self-efficacy and promoting positive social norms around ITN use and care.

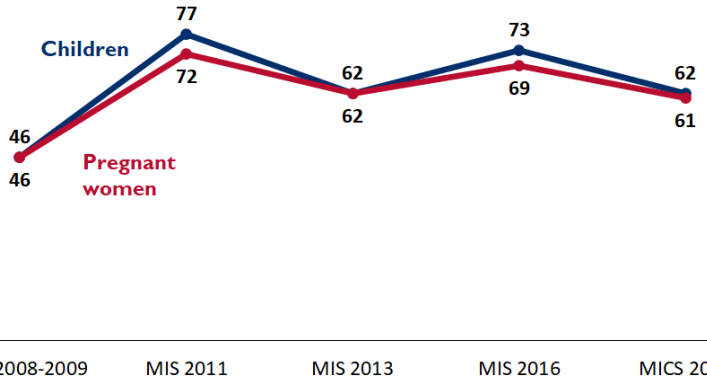
Key Question 2b

What percent of pregnant women and children under five years of age report sleeping under an ITN?

Supporting Data

Figure A-9. Trends in ITN use among children and pregnant women

Percent of children under five years of age and pregnant women 15 to 49 years of age who slept under an ITN the night before the survey



The percent of children under five years of age whose guardians reported they slept under an ITN the previous night increased from 62 percent in 2013 to 73 percent in 2016. In the 2018 MICS survey, the estimate was slightly lower; however, that survey included districts that had not received ITNs in the mass distribution campaign whereas the MIS surveys excluded those areas. PMI and the NMCP have coordinated with maternal child health agencies to improve SBC efforts during ANC visits in support of consistent ITN use among pregnant women and to ensure ITN availability at the community level.

Beginning in FY 2022, PMI is contributing 200,000 ITNs for routine distribution via ANC and EPI. To improve ITN distribution from health districts to health facilities the NMCP is subcontracting ITN transportation to local civil society organizations and providers.

Key Question 3

If ITN access is high but use is low, what significant structural and/or behavioral challenges affect the adoption and maintenance of ITN use and care behaviors?

The use of ITNs in Madagascar is systematic and part of the Malagasy culture. Given the high use:access ratio throughout the country, PMI/Madagascar will focus SBC efforts on maintaining that culture of use, and to reinforce proper ITN maintenance and care.

Supporting Data

Please refer to Section 3.4. for information on how SBC interventions will be directed to address the challenges identified above.

To reinforce correct ITN use and care practices, SBC efforts will focus on facilitators including self-efficacy and promoting positive social norms around ITN use, and messaging to ensure that households have a sufficient number of ITNs for all members.

Data from a recent ITN durability monitoring (DM) shows that 64.2 percent of households are properly caring for their ITNs (e.g., washing without detergent or bleach), 39.2 percent of ITNs sampled were well maintained. (Source: Vector Link ITN DM report, 2021).

Table A-3. Barriers to ITN Use

Facilitator	Type of Factor	Data Source	Evidence
Social Norms Around Net Use	Social	Institut Pasteur de Madagascar's Qualitative Study on Malaria: Ownership and Use of Long-lasting insecticidal nets (LLINs) in Madagascar – 2016 Associations Between Ideational Variables and Bed Net Use in Madagascar, Mali, and Nigeria - 2018	A recent qualitative survey concluded that "community members [in Madagascar] spoke positively about mosquito nets, with the majority of respondents mentioning it is their most preferred method for protection against insects." Similarly, a recent household survey found that "female caregivers' belief that net use was the norm in her community increased the odds of household member's net use by 39%."
High Perceived Self-Efficacy to Prevent Malaria	Internal	Associations Between Ideational Variables and Bed Net Use in Madagascar, Mali, and Nigeria – 2018	A household survey conducted between 2014-2015 found that "residents of households where the female caregiver demonstrated perceived self-efficacy to prevent malaria were 57% more likely to sleep under a net than those in households where the female caregiver did not demonstrate such beliefs."
Households in Close Proximity to Distribution Sites	Environmental	Site Monitoring Visit Reports	Distribution sites are located close to communities. This limits the need for travel and leads to increased net ownership, which facilitates increased net use.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
People Sleeping Away From Home	Environmental/ Social	Institut Pasteur de Madagascar's Qualitative Study on Malaria: Ownership and Use of LLINs in Madagascar – 2016	A recent qualitative survey found that it is not uncommon for people not to sleep under ITNs for a period of one or more nights due to insecurity or social events such as wakes and parties.

Barrier	Type of Factor	Data Source	Evidence
Poor Attitudes About Net Use	Internal	MIS – 2016 Institut Pasteur de Madagascar's Qualitative Study on Malaria: Ownership and Use of LLINs in Madagascar – 2016	A dislike of ITNs and complaints about the heat were two reasons frequently cited for non-use of ITNs in the 2016 MIS. These findings are supported by qualitative data, which found that heat impacted net use and that some communities associate the nets with burial practices.
Not Enough Nets in the Household	Environmental	MIS – 2016	The 2016 MIS found that among households with at least one ITN not having enough nets was the primary reason for non-use (46%).

Key Question 4

What type of nets are being distributed via which channels?

Table A-4. Insecticide Treated Net (ITN) Distribution

Year	Level Nationwide/ Region/State/ Province	Mass Campaign	ANC	EPI	School [2]	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 ,70	N/A		12,660	SafeNet Yorkool Royal Sentry Olyset plus
2020	12 districts				N/A	786,276		Royal Sentry Olyset plus
2021	12 districts				N/A	51,137		Royal Sentry Olyset plus

To complement the ITN mass distribution campaigns that occur every three years, PMI will support the NMCP for routine distribution of ITNs via ANC and EPI. Additionally, during non-campaign years, PMI supports community-based continuous distribution (CCD). Distribution via routine channels (through EPI and ANC) and community-based initiatives are intended to increase ITN coverage. Distribution efforts are supported by community health volunteers (CHVs) who conduct community sensitization activities. Community sensitization is accomplished through mass media and interpersonal communication and emphasizes that ITNs must be used by the whole family, all year long, every night.

The NMCP developed new approaches for the 2018 ITN campaign: 22 technicians were appointed as regional coaches (one coach for each region of the country) to improve campaign reporting and the monitoring. In addition, nearly 2,000 commune assistants (*Assistant Communal pour la Campagne MID* [ACCMID]) were recruited to support the health center directors to supervise the campaign activities in their communes. These

[2] School is one of the channels to identify gaps on ITN in the households. Eighth grade students are trained to serve as agents of change in their communities, identify unprotected sleeping spaces and sanitize their family to get from the community points of distribution.

efforts increased the MOH ownership of the campaign, particularly at regional and local levels. For the 2018 campaign, mobile banking was adopted where feasible to improve payment of community workers.

To improve distribution and use in remote and unsafe areas, a multisectoral approach that includes local authorities and the Ministry for Public Security was devised and this model will be used for the 2021 campaign.

Key Question 5

What is the estimated need for ITNs during calendar years 2021–2023? How many, and what types, of ITNs will be procured, and by what partners? Through what channels will ITNs be distributed? Are there any projected ITN gaps?

Table A- 5. ITN Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	28,121,820	28,968,286	29,840,232
Total population at risk for malaria	28,121,820	28,968,286	29,840,232
PMI-targeted at-risk population	28,121,820	28,968,286	29,840,232
Population targeted for ITNs	22,396,217	23,070,343	23,764,761
Continuous Distribution Needs			
Channel 1: ANC	655,928	690,467	726,491
Channel 2: EPI	690,946	783,394	888,212
Channel 3: Community Continuous Distribution	0	1,302,807	1,342,021
Channel 4: Social Marketing	514,296	540,010	567,011
Additional ITNs required to avoid ITN stockouts	131,182	273,870	
ITN for emergency and response	50,000	50,000	291,584
Additional ITNs required		2,480,168	
Estimated Total Need for Continuous Channels	2,042,351	6,120,717	3,815,319
Mass Campaign Distribution Needs			
Mass distribution campaigns	13,686,577	0	0
Estimated Total Need for Campaigns	13,686,577	0	0
Total ITN Need: Continuous and Campaign	***15,728,928***	***6,120,717***	***3,815,319***
Partner Contributions			
ITNs carried over from previous year	669,061	0	0
ITNs from Government	0	0	0
ITNs from Global Fund	11,294,500	1,669,300	1,956,150
ITNs from other donors	0	0	0
ITNs planned with PMI funding	3,677,000	1,300,000	1,720,000
Total ITNs Contribution Per Calendar Year	***15,640,561***	***2,969,300***	***3,676,150***
Total ITN Surplus (Gap)	***-88,367***	***-3,151,417***	***-139,169***

Supporting Data

Table A-6. Estimated ITN Need for 2021–2023

Calendar Year	2021	2022	2023	Comments
Total country population	28,121,820	28,968,286	29,840,232	Population (Source: Ministry of Health) Annual growth rate: 3,01% (Source: *Institut National de la Statistique*)
Total population at risk for malaria	28,121,820	28,968,286	29,840,232	100% of population are at risk of malaria
PMI-targeted at-risk population	28,121,820	28,968,286	29,840,232	National
Population targeted for ITNs	22,396,217	23,070,343	23,764,761	Targeted population in 101 districts for ITN (79,64% of total population) according to NMCP malaria stratification (NSP 2018-2022 mid-term review, 2019)
Continuous Distribution Needs				For national needs
Channel 1: ANC	655,928	690,467	726,491	4.5% living in the 101 ITN-targeted districts (79,64%) is estimated to be pregnant women . Based on HMIS data, 68.5% of pregnant women are expected to attend ANC in 2021, 70.0% in 2022 and 71.5% in 2023. 95% out of pregnant women expected to attend ANC are targeted for ITN
Channel 2: EPI	690,946	783,394	888,212	3,9% out of the total population are children under 1 year; and applying a 3,01% growth rate. Number of children immunized is 609 407 in 2020; and 527 897 in 2019 (HMIS data). Applying vaccination progress rate between 2019 and 2020 (13,38% of children below 1year to be vaccinated)

Calendar Year	2021	2022	2023	Comments
Channel 3: Community Continuous Distribution	0	1,302,807	1,342,021	18.89% out of the total population are living in high transmission districts (~18 districts) according to the NMCP malaria stratification (NSP 2018-2022 mid-term review, 2019). NETCalc software was used during quantification to calculate the quantity needed (Coverage at 85%, Household is 4.2 persons , growth 3,01%).
Channel 4: Social Marketing	514,296	540,010	567,011	Estimation based on historical distribution data from 2018 to 2020 with 5% of adjustment in annual increase
Additional ITNs required to avoid ITN stockouts	131,182	273,870	291,584	10% security stock for ANC, EPI, et CCD
ITN for emergency and response	50,000	50,000	50,000	Historical distribution data from 2018 to 2020 during malaria outbreak responses
Additional ITNs required		2,480,168		ITNs as an alternative to IRS in 10 districts elimination phase (Technical Review Panel Global Fund recommendation during NFM3 grant review). The mini mass distribution campaign is planned in early 2022.
Estimated Total Need for Continuous Channels	2,042,351	6,120,717	3,865,319	
Mass Campaign Distribution Needs				For national needs
Mass distribution campaigns	13,686,577	0	0	Coverage for 101 districts with a security stock (10%)
Estimated Total Need for Campaigns	13,686,577	0	0	
Total ITN Need: Continuous and Campaign	15,728,928	6,120,717	3,865,319	
Partner Contributions				For national needs

Calendar Year	2021	2022	2023	Comments
ITNs carried over from previous year	669,061	0	0	Estimated carried over from 2020: theoretical stock on hand of ITN for routine, carried over ITN for community based continuous distribution without PBO ITN.
ITNs from Government	0	0	0	
ITNs from Global Fund	11,294,500	1,669,300	1,956,150	Global Fund grant procuring for MID pour mass campaign and routine in 2021. Global fund contribution for 2022 and 2023 for routine, social marketing, and emergency; To be confirmed when the grant making process is completed.
ITNs from other donors	0	0	0	
ITNs planned with PMI funding	3,677,000	1,300,000	1,720,000	Contribution for mass campaign in 2021; for distribution continue (routine contribution for 2024 mass campaign and for continuous distribution (routine and CCD).
Total ITN Contribution Per Calendar Year	15,640,561	2,969,300	3,676,150	
Total ITN Surplus (Gap)	-88,367	-3,151,417	-189,169	

During submission of Global Fund NFM3 grant, the TRP did not approve Madagascar's proposal to implement IRS in the 13 elimination-targeted districts. They recommended replacing IRS activities with ITN distribution in those districts. This had not been planned for the 2021 mass campaign scheduled in August 2021. As a result, an additional 2,480,168 ITNs will be procured and distributed during a campaign in early 2022 in these districts.

Based on insecticide resistance surveillance data, PBO ITNs (Olyset+) were introduced in the District of Boriziny in 2020. During the 2021 campaign, two districts (Boriziny and Toamasina II) will receive PBO (Permanet 3.0). For future needs, five districts will be eligible for next generation nets, including PBO ITNs (Boriziny, Toamasina II, Vavatenina, Brickaville and Manakara) where pyrethroid insecticide resistance has been reported.

For the 2021 campaign, each *fokontany* will have a unique site to facilitate the transportation, distribution, and monitoring.

For the 2024 campaign, PMI plans the same level of support as for the 2021 campaign (3.677 million). However, PMI has planned an initial contribution of 800,000 ITNs with F Y 2021 MOP (order should be submitted 12 months before reception date).

Key Question 6

What is the current status of durability monitoring?

Supporting Data

Table A-7. Timing of Durability Monitoring

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
2015*	Antsohihy, Ankazobe, Mananjary and Toliary II	Permanet 2.0	completed	completed	completed	cancelled
	Sambava and Vondrozo	DawaPlus	n/a	n/a	completed	cancelled
	Manja and Beloha	Yorkool	n/a	n/a	completed	cancelled
2018**	Bekily, Farafangana, Maintirano,	DawaPlus	completed	completed	completed	not yet started
	Fort-Dauphin	Permanet 2.0	n/a	completed	completed	not yet started

The 2018 durability monitoring is ongoing; conclusions will be presented at the end of the monitoring activity.

Conclusions for ITN Investments

ITNs remain a key vector control intervention in Madagascar and reported ITN use is high. PMI will continue to support routine and continuous distribution channels in targeted districts and a mass distribution campaign in 2021 for 101 districts in collaboration with the Global Fund. The country is exploring ways to mitigate the rapid decrease of insecticidal activity of 2018 campaign nets after 12 months and forward. The NMCP is considering expanding the use of next generation ITN/PBO nets based on resistance data.

SBC activities will continue to promote and maintain positive social norms regarding ITN use and care in households at the community level.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.3. INDOOR RESIDUAL SPRAYING (IRS)

Key Goal

Ensure high spray quality and coverage, with an appropriate insecticide, in targeted endemic PMI-supported areas, in alignment with the national insecticide resistance management strategy.

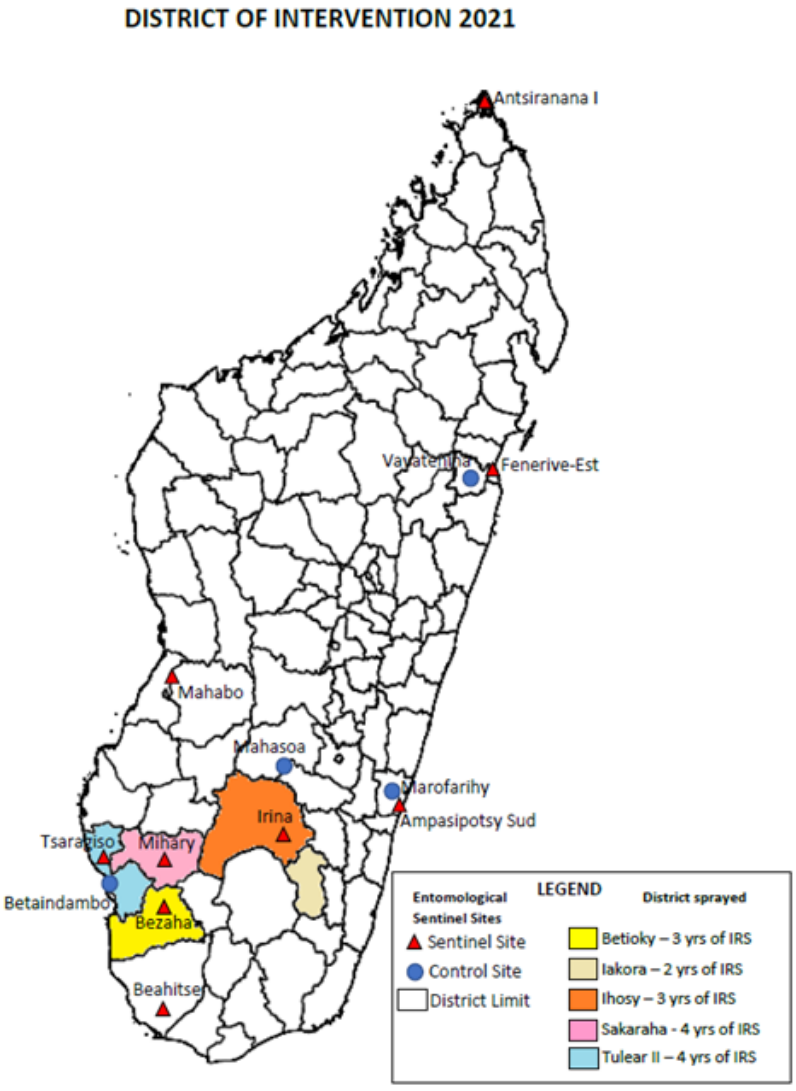
Key Question 1

What areas are targeted for IRS and why?

Supporting Data

PMI/Madagascar conducts blanket IRS in select high-burden areas; currently targeted areas are located in the Southwest coast and South of Madagascar (Betioky Sud, Iakora, Ihosy, Sakaraha, and Toliary II). Targeted districts are selected by the NMCP and vector control stakeholders and employ insecticide rotation strategies, taking into account the type of ITN present. District selection is also based on epidemiologic and entomological data, and other contextual factors, such as the presence of sensitive environmental areas. PMI has historically provided technical assistance (TA) to the NMCP to lead IRS activities; the pending Global Fund grant application includes funding for the NMCP to support IRS activities in response to outbreaks. PMI partners will continue to provide TA for IRS activities as needed. The map below shows the 2021 planned spray areas supported by PMI.

Figure A-10. PMI supported IRS intervention districts, 2021



Key Question 2

In PMI-supported areas, what spray coverage rates have been achieved in the past three years and what are the plans for 2021?

Supporting Data

Table A-8. PMI supported IRS Coverage, 2018–2021

Calendar Year	Districts Sprayed (#)	Districts	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)
2018	9	Farafangana, Vohipeno, Manakara, Mananjary, Brickaville, Fénérive Est, Toamasina II, Sakaraha, Toliary II	548,775	94	2,232,097
2019	5	Ihosy, Betioky Sud, Toliary II, Sakaraha, Ampanihy	267,874	96	1,150,922
2020	5	Ihosy, Betioky Sud, Toliary II, Sakaraha, Iakora	203,513	97	833,483
2021*	5	Ihosy, Betioky Sud, Toliary II, Sakaraha, Iakora	TBD	TBD	TBD

*Denotes targets for current year

Key Question 3

What is the residual efficacy of the insecticides used for IRS in PMI-supported areas?

Supporting Data

Table A-9. IRS Insecticide Residual Efficacy

Site/District	Year	Insecticide	Average Residual Efficacy
Ampanihy	2019	Pirimiphos-methyl	7 months
Betioky	2019	Pirimiphos-methyl	7 months
Toliary II	2019	Clothianidin	7 months
Sakaraha	2019	Clothiandin	7 months
Ihosy	2019	Clothianidin + deltametrin	7 months

Monthly residual efficacy monitoring is ongoing from the November 2020 IRS campaign, where pirimiphos-methyl, clothianidin and clothianidin + deltamethrin were sprayed. At the time of the MOP (four to five months post-spray) all three insecticides were performing well.

Key Question 4

What is the insecticide rotation plan in PMI-supported areas?

Supporting Data

Table A-10. Insecticide Rotation Plan

Target Spray Area	2020	2021	2022*	2023*
Ihosy**	Clothianidin + deltamethrin; Clothianidin	Clothianidin + deltamethrin	TBD	TBD
Betioky Sud**	Pirimiphos-methyl	Clothianidin	TBD	TBD
Toliary II**	Clothianidin	Clothianidin + deltamethrin	TBD	TBD
Sakaraha**	Clothianidin	Clothianidin + deltamethrin	TBD	TBD
Iakora	Clothianidin + deltamethrin	Pirimiphos-methyl	Clothianidin	TBD

*Denotes planned insecticide classes

**Denotes districts where IRS has been implemented for 4 years, therefore the NMCP may select to target new districts.

Conclusions for IRS Investments

PMI Madagascar plans to continue with a similar level of support for IRS with FY 2022 funding, implementing rotation of insecticides as susceptibility permits. While the overall number of structures and number of targeted districts will remain similar, PMI and the NMCP might decide to shift to new districts, based on other vector control interventions, entomological, and HMIS data. If IRS withdrawal in some districts is proposed, PMI will continue to support consistent ITN use and prompt care-seeking, along with continued monitoring of malaria data and as appropriate benefit from ITN CCD as part of the exit plan. IRS support will include appropriate SBC messages to encourage acceptance of IRS and refraining from washing/plastering walls, along with continued ITN use.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2. HUMAN HEALTH

2.1. CASE MANAGEMENT

NMCP Objective

The goal of the NMCP is to provide correct case management, according to malaria case management guidelines, for all cases of malaria at all levels of the health system, including at the community level and in the private sector.

NMCP Approach

Madagascar's case management guidelines are aligned with WHO recommendations and adapted to the local context. All malaria diagnosis and treatment in public facilities is free. The objective is to correctly diagnose (RDT or microscopy) and correctly treat 100 percent of suspected cases.

In control districts, treatment for uncomplicated malaria includes an ACT. First-line treatment is artesunate-amodiaquine (AS/AQ), and second-line treatment is artemether-lumefantrine (AL). According to the country's case management guidelines, *P. vivax* malaria should be treated with AS/AQ 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, and lack of G6PD testing nationwide. Thus, Pv cases and mixed infections receive the same treatment as Pf cases. Discussions regarding routine G6PD testing have been delayed due to the COVID-19 pandemic. In districts targeted for elimination activities, single low-dose primaquine should be given as part of routine case management for gametocyte elimination; however, stockouts have made this practice inconsistent in some districts. Severe malaria cases are treated with injectable artesunate followed by an ACT. Rectal artesunate was introduced in 2020 in select districts at the community level and in health facilities for pre-referral treatment of children less than five years of age (CU5) with severe disease. National data in 2016 shows two areas with significant Vivax rate: highland fringe West (8.4 percent) and coastal North-West (4.5 percent).

In pre-elimination and elimination districts, diagnosis is made by RDT in community health facility settings, and slides for microscopy are also prepared for parasite species identification. Treatment for uncomplicated malaria in these districts includes an ACT plus low-dose primaquine (for treatment of gametocytes) except among pregnant women, who receive only an ACT (captured in DHIS2 with the newly revised HMIS form since 2021). (Low-dose primaquine is contraindicated in pregnant women and among lactating women whose infants are less than six months of age.) However, low dose primaquine is not always given due to stockouts and microscopy is still limited but slowly being scaled-up. Madagascar has an extensive CHV program with approximately 36,000 CHVs covering the country (two CHVs per *fokontany*, the smallest administrative level). CHVs conduct sensitization activities on the prevention of communicable diseases, including malaria. They also provide integrated community case management (iCCM) services, including malaria testing and treating, to approximately 4.5 million children under five years of age. CHVs in targeted areas have been trained on the use of rectal artesunate for pre-referral treatment of children under five years of age with severe disease. Limited supplies of rectal artesunate were distributed in remote high-burden areas in 2020. Additionally, the NSP calls for CHVs working in remote high-burden areas to expand testing and treatment for malaria among children up to 14 years of age which represents nearly 66 percent of the population; however, this has not yet been widely implemented.

According to the 2016 MIS, 60 percent of children under five years of age with a febrile illness in the previous two weeks sought care in a health facility. Of these, 46 percent were treated in a public health facility and 11 percent in a private facility. Use of traditional healers is common in rural areas of Madagascar.

Private sector facilities (e.g., faith-based and non-governmental organizations) are more prevalent in urban and peri-urban areas, and account for approximately 40 percent of service provision in these areas. Guidelines for malaria case management in the private sector mirror guidelines in the public sector, and the NMCP attempts to include private providers in malaria case management training.

PMI Objective in Support of NMCP

From 2009–2014, PMI was only able to support private health facilities and CHVs were given U.S. government restrictions on engaging with the Malagasy government at that time. Since 2014, PMI has been supporting CHVs and public health facilities. This support includes refresher training, supervision, provision of case management commodities, laboratory quality assurance activities, iCCM, and SBC. PMI's current case management support in Madagascar is largely through its two bilateral USAID projects covering a total of 10 of Madagascar's 22 regions,

which represents an estimated 13,500,000 persons. These regions include an estimated 17,319 CHVs; 2,995 health workers;1,524 public and private health facilities; and 118 hospitals. In addition, PMI has been supporting laboratory technical training, development, and implementation of standard operating procedures, and laboratory equipment maintenance. The Global Fund has been supporting the development and implementation of the NMCP plan for laboratory quality assurance/quality control.

PMI-Supported Recent Progress (CY 2020)

From January-December 2020, PMI supported the NMCP to undertake the following activities:

- Conducted training of trainers in iCCM for regional and district health management teams in 10 regions, and training for new CHVs in 10 regions.
- Reinforcement of a referral and counter-referral system between CHVs and health facilities.
- Trained new health workers on malaria case management.
- Trained 118 providers on malaria severe case management using an e-learning approach.
- Periodic integrated supervision of district health teams by regional health management teams.
- Periodic integrated supervision of health facilities and hospitals by the district level.
- Trained 188 district staff on malaria microscopy.
- Trained 11,672 CHVs and Basic health centers (*Centres de santé de base* or CSBs) on rectal artesunate use and monitored that use.
- Supported two pilot elimination districts, including case management and case notification training of private and public health facility staff and and CHVs, development of job aids, and support for outreach, training and supportive supervision (OTSS).
- Conducted SBC activities for rectal artesunate introduction as a pre-referral treatment in 44 districts.

PMI-Supported Planned Activities (CY 2021 with currently available funds)

Activities currently planned or underway with current funds include:

- Support improvements in rectal artesunate use at the CHV level in 44 districts.
- Implement supportive supervision and coaching for health providers (public, private, and community).
- In seven regions where one PMI-bilateral will assume clinical activity support, they will introduce clinical aides to assist the health facility in charge with health facility operations and recruit community health liaisons to assist the health facility in charge with community activities and supervision. This will be modeled on work that was done in three regions already supported by the bilateral, and will be done in collaboration with the regional and district health management teams.
- Train approximately 1,000 CHVs in iCCM for children under five years of age; due to COVID-19 some of these will be modified and include e-learning or virtual events.
- Train 80 additional clinicians and laboratory technicians in refresher malaria microscopy and provide supportive outreach and supervision to clinicians and laboratorians in 13 PMI-supported regions (Ten with one bilateral and three with a different partner). This will include a train-the-trainer component as well as procurement of additional slide banks for ongoing training and practice. Among trainees, five will be selected for External Competency Assessment for Malaria Microscopists (ECAMM). A workshop to summarize lessons learned is also planned.

- Conduct refresher training on malaria case management for CHVs.
- Conduct trimestrial integrated supervision from central to regional, from regional to district, and district to CSB levels.
- Carry out periodic supervision specific to elimination and pre-elimination zones from the central level
- Support the USAID bilateral to implement proactive community case management of malaria (Pro-CCM) in three districts
- Support the district management team to train the health facility staff situated in elimination areas on case management and active case detection.

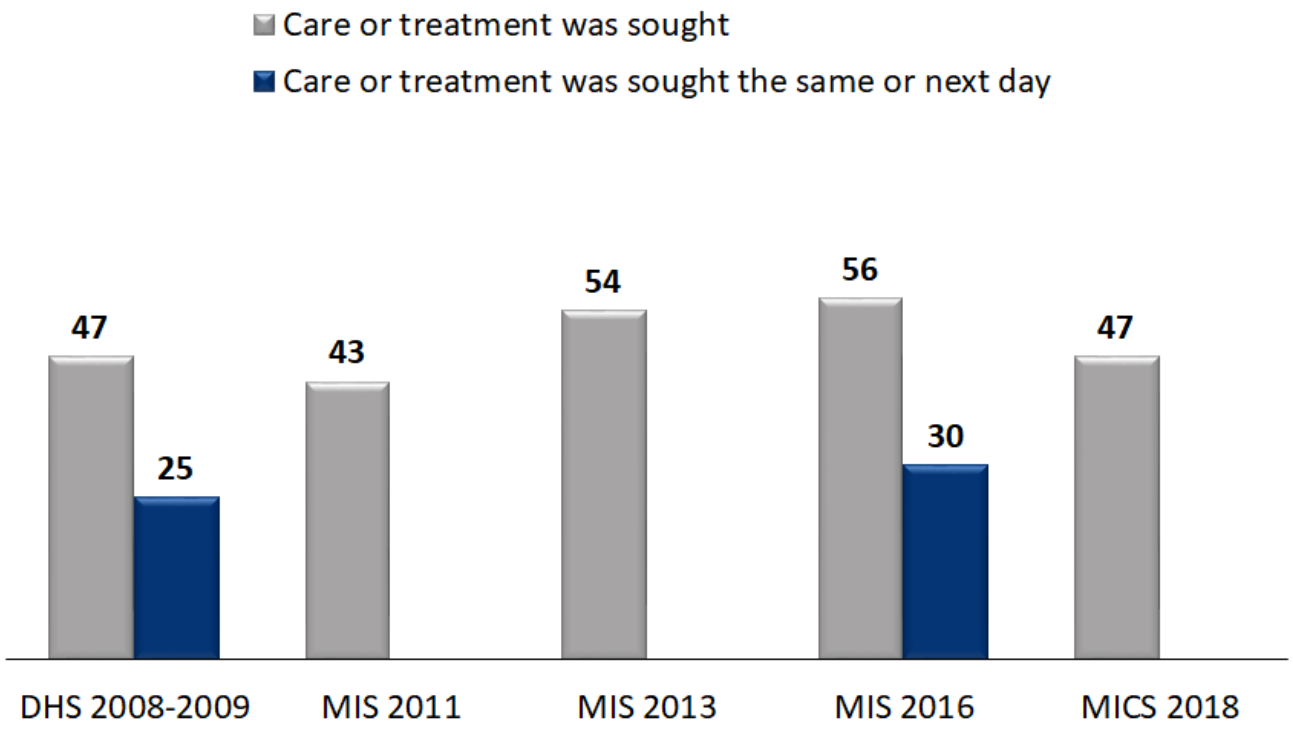
Key Question 1a

What is the status of care-seeking and/or access to care for children under five years of age with fever?

Supporting Data

Figure A-11. Trends in care-seeking for fever

Among children under five years of age with fever in the two weeks before the survey, percentage for whom advice or treatment was sought



*Excludes treatment or advice from a traditional practitioner

Various qualitative studies indicate that prompt care-seeking in health facilities for febrile illness remains low. Additional investments in SBC promoting prompt care-seeking and efforts to improve access to care remain an important focus of the NMCP and PMI.

Key Question 1b

What significant structural and/or behavioral challenges affect prompt care-seeking?

Supporting Data

Table A-11. Barriers to Care-Seeking

Barrier	Type of Factor	Data Source	Evidence
Social Norm of Self-Treatment Before Seeking Care	Social	JHPIEGO/MCSP Care-Seeking Behavior Study - 2018 Institut Pasteur de Madagascar's Study on the Determinants of the Care of Pregnant Women and Children – 2018	Recent qualitative data suggests that it is typical for self-medication to be the first step in caring for children who develop a fever. More data is needed on the extent of this practice.
Prohibitive Cost of Services/Medication	Environmental	JHPIEGO/MCSP Care-Seeking Behavior Study - 2018 Institut Pasteur de Madagascar's Study on the Determinants of the Care of Pregnant Women and Children – 2018	Cost cited as a barrier for seeking care
Perceived Quality of Care at Health Facilities	Environmental	Institut Pasteur de Madagascar's Study on the Determinants of the Care of Pregnant Women and Children – 2018	Recent qualitative data suggests the use of health facilities is rare and is considered only in the case of severe illness. This is due, in part, to the perceived quality of the care received.

Please refer to Section 3.4. for information on how SBC interventions will be directed to address the challenges identified above.

In early 2020, human centered design, a collaborative process focused on the end-user behaviors, was conducted to identify key influences on healthcare-seeking behaviors at the individual, interpersonal, community, and structural levels. Information collected included malaria care seeking behaviors in two regions. Participants discovered that although health workers are perceived as competent, the community often prefers seeking care with *matrones* (traditional healers) because they are trusted and accessible.

For many individuals and parents, addressing illness involves first self-treatment, followed by seeking care with a CHV or *matrone* if necessary and, as a last option, seeking care at a CSB.

Factors facilitating care seeking included close collaboration between *matrones* and healthcare providers "*Matrones* sometimes played a role in referring and accompanying women to the CSB." (Source: Health seeking design report 2020, ACCESS program). In addition, antimalarial drugs and services are offered for free at public health centers, facilitated care-seeking

To support service providers, virtual mentoring activities (integrated with other programs) to strengthen their ability to provide malaria care services in the context of the COVID-19 pandemic were conducted.

Until March 2020, Peace Corps Volunteers continued to conduct outreach activities to encourage early care seeking for all household members.

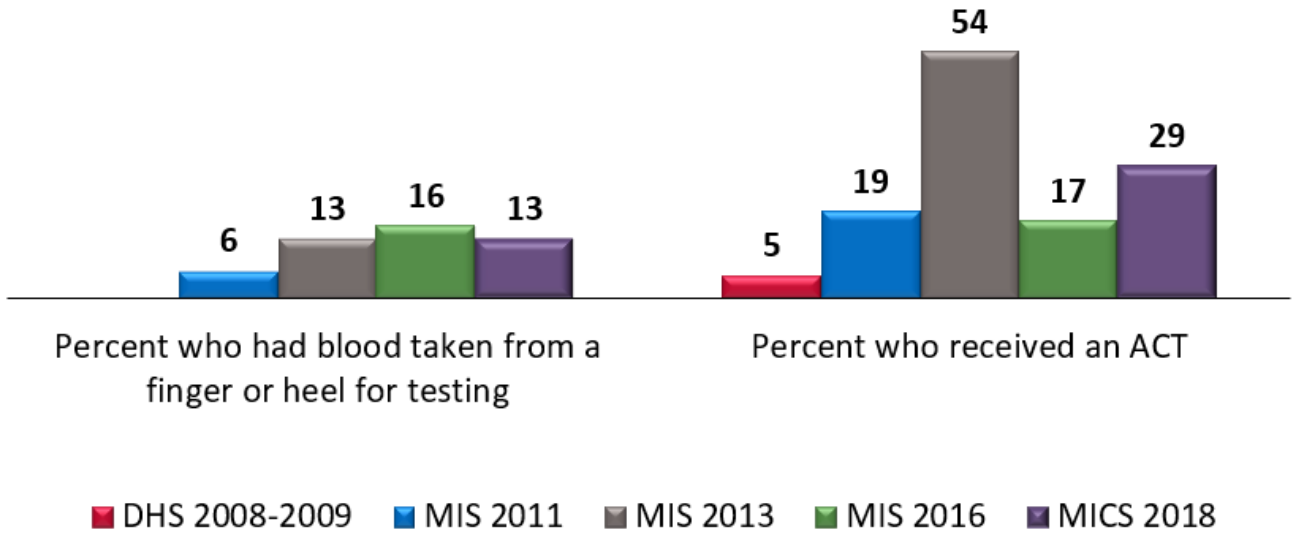
Key Question 2a

What proportion of patients are being tested and appropriately treated for malaria?

Supporting Data

Figure A-12. Trends in diagnosis and treatment of children with fever

Among children under five years of age with fever in the two weeks before the survey and with fever in the two weeks before the survey who received any antimalarial



Testing children under five years of age presenting with febrile illness for malaria, and treating confirmed cases with ACTs remains generally below annual targets. The proportion of suspected malaria confirmed by RDT or microscopy remains below the NMCP's objective of 95 percent in both health facilities (90 percent) and at the community level (84 percent). Additionally, microscopy is not being routinely done in hospital settings due to a lack of microscopes or limited requesting of microscopic analysis. However, among children properly diagnosed with malaria, 96 percent of those diagnosed in health facilities received correct treatment and 92 percent of those confirmed in the community were correctly treated. (Source: DHIS2)

There has been limited improvement in case management indicators for children under five years of age during 2018--2019. This may be due to several factors including hospital and private facility providers not following NMCP guidelines, the absence of training for some providers, and limited case management activities for children under five years of age in some community settings. Additionally, a midterm review revealed that only 46 percent of community health sites are functional. Finally, stockouts of malaria commodities for proper case management are frequent.

Key Question 2b

What significant structural and behavioral challenges affect testing and treatment practices among providers?

Supporting Data

Please refer to Section 3.4. for information on how SBC interventions will be directed to address the challenges identified above.

Table A-12. Barriers to Testing and Treatment

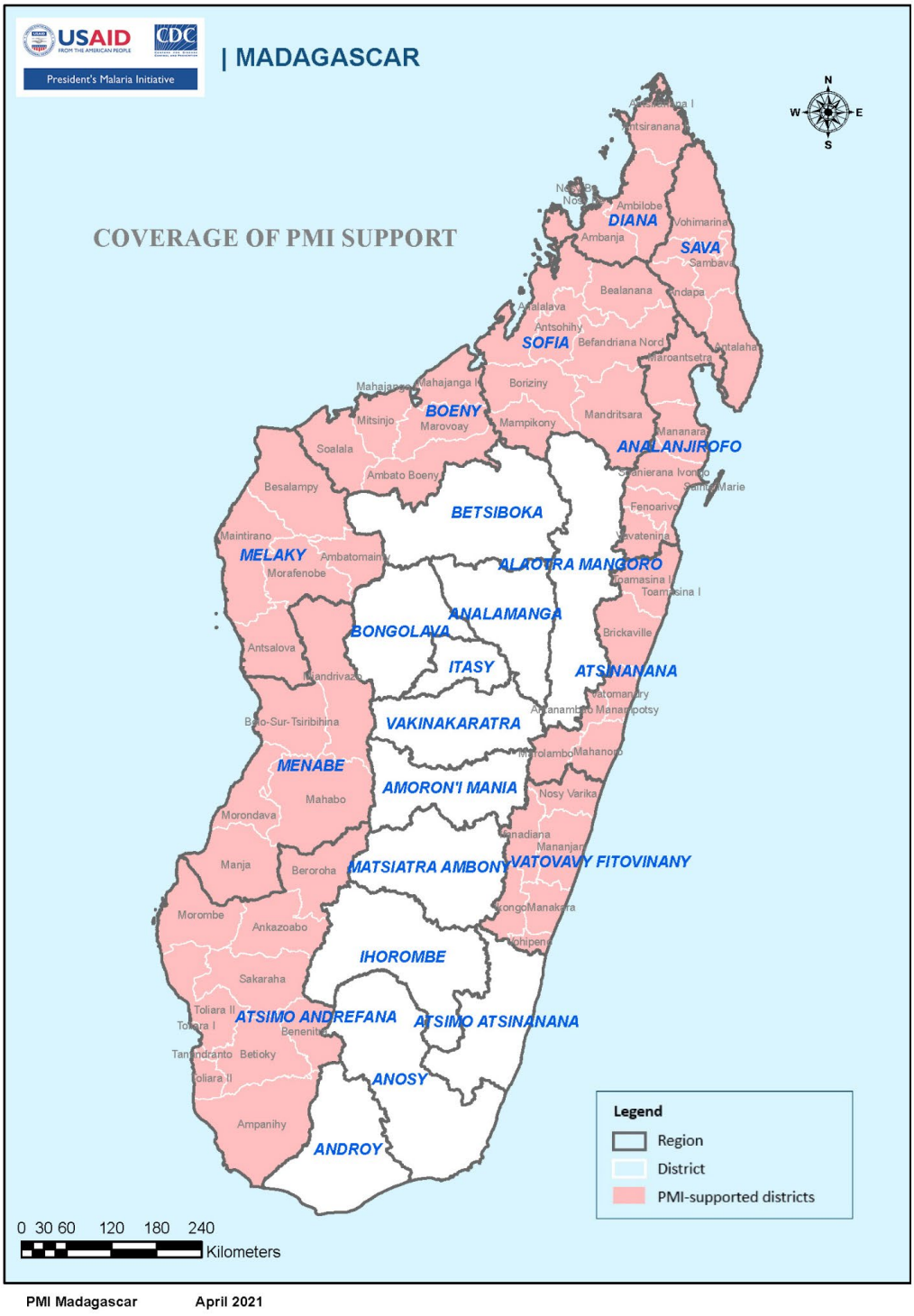
Barrier	Type of Factor	Data Source	Evidence
Low Provider Self-Efficacy Due to Limited Training and Supervision	Internal	JHPIEGO/MCSP Health Facility Assessment - 2018	A recent health facility assessment found limited training and supervision of providers. Only 42% of surveyed health providers reported a malaria supervision visit in the previous six months and 45% reported they had not received any malaria training in two years. As a result, provider self-efficacy regarding malaria testing and treatment practice is limited.
Insufficient Staffing of Health Facilities	Environmental-Structural	SARA Survey - 2019 Partner reports	The results of a recent SARA survey show a significant shortage of staff, with three-quarters (74%) of CSBs having only one nurse or midwife and roughly half (49%) having no doctor. This is below required staffing standards.

Information from various surveys and site-monitoring visits revealed staff shortages and limited training and supervisory visits for providers. These challenges may explain sub-optimal knowledge of case management recommendations among providers. To address this, PMI/Madagascar will strengthen supportive supervision and training activities for providers in 13 regions and assure that providers have the guidance and standard operating procedures they need to do their jobs. Providers will also receive refresher training sessions and job aids aimed at improving communication skills. These training sessions will emphasize how to promote desired behaviors, manage rumors, and maintain public confidence in the health system.

Key Question 3

What is the current and planned support for case management at health facilities and in the communities by CHVs?

Figure A-13. Coverage of PMI Support



PMI provides case management support in 10 regions (60 districts) including facility- and community-level case management through a USAID bilateral. These regions include approximately 17,317 CHVs, 2,995 health facility staff, 1,524 health facilities, and 118 district hospitals, and cover approximately 12.4 million people. The Global Fund supports the remaining 12 regions in the Central Highlands, fringe districts (those surrounding the Central Highlands), and the south. The PMI-supported bilateral conducts malaria case management training for new facility-based providers and CHVs, and refresher training in iCCM for current facility providers and CHVs.

In support of Madagascar's National Strategy for Community Health, a program to introduce *accompagnateurs communautaires* (community aides) to support CHV activities and *aides cliniques* (clinical aides), to support the clinician-in-charge at health facilities was launched in 2020.

In 2020, PMI supported the introduction of pre-referral treatment with rectal artesunate for severe malaria among children under five years of age in select high-burden districts according to NMCP policy. Nearly 3,500 children under five years of age with severe disease benefited from this treatment in 2020; an initial review of the rollout identified areas for improvement which PMI will support. (Of note, the NMCP is aware of WHO recommendations for use of rectal artesunate for pre-treatment of severe disease among children up to age six years of age in the community; however, the current NMCP and MOH guidelines for community case management of malaria include only those children up to age five years. The NMCP opted for a rectal artesunate policy consistent with national community case management guidelines.)

A plan to initiate pro-active community case management of malaria (known as *prise en charge à domicile* or PECADOM plus in Madagascar) in two to three districts was delayed due to stock shortages and the COVID pandemic; plans to launch this initiative in a limited number of high-burden communities are underway.

PMI supported the development of a national malaria diagnostics quality assurance/quality control manual and will continue to support training for hospital-level laboratory technicians in microscopy. PMI also continues to reinforce the laboratory capacity by providing additional malaria parasite slide banks for training and OTSS activities. If the COVID situation allows, PMI will support the NMCP to send qualified microscopists to attend the ECAMM training.

PMI will continue to procure key malaria case management commodities, including RDTs, ACTs, injectable artesunate, rectal artesunate capsules, and microscopy supplies.

Key Question 4

What is the estimated need for RDTs during calendar years 2021-2023? Are there any projected RDT gaps based on anticipated partner contributions compared to estimated needs?

Supporting Data

Table A-13. RDT Gap Analysis

Calendar Year	2021	2022	2023
Total country population	28,121,820	28,968,286	29,840,232
Population at risk for malaria	28,121,820	28,968,286	29,840,232
PMI-targeted at-risk population	28,121,820	28,968,286	29,840,232
RDT Needs			
Total number of projected fever cases	8,943,243	11,015,837	12,869,575
Percent of fever cases tested with an RDT	100%	100%	100%
RDT Needs (tests)	**9,708,614**	**12,020,699**	**14,055,393**
Needs Estimated based on HMIS Data			
Partner Contributions (tests)			
RDTs from Government	*0*	*0*	*0*
RDTs from Global Fund	1,222,125	1,150,000	6,071,250
RDTs from other donors	0	0	0
RDTs planned with PMI funding	7,876,125	2,000,000	2,500,000
Total RDT Contributions per Calendar Year	***9,098,250***	***3,150,000***	***8,571,250***
Stock Balance (tests)			
Beginning Balance	5,825,625	5,215,261	0
- Product Need	9,708,614	12,020,699	14,055,393
+ Total Contributions (received/expected)	9,098,250	3,150,000	8,571,250
Ending Balance	5,215,261	-3,655,438	-5,484,143
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	7,281,460	9,015,524	10,541,545
Total Surplus (Gap)	***(2,066,199)***	***(12,670,962)***	***(16,025,688)***

Key Question 5

What is the estimated need for ACTs during calendar years 2021-2023? Are there any projected ACT gaps?

Supporting Data

Table A-14. ACT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	28,121,820	28,968,286	29,840,232
Population at risk for malaria	28,121,820	28,968,286	29,840,232
PMI-targeted at-risk population	28,121,820	28,968,286	29,840,232
ACT Needs			
Total projected number of malaria cases	4,288,597	4,297,085	6,422,892
Total ACT Needs (treatments)	***4,473,528***	***4,498,132***	***6,725,748***
Needs Estimated based on HMIS Data			
Partner Contributions (treatments)			
ACTs from Government	*0*	*0*	*0*
ACTs from Global Fund	1,928,100	*283,750*	*1,815,625*
ACTs from other donors *[specify donor]*	*0*	*0*	*0*
ACTs planned with PMI funding	3,276,321	1,000,000	*1,500,000*
Total ACTs Contributions per Calendar Year	***5,204,421***	***1,283,750***	***3,315,625***
Stock Balance (treatments)			
Beginning Balance	657,810	1,388,703	0
- Product Need	4,473,528	4,498,132	6,725,748
+ Total Contributions (received/expected)	5,204,421	1,283,750	3,315,625
Ending Balance	1,388,703	-1,825,680	-3,410,123
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	3,355,146	3,373,599	5,044,311
Total Surplus (Gap)	***(1,966,444)***	***(5,199,279)***	***(8,454,434)***

Key Question 6

What is the estimated need for definitive treatment and pre-referral treatment for severe malaria during calendar years 2021-2023? Are there any anticipated gaps?

Table A-15. Inj. Artesunate Gap Analysis Table

Calendar Year	2021	2022	2023
Injectable Artesunate Needs			
Projected number of severe cases	129,963	119,980	184,450
Projected number of severe cases among children	95,783	88,425	135,940
Average number of vials required for severe cases among children	382,092	352,742	542,283
Projected number of severe cases among adults	34,180	31,555	48,510
Average number of vials required for severe cases among adults	307,623	283,993	436,593
Total Injectable Artesunate Needs (vials)	***696,611***	***643,102***	***988,665***
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	196,250	442,780	548,610
Injectable artesunate from other donors [specify donor]	0	0	0
Injectable artesunate planned with PMI funding	411,000	100,000	200,000
Total Injectable Artesunate Contributions per Calendar Year	***607,250***	***542,780***	***748,610***
Stock Balance (vials)			
Beginning Balance	382,849	293,488	193,166
- Product Need	696,611	643,102	988,665
+ Total Contributions (received/expected)	607,250	542,780	748,610
Ending Balance	293,488	193,166	-46,889
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	522,459	482,326	741,499
Total Surplus (Gap)	***(228,971)***	***(289,161)***	***(788,388)***

Table A-16. RAS Gap Analysis Table

Calendar Year	2021	2022	2023
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose	34,937	32,253	49,584
Total Artesunate Suppository Needs (suppositories)	67,619	62,425	95,969
Needs Estimated based on HMIS Data			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	170,216	0	0
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	0	34,540	90,000
Total Artesunate Suppositories Available	***170,216***	***34,540***	***90,000***
Stock Balance (suppositories)			
Beginning Balance	38,590	141,187	113,301
- Product Need	67,619	62,425	95,969
+ Total Contributions (received/expected)	170,216	34,540	90,000
Ending Balance	141,187	113,301	107,333
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	50,715	46,819	71,977
Total Surplus (Gap)	***90,472***	***66,482***	***35,356***

Key Question 7

What is the estimated need for any other standard antimalarial drug used in the country (e.g., primaquine for *P. vivax*) during calendar years 2021-2023? Are there any anticipated gaps?

Supporting Data

Key Question 8

Are first-line ACTs effective and monitored regularly?

Supporting Data

Table A-17. Recently Completed and Ongoing Antimalarial Therapeutic Efficacy Studies

Most recent study year	Sites	PMI Funded (Y/N)	Treatment Arms	PCR-Corrected Efficacy>90% (Y/N)
2018	Ankazomborona	Y	AL, AS/AQ	Y
2018	Matanga	Y	AL, AS/AQ	Y

Ongoing Therapeutic Efficacy Studies (TES): None **Next planned TES:** 2022

ACPR: adequate clinical and parasitological response; AL: artemether-lumefantrine; AS/AQ: amodiaquine-artesunate; DHP: dihydroartemisinin-piperaquine; PARMA: PMI-supported Antimalarial Resistance Monitoring in Africa

Key Question 9

Are there other areas (e.g., lab strengthening, private sector support, etc.) that should be considered for PMI support?

Supporting Data

Laboratory capacity for malaria microscopy at hospitals remains limited. Trained staff and/or equipment and reagents are often lacking. PMI has recently reinvested in supporting training microscopy technicians at the district level and supported the NMCP to update its quality assurance/quality control manual. In addition to core case management support and interventions, PMI continues to invest in supporting the NMCP to move Madagascar towards malaria elimination; part of that work entails strengthening case management at all levels.

Conclusions for Case Management Investments

With the exception of updating treatment recommendations for uncomplicated malaria with ACTs to include pregnant women in their first trimester, case management recommendations have not changed. However, the NMCP is committed to expanding the age of CCM to include children two months through 14 years of age in select areas. Scale-up of this plan is ongoing.

The COVID-19 pandemic has affected malaria care. The RBM community suspects that delays in care-seeking for fever may have increased due to concerns about COVID-19, and partners have had to modify certain activities. For example, e-learning and virtual meetings have been increasingly used for training and management. Stock management has been complicated by supply chain disruptions, lockdowns, and staff illness. The NMCP and PMI partners and the RBM community have stayed focused on addressing challenges and modifying activities to maintain malaria services during the pandemic.

Ensuring prompt and appropriate malaria case management remains a challenge. To address this, PMI/Madagascar will continue to support a range of communications activities including radio spots, songs,

community theater, and school-based messaging to promote prompt care-seeking and continue to bolster social norms around self-medication.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2. DRUG-BASED PREVENTION

NMCP Objective

Madagascar has adopted the WHO multi-pronged approach to drug-based interventions, including preventing MIP that includes provision of at least three doses of sulfadoxine-pyrimethamine (SP) spaced one month apart starting early in the second trimester (from 13 weeks of pregnancy) until delivery, and prompt and effective diagnosis and treatment of malaria during pregnancy. Madagascar has also adopted the use of mass drug administration (MDA) with Dihydroartemisinin-piperaquine (DHP) in select high-transmission districts and will be piloting SMC implementation in high burden districts with seasonal transmission patterns in the South of the country.

NMCP Approach

- The NMCP implements IPTp in 101 districts currently classified as control or pre-elimination districts as part of its current NSP (2018-2022). In these targeted districts, the NMCP aims to achieve coverage of 60 percent of pregnant women with IPTp3 by 2022.
    - Since May 2018, the MOH national ANC norms and guidelines have been consistent with the 2016 WHO ANC recommendations, which include promoting eight ANC contacts during pregnancy and recommend an additional visit at 13-16 weeks for initiating IPTp.
    - In 2020, the NMCP updated its treatment recommendations for uncomplicated malaria in pregnancy to allow administration of ACTs for pregnant women in their first trimester.
    - WHO recommendations for ANC have been incorporated into national reproductive health norms and procedures and a malaria communication plan has been developed to address the frequency and timing of ANC visits. The plan calls for CHVs and healthcare providers to encourage pregnant women to attend ANC at health facilities beginning in their first trimester.
- The NMCP implements MDA with DHP in 11 districts with support from the Global Fund, using DHP to respond to persistent increases of malaria in select districts of Madagascar which targets individual children 2 months of age and above. A second round in the same districts is planned in June 2021. After these two rounds are complete, the NMCP plans to evaluate the impact and draft a plan for MDA use in the country. Another round of MDA is planned in 17 districts in 2022.
    - Providing TA for pilot implementation of SMC in the high burden districts in the South of Madagascar with seasonal malaria transmission as an OR before scale-up, in partnership with Global Fund (procurement of commodities and implementation costs will be fully covered by the Global Fund).

PMI Objective in Support of NMCP

PMI supports the NMCP's comprehensive MIP approach for pregnant women, including ensuring provision of IPTp starting early in the second trimester (from 13 weeks of pregnancy) until delivery, and prompt and effective diagnosis and case management of malaria during pregnancy.

PMI-Supported Recent Progress (CY 2020)

PMI supported the NMCP to strengthen the quality and delivery of IPTp and MIP services at the facility level, focusing on the health facility staff. PMI partners ensured supportive supervision was done by district health staff who provide on-the-job training and guidance to improve provider practices and knowledge of the updated IPTp and ANC guidelines. PMI partners ensured the most recent IPTp policy guidance were disseminated and available, and verified IPTp was being correctly tracked and recorded in the ANC registers and routine reporting forms:

- Trained 5,461 CHVs and 1,140 health workers in MIP activities (refresher and new staff)
- Provided supportive supervision to approximately 1,000 providers in USAID/PMI regions.
- Provided CHVs refresher training in SBC support for ANC and IPTp.

Since the progressive rollout of the community-based IPTp (TIPTOP) project in three districts beginning in Mananjary in 2018, TIPTOP has been extended to Vohipeno and Toliary II where PMI-supported CHVs are engaged at the community level to support ANC attendance and IPTp uptake. In TIPTOP districts, ANC attendance rates have continued to increase: 20 percent to 59 percent for ANC 4, ANC attendance in the first trimester from 18 percent in October 2018 to 35 percent in February 2021.

- PMI continued supporting efforts at the national level for strengthening drug-based prevention during pregnancy, ensuring coordination between malaria and maternal health programs with a national MIP technical working group.
- PMI conducted SBC activities around appropriate timing for ANC and taking SP for IPTp.
- PMI strengthened health systems for MIP, including support to supply chain strengthening to ensure sufficient SP stocks are available at central and peripheral levels. PMI also supported strengthening routine reporting of MIP indicators as part of the broader M&E support to the MOH to ensure that core IPTp 1,2,3 and 3+ indicators are included in the HMIS and reported routinely.
- PMI procured 1.65 million SP treatments in FY 2021 contributing to the national annual need, ensuring adequate stocks of SP are available at the central warehouse. PMI continued to support strengthening of the supply chain management system, including ensuring sufficient SP stocks are available at district and CSB level.

PMI-Supported Planned Activities (CY 2021 with currently available funds)

- PMI will continue to strengthen the quality of MIP implementation at ANC, including supportive supervision and on-the-job training. PMI will provide guidance to improve provider practices and knowledge, and to ensure the availability of ANC guidelines and job aids for health facilities and CHVs.

- PMI will continue to support SBC related to MIP as part of PMI's support for strengthening malaria SBC to encourage pregnant women to attend at least four ANC visits and complete at least three courses of IPTp.
- PMI will strengthen health systems for MIP prevention, including support to supply chain strengthening to ensure sufficient SP stocks are available at central and peripheral levels. PMI will also support strengthening of routine reporting of MIP indicators as part of the broader M&E support to the MOH. This will ensure that core MIP indicators are included in the HMIS and reported routinely.
- PMI will conduct a study to describe barriers and facilitators to MIP prevention uptake, including IPTp, SBC, and consistent ITN use.
- PMI will participate in community-based IPTp expansion, according to the NSP.

CHVs receive refresher training in SBC by health providers during monthly meetings at the health facility. In addition, bilateral partners support ANC and IPTp training of CHVs.

Please see FY 2022 MOP budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2.1. MALARIA IN PREGNANCY (MIP)

Key Goal

Support the national MIP strategy which includes provision of ITNs at the first ANC visit, a minimum of three courses of IPTp starting at 13 weeks gestational age (in targeted districts), and effective case management of malaria per WHO guidelines.

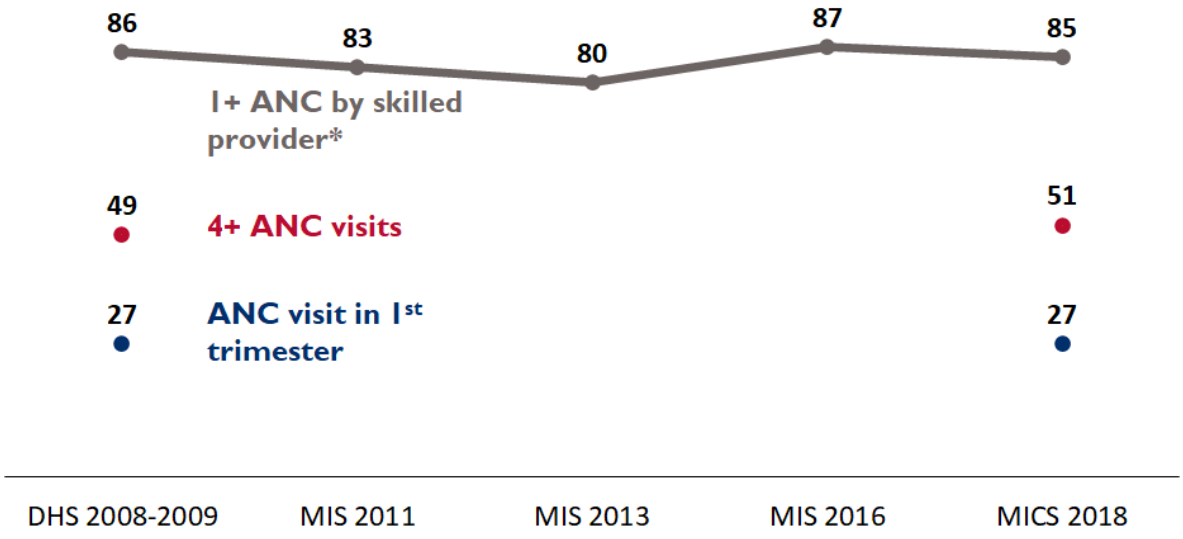
Key Question 1a

What proportion of pregnant women are accessing ANC early and frequently (as recommended by national and/or WHO strategies) during their pregnancy?

Supporting Data

Figure A-14. Trends in ANC coverage

Women 15 to 49 years of age with a live birth in the five years before the survey (most recent birth)



- Nearly 85 percent of pregnant women attend ANC at least once; however, only 51 percent of pregnant women completed all four recommended ANC visits which is a very slight increase between 2008 and 2018. Approximately 27 percent of pregnant women initiated ANC in the first trimester and this figure did not increase during 2008-2018.

Key Question 1b

Are there important health systems and/or behavioral barriers to ANC attendance at health facilities?

Supporting Data

Please refer to Section 3.4. below for information on how SBC interventions will be directed to address the challenges identified above.

- *Matrones* (traditional midwives) are perceived to be more accessible and less expensive for ANC than CSB-based ANC and pregnant women often choose to seek ANC via *matrones*; however, *matrones* are not allowed to provide SP. Pregnant women report attending their first CSB-based ANC visit only to get an ITN. (Source: partner reports)
- Fever is considered a common condition; therefore, in some areas there is a low sense of urgency to seek care for fever among pregnant women.
- ANC attendance is not associated with maternal education or literacy; pregnant women with a lower literacy level were more likely to delay ANC initiation. (Source: site visits)

- Fear of potential exposure to COVID-19 during consultations for malaria infection has created another barrier and reduced care-seeking for malaria.

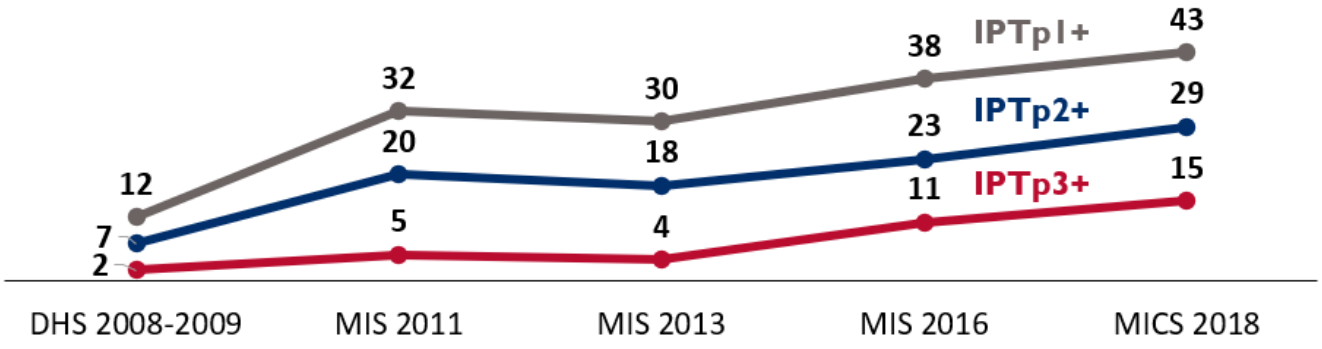
Key Question 2

What proportion of pregnant women are receiving the recommended doses of IPTp?

Supporting Data

Figure A-15. Trends in IPTp

Women 15 to 49 years of age with a live birth in the two years before the survey who received the specified number of doses of SP/Fansidar during their last pregnancy



Note: IPTp3 baseline uses the first survey available after the recommendation was updated to three or more doses. These indicators have changed slightly over time. Depicted here is the coverage value not restricted to doses received at ANC.

IPTp coverage has increased steadily since PMI started in 2008; however, IPTp3 coverage according to the most recent MICS was only 15 percent. This is well below the updated NSP target of 60 percent by 2022. The NMCP with PMI and in-country RBM partners are working to address this challenge.

Continued support for strengthening the delivery of MIP services at the health facility level, and encouraging pregnant women to attend ANC early and to return for subsequent visits is needed to increase the proportion of pregnant women who receive three doses of IPTp in targeted districts. To this end, new strategies such as supporting health workers to conduct ANC outreach clinics, which include SP provision, are being initiated by PMI partners. Madagascar has been participating in a UNITAID-supported study to test community-distributed IPTp by trained CHVs (TIPTOP). Preliminary results from this study suggest improved IPTp uptake with this approach. If WHO endorses this approach, the NMCP is interested in scaling up community distributed IPTp to other districts in Madagascar and PMI will coordinate closely with NMCP to support this effort.

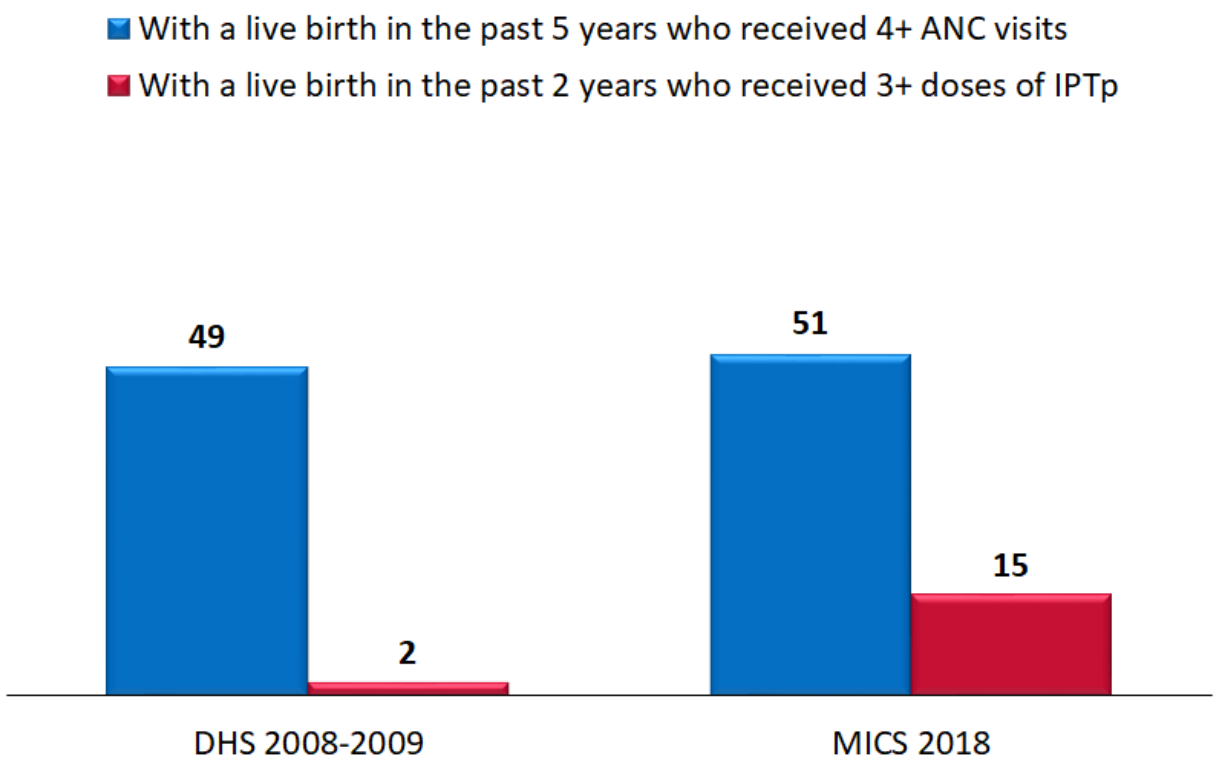
Key Question 3a

What is the gap between ANC attendance and IPTp uptake (i.e., missed opportunities for giving IPTp at ANC)?

Supporting Data

Figure A-16. Trends in missed opportunities for IPTp

Percentage of women 15 to 49 years of age



- There is limited quantitative data available on ANC attendance and IPTp; the MIS-DHS 2020 was delayed due to the COVID-19 pandemic; information from that survey will be incorporated when available.
- Barriers to improving ANC and IPTp coverage include distance from health facilities, the costs of ANC services (e.g., iron folate tablets and mebendazole, which are part of the national cost-recovery scheme and may pose a financial burden for pregnant women), and limited knowledge among pregnant women regarding the importance of IPTp.

Key Question 3b

What significant health system and/or behavioral challenges affect provider delivery of MIP services (e.g., IPTp and ITN distribution at ANC)?

Supporting Data

Please refer to Section 3.4. for information on how SBC interventions will be directed to address the challenges identified above.

Table A-18. Barriers ANC Attendance and IPTp Administration at ANC Visits

Barrier	Type of Factor	Data Source	Evidence
Limited Knowledge on Pregnant Women's Increased Vulnerability to Malaria	Internal	MIS - 2016	Only 25% of respondents to the 2016 MIS indicated that pregnant women are more vulnerable to malaria.
Cost of Some ANC Services	Environmental	JHPIEGO/MCSP Care-Seeking Behavior Study – 2018 TIP TOP Project- Results of Qualitative Research on IPTp	Women are charged for iron folate tables and mebendazole as part of the national cost-recovery scheme. These costs, as well as any costs associated with consultation, are frequently cited as a barrier in qualitative research on ANC attendance in Madagascar.
Distance to Health Facility	Environmental	Institut Pasteur de Madagascar's Study on the Determinants of the Care of Pregnant Women and Children – 2018	A recent analysis found that distance is an important determinant to whether women attend ANC. Women who live more than 5 kilometers from a health facility are less likely to attend ANC.
Limited Provider Familiarity with IPTp Guidelines	Internal/ Environmental	Use of MIP Assessment Tools to Identify Key Challenge in Implementing IPTp in Moramanga District - 2018	A recent study conducted in one district found that up-to-date national IPTp guidelines were only available in 30% of facilities and that 50% of facilities had outdated IPTp guidelines. These data, while limited to a single district, suggest that limited understanding of current guidelines may contribute to the gap between ANC attendance and IPTp uptake.

Barrier	Type of Factor	Data Source	Evidence
Multiple	Health Systems, Environmental, Security	IS Global Mid-term Survey of TIPTOP	A midterm survey by IS Global in 2019 revealed that barriers including cyclones that result in blocked roads, suspension of DINA, increasing concerns about safety, absence of healthcare staff and resulting shortages of supervision and an increasing number of traditional birth attendants.
Multiple	Health Systems, Environmental, Social	IPM/ACCESS study in three districts (Fenerive Est , Manakara, and Miandrivazo)	Women reported that lack of confidentiality during consultations, distance from health centers and lack of transport, and a limited staffing at health facilities were barriers to seeking ANC. Women also mentioned a lack of respect for their wishes and customs, and that ANC services were not free were barriers to attending ANC.

Key Question 4

Does the national ANC program or health information system collect data and track the proportion of pregnant women with fever, those tested for malaria, those found to have malaria infection, and those who are treated?

Supporting Data

The revised HMIS monthly reporting forms only include the number of pregnant women who tested positive for malaria. The other indicators related to fever cases and treatment are not currently captured. The next revision of the reporting forms is expected in 2025.

Key Question 5

What is the estimated need for SP during 2021-2023? Are there any anticipated SP gaps? Are there gaps in other IPTp commodities?

Supporting Data

Table A-19. SP Gap Analysis Table

Calendar Year	2021	2022	2023
Total Country Population	28,121,820	28,968,286	29,840,232
Total Population at Risk for Malaria	28,121,820	28,968,286	29,840,232
PMI Targeted at Risk Population	28,121,820	28,968,286	29,840,232
SP Needs			
Total Number of Pregnant Women	963,791	992,801	1,022,684
Proportion of women expected to attend ANC1 at 13 weeks or greater	51.4%	59.5%	64.4%
Proportion of women expected to attend ANC2	41.1%	49.0%	53.6%
Proportion of women expected to attend ANC3	34.3%	42.0%	46.5%
Proportion of women expected to attend ANC4			
Total SP Needs (treatments)	***1,233,578***	***1,509,107***	***1,698,623***
Needs Estimated based on Household Survey Data (e.g., DHS)			
Partner Contributions (treatments)			
SP from Government	0	0	0
SP from Global Fund	1,473,300	1,525,000	970,000
SP from Other Donors	0	0	0
SP planned with PMI funding	1,650,000	1,000,000	0
Total SP Contributions per Calendar Year	***3,123,300***	***2,525,000***	***970,000***
Stock Balance (treatments)			
Beginning balance	436,250	2,325,972	3,341,865
- Product Need	1,233,578	1,509,107	1,698,623
+ Total Contributions (Received/expected)	3,123,300	2,525,000	970,000
Ending Balance	2,325,972	3,341,865	2,613,242
Desired End of Year Stock (months of stock)	9	9	9
Desired End of Year Stock (quantities)	925,183	1,131,830	1,273,967
Total Surplus (Gap)	***1,400,789***	***2,210,034***	***1,339,275***

Conclusions for MIP Investments

Increasing early and ongoing ANC attendance and IPTp uptake to reach NMCP goals remains challenging. Efforts to address identified barriers, including costs and distance to health facilities and knowledge gaps among providers and pregnant women are being enhanced; however, the COVID-19 pandemic delayed some of these activities. SBC activities will focus on improving knowledge about IPTp and encouraging early and ongoing ANC attendance.

2.2.2. SEASONAL MALARIA CHEMOPREVENTION (SMC)

Key Goal

Pilot SMC intervention targeting relevant high burden geographic areas as OR in the southern part of the country with seasonal transmission with three rounds targeting children 6 to 13 years years of age. This activity is funded by Global Fund, not PMI.

Key Question 1

What is the estimated need for SMC drug (SPAQ) during CYs 2021-2023? Are there any projected SPAQ gaps?

Supporting Data

SPAQ procurement will be covered by Global Fund.

Key Question 2

What are the estimated non-commodity resources needed to properly deliver SMC over the next three years (e.g., staffing, SBC, etc.)?

The Global Fund will be supporting implementation costs for the SMC OR, which consists of three rounds targeting children 6-13 years in one district (TBD) and adult migrants in two communes of two different districts (TBD). No SMC for children under 5 years of age is planned as the community health system in place is already providing malaria case management for children under 5 and is being strengthened in these districts. PMI plans to provide TA to the proposed OR.

Key Question 3

If refusal or adherence to full dosing of SMC is a challenge, what behavioral challenges affect SMC acceptance and adherence?

N/A

Conclusions for SMC Investments

PMI's planned SMC investments are currently limited to TA for an SMC OR implementation pilot in 2023. Based on the results of that pilot, PMI may consider additional investments in the future.

2.2.3. ADDITIONAL DRUG-BASED PREVENTIVE STRATEGIES

N/A

Please see FY 2022 MOP budget tables for a detailed list of proposed activities with FY 2022 funding.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.1. SUPPLY CHAIN

NMCP Objective

To ensure continuous availability of life-saving and quality malaria commodities across all sectors, and segments of the Malagasy population (National Malaria Strategic Plan 2018–2022). The NMCP objective is for 95 percent of facilities to report no stockouts of malaria commodities by 2022.

NMCP Approach

Enhance coordination among the public, nonprofit, and commercial sectors for reliable supply and distribution of quality health products through implementation of a total market approach. This includes a multi-sectoral approach and public-private partnerships to reach all segments of the population with quality commodities.

- Improve coordination among donors (e.g., Global Fund and PMI) and other relevant RBM partners to fill supply gaps including commodity procurement and supply chain TA.
- Conduct annual forecasting and supply planning to mobilize adequate financial resources to order malaria commodities.
- Maintain a strong integrated supply chain through SALAMA (central medical supply depot) which stores antimalarial commodities and distributes them on a quarterly basis to all 114 districts in collaboration with the MOH *Unité de Coordination des Projets* (UCP) funded by the Global Fund.
- Strengthen the capacity of district *Gestion et Achats de Stock* or GAS (supply chain sub-committee) committees to analyze consumption data reported by CSBs, CHVs, and hospitals.
- Implement last mile distribution and reduce stockouts at service delivery points.
- Bring to scale new methods to deliver commodities to hard-to-reach communities, such as drones.
- Given the COVID-19 pandemic, enhance tracking international orders in the pipeline to monitor adherence to approved supply plan and mitigate delivery delays
- Refine the logistics management information system (LMIS) to improve data quality and reduce stockouts as well as transition the current LMIS tool (Channel) to a tool that is interoperable with DHIS2

PMI Objective in Support of NMCP

In coordination with the Global Fund, PMI continues to support the NMCP to improve the supply chain at national, regional, and district levels. This includes procurement of antimalarial commodities as well as providing relevant TA. While all commodities are distributed across the 114 districts by SALAMA, PMI supports TA in 10 regions (Atsinanana, Atsimo-Andrefana, Vatovavy-Fitovinany, Analanjirofo, Boeny, Diana, Melaky, Menabe, Sava, and Sofia), reaching approximately 12.4 million individuals. The 10 regions were selected based on malaria burden and opportunities to leverage other U.S. government health sector investments (i.e., maternal, newborn and child health, family planning, and water, sanitation, and hygiene programs). The remaining regions receive supply chain TA from the MOPH through the UCP as the Global Fund Government Principal Recipients.

PMI-Supported Recent Progress (CY 2020)

Central-level support

- Trained 52 MOH technical staff and partners including 10 malaria GAS core team members on quantification using Pipeline and Quantimed software to generate multiyear forecasting and malaria commodity supply planning. The core team (10 GAS committee members) also oversees the distribution and monitoring plan of supply chain activities.
- Using the results of the quantification, the GAS committee mobilized over 90 percent of financial resources from PMI funding through the FY 2020 MOP and reprogramming processes as well as from the Global Fund through their grants (NFM2 and NFM3) to cover FY 2021 commodity needs.
- Ordered over 75 percent of antimalarial commodity needs in FY 2021, which covers an estimated 11 months of national stocks. This support was critical to ensure that no commodity gaps or disruption occurred during the transition between NFM2 and NFM3 Global Fund grants (NFM2 and NFM3).
- Continued to support SALAMA for storage and transportation of the commodities to *Pharmacie de Gestion des Districts* (Pha-G-Dis) during routine distribution (based on quarterly distribution plans) as well as emergency distribution when required.
- Supported the central malaria GAS committee at NMCP to collect and analyze quarterly requisitions and LMIS data from the 114 districts to generate accurate, efficient, and timely distribution plans.
- Supported the NMCP to introduce a joint (with district management teams and partners) and virtual validation process of quarterly distribution plans review and validation with the 114 districts. The validation process included a review of health district requisitions, assumptions used to estimate quantities, data accuracy, and a verification of quantities allocated to each district. This innovation contributed to building the capacity of the district's GAS team and preventing product waste.
- Due to the COVID-19 global pandemic and subsequent delays in the delivery of AS/AQ, PMI coordinated an emergency delivery of 185,760 doses of AL and 105,060 AL doses funded by the Global Fund so that Madagascar had a three-month of stock of ACTs to ensure continuation of case management. Job aids on the correct use of AL were disseminated.
- In support of the Directorate of Pharmacy, Laboratory, and Traditional Medicines and Department of Studies and Information System Planning, completed an assessment of the current LMIS tool. Findings were used to develop a roadmap for improvements including procuring and deploying software that is interoperable with DHIS2.
- Conducted two End-User Verification (EUV) surveys: in January and October 2020 and disseminated results to RBM partners. EUV surveys were led by the MOPH and with TA from the GHSC-PSM project.
- Completed the malaria market assessment and dissemination of results within the RBM community. The assessment laid out paths toward effective private sector engagement in health product markets including malaria products.
- Provided district-level support.
- Supported coordination among PMI partners and relevant stakeholders to improve commodity security at peripheral level including planning of supply chain TA activities.
- Supported all 13 regional *Unités Technique de Gestion Logistique* (UTGLs) and 78 district GAS committees in USAID/PMI regions to analyze stock available at Pha-G-Dis and CSB, detect stock imbalances and adopt corrective actions, including redistributing commodities as needed, and to estimate quantities for emergency orders.

- Trained 24 hospital pharmacists on the management of commodities for vertical programs (malaria, TB, and HIV). As a result, 20 of 52 hospitals (38 percent) in PMI-supported regions accurately ordered malaria commodities on a quarterly basis and reported on monthly consumption and stock status after the training. This will further improve, with the recent deployment of hospital reporting modules in the DHIS2.
- Supported the NMCP and its partners to organize a workshop to discuss and adopt strategies to increase SP uptake including re-distributing SP stocks from over- to under-stocked districts in Quarter 4 FY 2019.
- Conducted on-the-job supervision visits in the 78 Pha-G-Dis (one visit per quarter), in 679 of 1,792 community pharmacies (*Pharmacie de Gestion de Communauté* of Pha-Ge-Com) and three of 74 district hospitals in PMI-supported regions to reinforce stock managers' capacities. 1,127 (491 male, 636 female) district and CSB staff received this on-the-job training, and 171 (93 male, 78 female) district staff were trained on LMIS Channel software
- Introduced the Supervision, Performance Assessment and Recognition strategy (SPARS) tool in all 78 Pha-G-Dis and 683 of 1734 Pha-Ge-Com in support of regional (EMAR) and district (EMAD) management teams to improve stock management. The SPARS assessment includes : (1) human resources, (2) inventory control management, (3) stock availability, (4) good storage practices, (5) good governance, and (6) ordering/distribution in LMIS. Six months later, 72 percent of Pha-G-Dis were ranked high performing.
- Leveraged Global Fund and other USAID health community platforms for: (1) training/refresher training of 717 CSB staff health on stock management and (2) implementation of the last mile distribution strategy using cash incentives for transporting malaria commodities from Pha-G-Dis to CSB/Pha-Ge-Com in all 78 PMI-supported districts

PMI-Supported Planned Activities (CY 2021 with currently available funds)

PMI will continue to support most of the activities noted here at the central and district levels including: :

- Procure malaria commodities and support warehouse and distribution costs, including pre-positioning up to six months of buffer stocks in hard-to-reach areas that have experienced malaria increases during the recent years.
- Support the FY 2022 quantification review (December 2022) and the annual quantification exercise for FY 2023 (May 2023). Adjustments to procurement and distribution plans and funding will be considered during the new funding model Global Fund and PMI reprogramming exercises.
- Continue to leverage Global Fund resources to reinforce central-level (malaria national supply chain management committee and UTGL) supply chain capacity, including training, validation of quarterly distribution plans, and emergency distribution across the 115 Pha-G-Dis in 114 health districts.
- In light of the COVID-19 pandemic, continue to track international orders in pipeline to monitor adherence to validated supply plans to mitigate delays that would impact stock availability at the central level.
- Support supply chain strengthening, decentralization (regional UTGL, and district GAS committees), and capacity building for stock management at district, CSB and community levels (i.e., Pha-G-Dis, district hospitals, Pha-Ge-Com) in the 78 heath districts supported by PMI. As PMI procured almost 75 percent

of commodities to be distributed to all 114 districts, the technical support may go beyond the supported districts in cases of urgent issues with stock management.

- Support 78 districts to conduct follow-up and monitoring of deliveries from SALAMA, prepare orders correctly, and assure last-mile distribution of commodities to service delivery points (health facilities and communities).
- Support the implementation of the new DHIS2-compatible LMIS tool and its nationwide rollout (including procuring, training users, and full deployment).
- Support a bi-annual EUV survey in 10 PMI-supported regions.
- Complete the drone project evaluation and scale-up in up to three hard-to-reach, high-burden health districts based on the findings.
- Leverage other donors and support the MOH to implement national supply chain assessment using the USAID National Supply Chain Assessment Tool.
- Continue conducting SPARS assessments as part of continuous quality improvement for malaria commodity stock management.
- Continue to enhance private sector engagement to support the Pha-G-Dis to improve its storage conditions and last-mile distribution.
- Support the MOH to improve commodity management at the peripheral level.

Key Goal

Ensure continual availability of quality products needed for malaria control and elimination (ACTs, RDTs, SP, Art. Inj, Art rectal, and ITNs) at health facilities and community level.

Key Question 1

Has the central level, (or subcentral level, if appropriate) been stocked according to plan for ACTs, RDTs, SP, and Art. Inj. over the last year (2020)? If not, have they been under, over, or stocked out?

In general, national stocks were sufficient to ensure continuous availability of malaria commodities until the end of FY 2019. However, because the COVID-19 pandemic affected global supply chains and logistics, the country recorded several weeks of delays in the delivery of products procured by both PMI and the Global Fund . This resulted in stockouts of injectable artesunate, and of one AS/AQ formulation in the latter part of FY 2020. PMI orders scheduled for March 2020 delivery arrived in July–Sept 2020. In anticipation of a gap, PMI and the Global Fund coordinated an emergency delivery of AL in February 2020 to ensure a three-month supply of ACTs. The Global Fund also approved and delivered an emergency air shipment of injectable artesunate.

To address excess of SP at the end of Quarter 4 FY 2019, PMI took mitigation actions 18 months in advance of the expiration date : (1) supported NMCP and its partners to develop a roadmap to increase SP uptake, (2) worked with the Global Fund to ship SP tablets at risk of expiring to Zambia with GHSC-PSM support. These actions resulted in a correction of central SP stock levels and optimized district levels.

PMI the Global Fund procured over 90 percent of country malaria commodity needs for FY 2021 which will improve the stocks at central and district levels

Key Question 2

What are the trends in service delivery point stockout rates for ACTs (including ability to treat), RDTs, Art. Inj., and SP over the last year (if tracked)? Is there a seasonal or geographic difference in stockout rates?

The stockout rates for all products were at or below 10 percent in Quarter 4 of FY 2019. In the first quarter of FY 2020, Madagascar experienced delays of malaria commodity orders due to international logistics issues resulting from the COVID-19 pandemic. PMI coordinated with the Global Fund for an emergency delivery of AL and air shipment of injectable artesunate to improve the situation while waiting for the Global Fund and PMI orders to arrive. Deliveries of SP to facilities in Quarter 1 of 2020 were delayed; thus, IMPACT worked with the USAID ACCESS, the NMCP, and RBM partners to establish a push distribution plan to districts and SDPs . Note that injectable artesunate stock reporting in DHIS2 will start in Q2 FY 2021.

Key Question 3

What is the difference between quantities for ACTs consumed and malaria cases, and RDTs consumed and numbers tested? What is driving any differences seen?

Supporting Data

Figure A-17a. RDT Discrepancies Data

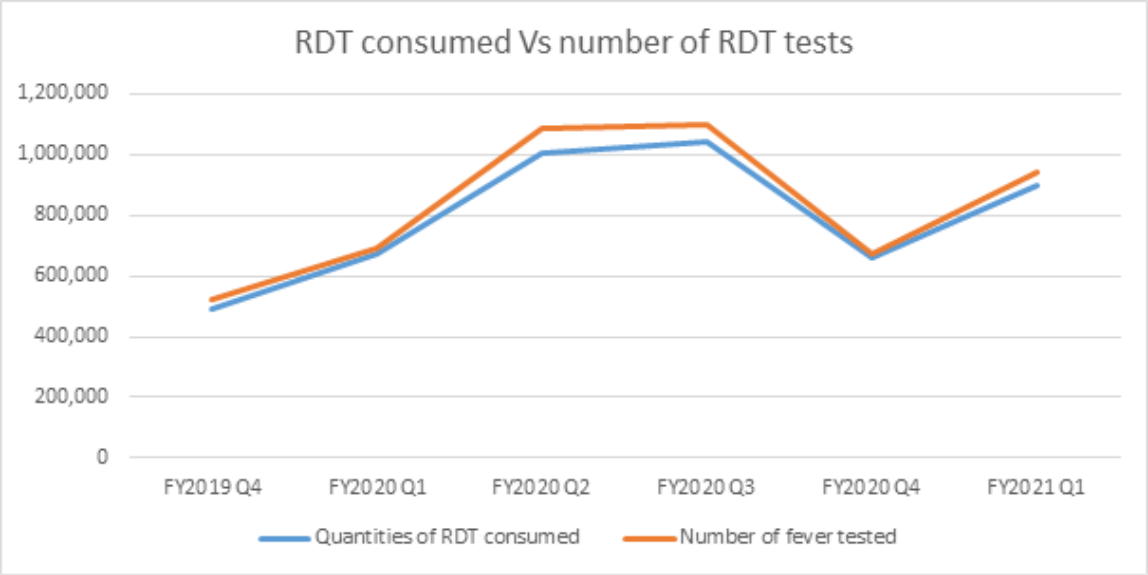
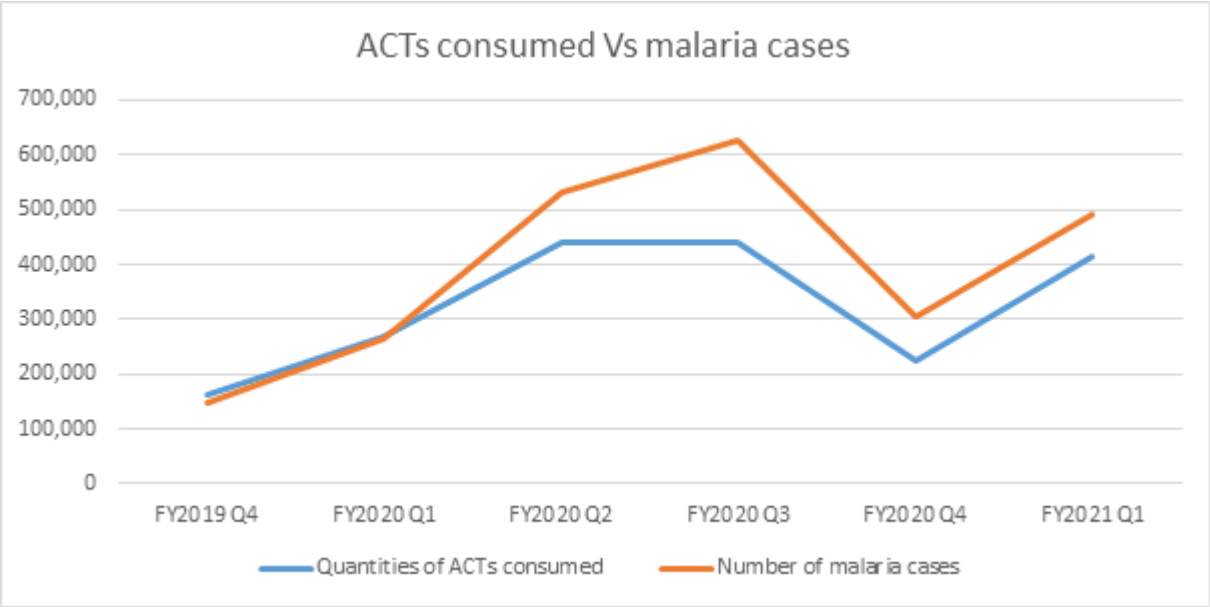


Figure A-17b. ACT Discrepancies Data



Despite global supply challenges, the fevers tested nearly matches RDTs consumed, reflecting good compliance with treatment guidelines.

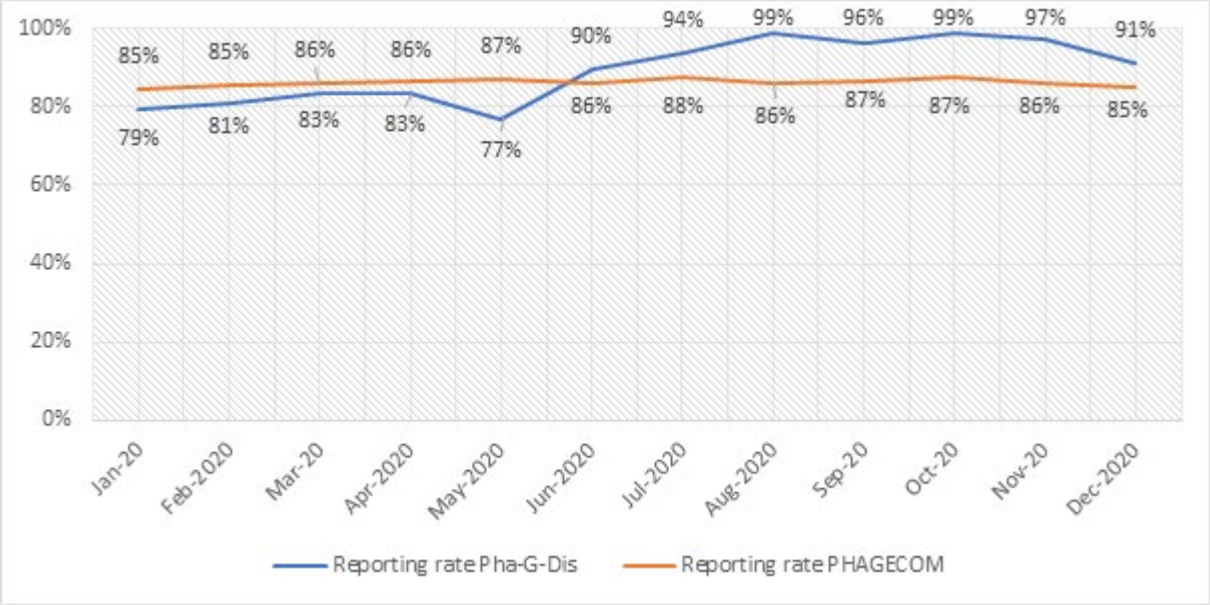
Global supply challenges due to COVID-19 delayed international shipments to Madagascar, which lowered central stocks of ACTs and impacted ACT availability at district, facility, and community levels, resulting in an increased discrepancy between malaria cases diagnosed vs ACTs consumed. However, by the fourth quarter of 2020, the discrepancy was narrowing.

Key Question 4

To what extent does a functional LMIS provide visibility into timely and quality logistics data from various levels of the system? To what extent is commodity data visibility dependent on surveys or supervisory data rather than routine data reported by an LMIS?

Supporting Data

Figure A-18. Evolution of Reporting rate at Pha-G-Dis



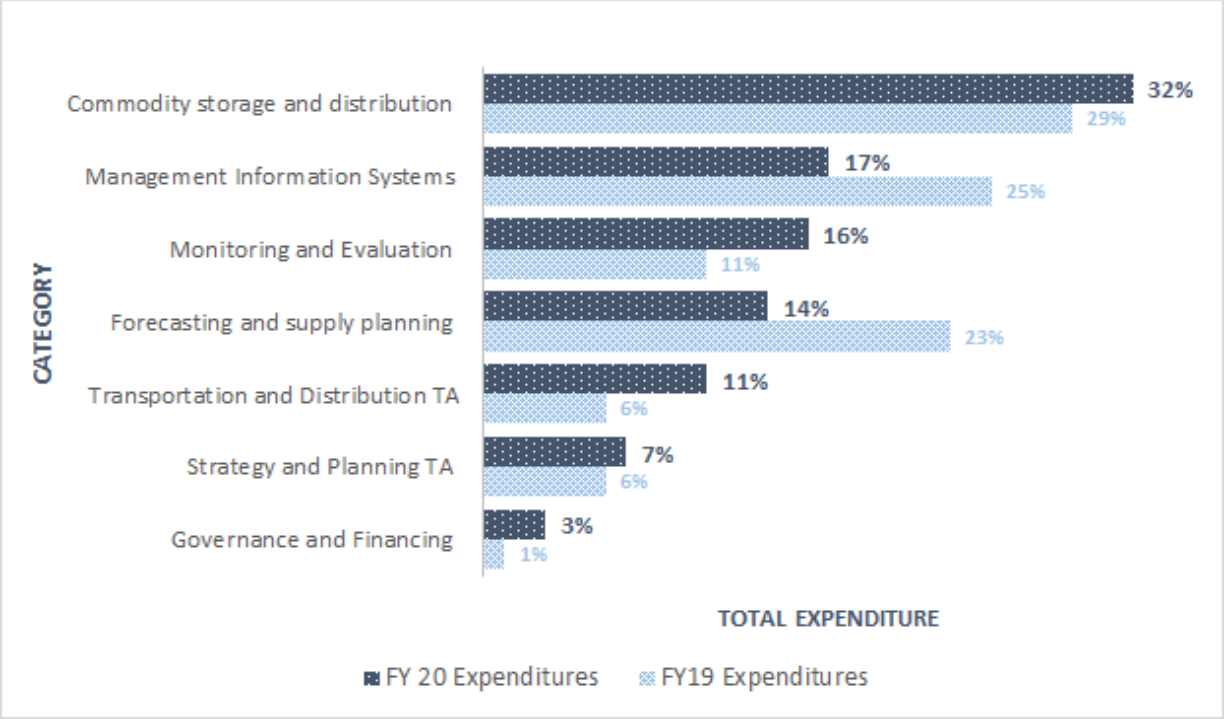
Comments:
The Pha-G-Dis report through the LMIS software Channel while the Pha-Ge-Com report through DHIS2. Pha-Ge-Com reporting rates remained consistently high through Quarter four of 2020. Pha-G-Dis reporting rates were slightly lower than Pha-Ge-Com in the first half of 2020, but improved later because: (1) a helpdesk installed at central level with support from IMPACT that issues automated reminders to Pha-G-Dis managers to submit LMIS data. The helpdesk also provides technical support for troubleshooting; (2) PMI and the Global Fund procured and distributed laptops to each Pha-G-Dis across the country (43 laptops procured by PMI and 35 laptops procured by the Global Fund were distributed in all 78 PMI supported districts; 37 other laptops procured by the Global Fund were distributed in the remaining districts).Though the Pha-G-Dis reporting rate has improved, reports are still not submitted on time. The deployment of DHIS2-interoperable, web-based LMIS software in the upcoming months will improve timely reporting.

Key Question 5

What are the main supply chain TA functions supported by PMI? Are there additional investments that PMI should make (e.g., increasing visibility of demand at health facilities) to ensure continual availability of quality products needed for malaria control and elimination at health facilities and the community level? In areas performing well, is it dependent on PMI/donor funding (e.g., PMI and Global Fund pay for warehousing and distribution)? Should more be done to foster self-reliance in domestic systems and, if so, what approaches should be considered?

Supporting Data

Figure A-19. PMI Supply Chain Investment by Technical Area



PMI, along with the Global Fund and other USAID health programs (e.g., maternal child health and family planning), fund supply chain TA at the central level. Through this PMI/Global Fund collaboration and leveraging of other USAID health programs, PMI supported annual forecasting and supply planning, in-country storage (at SALAMA), distribution (the biggest portion of TA funds) and LMIS efforts that are critical to maintaining commodity availability at health facilities and in communities. In addition, PMI supported training, supervision, warehousing, and distribution, including to the last mile as well as LMIS reporting at the district, health facility, and community levels. PMI also supports private sector engagement through a total market approach to mobilize additional resources, monitoring and evaluation (M&E), including biannual EUV, and stock management quality improvement. While procured commodities are distributed across the 114 districts by SALAMA, PMI focuses its supply technical assistance in 10 regions and in-country technical assistance is provided by a bilateral activity (IMPACT).

Key Question 6

There are no in-country considerations at this time.

Supporting Data

Conclusions for Supply Chain Investments

PMI will continue to leverage available resources to support the MOH to strengthen its supply chain management system and improve the availability of life-saving antimalarial commodities across the country. Despite this commitment, poor infrastructure, sustained insecurity in some high-burden regions of Melaky, Menabe, and Atsimo Andrefana constitute an ongoing challenge for malaria control, including establishing an efficient supply chain. As the Government of Madagascar continues to improve the security situation in these regions, the scale-up of innovations such as drone-based delivery will be critical. Finally, the investment in a DHIS2-interoperable LMIS tool will ensure that commodity data from community, CSB, district health management depots, and hospital pharmacies are collected, stored, analyzed, and accessible in DHIS2 for improved decision making.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.2. SURVEILLANCE, MONITORING, AND EVALUATION (SM&E)

NMCP Objective

Strengthen the SM&E system to provide high-quality data to guide response to malaria epidemics and decision-making. The NMCP target in the revised NSP 2018-2022 is to reach at least 95 percent of data completeness by 2022.

NMCP Approach

The NMCP places a high priority on building a robust SM&E system to inform decision-making.

NMCP approach related to surveillance includes:

- Strengthening the reporting system and improving the reporting rate of surveillance data.
- Enhancing the use of surveillance data to allow early detection of malaria epidemics and reduce delays in outbreak response.
- Ensuring preparedness to manage emergencies and malaria epidemics.

NMCP approach related to M&E includes:

- Encouraging and systematizing data use and dissemination at all levels.
- Improving data quality.
- Building SM&E capacity at the district and regional levels.
- Reinforcing management and coordination of M&E activities.

PMI Objective in Support of NMCP

PMI supports several aspects of the country's SM&E strategy aimed at improving capacity to conduct high-quality surveillance. Specifically, PMI supports:

- Periodic surveys and routine health information system (RHIS) strengthening via implementing partners and the RBM community.
- The integration of data systems to establish a comprehensive routine HMIS that is based on the DHIS2 platform,
- Training of SM&E personnel at all levels of the health system to support HMIS.
- Supporting the NMCP to analyze and interpret their surveillance data via implementing partners and to present these analyses to the RBM community for situational awareness.
- Implementing SM&E activities in two elimination pilot districts of Antsirabe II and Antsiranana I.

PMI-Supported Recent Progress (CY 2020)

PMI provided the following support in the previous 12–18 months:

- Extended the use of DHIS2 nationwide to integrate hospital and community data (facility data was introduced in 2019), and to increase malaria case response in elimination areas.
- Conducted cascade trainings from regional to community level on recently adopted monitoring and reporting tools including registers and monthly summary forms.
- Improved analysis and dissemination of health statistics, including weekly malaria epidemiology updates during RBM meetings, monthly bulletins with disease surveillance data, and quarterly bulletins summarizing malaria data
- Conducted data use meetings at regional level in Atsimo Andrefana and Vatovavy Fitovinany regions and systematized quarterly review meetings at district level leveraging the DHIS2 platform.
- Assessed RHIS data quality through Data Quality Assessment (DQAs) in three districts.
- Improved the reporting system through digital health for 146 health providers who received tablets and 1,058 CHVs who received smartphones in an effort to reduce delays in routine and surveillance report submission using the CommCare application.
- Assessed the Digital community health initiative in Madagascar. The findings are not yet available.
- Facilitated discussion between NMCP and the DVSSER to set up an integrated electronic disease surveillance system in Madagascar. Parallel surveillance systems are still implemented and funded by different donors in Madagascar. However, the public health community is building a consensus to develop one robust system
- Improved malaria surveillance at district level: disseminated malaria surveillance protocols to all 114 districts of Madagascar, established active surveillance in elimination district of Antsirabe II, integrated elimination surveillance data in DHIS2

PMI-Supported Planned Activities (CY 2021 with currently available funds)

- Provide training at decentralized levels on systematic data use of DHIS2 to inform decision-making.
- Provide supportive supervision for DHIS2 at regional and district levels.
- Develop the SM&E plan for the NSP 2023–2027.
- Improve interoperability between DHIS2 and other health systems (e.g., IDSR, LMIS) while waiting for the adoption of centralized surveillance data into DHIS2.
- Provide support to the coaching system to improve the quality of routine M&E and surveillance data.

- Provide technical support to conduct timely malaria outbreak and emergency response.
- PMI will pilot and support the tablet-based surveillance system at the facility level in two elimination districts, Antsirabe II and Antsiranana I. It will be used to inform the program and refine elimination activities.
- Identify high-risk populations in elimination districts.
- Support the monitoring of the LLIN mass campaign in 2021.

Key Goal

To support the NMCP to build their capacity to conduct surveillance as a core malaria intervention using high quality data from both surveys and routine health information systems.

Key Question 1

Which data sources are available to inform estimates of intervention coverage, service availability and readiness, and morbidity and mortality?

Supporting Data

Table A-20. Available Malaria Surveillance Sources

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Household Surveys	Demographic Health Survey (DHS)			X*			
	Malaria Indicator Survey (MIS)			X			P
	Multiple Indicator Cluster Survey (MICS)						
	EPI survey			X			
Health Facility Surveys	Service Provision Assessment (SPA)		X				
	Service Availability Readiness Assessment (SARA) survey	X					
	Other Health Facility Survey (MPR)		X		P		
	Quality of care Facility Survey				P		

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)		X		P		P
	Support to Parallel Malaria Surveillance System	X	X	X			
	Support to HMIS	X	X	X	P	P	P
	Support to Integrated Disease Surveillance and Response (IDSR)	X	X	X	P	P	P
	Support to Electronic Logistics Management Information System (eLMIS)	X	X	X	P	P	P
	Malaria Rapid Reporting System	X	X	X	P	P	P
Other	EUV	X	X	X	P	P	P
	School-based Malaria Survey			X		P	
	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey				P		P
	Malaria Impact Evaluation						
	Entomologic Monitoring Surveys	X	X	P	P	P	P
	Household Survey High Risk Population Assessment and Elimination Implementation Assessments			X			
	Malaria Market Assessment	X					
	Malaria Behavior Survey				*P		
	Preliminary studies on digital square project			X			

*X denotes completed activities and P denotes planned activities.

*P denotes pending additional funding

Conclusion

Available data support maintaining SM&E funding levels at the current amount. Due to the delay in data collection related to the current DHS, the next round of MIS is expected in 2024.

Key Question 2

What HMIS activities have been supported? What current priorities will be supported with FY 2022 MOP funding?

Supporting Data

PMI-supported HMIS activities include:

- Provided support to set up the DHIS2 as the national platform for health data storage and data visualization and contributed to its use among hospital, facility and community.
- Initiated data review at sub-national level leveraging DHIS2 dashboard and the WHO data quality tool.
- Initiated the use of DHIS2 tracker for surveillance data.
- Supported the MOH in the development and dissemination of new registers and summary forms.
- Supported DQA and training at all levels of the health system.

PMI-support to HMIS with FY 2022 MOP funding includes:

- Continued support to strengthen broader use of DHIS2 for data visualization and data quality check.
- Conduct data improvement activities including DQA and data validation.
- Facilitate data review workshop and disseminate data analysis as part of data-sharing.
- Support training on SM&E at lower levels of the health systems to improve decision-making.

Conclusion

HMIS activities were jointly undertaken by PMI and the Global Fund. By leveraging PMI and Global Fund resources, the MOH was able to maintain integrated surveillance activities among partners and stakeholders.

Key Question 3

Are there specific outcomes of past/current HMIS strengthening efforts that can be identified?

Supporting Data

Table A-21. Outcomes of HMIS Strengthening Efforts

	Indicator	2019	2020
Timeliness	% of reports received on time	57%	83%
Completeness	"Confirmed malaria cases for children under 5 years of age" was reported in X% of facility-months	69%	73%
Accuracy	Populate with most recent DQA data	67%	66%

Conclusion

Both timeliness and completeness of surveillance reports submitted on the HMIS improved from 2019 to 2020, but both fall short of the NMCP's goal of having 90 percent of reports being complete and on-time. Data accuracy remains below the NMCP target of 90 percent and still requires continued efforts to improve overall accuracy. As use of DHIS2 expands and integration of various surveillance systems onto DHIS2 continues, HMIS strengthening efforts remain crucial to improving malaria surveillance functionality. Timeliness, completeness, and accuracy should improve as integration of surveillance systems and adoption of DHIS2 solidifies.

Key Question 4

Are there any other considerations that impact your funding allocation in this category (e.g., strategic information or capacity building in-country)?

Supporting Data

There are no in-country considerations that impact funding for SM&E at this time.

Conclusions for SM&E Investments

PMI will continue to support SM&E activities to achieve the NMCP's goal of improved data integration, quality, completeness, timeliness, and use for advancing malaria prevention, control, and elimination.

Due to the COVID-19 pandemic, the DHS data collection was postponed to 2021. There was a need for new training for data collectors, which increased the initial activity budgeted cost, but with no implication to PMI budget support as this was fully covered by other USAID health programs and other donors.

A health facility survey at national level will be conducted in 2022 as part of the FY 2021 Reprogramming Request. It aims to assess the quality of care and the availability of services, and to check data quality in a national sample of facilities. The last facility survey was in 2018.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.3. OPERATIONAL RESEARCH

NMCP Objective

The NMCP objective for program evaluation (PE) and operational research (OR) is to provide evidence-based information to guide decision making and update policies.

NMCP Approach

The NMCP is revitalizing the malaria OR committee to update the country's research agenda in collaboration with malaria stakeholders and RBM partners.

PMI Objective in Support of NMCP

PMI support for program and policy-relevant OR and PE intends to:

- Test promising new tools and approaches for remote locations.
- Evaluate scale-up malaria interventions in remote areas.
- Identify local solutions to vector control and case management challenges.
- Identify effective combinations of interventions to reduce malaria transmission in remote areas.

PMI-Supported Recent Progress (CY 2020)

PMI supported the NMCP and the Institut Pasteur de Madagascar to complete a baseline survey for an OR study in Farafangana District to test the feasibility and effectiveness of expanding community case management of malaria to all ages. Analysis of the baseline survey is complete, and a manuscript is being prepared. In October 2020, the OR intervention began and will continue through December 2021. In October–December 2021, an endline survey will be done and data analysis will begin. This study is funded with FY 2018 country funds, and FY 2018 PMI core funds. Pending the results of the OR study, donors, including PMI, may adjust community activities to expand the community case management to all ages in non-study areas.

PMI-Supported Planned Activities (CY 2021 with currently available funds)

PMI/Madagascar is proposing to conduct preliminary feasibility assessments and an OR pilot in two districts to reduce remaining malaria transmission and disease burden in transition zones (those that bridge elimination-targeted districts and high-transmission districts) and in select high-burden districts via vector control activities.

PMI Goal

PMI will conduct PE/OR to evaluate coverage of at-risk populations, intervention quality, or delivery efficiency. Studies may include interventions to reduce malaria transmission and disease burden, to test the effectiveness of new or evolved priority interventions and strategies, or to explore new metrics and mechanisms to assess intervention impact.

Key Question 1

In consultation with the NMCP, have technical challenges or operational bottlenecks in program interventions been identified that require PE/OR? How have they been prioritized?

Supporting Data

A care-seeking behavior survey conducted in 2017 revealed that reasons for delays in seeking care for febrile illness include distance from health centers. Thus, the NMCP prioritized studying the efficacy and feasibility of expanding the age of malaria case management provided at the community level. A baseline survey for a cluster-randomized trial to determine feasibility and effectiveness of this strategy has been completed. After delays due to the COVID-19 pandemic, the study was launched in October 2020 and is ongoing.

Madagascar has also experienced focal malaria outbreaks in coastal and fringe areas of the country during 2017-2020, including in areas bordering elimination districts. The NMCP is interested in exploring new strategies for vector control in areas experiencing these outbreaks.

Table A-22. Ongoing Program Evaluation and Operational Research

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
PMI	Institut Pasteur de Madagascar	Feasibility of malaria community case management for all ages	Ongoing; intervention completion December 2021
PMI	Vector Link	Feasibility of Larval Source Management	2021–2022

Key Question 2

Are there specific challenges in any intervention areas that merit further exploration or research with the potential of establishing strategies or interventions applicable in the near future?

Supporting Data

Findings from the larval source management (LSM) evaluation will be used to modify or extend LSM activities. The OR/PE budget for the FY 2022 MOP contains limited funds for additional LSM, if the pilot has promising results.

Key Question 3

Are there any other considerations that impact your funding allocation in this category?

There are no specific in-country concerns impacting this funding allocation.

Conclusions for Program Evaluation and Operational Research Investments

To address malaria outbreaks in Madagascar and describe the feasibility of improving access to care in remote areas, the NMCP is studying new strategies for case management at the community level (extension of community case management for all ages and scale-up of ProCCM) and for vector control (feasibility of LSM).

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.4. SOCIAL AND BEHAVIOR CHANGE (SBC)

NMCP Objective

The NMCP supports the national SBC plan which is an essential component integrated in its Malaria NSP 2018-2022. The objective of this plan is for at least 90 percent of the target population to adopt correct practices and behaviors conducive to malaria prevention and early prompt care-seeking.

NMCP Approach

The NMCP SBC approach includes engaging multiple stakeholders and using diverse communication tools to reach the largest possible range of the population with effective malaria prevention and control messages. Elements of the NMCP SBC approach include:

- Engagement of multiple stakeholders:
  - Inclusion and engagement of Government of Madagascar ministries, including the Ministry of National Education and the Ministry of Population and the Promotion of Women for multisectoral advocacy at all levels
  - Strengthen partnership and engagement with community leaders, traditional healers, and religious groups through community dialogue
  - Community participation via CHVs and health facility workers in planning and delivering key messages
  - Engagement with private sector providers
- Use of diverse communication tools, methods, and channels:
  - Creation of SBC materials in collaboration with the Ministry of Education for use in primary and secondary schools
  - Development of standardized SBC messages, job aids, and materials targeting pregnant women, young children, and household members.
  - Development of strategies to reach older children in and out of school settings
- Coordination of SBC activities via the SBC Coordinating Committee:
  - Update the National SBC Plan
  - Coordinate SBC activities, harmonize materials and messages, validate communication
- Integration of the national Malaria SBC Plan within the MOH Communication Plan:
  - Alignment with national strategic plans
  - Utilization of approved SBC tools and materials
  - Guidance for the implementation of SBC activities

- M&E
  - Conduct remote monitoring as adaptation to COVID-19 pandemic
  - Site visit monitoring
- Communication in the crisis-emergency situation

PMI Objective in Support of NMCP

PMI supports the NMCP's objective to develop technically sound SBC plans, tools, and evaluations. PMI also aims to strengthen the NMCPs technical and organizational capacity to advance their SBC objectives. PMI's SBC support to the NMCP compliments that of the Global Fund.

PMI-Supported Recent Progress (CY 2020)

In the past ~12 months, PMI and PMI partners supported the following SBC activities:

- Supported the launch of the MOPH's integrated SBC strategy, Be M'Ray, an umbrella communication strategy that incorporates key health behavior messaging, including malaria prevention.
- Developed communication materials for malaria elimination districts to guide SBC interventions.
- Designed messages, tools, and job aids to guide correct use of rectal artesunate among CHVs and providers.
- Promoted school-based SBC activities to identify households that need ITNs and strengthened communication outreach for continuous community distribution.
- Community mobilization:
  - Supported CHVs to improve ANC attendance and IPTp uptake through interpersonal communication and health center referrals; and home visits to encourage the proper use and maintenance of ITNs
- Supported SBC activities to increase IRS acceptance and optimum coverage:
  - Prepared for the 2020 IRS campaign to educate communities and reduce IRS refusals
  - Engaged and trained community leaders and actors
  - Adapted SBC materials and disseminated them through multiple channels
  - Launched "The Best District for the 2020 IRS campaign" contest to recognize the district with the lowest refusal rate.
- Supported communication events such as World Malaria Day at national and district levels.
- During World Mosquito Day, conducted a virtual handover ceremony for antimalarials commodities from the USG to the MOPH
- Integrated refresher training for community actors in behavior change communication.
- In collaboration with the Global Fund:
  - Supported school actors' mobilization in primary schools under the *friends-of-malaria-prevention* initiative to encourage prompt care seeking and proper ITN use and care
  - Began expansion of the *friends-of-malaria-prevention* initiative from 23 to 41 districts
  - Developed and disseminated CHV guides for community dialogue
- Supported the gradual integration of SBC activities that include malaria in the DHIS2 platform with integration of community-level DHIS2 data.

PMI-Supported Planned Activities (CY 2021 with currently available funds)

PMI will continue to support a range of communication activities to influence the adoption of desired malaria prevention and treatment behaviors (e.g., proper ITN use, care and maintenance; IPTp uptake; IRS acceptance; and prompt care-seeking for fever). Some of these activities include:

- Development and review of SBC strategy for the National Malaria Strategic Plan NSP 2023-2027.
- Modification of SBC strategies based on analysis of the DHS 2021 data.
- Prepare to support an evaluation of malaria SBC activities (Malaria Behavioral Survey)
- Community-based behavior change interventions:
    - Support for home visit programs, community meetings, materials for school-based activities
    - Support for targeted malaria prevention and control strategies, including:
        - SBC for proper ITN use and care, the 2024 mass distribution campaign, continuous community distribution, and routine distribution
        - SBC support for IRS
        - SBC for the use of rectal artesunate for pre-referral treatment of severe disease among children under five years of age in targeted districts
        - Enhanced communication for malaria prevention in districts in which IRS was recently discontinued
        - Implementation of prevention messages and activities in elimination districts
        - Reinforce SBC for malaria in the context of the Covid-19 pandemic
    - Support for new malaria prevention and control strategies, including:
        - SBC activities to support school-aged children
        - SBC in conjunction with larviciding activities
    - Advocacy:
        - Strengthen collaboration with the private sector
        - Coordination with various actors to ensure detection, treatment, follow-up of cases in elimination districts
    - Support for an enhanced communication during events such as World Malaria Day and World Mosquito Day
- Support mobilization in primary schools under the *friends-of-malaria-prevention* initiative.
- Develop and review job aids, materials, media outreach strategies (e.g., radio and TV spots) to guide the implementation of SBC interventions including in elimination districts.
- Develop messages for the proper use and care of PBO ITNs.

Key Goal

Through the use of SBC interventions and in alignment with the country's national malaria control communication strategy, PMI supports the uptake and correct and consistent use of malaria interventions, thereby improving the overall quality of malaria control efforts that will contribute to reductions in malaria.

Key Question 1

What behaviors is PMI proposing to prioritize through its SBC programming? What data support this prioritization? Will support be geographically targeted or national?

PMI/Madagascar plans to prioritize the following behaviors, in line with the priorities of the NMCP.

Table A-23. Prioritized Behaviors with FY 2022 Funds

Behavior	Target Population	Geographic Focus	Justification
Early ANC Attendance and IPTp Acceptance	Pregnant women	10 regions	Only 10% of pregnant women reported taking 3 doses of IPTp during their routine antenatal visits. From a recent situational analysis conducted between (April 2019 to March 2020) on low IPTp3 it was noted that 14 districts had IPTp3 lower than 35%, and that CSB staff are not systematically providing IPTp to pregnant women during ANC visits. In 2020, the reported average rate of women attending at least one antenatal clinic was 69%. Partner reports
Care-seeking within 24 hours of signs and symptoms	Parents and caretakers of children	10 regions	Site visit monitoring reported that two-thirds of malaria deaths were among children under 15 years of age. As noted under the Case Management Section, prompt care-seeking is generally perceived as a social norm in Madagascar, yet prompt care-seeking in the formal health sector remains low for children with febrile illness and self-medication is not uncommon. This reflects the fact that the use of health centers is rare and considered only in the case of severe illness, a decision that is influenced by the perceived quality of the care received, the relationship with the provider, the type of information provided, the effectiveness of the treatments received during the previous consultations, the length of the waiting time, and the presence of service providers at facilities.
Consistent ITN use and maintenance	All household members	10 regions	As mentioned above in the ITN section, Madagascar has a high rate on ITN access and use. There are efforts needed to maintain those along with the maintenance of ITNs

Key Question 2a

For early ANC attendance and IPTp acceptance what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

Per a recent partner report, IPTp3 rates increased from 43 percent of pregnant women that attended ANC in Q1 FY 2020 to 49 percent in Q4 FY 2020. SBC interventions will be tailored to maintain and increase that behavior.

There continues to be a lack of understanding regarding the dangers of malaria in pregnancy and understanding of the efficacy of IPTp. In addition, many women prefer to seek care with traditional birth attendants for reasons of comfort, convenience, proximity, cost, and lack of trust in healthcare providers. Fear of potential exposure to COVID-19 during ANC or malaria consultations for malaria infection has created an additional barrier to care-seeking among pregnant women.

Key Question 2b

For care-seeking within 24 hours of signs and symptoms, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

Health facility use is rare among some populations and is often only considered in cases of severe illness. This is due to the perceived poor quality of the care, lack of trust in service providers, and preference for self-medication. There is also a preference to seek care from traditional healers. Barriers to care-seeking include lack of transportation, cost, and concern about bandits on the roads. Staffing shortages result in facilities that have no providers. (Source: partner reports/Human-Centered study Jan –Mar 2020)

Fear of potential exposure to COVID-19 during consultations for malaria infection has created another barrier and reduced care-seeking for malaria.

Key Question 2c

For consistent ITN use and maintenance, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

Madagascar has a strong culture of ITN access and use with use targets typically being met. SBC efforts are aimed at maintaining use and improving proper care.

Key Question 3

What is the country's capacity to design, implement, and monitor SBC interventions at the national and sub-national level?

Supporting Data

The NMCP identified a need to evaluate SBC interventions to understand their impact on malaria indicators, and to assure that SBC activities have specific measurable objectives that can be adapted to local needs. The NMCP also indicated a need to improve their capacity to monitor the effectiveness of SBC interventions.

Conclusions for SBC Investments

- For FY 2022, PMI will support three malaria priority areas: increasing early and regular ANC attendance and IPTp uptake, improving prompt care seeking for febrile illness, and increasing ITN use and care. PMI will support SBC efforts to improve uptake of these prevention and control efforts via bilateral partners. These activities include community mobilization for school-aged children not attending school, home

visits, radio spots adapted to local situations, mobilizing schools, and community dialogues that include traditional leaders and key community members.
- As part of the design and evaluation of the SBC activities, PMI will support the NMCP to incorporate the recommendations from the MBS results. In addition, iSupport SBC activities addressing expansion of community-level services to include malaria case management for children over five by CHVs.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.5. OTHER HEALTH SYSTEMS STRENGTHENING

NMCP Objective

The NMCP HSS objective is to build capacity to effectively implement the national malaria strategy and meet its goal of progressive elimination of malaria in Madagascar.

NMCP Approach

- Enhance collaboration with all MOH directorates, other government ministries, donors, and the private sector to strengthen the public health system across the country.
- Improve NMCP leadership, technical and organizational capacity.
- Enhance in-country coordination through functional RBM and technical working groups platforms.
- Investment in surveillance and operational research with support from PMI and the Global Fund to inform policy and strategies.

PMI, through partnerships with implementing partners, including Vector Link, Impact, and Access, has historically engaged with the U.S. Peace Corps to support health systems strengthening, and plans to resume that. when volunteers return.

PMI-Supported Recent Progress (CY 2020)

- Rolled-out the implementation of Leadership Development Program Plus (LDP+) for NMCP division heads. LDP+ promotes team-based health planning by (1) identifying the challenges to achieving defined objectives and (2) finding and implementing local solutions (within the regulatory framework and according to national protocols) to overcome them.
- Supported the NSP 2018-2022 midterm review and development of the revised strategy along with an M&E plan.
- Supported one malaria Resident Advisor (PMI Measure Malaria) embedded with the NMCP.
- Supported the functioning of malaria technical working groups including: elimination, national ITN campaign coordination committee, malaria supply chain management committee at national, regional and district levels, surveillance and malaria total market approach sub-group.
- Supported the NMCP to lead a TES in two districts, with plans for a G2G collaboration with USAID and PMI.
- Training NMCP staff on planning and implementation of operational research as well as on writing scientific papers.

- Due to the COVID19-epidemic, the Peace Corps volunteers have been repatriated and all activities have been suspended.

PMI-Supported Planned Activities (CY C2021 with currently available funds)

- Continue the implementation of LDP+ for NMCP division heads.
- Support malaria program review and development of the new NSP 2023-2027 along with an M&E plan.
- Continue supporting the malaria Resident Advisor (PMI Measure Malaria) embedded within the NMCP.
- Continue to support the functioning of malaria technical working groups.
- Initiate a G2G mechanism with the NMCP to lead a TES in two districts and other relevant activities.
- Continue to support various trainings based on NMCP needs.
- PMI will continue to collaborate with the Peace Corps in their support of SBC activities. These activities will be funded through the existing pipeline of previous fiscal years resources and new FY 2022 funding.

Conclusions for Additional Health Systems Strengthening Investments

PMI will continue to support leadership development at the NMCP and their efforts to improve coordination among MOH departments and external partners.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.