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Mozambique

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

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BMGF	Bill & Melinda Gates Foundation
CBO	Community-based organization
CDC	U.S. Centers for Disease Control and Prevention
CDC-LT	CDC light trap
CHW	Community health workers
CMAM	Central medical stores
CY	Calendar year
DHS	Demographic and Health Survey
DQA	Data Quality Assurance
EIR	Entomological inoculation rate
EPI	Expanded Program for Immunization
FELTP	Field Epidemiology Laboratory Training Program
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GOM	Government of Mozambique
HLC	Human landing catch
HMIS	Health Management Information System
HSS	Health system strengthening
IEC	Information, education, and communication
iMISS	Integrated Malaria Information Storage System
IPC	Interpersonal communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LMIS	Logistics management information systems
M&E	Monitoring and evaluation
MCH	Maternal and child health
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
mRDT	malaria RDT
NHS	National Health Service
NMCP	National Malaria Control Program

NMSP	National Malaria Strategic Plan
OR	Operational research
PBO	Piperonyl butoxide
PE	Program Evaluation
PELF	Strategic Plan for Pharmaceutical Logistics
PMI	U.S. President's Malaria Initiative
PSC	Pyrethrum spray catch
Q	Quarter
QA	Quality assurance
QC	Quality control
RDT	Rapid diagnostic test
SBC	Social and behavior change
SDP	Service delivery point
SIGLUS	*Sistema de Informação de Gestão Logística das Unidades Sanitária*
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TA	Technical assistance
UNICEF	United Nations International Children's Emergency 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 Mozambique to end malaria. PMI has been a proud partner of Mozambique since 2007, helping to decrease child death rates by 37 percent and increasing the percent of children under five years of age who sleep under insecticide-treated nets from 7 percent in 2007 to 73 percent in 2018 through investments totaling almost $414 million.

The proposed PMI fiscal year (FY) 2022 budget for Mozambique is $27.5 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Mozambique 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 Mozambique (GOM) as well as other donors and partners.

Malaria is endemic in Mozambique and the entire population is at risk of contracting the disease. Most of the country has year-round malaria transmission with a seasonal peak during the rainy season, usually from December to April. National malaria incidence increased by 64 percent from 2015 to 2019, with 226 cases per 1,000 population in 2015 to 372 cases per 1,000 population in 2019. In 2020, malaria incidence was estimated at 368 cases per 1,000 population. The number of reported hospital malaria deaths decreased from 2,337 in 2015 to 563 in 2020. Malaria prevalence among children 6 to 59 months of age remained stable at around 40 percent from 2011 to 2018.

PMI supports investments in the following intervention areas which will continue with FY 2022 funds:

- Vector Control
  - Entomological monitoring, insecticide treated nets (ITNs), and indoor residual spraying (IRS)
    - PMI supports year-round entomological data collection at sentinel sites throughout the country, along with IRS residual efficacy monitoring and annual insecticide resistance testing as part of supported IRS activities.
    - PMI supports the direct implementation of IRS in five districts of Zambezia, which provided malaria protection to 1,619,088 inhabitants in calendar year (CY) 2020.
    - Although procurement of ITNs has shifted from PMI to the Global Fund, PMI has continued to support distribution of ITNs from the regional to the subregional level.
    - With FY 2022 funds PMI will maintain the current breadth of vector control support.
- Human Health
  - Case Management
    - PMI and the Global Fund together continue to purchase all rapid diagnostic tests (RDTs) and artemisinin-based combination therapy (ACT) treatments needed in the country. In CY 2020 PMI supported procurement of 16 million RDTs, 17 million ACTs, and 700,000 injectable artesunate vials.

        - At the provincial and district level, PMI supports health facility supervision visits. In CY 2020 this included 1,693 health providers from 88 health facilities in 86 districts.
        - PMI continues to prioritize the procurement of case management commodities and the implementation of the integrated supervision platform. This includes direct implementation support to the GOM.
        - PMI continues to prioritize improving community health worker (CHW) malaria commodity access and strengthening service provision for the remote populations that they target.
    - Drug-based Prevention (Malaria in Pregnancy)
        - In CY 2020 PMI supported training and supervision of 464 maternal and child health (MCH) nurses in malaria in pregnancy (MIP) interventions in the four target provinces of Nampula, Zambezia, Cabo Delgado, and Tete and procured and distributed 1.2 million tablets of sulfadoxine-pyrimethamine (SP).
        - With FY 2022 funds PMI will continue to prioritize the implementation of the integrated supervision platform to strengthen MIP interventions. This includes direct implementation support to the GOM. The procurement of SP will be transitioned to the GOM.
- Cross-cutting and Other Health Systems
    - Supply Chain
        - PMI continues to support the supply chain system through provision of technical assistance (TA) and warehousing and distribution of malaria commodities.
        - PMI also continues support for the expansion of the health facility logistic management information system (SIGLUS). As of January 2021, 75 percent of health facilities in Mozambique were actively reporting logistics information into SIGLUS.
        - With FY 2022 funds PMI will continue to support strengthening the supply chain system and will support last mile distribution of malaria commodities with a particular focus on CHW commodity availability.
    - Surveillance, Monitoring, and Evaluation (SM&E)
        - PMI support for SM&E includes implementation of data quality assurance (DQA) exercises during integrated malaria supervision visits. In CY 2020 PMI supported refresher training to 634 district staff in Nampula, Zambezia, Cabo Delgado, and Tete. PMI also supported the rollout of the integrated Malaria Information Storage System (iMISS).
        - With previous year funding, PMI also invested in the initiative's Malaria Data Integration and Visualization platform and digital health efforts.
        - With FY 2022 funds PMI will continue to support the implementation of routine SM&E activities and the rollout of iMISS, with a focus on data quality and the use of data for decision-making. PMI will include implementation support to the GOM for implementation of the national integrated malaria supervision visits and associated data quality assurance exercises.
    - Program Evaluation (PE) and Operational Research (OR)
        - PMI recently supported the implementation of what was originally designed as a cluster randomized social behavior change intervention study. However, due to the COVID-19 pandemic only baseline data were collected; a detailed analysis of that data is ongoing.
        - There are no planned PMI-supported OR projects.

- Social Behavior Change (SBC)
  - PMI continues to support the implementation of a combination of SBC interventions through community-based organizations (CBOs) and community radio stations, including mass media activities and interpersonal communication activities. Despite the restrictions caused by the COVID-19 pandemic, in CY 2020 PMI supported the implementation by CBOs of dialogues with 165,673 community participants. PMI also supported health talks at health facilities that reached 417,276 participants and in communities that reached 389,347 participants.
  - With FY 2022 funds PMI will continue to support the implementation of SBC interventions by CBOs and media in the provinces of Nampula, Zambezia, Manica, and Cabo Delgado. The overall financial investment is a slight expansion, reflecting the growing importance of SBC in facilitating appropriate access and use of the other priority investments such as RDTs and IRS.
- Health System Strengthening (HSS) general/other
  - PMI continues to provide technical and financial support for Field Epidemiology Laboratory Training Program (FELTP) residents.
  - In CY 2020, due to the evacuation of Peace Corps volunteers during the COVID-19 pandemic, PMI was not able to continue support to Peace Corps volunteers to implement malaria-related interventions.
  - In FY 2022, PMI will continue to support the FELTP and will resume its support to the Peace Corps. PMI will also continue to support data analysis and use at the central, provincial, and district level. Additionally, PMI will support system resilience to emergencies through TA for the new NMCP strategic plan and for malaria emergency response plan.

Mozambique's National Malaria Strategic Plan (NMSP) objectives and activities are well-aligned with the PMI priorities. The goals of the Mozambique NMCP, as described in the 2017–2022 NMSP, are to reduce malaria morbidity and mortality at the national level by at least 40 percent by 2022 from the levels observed in 2015. To reach this vision, the NMSP includes the following six objectives:

1. Program Management – Strengthen program management skills at the central, provincial, and district levels to achieve the Strategic Plan objectives by 2022.
2. Prevention – Provide at least 85 percent coverage of the population with a minimum of one vector control intervention in every district of the country by 2022.
3. Case Management – Test 100 percent of suspected malaria cases and treat 100 percent of confirmed malaria cases at the health facility and community level by 2022, as per national guidelines.
4. SBC – Implement an effective SBC approach to ensure at least 70 percent of people seek appropriate and timely healthcare and at least 85 percent of the population uses an appropriate protection method by 2022.
5. Elimination – Accelerate efforts toward malaria elimination by implementing epidemiologically appropriate interventions by 2022.
6. SM&E – Strengthen the surveillance system so 100 percent of health facilities and districts are reporting complete, timely, and quality data by 2022.

1. 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 Mozambique to end malaria. PMI has been a proud partner of Mozambique since 2007, helping to decrease child death rates by 37 percent and increasing the percent of children under five years of age who sleep under insecticide-treated nets from 7 percent in 2007 to 73 percent in 2018 through investments totaling almost $414 million.

The proposed PMI fiscal year (FY) 2022 budget for Mozambique is $27.5 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Mozambique 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 Mozambique (GOM) as well as other donors and partners.

Mozambique at a Glance

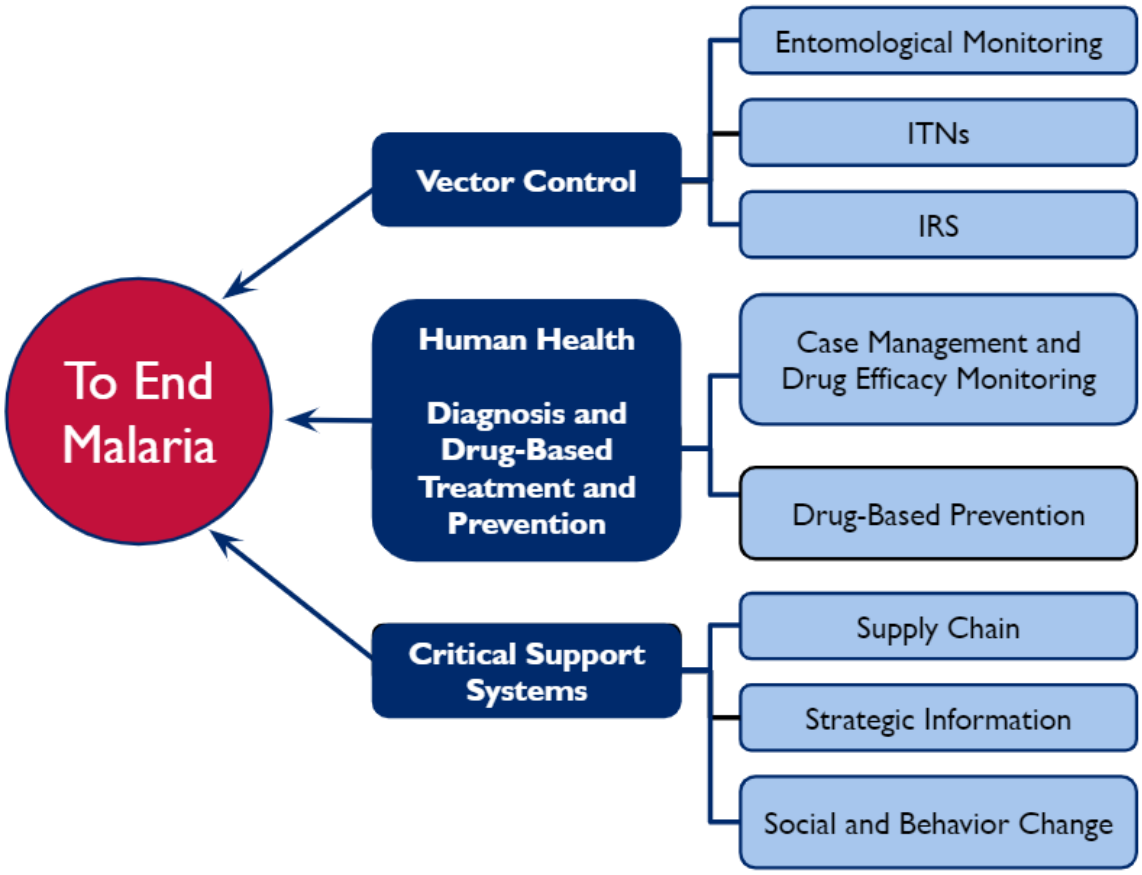
- **Geography:** 309,500-square-mile country that borders Tanzania, Malawi, Zambia, Zimbabwe, South Africa, and Eswatini and has a 1,600-mile coastline; divided into 11 provinces, including the capital of Maputo City
- **Climate and Malaria Transmission Seasonality:** subtropical and tropical with wet season primarily from October to March
- **Population in 2021:** 31,780,302 (Ministry of Health, 2020)
- **Population at Risk of Malaria:** 31,780,302 (Ministry of Health, 2020)
- **Principal Malaria Parasite:** *Plasmodium falciparum* (Mozambique SBC Protocol, 2019)
- **Principal Malaria Vectors:** *Anopheles gambiae* s.s., *An. arabiensis*, and *An. funestus* s.s. (National Malaria Control Program, 2020)
- **Malaria Case Incidence per 1,000 Population:** 368 (National Malaria Control Program, 2020)
- **Under-Five Mortality Rate:** 77 (https://databank.worldbank.org/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=MOZ)
- **World Bank Income Classification and GDP:** Low income; $15.29 billion (https://data.worldbank.org/?locations=MZ-XM)
- **Government Health Budget:** $362.8M
- **Trafficking in Persons Designations, 2018–2020:** Tier 2 (https://www.state.gov/reports/2020-trafficking-in-persons-report/mozambique/)
- **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)
- Bill & Melinda Gates Foundation (BMGF)
- Unitaid

- **PMI Support of National Malaria Control Strategy:** PMI worked closely with the NMCP in drafting the National Malaria Strategic Plan (NMSP). The plan objectives and activities are well-aligned with the PMI priorities. PMI provides direct support for all intervention areas described in the NMSP with the exception of elimination because there is complementary regional donor support in this area. (See III. Overview of PMI's support of Mozambique's Malaria Control Strategy for additional details.)
- **PMI Investments:** Mozambique began implementation as a PMI focus country in FY 2007. The proposed FY 2022 PMI budget for Mozambique is $27.5 million; this will bring the total PMI investment to nearly $442 million.

PMI organizes its investments around the activities below, in line with the Mozambique NMSP 2017–2022.

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



Building and strengthening the capacity of Mozambique'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/Mozambique will continue to rely on and engage with local partners such as *Programa Inter-Religiosa Contra a Malaria* and is expanding its local partner base to include provincial governments. Finally, PMI/Mozambique will work with the NMCP to continue to build upon private sector partnerships such as with Exxon-Mobil.

To accelerate sustainable development, PMI developed a programmatic inventory to assess the strengths and persistent challenges of Mozambique's program (see Annex B). The activities proposed in this MOP are tailored to draw on these strengths and address weaknesses; activities will be monitored to evaluate the effectiveness of

[1]A number of actions are cross-cutting 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 fieldwork, 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.

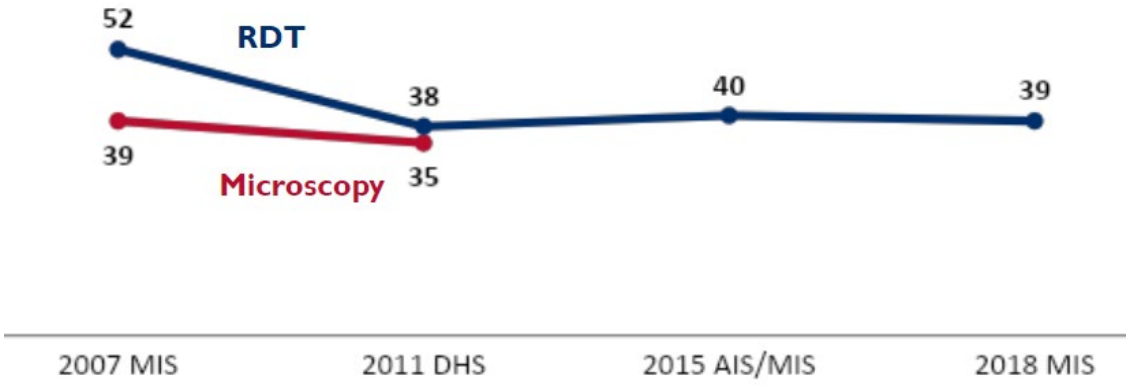
capacity-building efforts. In addition, while PMI understands it will take time for Mozambique to fully finance its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Mozambique's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND PROGRESS

Malaria is endemic in Mozambique and the entire population is at risk of contracting the disease. Pregnant women and children under five years of age have the greatest risk of developing severe malaria. *Plasmodium falciparum* accounts for 90 percent of all malaria infections, while *Plasmodium malariae* accounts for 9 percent and *Plasmodium ovale* for 1 percent. In 2020, malaria accounted for approximately 26 percent of all outpatient consultations with over 11 million cases diagnosed in public health facilities and communities. Since 2015, the number of reported malaria cases nationwide has increased each year, but there are important differences throughout the country. Gaza, Maputo City, and Maputo Province have reported decreases in cases, but large increases have been noted in Manica, Zambezia, and Nampula. Malaria incidence increased by 64 percent from 2015 to 2019 with 226 cases per 1,000 population in 2015 and 372 cases per 1,000 population in 2019. In 2020, malaria incidence was estimated at 368 cases per 1,000 population. The number of reported hospital malaria deaths decreased from 2,337 in 2015 to 563 in 2020. Malaria prevalence among children aged 6 to 59 months remained stable from 2011 to 2018 at around 40 percent, but the prevalence of low hemoglobin in the same ages increased from 9 percent in 2011 to 14 percent in 2018. Data from the 2018 Malaria Indicator Survey (MIS) showed that malaria prevalence varies across the country. Prevalence is higher in the Northern and Central regions (ranging from 29 percent in Sofala to 57 percent in Cabo Delgado) and lower in the Southern region (ranging from 1 percent in Maputo city to 35 percent in Inhambane).

Figure 2. Trends in malaria prevalence*

Children 6 to 59 months of age who tested positive for malaria by microscopy/RDT 2007–2018



*Demographic and Health Surveys (DHS) and multiple indicator checklist surveys (MICS) 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.

Figure 3. Malaria prevalence by geographic area

Children 6 to 59 months of age who tested positive for malaria by RDT [2018 MIS]

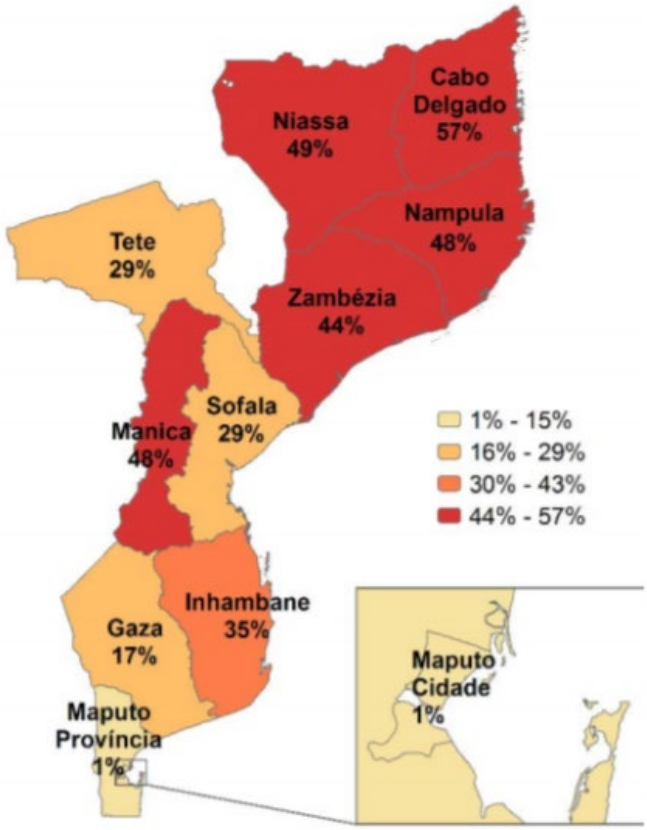


Table 1. Key indicators for malaria prevention and treatment coverage and impact indicators from DHS and MIS for 2007–2018

Indicator	2007 MIS	2008 MICS	2009 INSIDA*	2011 DHS	2015 IMASIDA**	2018 MIS
% Households with at least one ITN	N/A	N/A	N/A	N/A	N/A	N/A
% Households with at least one ITN for every two people	N/A	N/A	N/A	N/A	N/A	N/A
% Population with access to an ITN	N/A	N/A	N/A	37	54	69
% Population that slept under an ITN the previous night[1]	N/A	N/A	N/A	30	45	68
% Children under five years of age who slept under an ITN the previous night[1]	7	23	49	36	48	73
% Pregnant women who slept under an ITN the previous night[1]	7	N/A	N/A	34	52	76
% Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought[2]	36	N/A	N/A	56	63	69
% Children under five years of age with a fever in the last two weeks who had a finger or heel stick	N/A	N/A	N/A	30	40	48
% Children receiving an ACT among children <5 with a fever in the last two weeks who received any antimalarial drug	N/A	N/A	N/A	60	93	99
% Women who received two or more doses of intermittent preventive treatment for pregnant women (IPTp) during their last pregnancy in the last two years[3]	16	43	33	20	35	61
% Women who received three or more doses of IPTp during their last pregnancy in the last two years[3]	N/A	N/A	N/A	N/A	23	41
Under five years of age mortality rate per 1,000 live births	N/A	N/A	N/A	64	N/A	N/A
% Children under five years of age with parasitemia by microscopy[1]	38	N/A	N/A	35	N/A	N/A
% Children under five years of age with parasitemia by RDT[1]	51	N/A	N/A	38	40	39
% Children under five years of age with severe anemia (Hb<8gm/dl)	12	N/A	N/A	9	8	14

[1]DHS and MICS are generally fielded during the dry season, whereas MIS are deliberately fielded during the high-transmission season, which should be taken into consideration when interpreting these indicators.

[2]Note that this indicator has been recalculated according to the newest definition, the specified number of doses of sulfadoxine-pyrimethamine (SP) (Fansidar) from any source wherever possible.

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

* National Survey on the Impact of HIV and AIDS in Mozambique

** Survey of Indicators on Immunization, Malaria, and HIV/AIDS in Mozambique

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

Indicator	2016	2017	2018	2019	2020
# Suspect malaria cases[1]	NA	NA	NA	19,776,616	19,516,184
# Patients receiving diagnostic test for malaria[2]	15,434,390	17,375,330	18,752,761	19,737,180	19,503,860
Total # malaria cases[3]	7,546,091	9,980,677	10,336,065	10,904,113	11,331,009
# Confirmed cases[4]	*7,546,091*	*9,892,473*	*10,301,229*	*10,864,677*	*11,318,685*
# Presumed cases[5]	*N/A*	*88,204*	*34,836*	*39,436*	*12,324*
% Malaria cases confirmed[6]	100%	99.1%	99.7%	99.6%	99.9%
Test positivity rate (TPR)[7]	48.9%	56.9%	54.9%	55.0%	58.0%
Total # under five years of age malaria cases[8]	2,132,139	4,543,335	4,796,243	5,031,140	5,064,404
% Cases in children under five years of age[9]	35%	45.5%	46.4%	46.1%	44.7%
Total # severe cases[10]	80,829	72,309	70,676	72,941	57,703
Total # malaria deaths[11]	1,685	1,685	1,114	734	563
# Facilities reporting[12]	N/A	N/A	N/A	19,656	19,855
% Data completeness[13]	87%	92%	98.8%	95.5%	96.4%

Definitions:

1 Number of patients presenting with signs or symptoms (e.g., fever) possibly due to malaria. 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 malaria occurs when infections are complicated by serious organ failures or abnormalities in the patient's blood or metabolism. 11 All ages, outpatient, inpatient, confirmed, and unconfirmed. 12 Total # of health facilities reporting data into the Health Management Information System (HMIS)/District Health Information Software 2 (DHIS2) system that year. 13 # monthly reports from health facilities divided by # health facility reports expected

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

The goals of the Mozambique National Malaria Control Program (NMCP), as described in the 2017–2022 NMSP, are to reduce malaria morbidity and mortality at national level by at least 40 percent by 2022 from the levels observed in 2015 to advance national and subnational control efforts. To reach this vision, the NMSP includes the following six objectives:

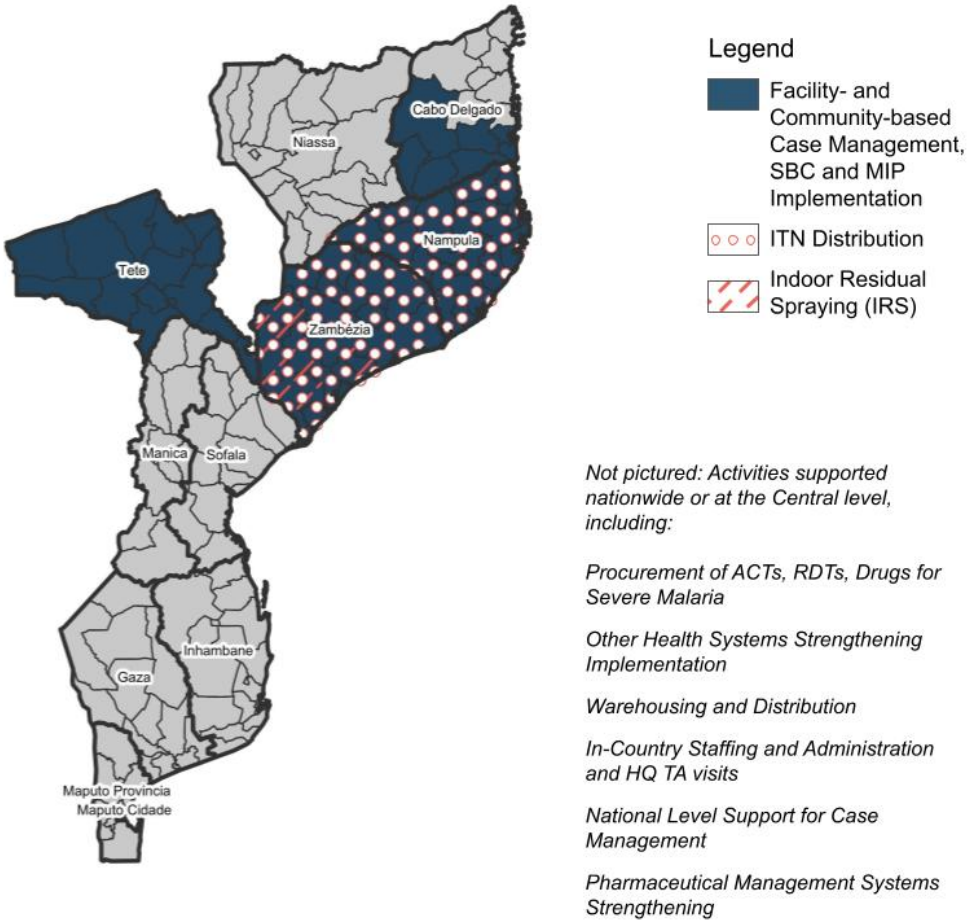
1. Program Management – Strengthen program management skills at central, provincial, and district levels to achieve the Strategic Plan objectives by 2022.
2. Prevention – Provide at least 85 percent coverage of the population with a minimum of one vector control intervention in every district of the country by 2022.

3. Case Management – Test 100 percent of suspected malaria cases and treat 100 percent of confirmed malaria cases at the health facility and community level by 2022, as per national guidelines.
4. Social and Behavior Change Communication (SBCC) – Implement an effective SBCC approach to ensure that at least 70 percent of people seek appropriate and timely healthcare and at least 85 percent of the population uses an appropriate protection method by 2022.
5. Elimination – Accelerate efforts toward malaria elimination by implementing epidemiologically appropriate interventions by 2022.
6. Surveillance, Monitoring, and Evaluation (SM&E) – Strengthen the surveillance system so 100 percent of health facilities and districts are reporting complete, timely, and quality data by 2020.

PMI worked closely with the NMCP in drafting this plan and the objectives and their associated activities are well-aligned with the PMI in-country priorities. PMI provides direct support for all intervention areas described above with the exception of elimination because there is complementary regional donor support (Elimination 8 and the Mozambique, South Africa, and Eswatini fund) in this area. PMI support is also complementary to that of the Global Fund. PMI- and Global Fund-procured diagnostics and treatments are pooled and distributed nationwide through the national supply chain. Global Fund procures insecticides for indoor residual spraying (IRS) and insecticide-treated nets (ITNs) for campaign distribution, complementing PMI support for IRS implementation and routine ITN distribution. Additionally, the Bill & Melinda Gates Foundation (BMGF) supports national and targeted surveillance strengthening that is coordinated and complementary to PMI investments.

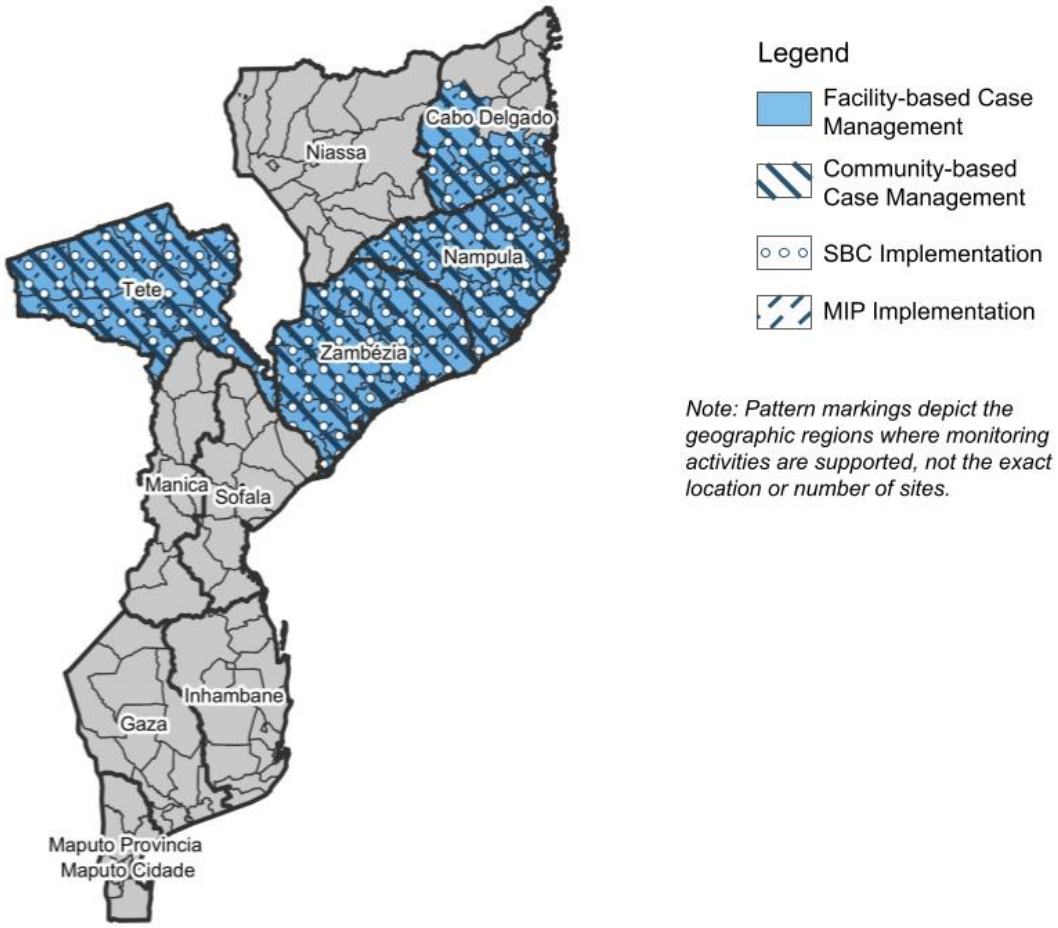
As shown in the figure below, PMI supports commodities for the whole country, but currently targets case management, malaria in pregnancy (MIP), health system strengthening (HSS), SM&E, and SBC activities in the provinces of Zambezia, Nampula, Cabo Delgado, and Tete. In FY 2021 this support will transition to focus on Zambezia, Nampula, Manica, and Cabo Delgado based on the incidence, prevalence, and unmet service needs in those provinces. PMI covers all non-insecticide operational costs for IRS in targeted districts of Zambezia and provides some technical support to the IRS program led by the Ministry of Health (MOH) in Nampula. PMI supports direct entomological data collection in Zambezia and Nampula and provides financial support for entomological collection in the remaining provinces in the central and northern regions, which is complementary to other donor support in the southern region.

Figure 4. PMI-supported activities in Mozambique



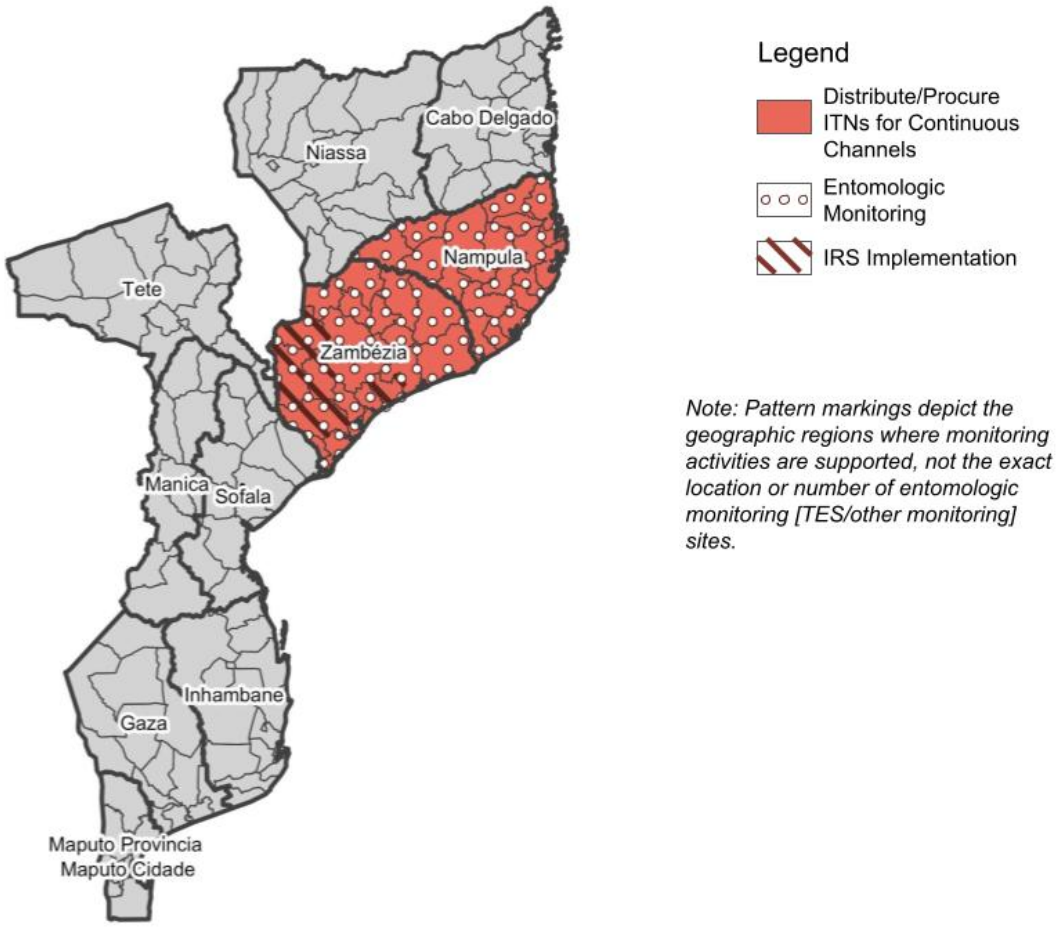
Source: Mozambique MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

Figure 5. PMI-supported service delivery and social and behavior change activities in Mozambique



Source: Mozambique MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE).

Figure 6. PMI-supported vector control activities in Mozambique



Source: Mozambique MOP Funding Table 2, Fiscal Year 2021 Malaria Data Integration and Visualization (M-DIVE)

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 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 fiscal year. For example, this FY 2022 MOP is anticipated to largely fund implementation of activities starting in 2023. Global Fund resources are based on the CY and planned for a three-year grant cycle. Most partner country governments and other partners also budget based on the calendar year.

The tables below summarize contributions by key external partners and partner country governments in calendar years 2020–2022, providing insight into total country investments. Because 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	Cross-cutting and HSS[3]	Total Per Funder
PMI	$6.4M	$14.3M	$1.4M	$1.2M	$1.5M	$4.2M	$29.0M
Global Fund	$28.4M	$11.9M		$3.3M	$0.7M	$13.9M	$58.2M
BMGF[4,5]							$13.7M
Total Per Category	$34.8M	$26.2M	$1.4M	$4.5M	$2.2M	$18.1M	$100.9M

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	$5.4M	$15.5M	$0.7M	$1.9M	$1.3M	$4.1M	$29.0M
Global Fund	$8.2M	$8.4M			$0.5M	$17.8M	$34.8M
BMGF[5]							$15.2M
Total Per Category	$13.6M	$23.9M	$0.7M	$1.9M	$1.8M	$21.9M	$79.0M

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	$3.1M	$13.9M	$0.9M	$2.2M	$3.1M	$4.4M	$27.5M
Global Fund	$8.0M	$10.9M			$1.6M	$90.4M	$111.0M
BMGF[5]							$11.0M
Total Per Category	$11.1M	$24.8M	$0.9M	$2.2M	$4.7M	$94.8M	$149.5M

1. Drug-based prevention, including SMC and 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. 4. The GOM has invested significant resources in the health system human and physical resources that implement malaria interventions. It also procures all national SP needs, a significant proportion of injectable artesunate, and all operational costs of IRS in Nampula province. 5. BMGF supports central-level technical planning such as funding application development, has made considerable investments in surveillance strengthening, in regional initiatives such as E8 and MOSASWA, and in the piloting of interventions such as seasonal malaria chemoprevention. This funding is through global, regional, and national investments that are not coded using the same categories as noted above, but the total amount reflects annual Mozambique support.

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]	$0.0M		$5.5M	$6.0M	$5.0M	$1.3M			$17.8M
Global Fund[3]		$3.2M	$1.3M	$7.4M	$1.2M				$13.0M
Total	$0.0M	$3.2M	$6.8M	$13.4M	$6.2M	$1.3M	$0.0M	$0.0M	$30.9M

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]			$4.1M	$7.1M	$5.5M	$1.0M			$17.7M
GF[3]				$0.1M	$2.1M				$2.2M
Total	$0.0M	$0.0M	$4.1M	$7.2M	$7.6M	$1.0M	$0.0M	$0.0M	$19.9M

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]			$2.1M	$4.5M	$5.5M	$1.4M			$13.5M
GF[3]				$3.3M	$3.0M				$6.3M
Total	$0.0M	$0.0M	$2.1M	$7.8M	$8.5M	$1.4M	$0.0M	$0.0M	$19.8M

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, including quality control, freight, insurance, and customs totaled $20.5M for CYs 2021–2023.

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 Mozambique 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

The objective of the 2017–2022 NMSP for vector control is to provide at least 85 percent coverage of the population with a minimum of one vector control intervention in every district of the country by 2022.

NMCP Approach

Mozambique has prioritized coverage of the entire population with ITNs and deploys IRS in areas with pyrethroid insecticide resistance, continued high transmission, and in areas targeted for elimination. For ITNs, the country uses two distribution channels: mass campaign distribution and routine distribution through antenatal care (ANC) services. For the mass campaign distribution the country aims to distribute one ITN for every 1.8 people. The 2019–2020 mass campaign distribution prioritized the distribution of non-pyrethroid ITNs and this remains a priority that will be scaled up in future campaigns. For ANC distribution, every pregnant woman should receive an ITN during her first ANC visit. The type of insecticide used on the ITN distributed through ANC in each province is aligned with the ITN that was distributed in the 2019–2020 mass coverage campaign.

PMI Objective in Support of NMCP

In keeping with the goals set forth in the NMSP and in the national integrated vector management (IVM) strategy, PMI aims to do the following:

- Support collection and use of quality entomological data.
- Support an evidence-based approach to IRS that results in a more cost-effective and efficient, targeted strategy.
- Support the implementation of the IVM strategy to ensure sustained ITN coverage through both continuous and campaign channels.
- Strengthen the MOH-led entomology, IRS, and ITN programs.

PMI-Supported Recent Progress (FY 2020)

- In Nampula and Zambezia provinces PMI supported the direct collection and analysis of routine vector bionomic data in seven districts, IRS quality and residual efficacy in four districts, and insecticide susceptibility in nine districts. It also financially supported the MOH collection of density data from 10 districts and of resistance data in 14 districts in Niassa, Cabo Delgado, Tete, Sofala, and Manica. Entomological surveillance sites were selected based on epidemiological, environmental, and entomological diversity and are fixed to allow for comparison of trends.
- PMI supported the direct implementation of IRS in five districts of Zambezia, spraying 361,820 structures (97.0 percent of eligible structures), which provided malaria protection to 1,619,088 inhabitants. Of these, 231,509 were children under five years of age and 85,856 were pregnant women. PMI has supported IRS in Zambezia since its inception due to the high malaria burden. Districts targeted for IRS implementation over the years have been largely unchanged to maintain gains.

- PMI provided technical and financial support to the MOH-led IRS campaign implemented in Nampula province, including leading a training of trainers and funding central-level supervision. It further supported the implementation of activities to inform environmental compliance in the province during IRS.
- PMI did not procure ITNs in the past 12 months because the procurement of ITNs has shifted to Global Fund Support due to the NMCP preference for blue-colored ITNs rather than the white ITNs procured by PMI. PMI did, however, support the distribution of ITNs from regional to subregional level.

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

- Directly support insecticide resistance monitoring in 17 sites in nine districts in Nampula and Zambezia with some support transitioning to direct support to the governments.
- Conduct vector bionomics monitoring monthly in 13 sites in seven districts in Nampula and Zambezia.
- Provide technical assistance for management on ITNs distributed through ANC services, including associated information systems.
- Support distribution of ITNs from the district to the facility-level in Zambezia
- Conduct IRS in four districts, beginning in October 2022.
- Conduct community mobilization activities in conjunction with IRS campaign.

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

Table A-1. Entomological Monitoring Activities Planned for 2021

Site	District*	Activities	Supported by
Motinho	Maganja da Costa, Zambezia	Insecticide susceptibility	PMI
Mussaia Inroga	Maganja da Costa, Zambezia	Insecticide susceptibility	PMI
Josina Machel	Mopeia, Zambezia	CDC-light traps (CDC-LT), Prokopack, IRS residual efficacy, Insecticide susceptibility	PMI
Eduardo Mondlane	Mopeia, Zambezia	Prokopack, Insecticide susceptibility	PMI
12 de Outubro	Milange, Zambezia	CDC-LT, Prokopack, Insecticide susceptibility	PMI
3 de Fevereiro	Milange, Zambezia	Prokopack, IRS residual efficacy, Insecticide susceptibility	PMI
Nhacungulune	Lugela, Zambezia	CDC-LT, Prokopack, insecticide susceptibility	PMI
Dabane	Lugela, Zambezia	Prokopack, insecticide susceptibility	PMI
Morrumbala Sede	Morrumbala, Zambezia	Insecticide susceptibility	PMI
Morrumbo Sede	Molumbo, Zambezia	CDC-LT, Prokopack, insecticide susceptibility	PMI
Nawithipele	Nampula City, Nampula	CDC-LT, Prokopack, insecticide susceptibility	PMI
Murrapaniwua	Nampula City, Nampula	Prokopack, insecticide susceptibility	PMI
Muriasse	Nampula City, Nampula	IRS residual efficacy, Insecticide susceptibility	PMI
Intuto	Erati, Nampula	CDC-LT, Prokopack, IRS residual efficacy, insecticide susceptibility	PMI
Mualangonha	Erati, Nampula	Prokopack, insecticide susceptibility	PMI
Nanhupo Rio	Mogovolas, Nampula	Prokopack, insecticide susceptibility	PMI
Meluli B	Mogovolasi, Nampula	CDC-LT, Prokopack, insecticide susceptibility	PMI
C. Beira	Sofala	Insecticide susceptibility	PMI
Dondo	Sofala	Insecticide susceptibility	PMI
Chibabava	Sofala	Insecticide susceptibility	PMI
C. de Chimoio	Manica	Insecticide susceptibility	PMI
Sussundenga	Manica	Insecticide susceptibility	PMI

Site	District*	Activities	Supported by
Gondola	Manica	Insecticide susceptibility	PMI
C. de Tete	Tete	Insecticide susceptibility	PMI
Chifunde	Tete	Insecticide susceptibility	PMI
Moatize	Tete	Insecticide susceptibility	PMI
C. de Pemba	Cabo Delgado	Insecticide susceptibility	PMI
Metuge	Cabo Delgado	Insecticide susceptibility	PMI
Montepuez	Cabo Delgado	Insecticide susceptibility	PMI
Chimbonila	Niassa	Insecticide susceptibility	PMI
Kamaxakeni	Maputo City	Insecticide susceptibility	Tchau-Tchau Malaria
Ka Mubukwana	Maputo City	Insecticide susceptibility	Tchau-Tchau Malaria
Ka Mavota	Maputo City	Insecticide susceptibility	Tchau-Tchau Malaria
Boane	Maputo Province	Insecticide susceptibility	Tchau-Tchau Malaria
Moamba	Maputo Province	Insecticide susceptibility	Tchau-Tchau Malaria
Marracuene	Maputo Province	Insecticide susceptibility	Tchau-Tchau Malaria
Namaacha	Maputo Province	Insecticide susceptibility	Tchau-Tchau Malaria
Matutuine	Maputo Province	Insecticide susceptibility	Tchau-Tchau Malaria
C. Matola	Maputo Province	Insecticide susceptibility	Tchau-Tchau Malaria
Chokwe	Gaza	Insecticide susceptibility	Tchau-Tchau Malaria
X. Xai-Xai	Gaza	Insecticide susceptibility	Tchau-Tchau Malaria
Chibuto	Gaza	Insecticide susceptibility	Tchau-Tchau Malaria
Bilene	Gaza	Insecticide susceptibility	Tchau-Tchau Malaria
C. Inhambane	Inhambane	Insecticide susceptibility	Tchau-Tchau Malaria
Jangamo	Inhambane	Insecticide susceptibility	Tchau-Tchau Malaria
Maxixe	Inhambane	Insecticide susceptibility	Tchau-Tchau Malaria
Massinga	Inhambane	Insecticide susceptibility	Tchau-Tchau Malaria

*****Entomological surveillance sites were selected based on epidemiological, environmental, and entomological diversity and are fixed to allow for comparison of trends.

Figure A-1. Map of entomological sentinel sites in IRS intervention and control districts in Zambezia Province

Under consultation with the NMCP, entomological monitoring was conducted in three IRS intervention districts in Zambezia Province: Maganja da Costa, Milange, and Mopeia. Unsprayed Lugela district was used as a control district.

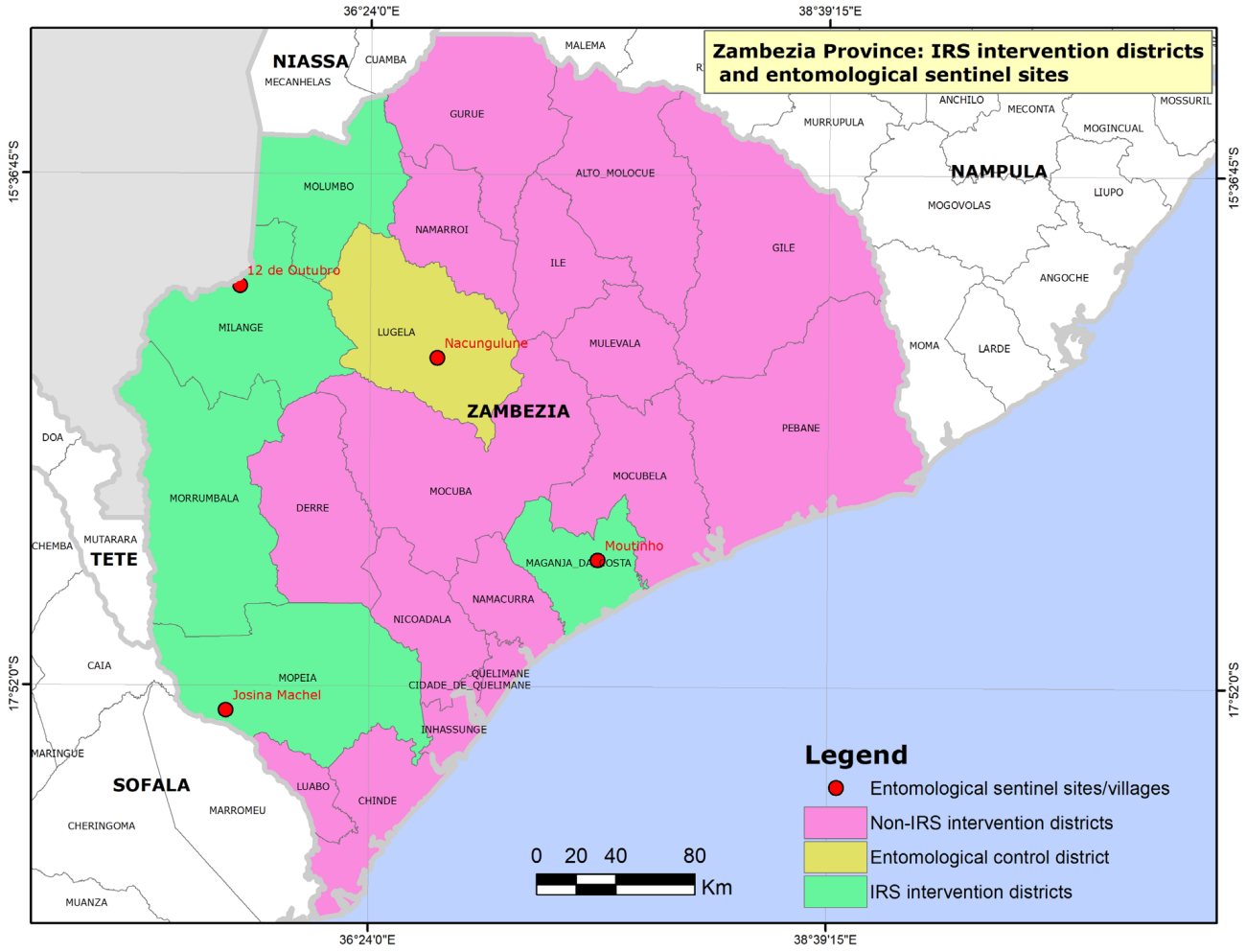


Figure A-2. Map of entomological sentinel sites in IRS intervention and control districts in Nampula Province

Through the NMCP, the GOM conducted IRS in eight districts of Nampula Province: Angoche, Meconta, Monapo, Murrupula, Nacala, Nampula City, Rapale, and Ribaue and a mass ITN distribution campaign in all districts of Nampula that started on July 15, 2019 and ended in September. VectorLink Mozambique provided technical support to Nampula Province for the implementation of entomological surveillance in two IRS intervention districts, Monapo and Nampula City, as well as in the control district of Erati.

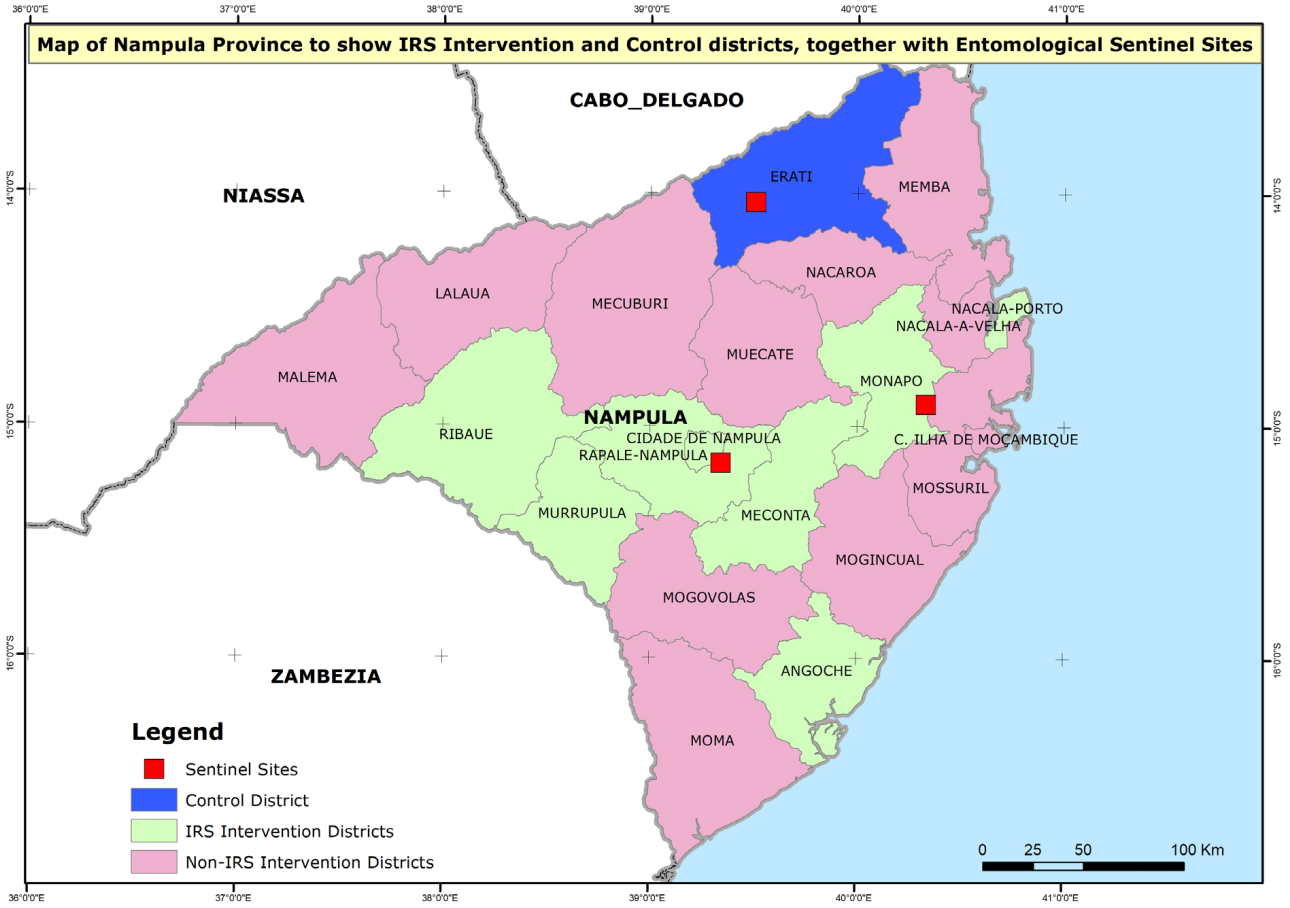


Table A-2. Distribution and bionomics of malaria vectors (2019–2020 data)

District	Vector*	Season (month)	Preferred Biting Location (mean biting rate)	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR***
Maganja da Costa (IRS district)	***An. funestus* s.l.**	Dry season (October–December)	Indoor (4.33)	2:00–3:00 a.m.	NA	NA	NA
Maganja da Costa (IRS district)	*An. gambiae* s.l.	Numbers low year-round	Indoor (1.58)	1:00–2:00 a.m.	NA	NA	NA
Milange (IRS district)	*An. funestus* s.l.	Rainy season (numbers low January–March)	Indoor and outdoor (1.08/1.17)	1:00–2:00 a.m.	NA	NA	NA
Milange (IRS district)	***An. gambiae* s.l.**	Rainy season (January–March)	Outdoor (6.38)	11:00 p.m.–2:00 a.m.	NA	NA	NA
Mopeia (IRS district)	***An. funestus* s.l.**	Abundant year-round with peak in dry season in December	Indoor (3.28)	11:00 p.m.–12:00 a.m.	NA	NA	NA
Mopeia (IRS district)	*An. gambiae* s.l.	Rainy season (February–March)	Indoor and outdoor (0.07/0.11)	11:00 p.m.–12:00 a.m.	NA	NA	NA
Lugela (Control district)	***An. funestus* s.l.**	Abundant year-round with peak in rainy season in January	Indoor (16.38)	1:00–3:00 a.m.	NA	NA	NA
Lugela (Control district)	*An. gambiae* s.l.	Rainy season (February–March)	Indoor and outdoor (1.33/1.46)	3:00–5:00 a.m.	NA	NA	NA
Monapo (IRS	*An. funestus*	Numbers low year-round	Indoor and outdoor	1:00–2:00 a.m.	NA	NA	NA

District	Vector*	Season (month)	Preferred Biting Location (mean biting rate)	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR***
district)	s.l.		(0.63 and 0.33)				
Monapo (IRS district)	**_An. gambiae_ s.l.**	Numbers low year-round	Indoor and outdoor (1.04 / 1.42)	8:00–9:00 p.m.	NA	NA	NA
Nampula City (IRS district)	_An. funestus_ s.l.	Rainy season (January–March)	Outdoor (5.38)	11:00 p.m.–4:00 a.m.	NA	NA	NA
Nampula City (IRS district)	**_An. gambiae_ s.l.**	Rainy season (January–March)	Outdoor (12.08)	1:00–4:00 a.m.	NA	NA	NA
Erati (Control district)	_An. funestus_ s.l.	Dry season (July–October)	Indoor (4.92)	1:00–2:00 a.m.	NA	NA	NA
Erati (Control district)	**_An. gambiae_ s.l.**	Dry season (July–December)	Outdoor (6.50)	12:00–2:00 a.m.	NA	NA	NA

*Primary vector listed in bold

** Marked as NA if simultaneous indoor and outdoor collections are not conducted

*** Entomological inoculation rate

In Mopeia District, entomological monitoring data was initially collected using the Centers for Disease Control and Prevention light trap (CDC-LT) and human landing catch (HLC) collection methods; in November 2019, Prokopack aspiration was introduced as an additional collection tool. The HLC collection method was dropped in late February 2020 in Mozambique in alignment with national entomological data collection procedures. In the other two IRS districts, Maganja da Costa and Milange, and in Lugela, the control district, entomological monitoring data were collected using the pyrethrum spray catch (PSC), CDC-LT, and HLC methods. In September 2019, PSC collection was replaced by Prokopack as per the approved work plan. Similar to Mopeia, HLC collection was also dropped in February 2020 as PMI phased out support for HLC. For susceptibility tests, Prokopack aspirators were used in all districts to collect adult *An. funestus* s.l., and larval collections were conducted to collect *An. gambiae* s.l. mosquitoes. Samples collected from July 2019 to March 2020 were selected

and sent to the National Institute of Health (*Instituto Nacional de Saúde*) laboratory for molecular analyses. Due to COVID-19 restrictions, only partial results were available at the time this MOP was written, thus preferred host and EIRs are indicated by NA in the table above.

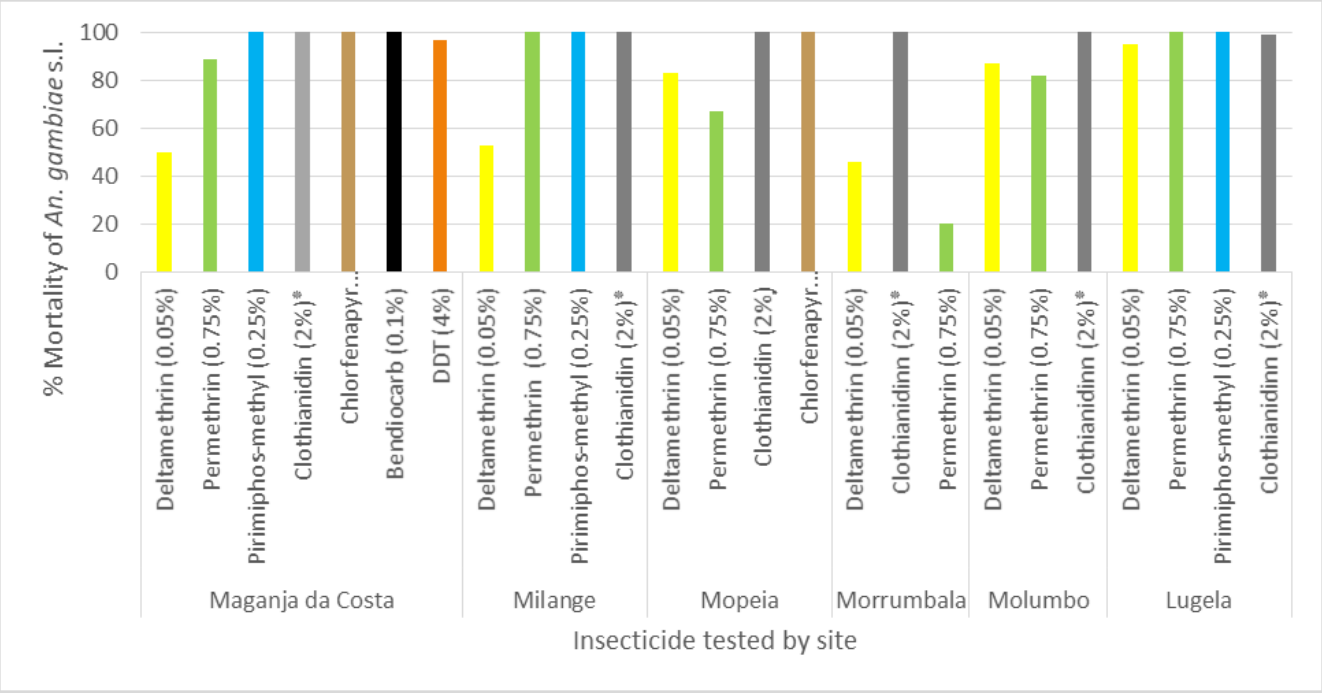
Key Question 2

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

Supporting Data

Figure A-3. Percentage mortality of adult *An. gambiae* s.l. raised from larval collections from the Zambezia Province exposed to a range of insecticides at respective diagnostic concentrations and holding periods

Susceptibility tests against *An. gambiae* s.l. were conducted from January through April 2020 in Lugela, Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala, by exposing the *An. gambiae* s.l. to diagnostic dosages of deltamethrin (0.05 percent), permethrin (0.75 percent), pirimiphos-methyl (0.25 percent), clothianidin (2 percent), chlorfenapyr (100 µg/bottle), bendiocarb (0.1 percent), and DDT (4 percent).



Note: Clothianidin and chlorfenapyr holding periods were up to three and seven days, respectively. The mortality for other insecticides was at 24–hour holding period

Figure A-4. Synergist assay (PBO) percent mortality of adult *An. gambiae* s.l. raised from larval collections from Zambezia Province

Synergist assays with 4 percent PBO (piperonyl butoxide) were carried out on *An. gambiae* s.l. from Maganja da Costa, Milange, Mopeia, Morrumbala, and Molumbo.

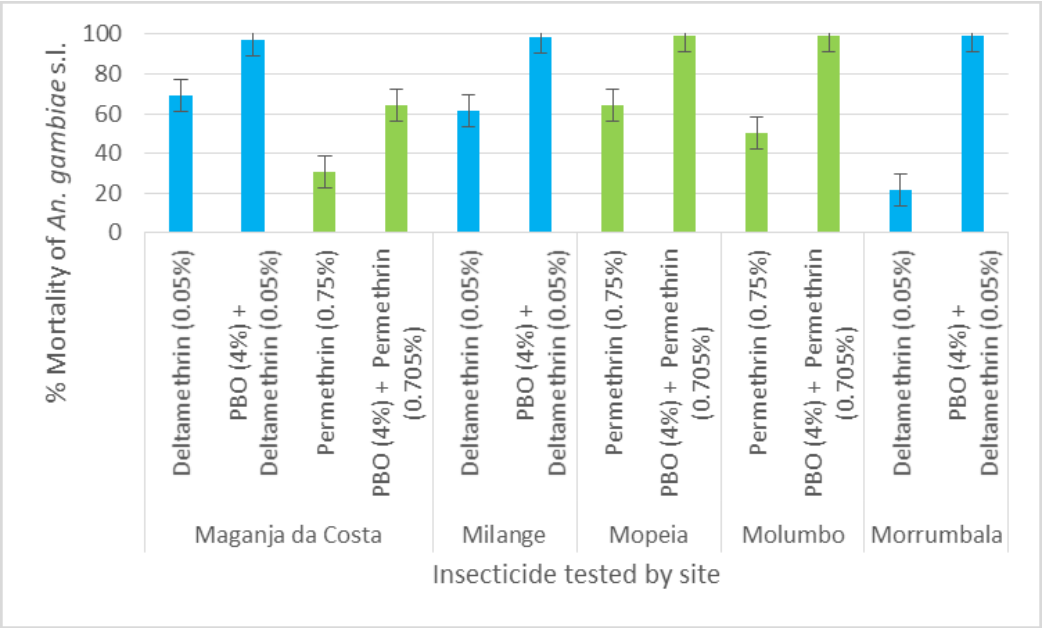


Figure 1.1.7. Percent mortality from WHO tube tests of *An. funestus* s.l. collected by Prokopack in Zambezia Province

Susceptibility testing was conducted with An. funestus s.l. samples collected from June to October 2019 in Maganja da Costa, Milange, and Mopeia. A shortage of mosquitoes in the field meant the tests could not be conducted in all districts with all planned insecticides.

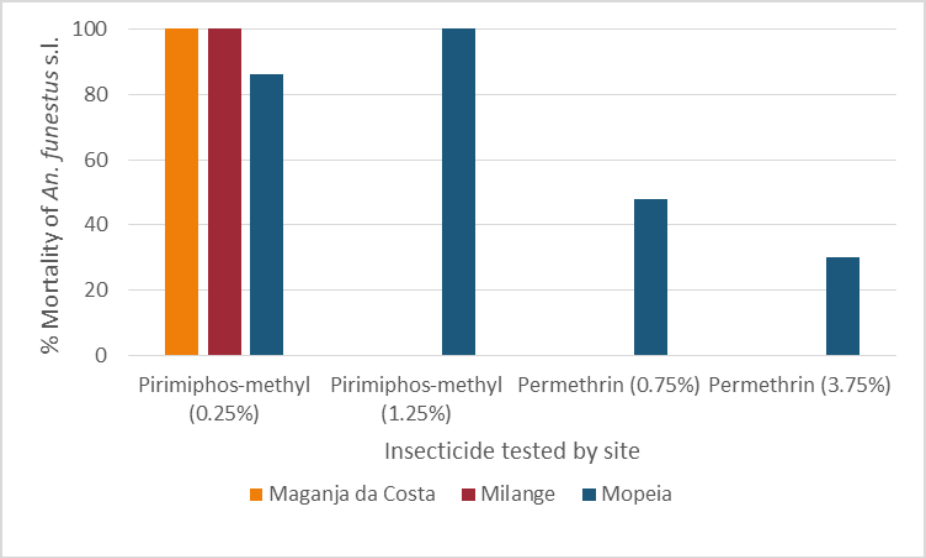


Figure A-5. Percentage mortality of adult *An. gambiae* s.l. raised from larval collections from the Nampula Province exposed to a range of insecticides at respective diagnostic concentrations and holding periods

Susceptibility tests on *An. gambiae s.l.* started in February 2020 and stopped in March because of data collection restrictions due to COVID-19. Tests were conducted on deltamethrin (0.05 percent), permethrin (0.75 percent), pirimiphos-methyl (0.25 percent), clothianidin (2 percent), chlorfenapyr (100 µg/bottle), bendiocarb (0.1 percent), and DDT (4 percent).

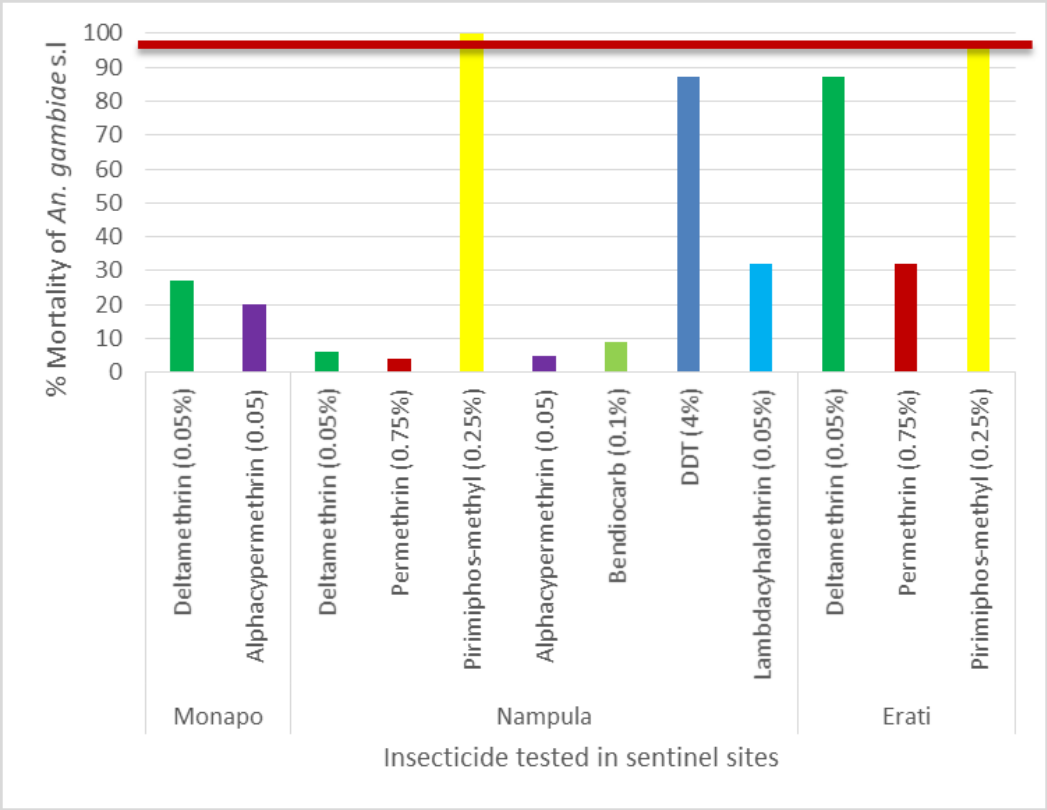


Figure A-6. Synergist assay (PBO) percent mortality of adult *An. gambiae* s.l. raised from larval collections from Nampula Province

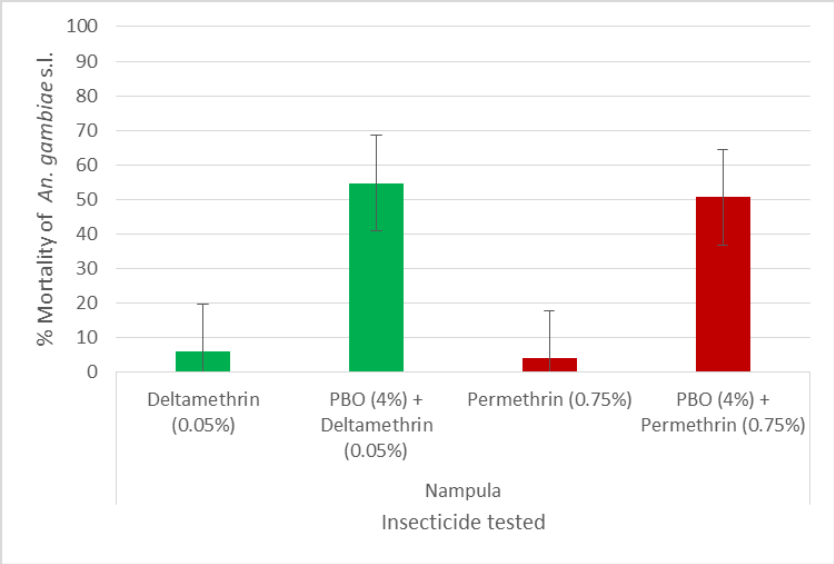
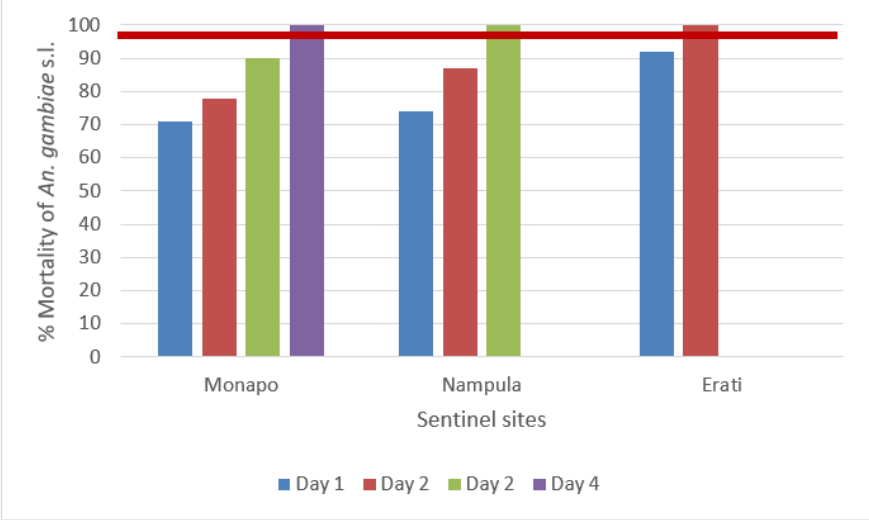


Figure A-7. Percentage mortality of adult *An. gambiae* s.l. raised from larval collections from the Nampula Province exposed to clothianidin



Conclusions for Entomologic Monitoring Investments

PMI will maintain current breadth of entomological support, but will continue its shift from implementation through a partner to implementation through the provincial government. The need for a harmonized, cost-efficient, sustainable model has led to a more strategic PMI funding allocation for some entomological monitoring costs in which PMI will provide direct financial support to the GOM for implementation costs and complementary support. PMI, Global Fund, and the GOM have invested in capacity-building of provincial level staff and insectary

development, including the development of entomological laboratories and insectaries throughout the country. Despite the existence of the physical space and initial equipping of these containers, there have been delays in utility access and replacement of essential commodities, hindering their full functionality. PMI is working with the NMCP and other donors to support the full establishment of these containers.

- In Zambezia, *An. gambiae* s.l. was fully susceptible to pirimiphos-methyl, clothianidin, chlorfenapyr, and bendiocarb in all districts where the insecticides were tested. Resistance to deltamethrin (0.05 percent) was observed in all districts except for possible resistance in Lugela. For permethrin (0.75 percent), resistance was noted in all districts except Milange and Lugela. *Anopheles funestus* s.l. exposed to diagnostic dosages of pirimiphos-methyl in Maganja da Costa and Milange were found to be fully susceptible, while in Mopeia probable resistance to diagnostic dosages of pirimiphos-methyl was detected. The synergist PBO restored full susceptibility to deltamethrin, estimated as ≥98 percent mortality, up from 61 percent to 99 percent in Milange and from 21 percent to 99 percent in Morrumbala. In Maganja da Costa, one of the assays showed restored susceptibility from 69 percent to 97 percent while full restoration of susceptibility was observed in Mopeia and Molumbo for permethrin with PBO synergist where mortality increased from 64 percent to 99 percent and 51 percent to 99 percent, respectively.
- WHO susceptibility tests indicated that *An. gambiae* s.l. mosquitoes from Erati and Nampula City districts of Nampula were susceptible to pirimiphos-methyl (with mortalities ranging between 98 percent and 100 percent). *An. gambiae* s.l. was resistant to deltamethrin across all the sites, resistant to permethrin in Nampula and Erati, and resistant to alpha-cypermethrin in Nampula City and Monapo. In Nampula City there was resistance at diagnostic concentrations to DDT and bendiocarb. *Anopheles gambiae* s.l. from across all sites tested were fully susceptible to clothianidin within four days post-exposure.
- Given the level of pyrethroid resistance across all sites, next generation nets are strongly recommended. In Zambezia, PBO data indicate that PBO nets are suitable for this province; however, in Nampula full susceptibility was not restored. The chlorfenapyr data indicate that a new net with chlorfenapyr in addition to pyrethroids should be considered in Mozambique. These data were utilized to plan all non-pyrethroid-only ITNs and IRS for campaigns from 2021 to 2023.
- In 2022, according to the rotation plan, organophosphates were slated to be used for IRS in all of Zambezia. Pirimiphos-methyl susceptibility was recorded in all sites in Zambezia, but in recent collections (data not shown in this MOP as it is still in progress) possible resistance to pirimiphos-methyl was recorded in Mopeia. This led to an adjustment in the 2021 and 2022 insecticide procurement plan to include bendiocarb for IRS in Mopeia and pirimiphos-methyl in the remaining intervention sites.

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 ITN coverage and use targets with effective nets, based on insecticide resistance data in PMI-supported areas, and maintain high coverage and use with consistent ITN distribution (via campaigns and/or continuous channels).

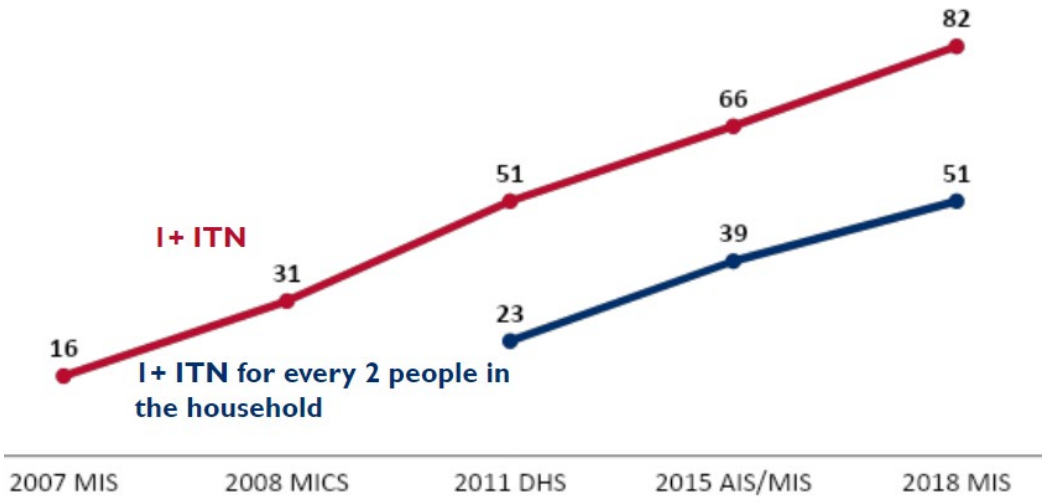
Key Question 1

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

Supporting Data

Figure A-8. Trends in ITN ownership

Percentage of households that own ITNs



Note: AIDS Indicator Survey (AIS)

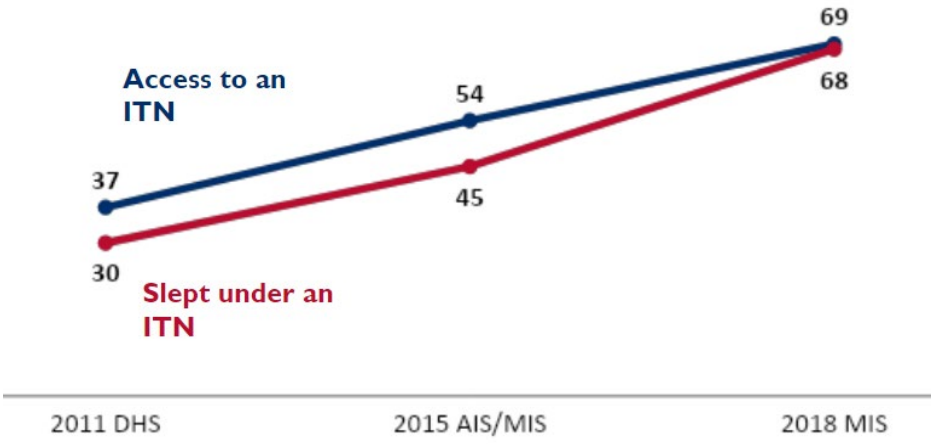
There has been a steady trend in increased ITN ownership from 16 percent in 2007 to 82 percent in 2018. Universal access with at least one ITN for every two people in the household has increased, but remained only 51 percent in 2018. It is expected that the 2019–2020 Global Fund-sponsored ITN universal coverage campaign further increased ITN ownership.

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-9. Trends in ITN access and use

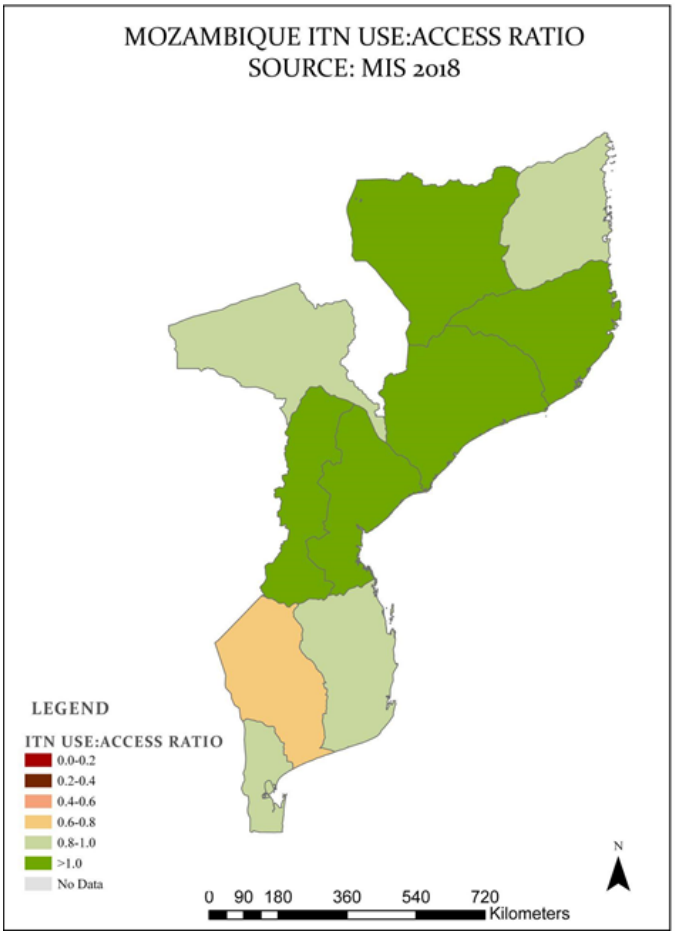
Percentage of household population with access to an ITN and percentage of those who slept under an ITN the night before the survey



There has been a steady trend in both increased access to ITNs and the percentage of people who slept under a net the night before the survey with use and access nearly equal in 2018. The ITN use to access ratio is between 0.8 and 1 or above 1 in most of the country, with the exception of Gaza Province. This indicates generally high use among individuals who have access to ITNs.

Figure A-10. Mozambique ITN use: access ratio map

The map indicates that there is a strong culture of net use. The 2018 MIS shows that although there is room for improvement, most of the country has a ratio of ITN use to access of at least 0.6 and in the PMI focus regions have a ratio of use to access >1.0.



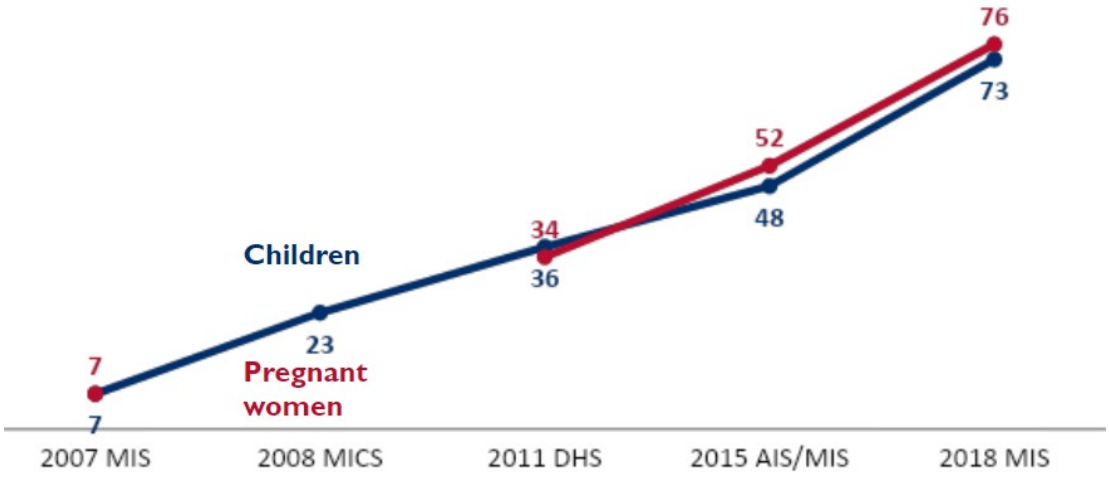
Key Question 2b

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

Supporting Data

Figure A-11. Trends in ITN use among children and pregnant women

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



Since 2007 the proportion of children under five years of age and pregnant women who slept under an ITN the night before the survey has been steadily increasing. According to the 2018 MIS data, 76 percent of pregnant women 15 to 49 years of age and 73 percent of children under five years of age slept under an ITN the night before a survey.

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?

Overall, Mozambique has a relatively high use to access ratio, as shown above in Figure A-10, and use has improved alongside access over the past decade. Nevertheless, there continue to be barriers to appropriate use. These include access to ITNs, which is lower in some provinces (e.g., Sofala had 67 percent ITN ownership in the 2018 MIS) and among urban populations. Additionally, use among those with at least one ITN is suboptimal in parts of the country with usage as low as 61 percent in Maputo City and 67 percent in Gaza (MIS, 2018). A recent study in Magoe, Tete, found that ITN use among households with at least one ITN per a child under five years of age was not associated with most ideational factors such as self-efficacy to use an ITN, and community norms around ITN use, but was associated with socioeconomic status and, surprisingly, lower maternal ITN response efficacy (Yukich et. al., under review).

In addition to these challenges related to ITN access and use, there are some net care practices that negatively affect ITN durability. A study in three ecological zones found that rodents were prevalent as were practices that affected ITN durability such as cooking in the same room as the ITN and failure to fold up ITNs during the day.

Better ITN survival was associated with exposure to communication, positive attitudes to net care, and folding of the nets (Abilio et al., 2020).

Key Question 4

What type of nets are being distributed via which channels?

Supporting Data

Table A-3. ITN Distribution

Level Nationwide/Region/ State/Province	Mass Campaign	ANC	EPI*	School	Community	Other
Cabo Delgado	PBO [July 2019]	PBO				
Niassa	Royal Guard / Interceptor G2 [October 2020]	Royal Guard / Interceptor G2				
Nampula	Standard [July–August 2020]	Standard				
Zambezia	Standard [August & October 2020]	Standard				
Tete	PBO [November 2020]	PBO				
Manica	Interceptor G2 [November 2020]	Interceptor G2				
Sofala	Standard [November 2020]	Standard				
Inhambane	Standard [December 2020]	Standard				
Gaza	Standard [December 2020]	Standard				
Maputo Province		Standard				
Maputo City		Standard				

* Expanded Program for Immunization

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?

During calendar years 2021–2023, all ITN needs will be covered with Global Fund support. This includes approximately 1.7 million ITNs per year for distribution through ANC and nearly 17 million ITNs that will be distributed through a universal coverage campaign in 2022–2023. Both channels will deploy PBO and dual-active

ingredient ITNs, maximizing the number of new nets, dependent on forthcoming durability study results. There are no projected ITN gaps because orders will be adjusted depending on buffer stock needs.

Table A-4. ITN Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	30,832,244	31,616,078	32,419,747
Total population at risk for malaria	30,832,244	31,616,078	32,419,747
PMI-targeted at-risk population	30,832,244	31,616,078	32,419,747
Population targeted for ITNs	30,832,244	31,616,078	32,419,747
Continuous Distribution Needs			
Channel 1: ANC	1,641,203	1,682,927	1,725,706
Channel 2: EPI	0	0	0
Channel 3: School	0	0	0
Channel 4:	0	0	0
Additional ITNs required to avoid ITN stockouts	164,120	168,293	172,571
Estimated Total Need for Continuous Channels	1,805,324	1,851,220	1,898,277
Mass Campaign Distribution Needs			
Mass distribution campaigns	0	5,383,563	11,352,638
Estimated Total Need for Campaigns	0	5,383,563	11,352,638
Total ITN Need: Continuous and Campaign	***1,805,324***	***7,234,783***	***13,250,915***
Partner Contributions			
ITNs carried over from previous year	0	0	0
ITNs from Government	*0*	*0*	*0*
ITNs from Global Fund	1,643,600	7,072,435	13,088,030
ITNs from other donors	0	0	0
ITNs planned with PMI funding	0	0	0
Total ITNs Contribution Per Calendar Year	***1,643,600***	***7,072,435***	***13,088,030***
Total ITN Surplus (Gap)	***-161,724***	***-162,347***	***-162,885***

Key Question 6

What is the current status of durability monitoring?

Supporting Data

Table A-5. Timing of Durability Monitoring

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
2020	Mandima, Niassa	RoyalGuard	X			
2020	Cuamba, Niassa	Interceptor G2	X			
2020	Gurue, Zambezia	Standard	X			
2020	Changara, Tete	PBO	X			
2020	Guro, Manica	Interceptor G2	X			
2020	Chemba, Sofala	Standard	X			

Durability monitoring of standard, PBO, Interceptor G2, and Royal Guard ITNs distributed through the 2020 national ITN campaign is supported through the New Nets Project with funding by Unitaid and The Global Fund. Data collection is ongoing and is expected to provide data on the durability and impact on case burden of different types of ITNs.

Table A-6. Results of Durability Monitoring

Site	Survey and Time Since Distribution (months)	Attrition to Wear and Tear (%)	Nets in Serviceable Condition (%)	Optimal Insecticidal Effectiveness in Bioassay (%)
Inhambane	36	74	57	3
Tete	36	56	43	11
Nampula	36	50	33	29

After three years of follow-up among rural populations in the provinces of Inhambane, Tete, and Nampula, the 150-denier polyethylene ITN Royal Sentry/MAGNet (standard alpha-cypermethrin ITN) showed significant differences in median physical survival ranging from 3.0 years in Inhambane to 2.8 in Tete and 2.4 in Nampula. The survival estimate for Nampula was significantly below the assumed three-year ITN survival while at the other two sites it was consistent with that assumption. The differences in survival could be attributed at least in part to house and net environment and net care behaviors. Insecticidal performance was optimal up to 24 months after distribution, but then dropped significantly. However, 96 percent of samples at 36 months still demonstrated minimal effectiveness (defined as 60-minute knock-down ≥ 75 percent and 24-hour functional mortality ≥ 50 percent) and provided at least some insecticidal protection. For more details, see the full report

(https://d1u4sg1s9ptc4z.cloudfront.net/uploads/2021/03/durability-monitoring-of-llin-in-mozambique-final-report-after-36-months-follow-up-2018-1.pdf).

Conclusions for ITN Investments

These data suggest that improvements have been made in ITN access through different channels and that there is appropriate ongoing monitoring of their effectiveness, but that important barriers to use remain. PMI will concentrate its support in addressing these barriers to use through SBC investments described in that section with an enhanced focus on maintaining appropriate ITN use where utilization and care are suboptimal and ITN care to address noted gaps. In recent years support for ITN procurement shifted from PMI to the Global Fund and that has proven to be an effective arrangement. The specific ITN formulation to be procured during the next universal coverage campaign will be informed by preliminary data from the ongoing ITN durability monitoring. ANC ITNs for each province are aligned with the ITNs distributed during the campaigns. ANC ITNs are delivered at the district level, but there are some transportation barriers associated with the large product volume and limitations on transportation of products with insecticides alongside medicines in PMI priority provinces so PMI will continue last mile support for ITN distribution in Zambezia. There are no ITN procurement gaps because all needs will be met by Global Fund. There are, however, ongoing needs for technical assistance from PMI partners to ensure that ITNs are integrated into the national commodity system to support visibility down to the health facility of ITNs. As such, PMI will not procure ITNs, but will provide technical assistance for their monitoring and limited distribution assistance.

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

1.3. INDOOR RESIDUAL SPRAYING (IRS)

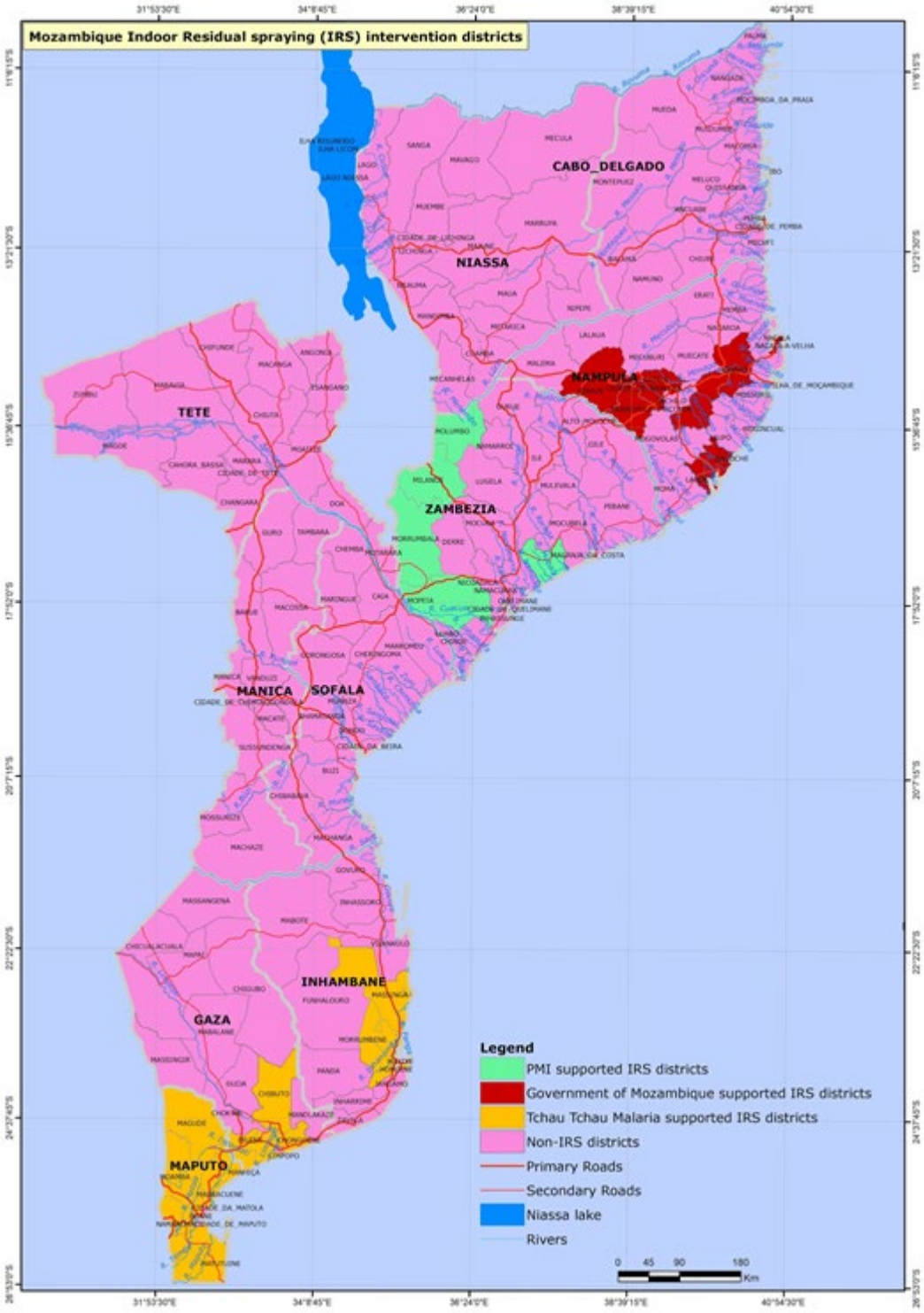
Key Goal

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?

Figure A-12. Map of coverage of IRS intervention districts



IRS in 2020 implementation with GOM, PMI, and Tchau Tchau Malaria financial support is shown in red, green, and yellow in the figure above. All insecticide is procured through the GOM Global Fund grant. It is anticipated that these same districts will be targeted in 2021. IRS is targeted in southern Mozambique in support of regional elimination efforts and concentrated in Zambezia and Nampula because of the evidence there of pyrethroid resistance and continued high malaria transmission. Additionally, IRS has been utilized in humanitarian emergency situations such as in Sofala Province in response to Cyclone Idai in 2019 and is expected to be supported by the USAID Bureau for Humanitarian Assistance in Cabo Delgado in 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-7. IRS coverage

Calendar Year	Districts Sprayed (#)	Districts	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)
2018	6	Derre, Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala	387,413	94.5%	1,663,109
2019	5	Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala	338,330	96.6%	1,484,191
2020	5	Maganja da Costa, Milange, Molumbo, Mopeia, and Morrumbala	361,820	97.0%	1,619,088
2021*	4	Milange, Molumbo, Mopeia, and Morrumbala	304,238*	85%*	1,330,163*

*Denotes targets for current year

PMI support to IRS has reduced in recent years, as shown in the reduced number of districts, but has maintained very high coverage, including 97 percent in the 2021 campaign. This provided malaria protection to 1.6 million people. PMI has complemented its reduction in IRS coverage with TA for strong ITN distribution and in SBC emphasizing the importance of ITN use due to continued high malaria transmission.

Key Question 3

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

Supporting Data

Table A-8. IRS insecticide residual efficacy

Site/District	Year	Insecticide	Average Residual Efficacy
Monapo, Nampula	2018–2019	Actelic® 300CS	4 months
Monapo, Nampula	2019–2020	SumiShield® 500W	9 months
Erati, Nampula	2020–2021	Fludora® Fusion	4 months[1]
Nampula City, Nampula	2018–2019	Actelic® 300CS	4 months
Nampula City, Nampula	2019–2020	Fludora® Fusion	9 months
Nampula City, Nampula	2020–2021	Fludora® Fusion	4 months*
Maganja da Costa	2017–2018	Actellic® 300CS	7 months
Maganja da Costa	2018–2019	Actellic® 300CS	7 months
Maganja da Costa	2019–2020	Fludora® Fusion	9 months
Maganja da Costa	2020–2021	Fludora® Fusion	4 months*
Milange	2017–2018	Actellic® 300CS	6 months
Milange	2018–2019	Actellic® 300CS	8 months
Milange	2019–2020	Fludora® Fusion	9 months
Milange	2020–2021	Fludora® Fusion	4 months*
Mopeia	2017–2018	Actellic®® 300CS (Eduardo Mondlane Village)	5 months
Mopeia	2017–2018	Actellic® 300CS (24 de Julho village)	4 months
Mopeia	2017–2018	Actellic® 300CS (Zero village)	7 months
Mopeia	2018–2019	Sumishield® 50 WG	11 months
Mopeia	2019–2020	Sumishield® 50 WG	10 months
Mopeia	2020–2021	Sumishield® 50 WG	4 months*
Mocuba	2017–2018	Actellic® 300CS	2 months
Morrumbala	2017–2018	Actellic® 300CS	9 months

*Data collection was ongoing at time of MOP development

Key Question 4

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

Supporting Data

Table A-9. Insecticide Rotation Plan

Target Spray Area	2020	2021	2022*	2023*
Milange	Clothianidin/ deltamethrin	Organophosphate	Organophosphate	Clothianidin
Mopeia	Clothianidin	Bendiocarb**	Bendiocarb	Clothianidin
Molumbo	Clothianidin/ deltamethrin	Organophosphate	Organophosphate	Clothianidin
Morrumbala	Clothianidin	Organophosphate	Organophosphate	Clothianidin

*Denotes planned insecticide classes

** Mopeia will use bendiocarb instead of organophosphate because adult *An. funestus* s.l. collected through Prokopack aspirators and with F1 progeny from forced oviposition of the adult gravid females in Mopeia showed signs of resistance to diagnostic doses of organophosphate

Conclusions for IRS Investments

PMI will maintain current breadth of IRS support, but will continue its shift from implementation through a partner to implementation through the provincial government. The need for a harmonized, cost-efficient, sustainable model has led to a more strategic PMI funding allocation for IRS in which PMI will provide direct financial support to the GOM for implementation costs and complementary support to an implementation partner for quality IRS implementation, monitoring, and environmental compliance. PMI will also continue to work with the NMCP and partners to better understand the impact and cost-effectiveness of IRS to refine targeting. The GOM, with PMI support, has implemented a progressive insecticide rotation schedule that is informed by vector susceptibility data.

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 NMCP objective is to test 100 percent of suspected malaria cases and treat 100 percent of confirmed malaria cases at health facility and community level by 2022, as per national guidelines.

NMCP Approach

- The national malaria treatment guidelines require parasitological diagnosis by RDTs or microscopy of all suspected cases (patient with fever or recent history of fever) before treatment with an antimalarial is

provided. The country adopted artemisinin-based combination therapy (ACT) in 2006, and artemether-lumefantrine (AL) and artesunate-amodiaquine (ASAQ) were introduced as treatment for uncomplicated malaria in 2009. Injectable artesunate is used as treatment for severe malaria in all groups; rectal artesunate is used as a pre-referral treatment at the community level among children under six of age.

- RDTs are the preferred test for primary diagnosis of malaria at all levels, and were rolled out nationally in 2011. Microscopy is reserved for suspected treatment failures, severe febrile illness, and cases referred from lower levels of care.
- For health facilities, supervision takes place through a malaria-specific platform that is integrated across multiple malaria technical areas. As part of this approach, all health facilities must receive at least one integrated malaria supervision per semester. Supervision visits to community health workers (CHWs) are implemented by the CHW program in an integrated assessment of the individual CHW's approach to the management of multiple diseases, including malaria. In addition to training and supervision, the malaria National Reference Laboratory also implements a proficiency testing screening for malaria diagnostics. This is implemented twice a year and tests the proficiency of 100 laboratories across the country in their use of RDTs and 156 laboratories across the country on their use of microscopy.
- It is estimated that the National Health Service (NHS) covers approximately 60 percent of the population. In 2011, Mozambique launched a revitalization of the community health program with the intent that this cadre of trained community health workers would extend the reach of the NHS and provide health-related care to the remaining 40 percent of the population. CHWs provide both preventive and curative care under an integrated community case management platform. CHWs are trained to perform RDT testing and to provide ACT treatment to those with positive test results. CHWs are placed in rural areas and they receive a monthly salary of $1,200.00 meticais (approximately $17). They also receive other nonmonetary incentives such as bicycles and T-shirts. According to the NMCP routine information system, in 2020 there were 6,959 CHWs across the country. These CHWs reported 12.4 percent of the total number of malaria cases. The plan is to train an additional 789 CHWs by the end of 2021. This training will be supported by the United Nations International Children's Emergency Fund (UNICEF) and the Global Fund.
- Although an estimated 85 percent of malaria cases are seen in the public sector, understanding and promoting the quality of services in the private sector is a component of the updated NMSP. However, the NMCP faces many challenges in engaging with the private service providers. These challenges include lack of a harmonized reporting system and absence of legislation requiring the private sector to follow national case management guidelines.

PMI Objective in Support of NMCP

The NMCP and PMI prioritize the scaling up of quality-assured diagnostic testing and treatment of all confirmed cases through the following:

- Procuring RDTs, microscopes, laboratory supplies, and reagents
- Procuring ACTs
- Supporting the implementation of the malaria integrated supervision package
- Scaling up quality assurance (QA)/quality control (QC) systems for malaria diagnostics and treatment

In line with the NMCP objectives, PMI aims to achieve the following objectives:

- Improve malaria case management at the health facility and community levels through mentoring, supervision, and training.
- Improve forecasting, allocation, distribution, stock management, access and use of case management commodities (e.g., ACTs and RDTs) in the country, including at the community level
- Improve QA/QC for both microscopy and RDTs

PMI support is closely aligned with the NMCP national strategy and the Case Management strategy. PMI supports all of the technical interventions, but the geographic focus is limited to the provinces of Zambezia, Nampula, Cabo Delgado, and Tete.

PMI-Supported Recent Progress (FY 2020)

- PMI and the Global Fund together continued to purchase all RDTs and ACT treatments needed in the country. PMI supported the procurement of 16 million RDTs, of which 7.7 million were distributed during FY 2020. PMI also supported the procurement of 17 million ACTs, of which 6.3 million were distributed during FY 2020. In addition, PMI supported the procurement and distribution of 700,000 injectable artesunate vials.
- The country also made significant progress in rolling out its *Sistema de Informação de Gestão Logística das Unidades Sanitária* (SIGLUS). As of January 2021, 1,179 public health facilities (out of 1,580 health facilities nationwide) were equipped and trained with SIGLUS (75 percent implementation rate). Data from SIGLUS shows that the country continues to have challenges in ensuring continued availability of ACTs and RDTs at service delivery points, as described in detail in the supply chain section below (see Section 3.1).
- At the provincial and district level, PMI continued to provide support for the implementation of the malaria integrated supervision package in the four targeted provinces of Zambezia, Nampula, Cabo Delgado, and Tete. This includes supervision of healthcare providers at health facilities, CHW supervisors, and CHWs. Across these four provinces, there are 66 districts with approximately 750 health facilities and 4,500 health workers. Every semester, PMI aims to target two to three health facilities for supervision in each district. In the past 15 months, PMI supported 139 supervision visits, covering 1,693 health providers from 88 health facilities in 63 districts.
- Across the 66 targeted districts of the four provinces, there are approximately 150 laboratories. The training of laboratory technicians to strengthen laboratory capacity was severely affected in FY 2020 by the restrictions related to the COVID-19 pandemic. However, an additional 1,984 clinicians were trained on RDT use during supervision visits. When COVID-19 restrictions were lifted in the first quarter of FY 2021, PMI supported the training of 18 laboratory technicians in malaria microscopy.
- In Zambezia, PMI supported the implementation of four external quality assessments of 51 laboratory technicians from 15 districts. Technical support was then provided via on-the-job training to laboratory technicians in 12 districts with low performance scores. In addition, PMI is supporting follow-up visits to these 12 districts to ensure retention of the material taught and improved quality of work.
- PMI continued to support the CHW program by providing RDTs and ACTs and by supporting the kitting system through which these commodities are distributed to CHWs. PMI also supported supervision of community health workers in Nampula, Zambezia, Tete, and Cabo Delgado and supervisory visits to 88 health facilities.

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

- PMI and the Global Fund will continue to purchase all RDTs and ACT treatments needed for facility-based and community-based malaria case management in the country.
- At the provincial and district level, PMI will continue to provide support to the malaria integrated supervision package of health facility staff and CHWs in the four targeted provinces of Zambezia, Nampula, Cabo Delgado, and Tete. PMI is currently reviewing its approach to this integrated supervision model to increase its effectiveness based on implementation experience of the model and the lessons learned from remote support provided in the COVID-19 era.
- PMI will also continue to support implementation of malaria community health services by supporting supervision of CHWs, by providing RDTs and ACT treatments, and by supporting the kitting system through which these commodities are distributed to CHWs.
- PMI will continue to support improvements in malaria laboratory diagnostics by supporting the National Reference Laboratory to conduct diagnostic proficiency panels testing for RDTs and microscopy. PMI will also support laboratory strengthening in the four targeted provinces.

Key Goal

Improve access to and use of timely, quality, and well-documented malaria testing and treatment by providing facility- and community-based health workers with training, supervision, and malaria commodities to provide quality, effective care.

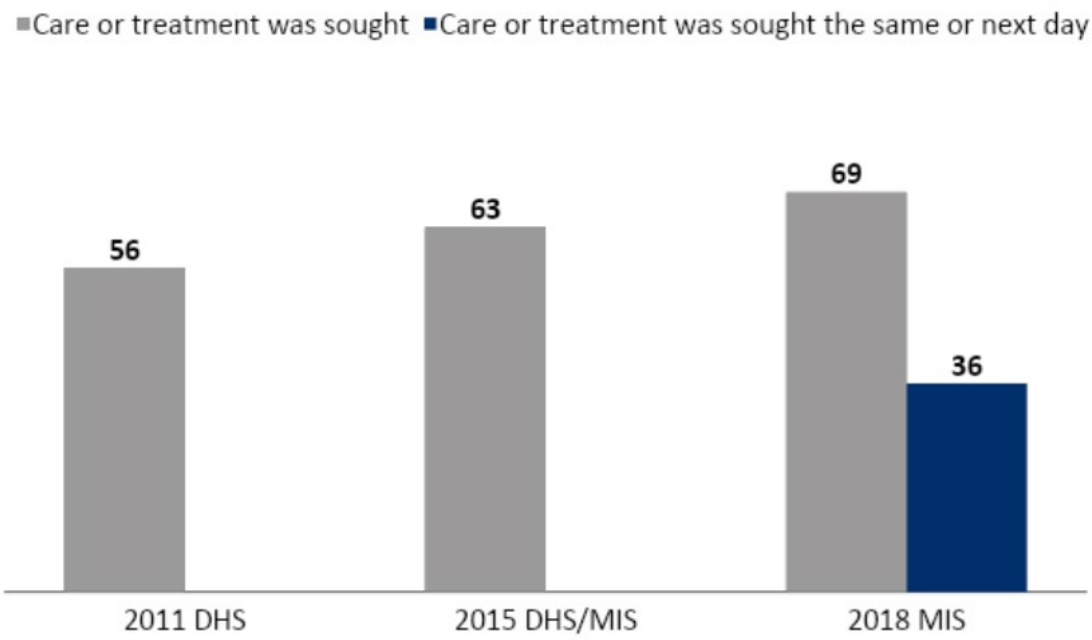
Key Question 1a

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-13. 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 [2011 DHS, 2015 DHS/MIS, 2018 MIS]



Since 2011, results from three national household surveys (2011, 2015, and 2018) have demonstrated a gradual increase in care- or treatment-seeking behavior among children under five years of age with a fever, with 69 percent seeking care or treatment in 2018. However, additional results from the 2018 MIS indicate that this drops to only 36 percent when considering if treatment was sought the same or next day. Minimizing the time between initial fever symptom and parasitological diagnosis is critical to ensuring prompt diagnosis and treatment, which decreases the likelihood of progression to severe disease. Since the start of PMI, SBC for prompt care-seeking and appropriate care provision have been priorities, and these survey results demonstrate that these interventions are having some impact and underscore the importance of continued investment in addressing barriers to access to care, increasing prompt care-seeking behaviors, and ensuring adequate stock levels of commodities. In addition to promoting appropriate care provision at the health facility level through improved access to malaria diagnostics and treatment and supportive supervision, PMI has specifically targeted community case management by CHWs. This support includes the procurement, alongside Global Fund, of CHW malaria commodities, the kitting and distribution of these commodities, supportive supervision of APEs and of APE supervisors, facilitation of community health committee meetings with CHWs, and SBC to promote appropriate community and facility care-seeking.

Key Question 1b

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

Supporting Data

While not included in the main report, the 2018 MIS included questions on why individuals did not seek care for a fever and who made the decision to seek care. PMI, the NMCP, and the National Institute of Health have begun to conduct a more detailed analysis of these data to inform programming. Consistent with global evidence, preliminary analyses of these data indicate that care-seeking was associated with familial socioeconomic status and maternal education, but was not associated with exposure to malaria messages or maternal malaria knowledge. This underscores the importance that structural factors such as cost of access to health services might have upon care-seeking.

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

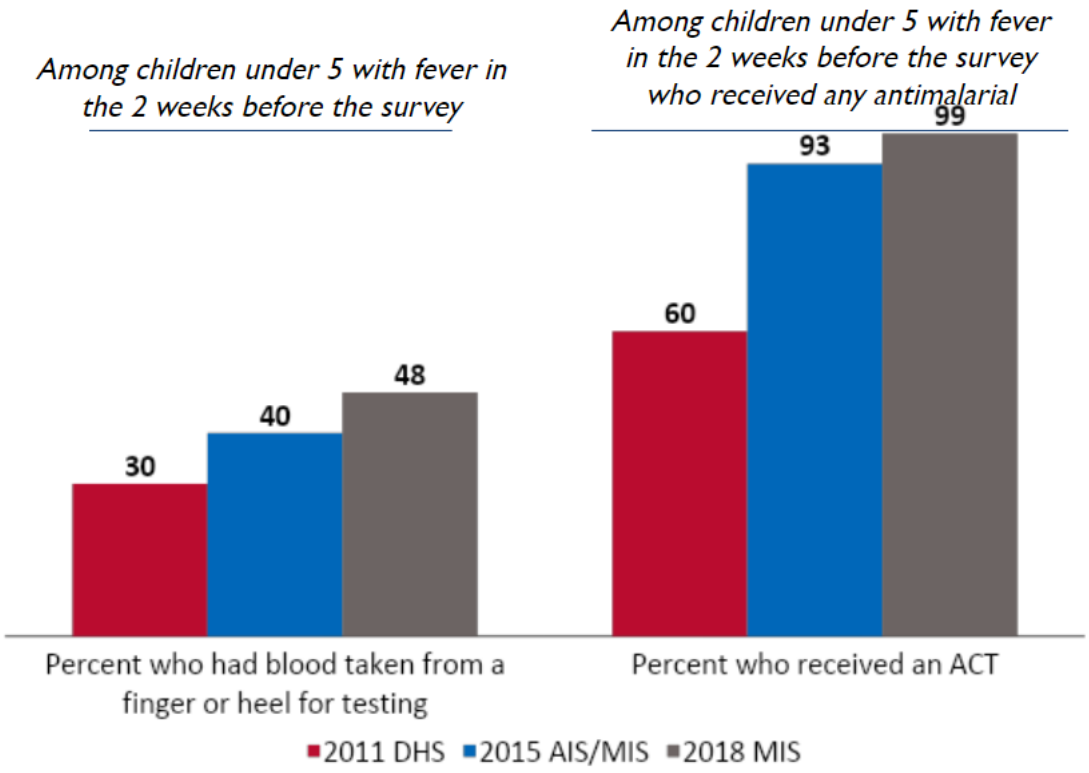
Key Question 2a

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

Supporting Data

Figure A-14. 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



Since 2011, results from three national household surveys (2011, 2015, and 2018) have demonstrated a gradual increase in the percentage of children under five years of age with fever receiving a diagnostic test for malaria, from 30 percent in 2011 to 48 percent in 2018, but this still indicates that over half of children with fever still do not. Among children under five years of age with fever receiving an antimalarial, the number receiving an ACT has increased significantly from 60 percent in 2011 to 99 percent in 2018. While the increase in access to ACTs among those receiving treatment is very promising in terms of ensuring appropriate medicine is being prescribed, the confirmation of malaria with a parasitological test among those with fever remains lower than desired. These data demonstrate that promoting care-seeking, ensuring adequate stocks of RDTs and microscopy supplies, maintaining a cadre of well-trained health workers and laboratory technicians, and SBC targeting health workers to increase confidence in RDT results continue to be key objectives of PMI's malaria programming.

Based on data from the National Community Health Program, the number of malaria cases reported by CHW increased from 1,042,755 in 2019 to 1,749,617 in 2020. The number of people tested with an RDT increased from 1.62 million in 2019 to 2.4 million in 2020. More than 94 percent of malaria cases treated at the community level were confirmed by an RDT. In 2016, 86 percent of malaria cases treated at the community level were confirmed by an RDT.

Key Question 2b

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

Supporting Data

The factors affecting testing and treatment practices among providers include the following:

- Lack of consistent availability of RDTs and ACTs at service delivery points, both health facilities and CHWs (Source: PSM reports).
- Level of malaria transmission – The quality of malaria case management was particularly low in Maputo, where only 29 percent of suspected cases were correctly managed. Common instances of incorrect case management include failure to test febrile patients, treatment with antimalarials for negative tests, and incorrect antimalarial dosing prescriptions. Maputo has the lowest transmission levels in the country (Source: Data from the 2018 Health Facility Survey).
- Training and supervision of healthcare providers can increase case management quality – The most recent health facility survey highlighted that better case management practices were associated with supervision of healthcare workers (in Maputo, supervised healthcare workers were over four times more likely to correctly manage suspect cases, and almost twice as likely in Cabo Delgado) and healthcare worker training (in Zambezia, those who received training were over three times as likely to correctly manage suspect cases). (Source: Data from the 2018 Health Facility Survey).

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

Key Question 3

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

Supporting Data

Table A-10. Support for facility- and community-based case management by major donor [2021]

Province	Health Facility	Community Health Workers
Cabo Delgado	PMI	Global Financing Facility (GFF), UNICEF, PMI
Niassa	Global Fund	GFF, UNICEF
Nampula	PMI	GFF, UNICEF, USAID
Tete	PMI	GFF, UNICEF, PMI
Zambezia	PMI	GFF, UNICEF, PMI
Manica	Global Fund	GFF, UNICEF
Sofala	Global Fund	GFF, UNICEF
Inhambane	Global Fund	GFF, UNICEF
Gaza	Global Fund	GFF, UNICEF
Maputo Province	Global Fund	GFF, UNICEF

While PMI and the Global Fund support commodity distribution to the entire country, the table above shows that PMI supports case management training and supervision in the provinces of Nampula, Zambezia, Tete, and Cabo Delgado. Global Fund supports the MOH to implement training and supervision in the remaining provinces.

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

PMI and Global Fund plan to procure RDTs to contribute to the country's estimated need and desired end-of-year stock during calendar years 2021–2023 (see Table A-11 – RDT Gap Analysis). Note that due to the reduced number of commodities procured with FY 2020 funds and the sharp increase in the unit cost of RDTs, there is a gap observed for 2023 that affects the desired months of end-of-year stock, but will not likely pose a risk for testing activities. The NMCP will work with PMI and other donors to find solutions to cover this gap.

Table A-11. RDT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	30,832,244	31,616,078	32,419,747
Population at risk for malaria	30,832,244	31,616,078	32,419,747
PMI-targeted at-risk population	30,832,244	31,616,078	32,419,747
RDT Needs			
Total number of projected fever cases	70,914,161	70,548,093	67,424,914
Percent of fever cases tested with an RDT	39%	43%	50%
RDT Needs (tests)	**27,725,608**	**30,132,710**	**33,719,731**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tests)			
RDTs from Government	*0*	*0*	*0*
RDTs from Global Fund	8,436,980	11,437,294	5,345,066
RDTs from other donors	0	0	0
RDTs planned with PMI funding	24,450,425	22,000,000	19,000,000
Total RDT Contributions per Calendar Year	***32,887,405***	***33,437,294***	***24,345,066***
Stock Balance (tests)			
Beginning Balance	14,839,325	20,001,122	23,305,706
- Product Need	27,725,608	30,132,710	33,719,731
+ Total Contributions (received/expected)	32,887,405	33,437,294	24,345,066
Ending Balance	20,001,122	23,305,706	13,931,041
Desired End of Year Stock (months of stock)	7	7	7
Desired End of Year Stock (quantities)	16,173,271	17,577,414	19,669,843
Total Surplus (Gap)	***3,827,851***	***5,728,292***	***(5,738,802)***

Key Question 5

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

Supporting Data

PMI and Global Fund plan to procure ACTs to contribute to the country's estimated need and desired end-of-year stock during calendar years 2021–2023 (see Table A-11 – ACT Gap Analysis). Note that due to the reduced number of commodities procured with FY 2020 funds, there is a gap observed for 2022 and 2023 that affects the desired months of end-of-year stock, but will not likely pose a significant risk for the ability to treat malaria cases. The NMCP will work with PMI and other donors to find solutions to cover this gap.

Table A-12. ACT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	30,832,244	31,616,078	32,419,747
Population at risk for malaria	30,832,244	31,616,078	32,419,747
PMI-targeted at-risk population	30,832,244	31,616,078	32,419,747
ACT Needs			
Total projected number of malaria cases	11,839,865	11,936,372	12,130,200
Total ACT Needs (treatments)	***17,906,578***	***18,149,494***	***18,601,801***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	*0*	*0*	*0*
ACTs from Global Fund	4,199,466	5,565,981	9,184,353
ACTs from other donors *[specify donor]*	0	0	0
ACTs planned with PMI funding	11,664,108	9,000,000	9,100,000
Total ACTs Contributions per Calendar Year	***15,863,574***	***14,565,981***	***18,284,353***
Stock Balance (treatments)			
Beginning Balance	19,129,072	17,086,068	13,502,555
- Product Need	17,906,578	18,149,494	18,601,801
+ Total Contributions (received/expected)	15,863,574	14,565,981	18,284,353
Ending Balance	17,086,068	13,502,555	13,185,107
Desired End of Year Stock (months of stock)	10	10	10
Desired End of Year Stock (quantities)	14,922,148	15,124,578	15,501,501
Total Surplus (Gap)	***2,163,920***	***(1,622,023)***	***(2,316,394)***

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?

Supporting Data

PMI, Global Fund, and the GOM plan to procure injectable artesunate, and PMI and Global Fund plan to procure rectal artesunate suppositories to contribute to the country's estimated need and desired end-of-year stock of severe malaria definitive and pre-referral treatment during calendar years 2021–2023 (see Table A-12 – Inj. Artesunate Gap Analysis and Table A-13 – RAS Gap Analysis). Because the NMCP has decided to expand the use of injectable artesunate by making it available to all peripheral health facilities, there is a gap observed in 2021–2023. The expansion of injectable artesunate will be implemented in a phased approach and the plan is to monitor the consumption during 2021. For rectal artesunate, there is a gap in 2021 for the desired stock level at central level, but the implementation of the kitting activity expansion will take place during 2022. If necessary, PMI will work with the GOM and other donors to address these gaps.

Table A-13. Inj Artesunate Gap Analysis Table

Calendar Year	2021	2022	2023
Injectable Artesunate Needs			
Projected number of severe cases + referral + pre-referral	236,797	238,727	242,604
Projected number of severe cases among children	129,786	130,844	132,969
Average number of vials required for severe cases among children	6	6	6
Projected number of severe cases among adults	107,011	107,883	109,635
Average number of vials .required for severe cases among adults	7.5	7.5	7.5
Total Injectable Artesunate Needs (vials)	***1,601,667***	***1,614,722***	***1,640,943***
Needs Estimated based on a Combination of HMIS and Consumption Data			
Partner Contributions (vials)			
Injectable artesunate from Government	0	500,000	500,000
Injectable artesunate from Global Fund	550,000	67,309	9,899
Injectable artesunate from other donors [specify donor]	-	-	-
Injectable artesunate planned with PMI funding	516,000	620,000	765,283
Total Injectable Artesunate Contributions per Calendar Year	***1,066,000***	***1,187,309***	***1,275,182***
Stock Balance (vials)			
Beginning Balance	1,296,544	760,877	333,464
- Product Need	1,601,667	1,614,722	1,640,943
+ Total Contributions (received/expected)	1,066,000	1,187,309	1,275,182
Ending Balance	760,877	333,464	-32,296
Desired End of Year Stock (months of stock)	8	8	8
Desired End of Year Stock (quantities)	1,067,778	1,076,481	1,093,962
Total Surplus (Gap)	***(306,901)***	***(743,017)***	***(1,126,258)***

Table A-14. RAS Gap Analysis Table

Calendar Year	2021	2022	2023
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose	180,853	211,199	211,199
Total Artesunate Suppository Needs (suppositories)	***78,000***	***211,199***	***211,199***
Needs Estimated based on # of providers offering pre-referral services			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	148,935	256,000	395,065
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	24,000	34,000	34,000
Total Artesunate Suppositories Available	***172,935***	***290,000***	***429,065***
Stock Balance (suppositories)			
Beginning Balance	0	94,935	173,736
- Product Need	78,000	211,199	211,199
+ Total Contributions (received/expected)	172,935	290,000	429,065
Ending Balance	94,935	173,736	391,602
Desired End of Year Stock (months of stock)	4	4	4
Desired End of Year Stock (quantities)	26,000	70,400	70,400
Total Surplus (Gap)	***68,935***	***103,337***	***321,203***

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

There is not a plan to procure other standard antimalarial drugs during calendar years 2021–2023.

Key Question 8

Are first-line ACTs effective and monitored regularly?

Supporting Data

Table A-15. 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*	Massinga	Y	AL, ASAQ	Y
2018*	Moatize	Y	AL, ASAQ	Y
2018*	Montepuez	Y	AL, ASAQ	Y
2018*	Mopeia	Y	AL, ASAQ	Y

Ongoing TES: None **Next Planned TES:** 2022

ACPR: adequate clinical and parasitological response; AL: artemether-lumefantrine; ASAQ: amodiaquine-artesunate; PARMA: PMI-supported Antimalarial Resistance Monitoring in Africa

*Pre-publication: Nhama, A., Nhamussua L., Macete E., Bassat Q., Salvador C., Enosse, S., Candrinho, B., Carvalho, E., Nhacolo, A., Chidimatembue, A., Saifodine, A., Zulliger, R., Lucchi, N., Svigel, S.S., Moriarty, L.F., Halsey, E.S., Mayor, A., & Aide, P. In vivo efficacy and safety of artemether-lumefantrine and amodiaquine-artesunate for uncomplicated Plasmodium falciparum malaria in Mozambique, 2018.

The effectiveness of ACTs is monitored regularly in Mozambique, about every three years. Results from the 2018 therapeutic efficacy study of both AL and ASAQ demonstrated adequate drug efficacy (above 90 percent). PMI continues to support the monitoring of ACTs, while also improving the in-country technical capacity to conduct such analyses.

Key Question 9

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

Supporting Data

PMI has historically supported the National Reference Laboratory for Blood Parasites. The support included refurbishment of the laboratory, procurement of laboratory consumables used for QC activities, and development of QA testing practices and of supervision guidelines for malaria diagnosis. PMI also supports the accreditation process of the laboratory and the certification of malaria laboratory technicians. Given the need to continuously support malaria diagnosis, PMI will continue to support the Reference Laboratory with the rollout of the national QA/QC system, building of central level laboratory capacity, and in maintaining the certification of the laboratory and of the laboratory technicians.

The role of the private sector in malaria case management is very limited and the private sector providers are concentrated in a few urban centers of the country.

Conclusions for Case Management Investments

PMI will continue to prioritize the procurement of case management commodities and the implementation of the integrated supervision platform at the facility and community level. There will be a particular focus on strengthening access to quality malaria case management at the periphery and community level.

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

The objective of the NMCP is to improve coverage of intermittent preventive treatment for pregnant women (IPTp) to reach all eligible pregnant women attending the ANC services.

NMCP Approach

- Mozambique has been implementing the WHO updated guidelines on IPTp since 2014, which recommend administering IPTp as early as possible starting in the second trimester (13 weeks) and at each scheduled ANC visit until the time of delivery, as long as there has been an interval of at least one month since the last SP dose.
- At the central level there is a MIP working group chaired by the NMCP and includes participants from the maternal child health (MCH) department.
- Malaria in pregnancy is a component of the malaria integrated supervision platform. Supportive supervision and training efforts aim to reach all health workers from at least two health facilities (one referral and one peripheral) in the 62 target districts of the four focus provinces of Nampula, Zambezia, Tete, and Cabo Delgado. In FY 2020 264 health workers were trained on MIP; the target for FY 2021 is 120.
- The national guidelines also state that SP is contraindicated in women receiving cotrimoxazole HIV/AIDS preventive treatment.

PMI Objective in Support of NMCP

PMI supports the procurement of SP for national distribution and the delivery of IPTp to all eligible pregnant women at all eligible ANC visits in the target provinces of Zambezia, Nampula, Cabo Delgado, and Tete. PMI also provides technical support at the central level.

PMI-Supported Recent Progress (FY 2020)

- PMI supported training and supervision of 464 MCH nurses in IPTp in the four target provinces of Nampula, Zambezia, Cabo Delgado, and Tete.
- PMI also continued to provide support for the procurement of SP by purchasing and distributing 1.2 million tablets. The GOM was responsible for the procurement and distribution of the remaining SP needs. However, the country continues to face challenges to ensure a continued availability of SP at service delivery points, as detailed in the supply chain section below (Section 3.1).

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

PMI will continue to prioritize implementation of MIP activities through the malaria integrated supervision platform. PMI will also continue to provide technical support at the central level by participating in the MIP technical working group. This group includes both NMCP and maternal and child health representatives.

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 strategy for MIP, which includes provision of ITNs at the first antenatal care (ANC) visit, a minimum of three doses of intermittent preventive treatment for pregnant women (IPTp) in malaria endemic areas starting at 13 weeks gestational age, and effective case management of malaria per WHO guidelines.

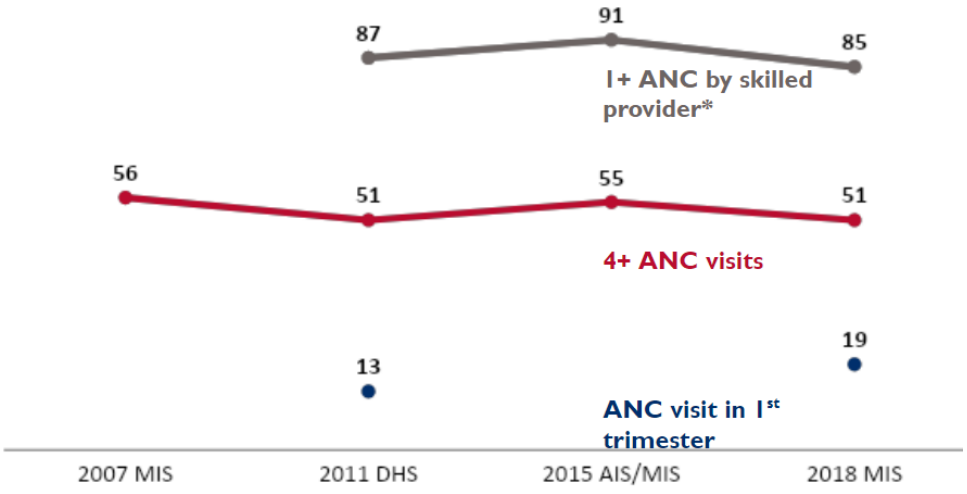
Key Question 1a

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-15. 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)



**Skilled provider includes doctor, nurse, or midwife.*

Key Question 1b

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

Supporting Data

Results from the national household surveys (2007, 2011, 2015, and 2018) show that coverage for at least one ANC visit is high, at 85 percent or more. However, coverage of at least four ANC visits remains low, around 50 percent. In addition, less than 20 percent of women start their ANC during the first trimester of pregnancy.

Mozambique has adopted the 2016 WHO ANC guidance and the national guidelines recommend a minimum of eight ANC visits. The country policy also supports early initiation of IPTp between 13 and 16 weeks. However, the fact that most women start ANC later in their pregnancy, coupled with the fact that most women do not return for the follow-up visits, poses serious challenges to the implementation of this policy.

To address these challenges, it is important to understand (1) the barriers for early ANC attendance and devise a set of interventions focusing on health promotion to address them, (2) the health system barriers that prevent women to return for follow-up visits and devise a set of interventions to improve the quality of healthcare, and (3) community barriers that prevent women to return for follow-up visits and devise a set of health promotion activities to address them.

PMI had planned to support an evaluation in CY 2019 to look at barriers to IPTp provision. This evaluation was postponed to CY 2020, due to logistic and financial issues and then postponed again due to the COVID-19 epidemic. PMI will continue to work with the NMCP and other stakeholders to plan this evaluation to identify and document these barriers.

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

Key Question 2

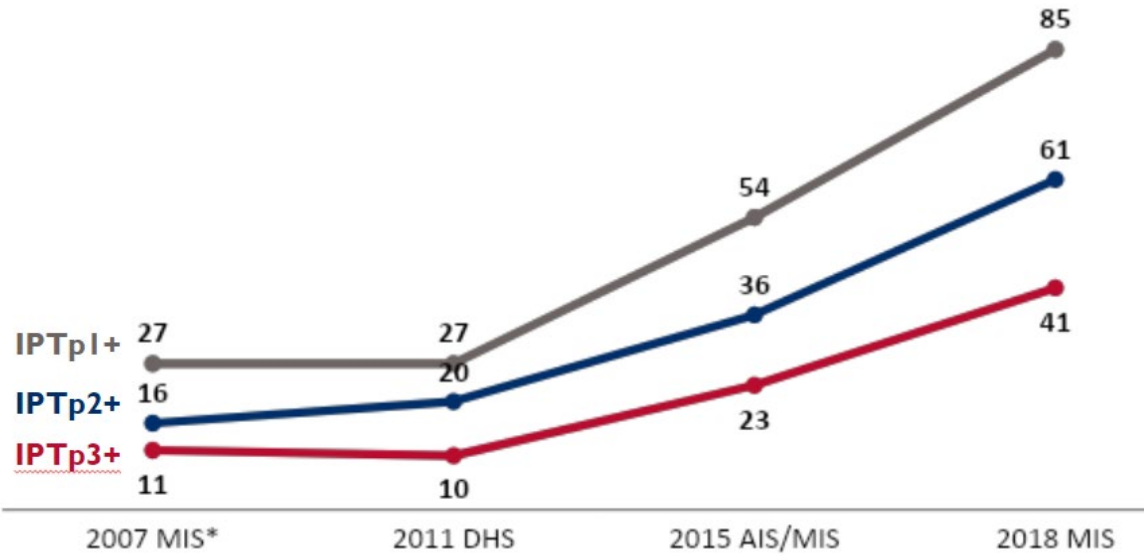
What proportion of pregnant women are receiving the recommended doses of IPTp?

Supporting Data

Figure A-16. 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



Since 2007, results from four national household surveys (2007, 2011, 2015, and 2018) have demonstrated a gradual increase in the uptake of IPTp. The proportion of women receiving at least one dose of IPTp increased from 27 percent in 2007 to 84 percent in 2018, while the proportion of women receiving at least three doses of IPTp increased from 11 percent in 2007 to 41 percent in 2018. These data demonstrate the need to ensure that pregnant women return for follow-up ANC visits and the need to ensure that they receive all ANC services, particularly IPTp, but also demonstrate that important progress has been made to date.

The routine HIS data also show improvements in the uptake of the IPTp. In fact, the proportion of pregnant women who received two or more doses of IPTp increased from 49 percent in CY 2018 to 74 percent in CY 2020. Similarly, the proportion of pregnant women who received four or more doses of IPTp increased from 44 percent in 2018 to 52 percent in 2020. In Mozambique, the DHIS2 does not track coverage of IPTp3.

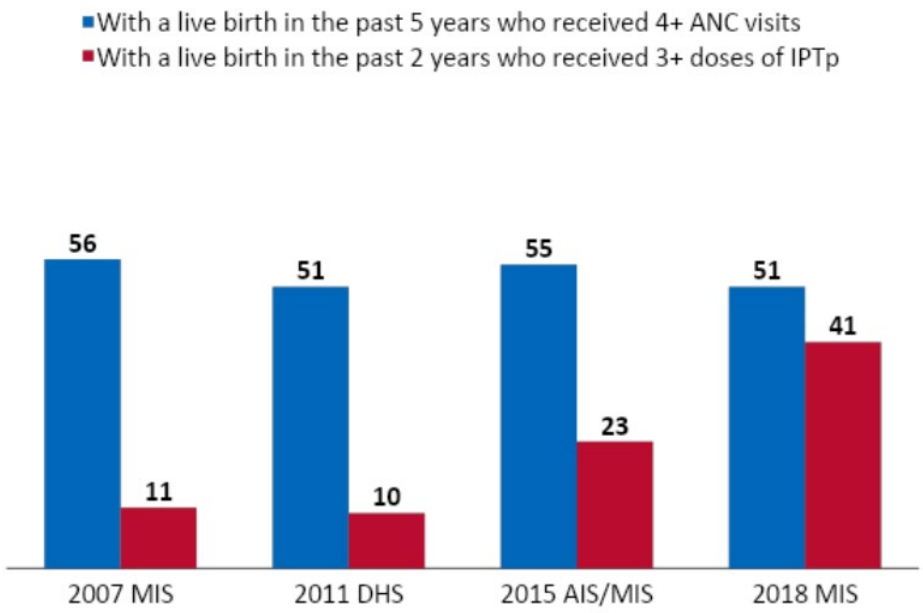
Key Question 3a

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

Supporting Data

Figure A-17. Trends in missed opportunities for IPTp

Percentage of women 15 to 49 years of age



The data above show that the gap between ANC attendance and IPTp uptake is narrowing. However, there is still a need to improve provision of IPTp at all ANC visits to ensure that all pregnant women are covered. PMI is working with the NMCP and other stakeholders to conduct an analysis of facility- and provider-level barriers to IPTp coverage that will provide evidence on which specific interventions might be appropriate to improve coverage.

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

There is limited data in Mozambique on the barriers and facilitators to IPTp coverage, especially among providers. Low IPTp uptake has been associated with non-institutional deliveries, first ANC visit after 28 weeks, low awareness of IPTp, and having no or only primary education[2] In order to address this gap, PMI is working with the NMCP and other stakeholders to conduct an analysis of barriers to IPTp coverage.

[2] Arnaldo P, Rovira-Vallbona E, Langa JS, et al. Uptake of intermittent preventive treatment and pregnancy outcomes: health facilities and community surveys in Chókwè district, southern Mozambique. *Malar J.* 2018;17(1):109. Published 2018 Mar 12. doi:10.1186/s12936-018-2255-z

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

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

Data on this intervention strategy is limited and not available at this time. There is a need to better capture information on treatment of malaria in pregnancy. PMI will aim to raise this in national working group discussions.

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

The GOM plans to contribute SP to the country's estimated need and desired end-of-year stock during calendar years 2021–2023 (see Table A-15 – SP Gap Analysis). There are no current indications of a project gap in SP.

Table A-16. SP Gap Analysis Table

Calendar Year	2021	2022	2023
Total Country Population	30,832,244	31,616,078	32,419,747
Total Population at Risk for Malaria	30,832,244	31,616,078	32,419,747
PMI Targeted at Risk Population	30,832,244	31,616,078	32,419,747
SP Needs			
Total Number of Pregnant Women	1,674,697	1,717,272	1,760,925
Proportion of women expected to attend ANC1 at 13 weeks or greater	98%	98%	98%
Proportion of women expected to attend ANC2	75%	77%	79%
Proportion of women expected to attend ANC3	55%	57%	58%
Proportion of women expected to attend ANC4	53%	54%	56%
Total SP Needs (treatments)	***4,706,188***	***4,910,283***	***5,123,215***
Needs Estimated based on a Combination of HMIS and Consumption Data			
Partner Contributions (treatments)			
SP from Government	4,706,188	4,910,283	5,123,215
SP from Global Fund	0	0	0
SP from Other Donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Contributions per Calendar Year	***4,706,188***	***4,910,283***	***5,123,215***
Stock Balance (treatments)			
Beginning balance	4,335,819	4,335,820	4,335,820
- Product Need	4,706,188	4,910,283	5,123,215
+ Total Contributions (Received/expected)	4,706,188	4,910,283	5,123,215
Ending Balance	4,335,820	4,335,820	4,335,820
Desired End of Year Stock (months of stock)	10	10	10
Desired End of Year Stock (quantities)	3,921,823	4,091,903	4,269,346
Total Surplus (Gap)	***413,997***	***243,917***	***66,474***

Conclusions for MIP Investments

PMI will continue to prioritize the implementation of the integrated supervision platform to strengthen MIP interventions and support the central-level working group. Some implementation support will shift from implementation partners to direct funding to the GOM.

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

2.2.2. SEASONAL MALARIA CHEMOPREVENTION (SMC)

SMC is not a recommended intervention for this country.

2.2.3. ADDITIONAL DRUG-BASED PREVENTIVE STRATEGIES

This country is not a designated country for near-term pre-elimination or elimination and there is no PMI support planned for such work in Mozambique.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.1. SUPPLY CHAIN

NMCP Objective

To ensure that all malaria case management and prevention commodities are available at all service delivery points.

NMCP Approach

- Medicines and other health commodity products are a core component of a functioning healthcare system. Recognizing the critical need to ensure access to medicines, in 2013 the MOH adopted the Strategic Plan for Pharmaceutical Logistics (PELF). Given the current and future needs of medicines in the NHS, the PELF aimed to ensure that safe and effective, quality-approved, essential medicines and products are available in sufficient quantities, when and where they are needed to prevent, diagnose, or treat priority health problems. It also aimed to do this at the lowest possible cost to the patient and community. To achieve this goal, PELF established several reforms based on global best practices, such as supply chain optimization design, by establishing three regional warehouses and 30 intermediate warehouses. This is one of the PELF key reforms that will decrease cost and increase the sustainability of the operation.
- Central Medical Stores (CMAM) is the national entity with primary responsibility within the MOH for all central-level supply chain functions, including procurement of all pharmaceuticals and related health supplies. In collaboration with NMCP, CMAM manages all functions related to forecasting malaria commodities (except ITNs) and commodity supply planning, procurement, storage, inventory management, and distribution from the central level to provincial and intermediate warehouses as they are opened.
- CMAM distributes malaria drugs and RDTs via two logistics systems: the prepackaged CHW kit and the Classic system. PMI currently supports the local production process of malaria drug kits for the community health workers at CMAM facilities, and their distribution is in conjunction with the essential medicines kit. The CHW malaria kit system was developed in response to the bulky ACT packaging, making it difficult to fit into the essential medicine kit. Malaria medicine kits are distributed to CHWs through health facilities using a push-based system. The second logistics system, the Classic system, distributes medicines (including ACTs and SP) and RDTs quarterly based on requisitions. Products are stored in regional warehouses in Maputo, Beira, and Nampula, from which central hospitals are supplied, and then to the still existing 11 provincial warehouses and the one open intermediate warehouse. Each of the 10 provincial warehouses supplies the provincial, general, and rural hospitals and district warehouses.

Malaria drugs are administered within this system, which uses a logistics management information system (LMIS) to generate consumption, stock, loss, and adjustment data. These systems provide the supply chain and NMCP with data for informed management decision-making. Despite these two distribution systems, facility-level stockout challenges persist. Delays in the arrival of shipments are a major cause of this situation as delayed arrivals at the central level can result in stockouts at service delivery points due to the time it takes to transport commodities from port to province, province to the district, and district to facility and community levels. Additionally, lack of transportation from the province level to health facilities, community level, and accessibility constraints during the higher transmission season have resulted in stockouts at the service delivery points.

- CMAM and NMCP have begun implementation of the PELF to strengthen the system. In particular, the intermediary warehouse concept of eliminating one of the four levels (regional, provincial, and district warehouses and health facilities) of the in-country supply chain and combining the current 11 provincial warehouses and 144 district warehouses into 30 intermediary warehouses optimally located across the territory has begun. In FY 2018, one regional warehouse was opened in the south (Vilanculos District, Inhambane Province). Four more regional warehouses are expected to open by the end of December 2021, three in Zambezia and one in Manica.

PMI Objective in Support of NMCP

In alignment with the NMCP, PMI aims to achieve the following objectives:

1. Develop more effective public sector medical supplies/commodity forecasting, support for commodities and supply planning, and procurement capacity.
2. Improve public sector warehousing and distribution at all levels.
3. Improve the use of medicines and develop more effective pharmaceutical services.
4. Strengthen the CMAM's strategic planning and management capacity.
5. Strengthen overall regulatory capacity.

PMI-Supported Recent Progress (FY 2020)

- During the past year, PMI continued to support CMAM by providing technical assistance, support for commodities and supply planning, procurement, and support to the CHW malaria kit system. PMI supports procurement quality control (including ensuring that products are WHO-certified, registered, and have pre-shipment inspection), storage (including renting, maintaining, and equipping warehouses and support for warehouse information systems and management), distribution of malaria commodities (specifically ACTs, RDTs, and SP), and assembling malaria kits for CHWs. PMI provides distribution support of these products to the regional level to improve the availability of products at the provincial level and reduce delays from port to end-user.
- PMI supported the supervision of health facilities through the implementation of e-supervision due to the COVID-19 restrictions. As social distancing and lockdown measures were put in place, PMI supported the development of a rapid e-Supervision guideline using phone calls, messages, WhatsApp, and video calls to provide uninterrupted TA to provinces, districts, and health facilities to keep managing health commodities according to best practices. E-supervisions were conducted in nearly all provinces during the COVID-19 pandemic. This supervision includes ensuring that all provincial quarterly commodity

requisitions and resupply are submitted complete and on time. Utilizing reports produced by SIGLUS, districts and health facilities with acute issues were identified and monitored to ensure commodity availability. During this E-supervision support on preparation of requisitions and commodities distribution plan, production and submission of monthly inventories of RDTs and ACTS was provided, and teams received on-the-job training in the use of standard operating procedures for commodity management. During Q4 FY 2020, through e-supervision 101 health facilities were supported and 62 health professionals trained in handling SIGLUS and drug management, and 34 trained in SIMAM to improve data quality and use for decision-making. All these interventions contribute to improving the LMIS by improving data flow and data quality. Remote supportive supervision reports were discussed with the Health Provincial Directorate, who validated the action plans.

- As of January 2021, 1,179 health facilities (out of the 1,580 existing national facilities) were actively reporting logistics information to SIGLUS.
- PMI continued to provide support to the Medicines Technical Working Group chaired by CMAM and composed of various U.S. Government implementing partners, MOH officials, and other donors. The group covers several technical areas, including malaria, and it meets quarterly to review the quantification tables, and monthly to monitor the shipments of commodities and track commodity consumption data to support the management and oversight of health commodities via regular supply plan updates.
- Other activities supported by PMI included district and provincial quarterly meetings to review and improve supply chain and logistics data and performance; training and supervision on logistics standard operating procedures and data quality to the district and facility staff. The majority of the quarterly meeting and training activities were carried out by provincial partner coordinators who worked closely with the MOH provincial warehouse to strengthen logistics management of health commodities in the province. Such activities were also targeted in response to specific provincial needs and training strategies and focused on inventory control, warehousing and storage, distribution, and supply chain monitoring and evaluation.

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

- PMI will continue to support procurement, quality control, storage, and distribution of malaria commodities and will continue with this support from the ports of entrance to provincial and intermediate warehouses.
- PMI will continue to support the CHW program by providing RDTs and ACTs through the kit system and distribution of kits to CHWs. It will also support the piloting of a pull-based system for CHW commodities and the evaluation of this pilot.
- E-supervision and on-site supervision will continue focusing on data quality assessments of commodity stock information through the health-facility level digital LMIS system. The current plan is to expand the e-supervision to eight facilities per province per month.

Figure A-18. E-Supervision compared to on-site supervisor over the past year

Key Goal

Ensure continual availability of quality products needed for malaria control and elimination (ACTs, RDTs, SP, Art. Inj., 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 past year (2020)? If not, have they been under, over, or stocked out?
There have been challenges in maintaining adequate stocks of several malaria commodities at the central level. Delays in the arrival of shipments and reductions in government and other donor procurements are important causes. Additionally, the quantification assumptions have been reviewed to strengthen and more adequately project commodity needs.

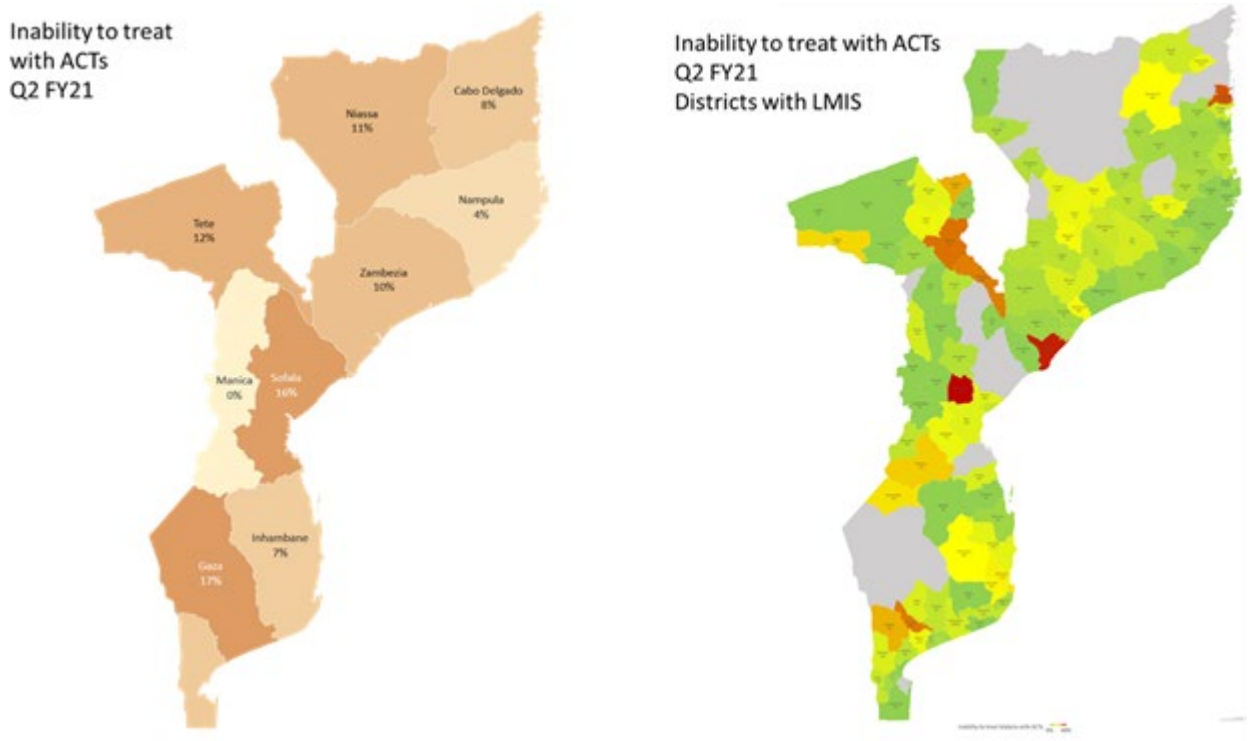
During 2020, most of the malaria commodities have been stocked according to plan. There were four commodities that were within the minimum and maximum range for the central-level stock status. Two commodities were above the maximum level and one was below the minimum level. The beginning of the year was challenging for the injectable artesunate, with the shipments delayed for several months due to COVID-19, and malaria RDTs (mRDTs) shortage, that affected the Q3 FY 2020 (April–June 2020) due to production constraints for the rapid tests.

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?
There have been challenges in maintaining adequate stocks of several malaria commodities at service delivery points. Lack of transport from provincial warehouses to the health facilities are the leading causes. Additionally,

the quantification assumptions have been reviewed to strengthen and more adequately project commodity needs.

Figure A-19. Map of inability to treat with ACTs in 2020



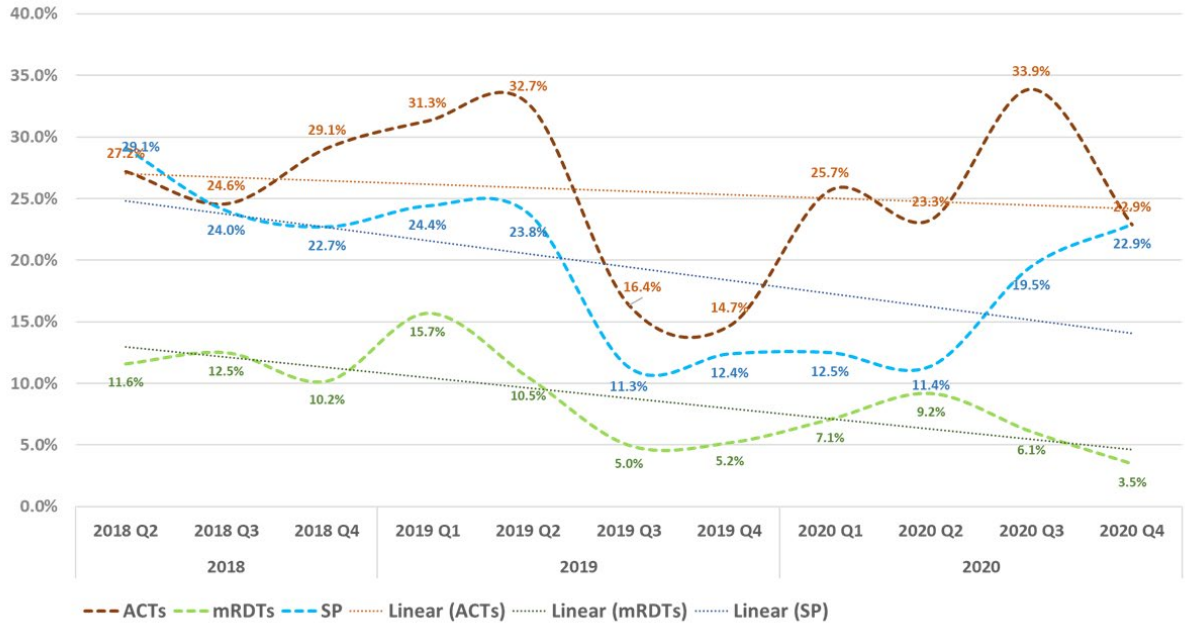
Quarterly distribution from the central to the provincial level (instead of proposed monthly distribution), delays the response during the high season. There are challenges in transportation availability and last mile distribution due to health facility access (rainy/high malaria season) for rural areas.

PMI has been supporting CMAM and the NMCP on the following:

- Changing the period for ACT distribution (from three months to one month), and decreasing the risk of stockouts of ACT formulations at the provincial level
- Expanding LMIS, data visibility, and data-driven decision-making across the supply chain
- Developing systems to have end-to-end visibility for the malaria commodities (open LMIS) for district warehouses and larger health facilities
- Supervising and training supply chain teams at all levels
- Triangulating commodities data (ACTs received/used in a given period vs. malaria cases reported)

Supporting Data

Figure A-20. ACT (average of all four formulations), mRDTs, and SP stockout trends at service delivery points (health facilities), 2018–2020



PSM is providing support only at the provincial level for the Last Mile Supply Chain CHEGAR in the transportation activities from provincial level to service delivery points.

Overall the trend of stockout of AL (ACTs) shows a slight decrease during the past fiscal year. Nevertheless, there have been challenges maintaining adequate stocks of ACTs at the SDP level. In Q3 FY 20, the stockout of different blister packs of ACTs at health facilities varied from 25 percent to 42 percent. To maintain the ability to treat, other antimalarial drugs were used. Delays in the arrival of shipments, COVID-19 impact, and lack of government capacity to transport supplies from provincial to district and health facilities are fundamental causes for the trend.

The stockout level of SP remained below 10 percent and was stable over the past fiscal year. The RDT varied from 10 percent to 20 percent, increasing from Q2 to Q4 in FY 2020. Delays in the arrival of shipments, COVID-19 impact, and lack of government capacity to transport supplies from provincial to district and health facilities are fundamental causes for the trend.

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?

The alignment between logistical data (consumption "SIMAM") and programmatic ("SISMA" cases) has improved considerably over the years, but critical factors such as the use of different formulations when one is stocked out, remain.

Supporting Data

Figure A-21. ACTs distributed vs. ACTs reported as used, 2013 to 2020

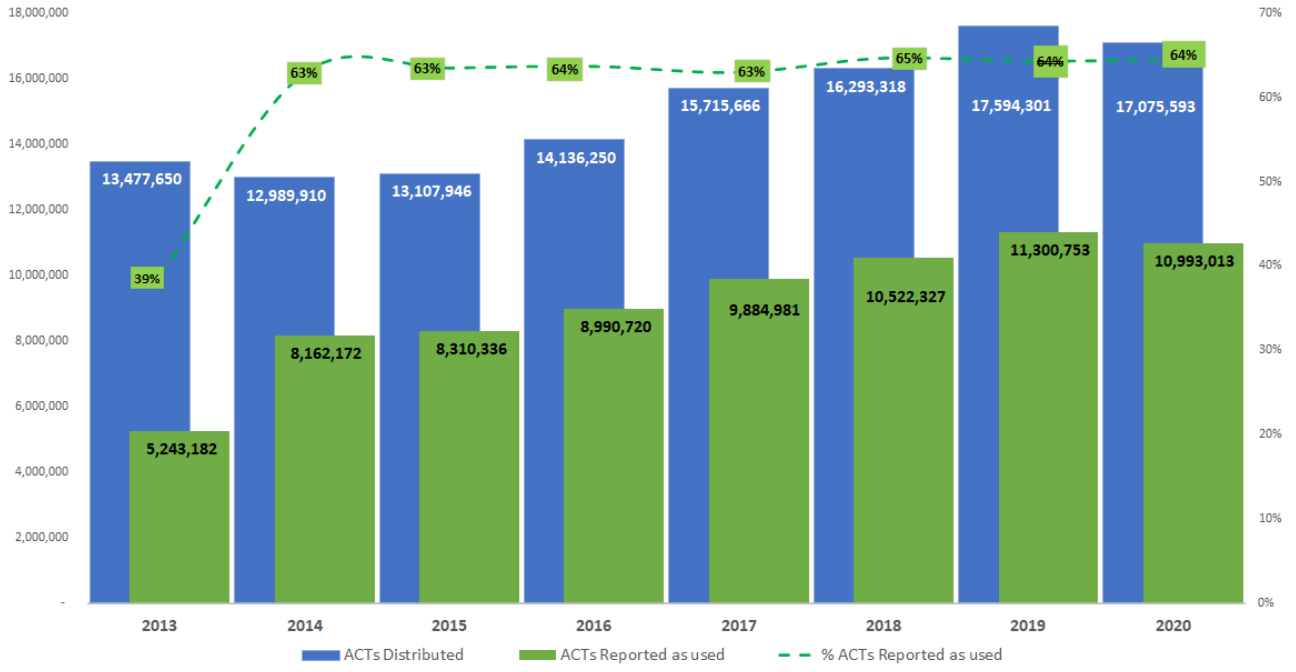
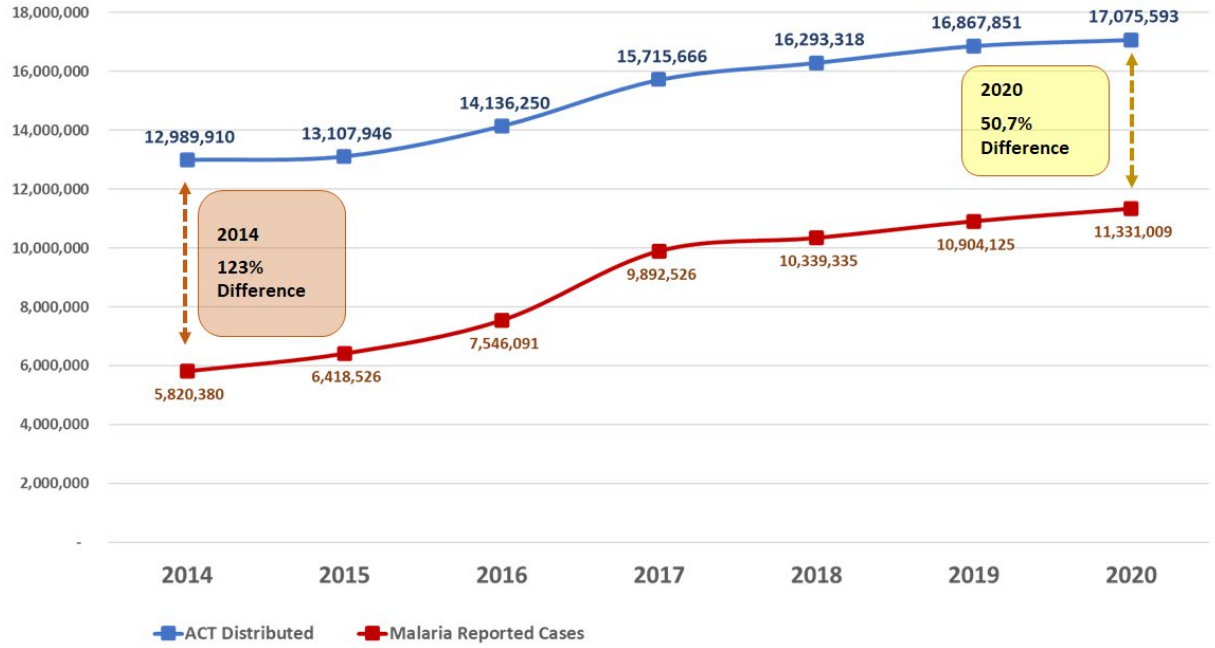
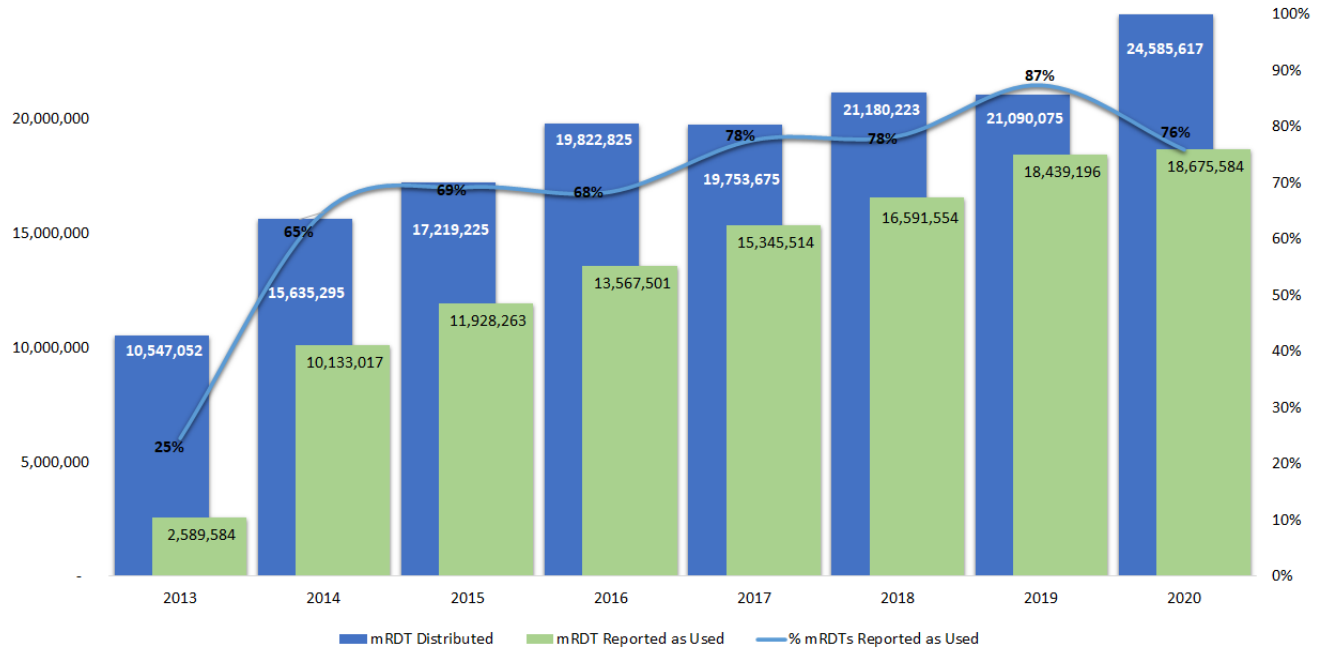


Figure A-22. Gap between malaria cases and ACTs distributed, 2014–2020



The difference between the reported malaria cases and ACT consumption decreased from 123 percent in 2014 to 50.7 percent in 2020. The gap between ACT distribution and malaria cases reported remains high but has been decreasing over the years due to improved data collection, data-driven ACT distribution planning, and decreased misuse of the ACT formulations during the dispensing. Factors contributing to this persistent difference include treatment of patients testing negative and patients not tested (Candrinho et al., 2019), incorrect distribution of ACT formulations, and under-reporting.

Figure A-23. mRDTs distributed vs. mRDTs used, from 2013 to 2020

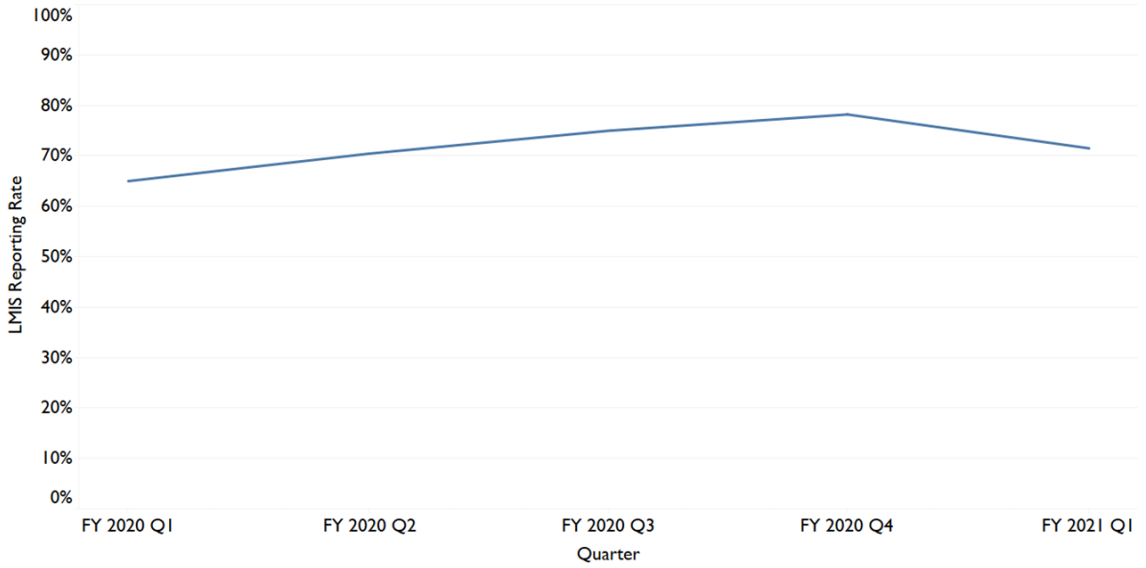


Over time, both the absolute number of mRDT distributed and used has improved, and the gap between them decreased from 2013 to 2019. The number of tests distributed in 2020 was proportionally much higher than in the previous years, and due to COVID-19, the positive growth trend in consumption was lower from 2019 to 2020, and fell to 76 percent of the mRDTs distributed.

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?

Figure A-24. LMIS reporting rate, 2020–2021



In the past year, reporting was delayed due to the following reasons:

- Internet was unavailable in rural areas to synchronize the data.
- New health facility staff were trained but not reporting.
- Equipment/systems did not function properly and there were challenges to replace/update it (Sofala and Tete).
- Loss of reporting from health facilities in Cabo Delgado due to the war in some districts in the country.

LMIS reporting has remained relatively stable as the new LMIS system has been rolled out. Despite upgrading the eLMIS, reporting rates remained stable, but the data's speed, accessibility, and visibility improved. As such, the focus is to improve reporting rates to take advantage of the benefits of the eLMIS, including supporting commodity data use. To improve reporting and data use, PMI is providing support on LMIS supervision training and remote assistance. Older equipment (tablets) are being replaced. Data quality analysis is being conducted at the health facility and regional levels to improve the quality of data, including data completeness, consistency, accuracy, and timeliness. Data are included in the iMISS system, which supports their visibility across all levels of decision-makers. Support is underway to improve use of this system for decision-making.

Key Question 5

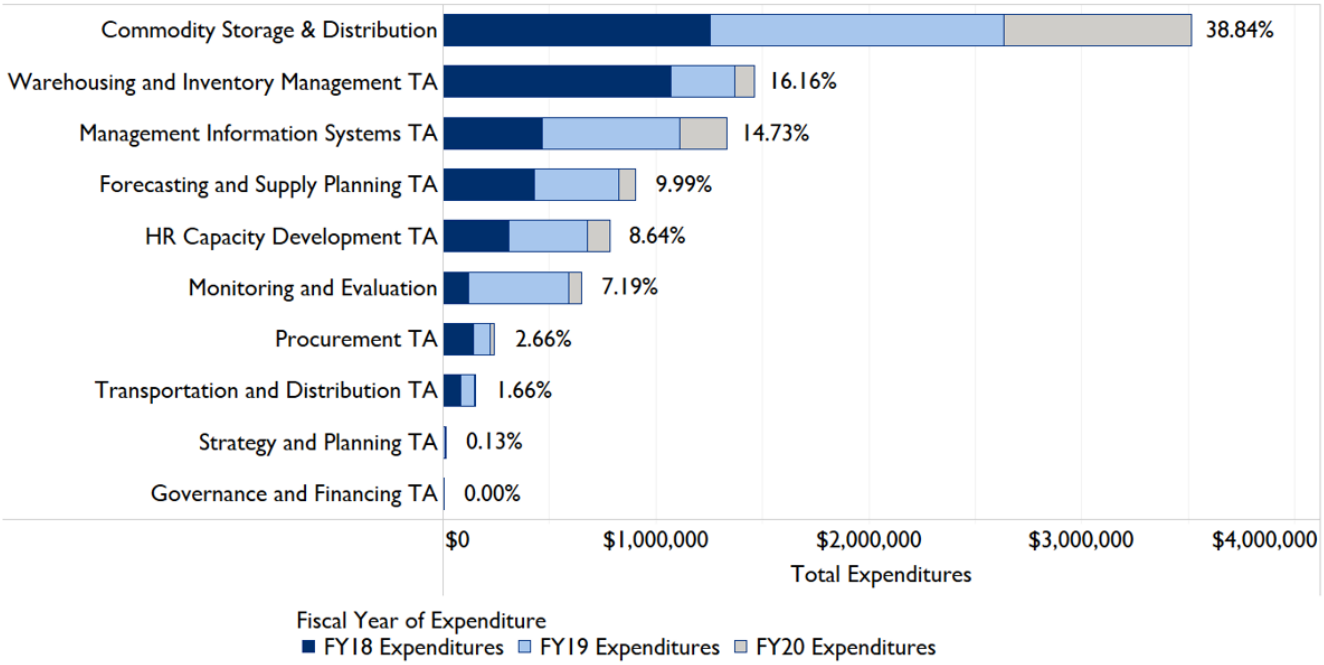
What are the main supply chain technical assistance functions supported by PMI? Are there additional investments that PMI should make (e.g., increasing visibility of demand at health facilities) to ensure continual availability of quality products needed for malaria control and elimination at health 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?

PMI predominantly supports storage, distribution, warehousing, and inventory management. This emphasis on distribution and management is aligned with and responsive to stockout problems at the service delivery points and LMIS reporting, such as commodity stockouts and low reporting, noted above.

The funding level of the commodity storage and other TA components decreased over the years, from 2018 to 2020, due to two main factors: The Global Fund and PMI have agreed to adjust the contributions to malaria commodity procurement. Global Fund covered all ANC ITN needs while PMI increased its contribution to ACT and RDT procurement. This factor decreased the commodity storage support and its TA budget and increased the budget for medicines and tests. However, the cost of malaria commodities increased over the years. To maintain the appropriate quantity of malaria commodities and avoid stockouts, PMI increased its contribution.

Supporting Data

Figure A-25. PMI supply chain investment by technical area, FY 2018–2020



The stockout reduction initiative approach was discussed with the Malaria supply chain technical working group and the relevant stakeholders and aligned with their expectations. Additionally, there was a discussion on the baseline commodities indicators for a better understanding of the baseline indicators' performance and to define aspiration. A historical baseline stockout rate for ACTs, RDT, and SP was created based on SDP open LMIS data from SIGLUS and discussed the expected trends of targets decreased based on historical data and the expected supply chain constraints over three years.

For prioritization of the interventions, the in-country technical working group identified and ranked the main challenges driving stockouts, the rationale for the challenges, and root causes.

The main identified causes are as follows:

- Lack of end-to-end data visibility, data quality constraints, and low knowledge in data use to drive decision-making in the lower levels of the supply chain
- Delay or unavailability of funding for malaria commodities
- Distribution and stocking points follow the administrative division of the country supply network (five levels, including central, provincial, district, health facility, and community levels)
- Lack of equipment and trained MOH staff mainly in lower levels
- Deficit in transportation management and capacity, lack of LMIS in some health facilities, poor inventory management, and lack of training in data usage for decision-making

The main outputs identified for the investment plan are as follows:

- Donor and Stakeholder Coordination – Provide technical assistance with forecast processes, MOP development, Global Fund subvention, and GOM supply planning exercises.
- Transport – Provide technical and operational support to CMAM to optimize transport of commodities to SDPs.
- Country Storage And Transport – Provide TA to the current provincial and district warehouses and expand to new intermediary warehouses.
- Country Storage And Transport – Provide TA in planning and implementation of ACTs distribution plan. Current quarterly distribution does not ensure commodity availability, especially during the high season. PMI provides support to CMAM to ensure monthly distribution for ACTs from central to provincial levels and to improve the availability and decrease stockouts.
- Community Case Management Expansion Planning – Support the expansion of community case management activities. The NMCP is expanding the communities' access to ACTs and mRDTs to enable a prompt management of non-severe malaria cases by CHWs and by avoiding having patients travel long distances to access treatment. During the quantification exercise the current and expected number of CHWs for next few years was taken into consideration to make sure that CHW kits are available at the community level.
- Human Resources Development – Strengthen capacity of staff on different aspects of the supply chain management.
- Data Systems and Usage – Provide TA in scaling up the electronic LMIS.
- Developing and Implementing Monitoring and Evaluation (M&E) Systems – Support the development and implementation of a new M&E Plan.
- Developing and Implementing M&E Systems – Improve data quality and use of data for decision-making.
- Developing and Implementing M&E Systems – Strengthen coordination activities at the central and provincial level, support the discussion of the logistic system with the district, encourage follow-up actions for improvement with managers at the provincial and regional warehouses, and establish monthly meetings of central and provincial technical groups to promote the exchange of experience and harmonize technical approaches used to support provinces.

Key Question 6

Are there any other considerations that impact funding allocation in this category? If there is a specific budget line item in Table 2 that is not covered by the above questions, address here.

Supporting Data

Mozambique has been going through a severe economic crisis since the discovery of undisclosed government loans in April 2016. Most donors have significantly reduced their contributions, both to the state budget and the health sector budget. For example, the health sector support decreased from approximately $100 million in 2015 to less than $20 million in 2018. This has affected the country's ability to procure malaria-related commodities and pay for warehousing and transportation of commodities.

Conclusions for Supply Chain Investments

PMI will continue to work with the MOH to advocate for funds to cover malaria commodities. PMI will also continue to work with other U.S. Government initiatives, the Global Fund, and other relevant stakeholders to improve the capacity of the MOH to execute and manage the available funds.

Please see the 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

The objective of the NMCP is to strengthen the surveillance system so that all health facilities and districts are reporting complete, timely, and quality data.

NMCP Approach

To achieve its objective, the NMCP will do the following:

- Improve malaria M&E capacity at all levels
- Establish a data quality assurance (DQA) system
- Establish a comprehensive integrated malaria information storage system at all levels
- Establish a system and strategy for outbreak responses in epidemic prone areas
- Establish a system to ensure implementation and operational research are conducted and the results are used to inform program activities in real time
- Establish an Integrated Malaria Information Storage System (iMISS) that congregates epidemiological, logistic, entomologic, and other programmatic data in one place

PMI Objective in Support of NMCP

In alignment with the NMCP objectives, PMI aims to do the following:

- Support the strengthening of malaria M&E capacity focusing in the four target provinces of Nampula, Zambezia, Cabo Delgado, and Tete
- Support data quality in the four target provinces
- Support the implementation of the iMISS platform

PMI-Supported Recent Progress (FY 2020)

Routine Health Information System

- PMI conducted M&E refresher training as part of the integrated supervision visits for 634 district technical staff across the four target provinces of Cabo Delgado, Nampula, Zambezia, and Tete.
- PMI support has focused on strengthening the quality of routine data through the implementation of the DQA tool during the malaria integrated supervision visits. PMI supported implementation of DQAs in 210 health facilities across its four targeted provinces. In 73 of these health facilities data quality was considered poor, as defined as having a deviation greater than 20 percent.
- PMI supported the rollout of the iMISS, focusing on the four target provinces.
- PMI continued to support a data manager, who was seconded to the NMCP. This data manager is an integral member of the NMCP SM&E working group and provides technical support to the NMCP for data access, data use, and production of annual reports. At the request of the NMCP, PMI has seconded a second data manager, who will support the rollout of the iMISS platform.

Surveys

National Level Surveys – Mozambique is planning the implementation of a Demographic and Health Survey and plans to start data collection in July 2021. The survey is being funded by several donors, including USAID Mozambique. PMI is providing TA for the design of the malaria module and questionnaires and national commodities are being utilized for malaria testing and treatment. It is expected that the results of the survey will be available by the end of FY 2022.

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

PMI will continue to support the same SM&E activities as were implemented in the past 12–18 months.

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?

Table A-17. Available malaria surveillance sources 2019–2024

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Household Surveys	Demographic and Health Survey (DHS)			*			
Household Surveys	Malaria Indicator Survey (MIS)				P		
Household Surveys	Multiple Indicator Cluster Survey (MICS)						
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment (SPA)						
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey						
Health Facility Surveys	Other Health Facility Survey			*			
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)				P		
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System						
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System (eLMIS)	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	End-use Verification Survey (EUV)						
Other	School-based Malaria Survey						
Other	Knowledge, Attitudes, and Practices Survey, Malaria Behavior Survey						
Other	Malaria Impact Evaluation			P			
Other	Entomologic Monitoring Surveys	X	X	X	P	P	P

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

Key Question 2

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

Supporting Data

Table A-18. Summary of supported HMIS activities

Intervention	PMI-Funded? (X) FY 20	FY 21	FY 22	Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
Central Level					
Register, tools (e.g., checklists, indicator glossary), job-aids (design, indicators, definition of data elements, data dictionary, system support)					X
Data quality assessments (separate from supervision – funding for travel to lower levels)	X	X	X	X	X
Program monitoring and technical assistance (funding for travel to lower levels)	X	X	X	X	X
Training (funding for central level to conduct training at lower levels, capacity-building (i.e., on-the-job training for central level staff)	X	X	X	X	X
Human resources (secondment of person in NMCP for SM&E, office/team for SM&E)	X	X	X		
Data use [analysis, interpretation, visualization (dashboards, bulletins), dissemination/feedback to lower levels, decision-making]	X	X	X	X	X
Policy guidelines and coordination (updating policies, guidelines, supporting sub-committee meetings, supporting participation in sub-committee meetings)	X	X	X	X	X
External relations/communications/outreach (support travel to international meetings and publications)			X		X
Support to annual operational plans for National Malaria Program		X	X	X	X
Desk review to catch "logic errors system" (provide TA to catch logic errors)					
Admin Level 1 (Province). PMI supports activities in 4 provinces while Global Fund supports activities in all 11 provinces.					
Registers (warehousing, printing, distribution)					X

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
	FY 20	FY 21	FY 22		
Data quality assessments (separate from supervision – funding for travel to lower levels)	X	X	X	X	X
Program monitoring and TA (funding for travel to lower levels)	X	X	X	X	X
Training (funding for district staff to conduct training at lower levels, capacity-building (e.g., on-the-job training for district-level staff)	X	X	X	X	X
Human resources (secondment of person for malaria SM&E, office/team for SM&E)					
Data use [analysis, interpretation, visualization (dashboards, bulletins), dissemination/feedback to lower levels, decision-making]	X	X	X	X	X
Adaptation of National Policy Guidelines and Coordination (adapting policies, guidelines, supporting sub-committee meetings, supporting participation in sub-committee meetings)	X	X	X	X	X
Adaptation of checklists and job aids	X	X	X		X
Participation in national meetings (support for travel costs)	X	X	X	X	X
Support to Annual Operational Plans for Provincial Malaria Program				X	X
Admin 2 Level (District)					
Data entry, summary, and transmission (training, re-training, computers, internet, tools)	X	X	X	X	X
Supervision (training, traveling, supervision tools/checklists, create/design system for organized/methodical supervision)	X	X	X	X	X
Data validation (data validation activities before monthly data submission – organize health facilities)	X	X	X	X	X
Monthly/quarterly data quality review meetings (venue, meeting support)	X	X	X	X	X
Data use (analysis, interpretation, visualization (dashboards), dissemination/feedback to facilities, decision-making)	X	X	X		X
Human resources (secondment of person for malaria SM&E, office/team for SM&E)					X
Annual planning with province (support travel)					

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
	FY 20	FY 21	FY 22		
Facility Level					
Data collection/entry, summary, and transmission (training, retraining, computers, internet, tools)	X	X	X		X
Supervision of CHWs (training, traveling, administering supervision tools/checklists of community health workers)	X	X	X	X	X
Data use (analysis, interpretation, visualization (dashboards), dissemination/feedback to CHWs, decision-making)	X	X	X		X
Monthly/quarterly data quality review meetings(support for travel)	X	X	X		X
Community Level					
Data collection/entry and transmission (training, retraining, tools)	X	X	X		X
Data use (analysis, interpretation, decision-making)	X	X	X		X
Monthly/quarterly data quality review meetings (support for travel)					X

PMI has robustly invested in a full range of SM&E activities at all levels of the health system in Mozambique in a way that is complementary to and in close coordination with substantial investment from other donors. PMI plans to continue these activities.

Key Question 3

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

Supporting Data

Table A-19. Outcomes of HMIS Strengthening Efforts

	Indicator	2019	2020
Timeliness	% of reports received on time	69.7%	80.6%
Completeness	"Confirmed malaria cases for children under five years of age" was reported in X% of facility-months	95.5%	96.4%
Accuracy	Most recent DQA data	Not available	72%

Completeness is already at near saturation levels. Timeliness has improved from 2019 to 2020, though there is still some opportunity for further attention and growth. Accuracy data is only available for 2020 and will continue to be monitored in the coming years, but is a current focus of NMCP efforts and PMI investments.

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)?

N/A

Supporting Data

Conclusions for Surveillance, Monitoring, and Evaluation Investments

Despite PMI and other donor robust investments and achievements to date, there is a need to maintain investments in this area to continuously improve data quality. It is also important to continuously improve the use of data for decision-making and the implementation of the iMISS offers a great opportunity to achieve this objective. Some implementation support will shift from implementation partners to direct funding to the GOM.

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

3.3. OPERATIONAL RESEARCH

NMCP Objective

Ensure relevant evaluations and operations research are conducted and that results are rapidly used to inform programmatic decision-making.

NMCP Approach

The NMCP, with PMI support, held a consultative review meeting to establish a research agenda in 2019 that fostered important discussions about priorities in academia, the government, research institutions, partner organizations, and donors. Individuals or entities interested in conducting research related to malaria propose their ideas to the NMCP, who liaises with other national institutions as appropriate. Studies that are deemed to be relevant based on local needs and the research agenda must be reviewed by the National Health Bioethics Committee prior to implementation.

PMI Objective in Support of NMCP

Support the NMCP to define and execute technically sound operations research and evaluations to inform programming.

PMI-Supported Recent Progress (FY 2020)

As described in the SBC section, PMI recently supported the implementation of an SBC operations research study. The original purpose of the study was to determine the impact of a low- and a high-intensity interpersonal communication (IPC) intervention on the use of ITNs in malaria-endemic Magoe District, Tete Province in Mozambique, as compared to a control group of no IPC. The primary research questions to be answered from this trial were (1) is exposure to the low-intensity IPC + radio more effective at increasing the use of mosquito nets than radio messaging alone, and (2) is exposure to the high-intensity IPC + radio more effective at increasing the use of mosquito nets than radio messaging alone? Baseline data collection was completed in January 2021 using a data collection instrument that was adapted from the Malaria Behavior Survey, which included extensive questions on knowledge, exposure to malaria interventions, ideational factors, and malaria behaviors. Nevertheless, the study was adjusted to remove cluster randomized intervention and to remove the endline survey due to COVID-19 because it was not feasible to implement IPC activities. More detailed analyses of baseline data are ongoing.

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

There are no planned PMI-Supported OR projects in the next year.

PMI Goal

PMI will conduct PE/OR that helps to evaluate coverage of population at risk, intervention quality, or delivery efficiency; study reducing malaria transmission and disease burden; test effectiveness of new or evolved priority interventions and strategies; and 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?

Yes, key questions that have been identified by the NMCP relate to the quality of malaria case management in health facilities and at the community level throughout the country on the impact and durability of new ITNs to inform selection of the ITNs to be used in the future, and the feasibility and/or impact of new interventions such as seasonal malaria chemoprevention, community-based IPTp distribution, use of ivermectin for malaria prevention and mass drug administration in humanitarian emergency situations. All of these studies or evaluations have included some PMI staff visibility and/or technical expertise, but have leveraged other donor funding from the BMGF, Unitaid, and the Global Fund. There are currently no planned studies or evaluations planned with PMI financial support.

Supporting Data

Table A-20. Ongoing Program Evaluation and Operational Research

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
BMGF	CHAI	What is the quality of malaria case management provided in Mozambique health facilities and communities?	Implementation planned for July 2021
BMGF	PATH, Tropical Health	Are women attending their first ANC visit a pragmatic sentinel population for monitoring malaria burden and malaria intervention coverage at the health facility level in western Mozambique?	Implementation began in 2020
Unitaid	PATH, Tropical Health	What is the impact of next-generation ITNs on malaria burden?	Implementation began in 2020
Unitaid	Jhpiego, CISM	What is the impact of community-based distribution of IPTp on coverage of three doses?	Implementation ongoing
European & Developing Countries Clinical Trials Partnership	CISM	What is the coverage of three or more doses of intermittent preventive treatment during infancy in children under two years of age attending the Expanded Program on Immunization at public health facilities in one district of Mozambique?	Planning underway
Unitaid	ISGlobal, CISM	What is the impact of ivermectin MDA on malaria infection in humans, on mosquito populations, and on the environment, as well as on its safety and acceptability by communities?	Implementation will begin in 2022
Global Fund	NMCP, World Vision	What is the coverage of and impact of the massive administration of treatment against malaria using dihydroartemisinin-piperaquine in the context of emergency in the province of Cabo Delgado?	Implementation began in 2021

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
BMGF	Malaria Consortium, CISM	What is the feasibility, acceptability, and impact of seasonal malaria chemoprevention in Mozambique?	Implementation ongoing/ Round 1 completed in 2021
BMGF	CISM	What is the effectiveness of the implementation of reactive surveillance in two low-burden districts?	Implementation underway

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?

The Mozambique NMCP is very interested in appropriate stratification and targeting of interventions, including proven and novel vector control, SBC, surveillance, and case management interventions, as a part of the national High Burden to High Impact strategy. Specific gaps relate to determining the impact and barriers to uptake of existent interventions to inform adaptations and appropriate targeting and scale. There is also a desire for more data on novel interventions, as evidenced by the numerous novel interventions that are being piloted in Mozambique. Subsequent evidence on feasibility of implementation at scale of these interventions will be important. Additionally, assessment of intervention quality is a critical need. Currently, assessment of facility and community case management quality has been prioritized for assessment through the 2021 health facility survey, but there are unmet information gaps related to the quality of implementation of other interventions such as IRS. PMI is working with other donors and partners to conduct analyses with routine and additional data collection on quality of interventions.

Supporting Data

Key Question 3

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

N/A

Supporting Data

Conclusions for Program Evaluation and Operational Research Investments

As noted in Table A-19, there has been extensive investment in OR and PE in Mozambique addressing programmatically relevant questions. PMI has provided extensive TA in the design and implementation of many of these studies, but this support has been in-kind. No new PMI investments are planned.

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

Implement an effective SBC approach to ensure at least 70 percent of people seek appropriate and timely healthcare and at least 85 percent of the population uses an appropriate protection method by 2022.

NMCP Approach

- Mozambique recently finalized an updated, national SBC strategy that includes strategic communication interventions for advocacy, malaria prevention, and appropriate case management.
- There is an active national SBC technical working group that meets on a monthly basis to coordinate partner activities, review SBC materials, plan commemorative activities, and support the NMCP strategic planning. Some provinces also have specific SBC technical working groups.
- The other main donor that supports SBC activities is the Global Fund. Its partners provide trainings for teachers and community leaders in targeted districts throughout the country and disseminate SBC messages through community radio. The target audience for these activities is community members through their activities in schools, community fora, and use of radio to improve ITN use and appropriate malaria care-seeking.

PMI Objective in Support of NMCP

PMI support is closely aligned with the NMCP national strategy and the SBC strategy. PMI supports implementation of all the technical interventions through community-based organizations (CBOs), faith-based organizations, and community radio stations. This is done through a malaria-specific, intensive approach that is implemented by a malaria service delivery partner and an integrated approach that addresses diverse health topics, including malaria, through religious leaders. In CY 2021 the PMI geographic focus is the provinces of Nampula and Cabo Delgado (malaria-specific, intensive approach and integrated approach through religious leaders), Zambezia and Tete (malaria-specific, intensive approach), and Sofala (integrated approach through religious leaders). This support includes use of community radio and capacity-building of influential community leaders to leverage their networks and disseminate malaria messages in all targeted provinces. It also includes more intensive interpersonal communication efforts implemented by CBOs that target community members through community dialogues and health talks in the provinces where the malaria-specific approach is implemented. All SBC support, including central- and provincial-level planning and community-level implementation is aligned with complementary support from the Global Fund.

PMI-Supported Recent Progress (FY 2020)

In the past 12 months PMI has supported the rollout and implementation by CBOs and radio stations of the SBC package approved by the NMCP for use by the malaria-specific, intensive approach partner. Interpersonal communication activities were temporarily paused following NMCP guidance in the COVID-19 context, but was resumed by July 2021. Between October 2019 and September 2020, the following activities were implemented by the malaria partner:

- Printing and distribution of over 30,000 posters and flip charts for health facilities promoting ITN use, early care-seeking, IPTp acceptance, and appropriate care provision
- Facilitation of over 500 meetings with community health committees, including CHWs and community leaders
- Implementation of community dialogues with 165,673 community participants
- Provision of health talks at health facilities that reached 417,276 participants and in communities reaching 389,347 participants
- Implementation of household visits that reached 166,625 household members
- Support for regular meetings of the national malaria SBC technical working group and finalization of the standard SBC intervention material package

Additionally, the faith-based organization project that utilizes an integrated approach through religious leaders finalized its intervention package and trained 419 religious leaders between November 2020 and April 2021on strategies to implement the standardized intervention package in Sofala, Zambezia, and Nampula. In November and December 2020, the project trained 20 journalists from community radio stations in Sofala, Zambezia, Nampula, and Cabo Delgado.

As described in the Operations Research section, PMI also recently supported the implementation of an SBC study. The original purpose of the study was to determine the impact of a low- and of a high-intensity IPC intervention on the use of ITNs in malaria-endemic Magoe District, Tete Province in Mozambique, as compared to a control group with no IPC. The primary research questions to be answered from this trial were (1) is exposure to the low-intensity IPC + radio more effective at increasing the use of mosquito nets than radio messaging alone, and (2) is exposure to the high-intensity IPC + radio more effective at increasing the use of mosquito nets than radio messaging alone? Baseline data collection was completed in January 2021. Nevertheless, the study was adjusted to remove cluster randomized intervention and the endline study due to COVID-19 as it was not feasible to implement interpersonal communication activities. More detailed analyses of the only study data, the baseline data, are ongoing.

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

Implementation of SBC interventions through a malaria-specific, intensive approach and an integrated approach through religious leaders will continue in the next 12 months. Activities implemented by the malaria-specific, intensive approach partner will include implementation through CBOs of community dialogues, community radio messaging, health facility and community-based health talks, influential leader training, and door-to-door visits using the standardized malaria SBC package in targeted communities in Zambezia, Nampula, Cabo Delgado, and Tete. These interventions target influential community members to improve malaria prevention and care-seeking behaviors. It also targets supervision of SBC at health facilities and addresses availability of print job aids to improve the quality of malaria care counseling. Specifically, during the supportive supervision visits described in the case management section, this partner assesses health facility and CHW provider behaviors through a standardized supervision tool that documents practices such as appropriate counseling of patients and provides suggestions on areas for improvement. The faith-based organization project utilizes an integrated approach through community radio and training of religious leaders to disseminate messages that target a variety of health behaviors, including some related to malaria: appropriate use of prevention tools and appropriate fever and ANC care-seeking. This project will continue to operate in Sofala, Zambezia, Nampula, and Cabo Delgado.

Key Goal

Through the use of SBC interventions and in alignment with a country's national malaria control communication strategy, PMI supports the uptake and maintenance 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?

Supporting Data

Table A-21. Prioritized Behaviors with FY 2022 Funds

Behavior	Target Population	Geographic Focus	Justification
Prompt care-seeking for fever	Mothers of children under five years of age	Nampula, Zambezia, Manica, Cabo Delgado	A total of 69 percent of children under five years of age sought care, but only 36 percent sought care within 24 hours. Care-seeking was lower for rural residents, those in Nampula, among children whose mothers had lower education, and those whose families had lower socioeconomic status (MIS, 2018).
Adherence to national case management guidelines	Health providers	Nampula, Zambezia, Manica	Critical gaps in quality of care provision were documented in the 2018 health facility survey. Overall, only 52 percent of patients in Cabo Delgado and Zambezia were appropriately managed for diagnostics and treatment and it was only 14 percent in the low malaria burden province of Maputo Province. Critical gaps at health facilities included failure to test febrile patients, particularly in Maputo Province, and provision of antimalarial treatment to 8–22 percent of patients with negative test results (Candrinho et al., 2019). These study findings are consistent with those from supportive supervision which continue to show gaps in adherence such as correct preparation of injectable artesunate. There is currently limited data on community-level services, but PMI is involved in a 2021 survey that will provide updated information on quality of care at health facilities and new information on quality of care at the community level.
Appropriate ITN use and care	General population	Nampula, Zambezia, Manica, Cabo Delgado	Median survival time of ITNs in the PMI-funded durability study was close to three years in two provinces, but was only 2.4 years in Nampula. Risk factors for damage were relatively high in all study sites. Wear and tear was an important factor related to durability, underscoring the need for improved net care practices (Abilio et al., 2020). Additionally, tens of millions of ITNs have been distributed in Mozambique and there are critical communication needs related to the appropriate use and care of new ITNs and repurposing of ITNs that are no longer in serviceable condition.

Key Question 2a

For prompt care-seeking for fever, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

There is evidence that prompt care-seeking has improved in recent years, but there continue to be various barriers. A forthcoming article on the baseline data from the SBC OR study found that care-seeking was associated with interpersonal communication with spouses and friends and with knowledge of malaria prevention and self-efficacy, but was not associated with any other ideational factors such as norms, attitudes, beliefs, risk perceptions or exposure to media (Hutchinson et al., under review). While there is consistent evidence of the role of socioeconomic factors on care-seeking and the importance of intra-household and community conversations about malaria, the evidence on which barriers the malaria program can address and how these may vary across provinces is limited.

Supporting Data

Key Question 2b

For adherence to national case management guidelines, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

The 2018 health facility survey provided valuable data on healthcare provider practices and a forthcoming 2021 health facility survey in six provinces is expected to provide additional information on prevalence of provider behaviors for case management, but there has been little exploration of the factors influencing adherence to guidelines (see case management section). It is expected that these influences include individual and normative factors, but that there are also important systemic barriers such as overburdening of healthcare workers and lack of access to appropriate malaria and alternative diagnostics at the facility and community level. These likely vary across providers, provinces, and service delivery levels and locations, but there is currently no data to inform the targeting of interventions to address these barriers (see case management section).

Supporting Data

Key Question 2c

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

There is growing evidence of improvements to ITN use, but gaps remain. For example, a forthcoming article on the baseline data from the SBC OR study described above found that there was generally no association between ideational factors and ITN use among households with at least one ITN for every two children under five years of age and that net use was lower among children whose mothers reported high ITN response efficacy (Yukich et al., under review). This underscores the need to better understand what barriers exist to use among those with access and inform associated SBC strategies.

Additionally, findings from three years of monitoring ITN durability in three provinces of Mozambique found that the prevalence of positive net care attitude was low across all provinces and survey points (Abilio et al., 2020).

There have been many rounds of SBC campaigns in Mozambique, yet positive care attitudes remain low. Additionally, there is very little data to inform messaging on the appropriate repurposing of ITNs that are no longer in serviceable condition. It is also important to note that many of the factors influencing net durability are not specific to malaria, but rather include broader environmental and socioeconomic factors. For example, presence of rodents was reported as very high across three study provinces, particularly in Nampula where 89-98 percent of survey respondents reported presence of rodents at each of the four data collection points (see ITN section).

Supporting Data

Key Question 3

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

There is currently limited SBC capacity within the NMCP and partners to design, implement, and monitor SBC. This is evidenced by the large dependence on external support for the development of strategic documents and intervention packages. Implementation capacity for SBC programming at the community level, however, is strong as shown by the large number of community-based organizations, faith-based organizations, and community services organizations that have been able to successfully implement complex SBC programs in recent years.

Supporting Data

Conclusions for SBC Investments

- In FY 2022 the new, malaria-specific SBC award is expected to begin full-scale implementation of its evidence-informed, tailored, innovative package of malaria SBC interventions through CBOs in the provinces of Nampula, Zambezia, and Manica. This is expected to include interventions that target appropriate ITN use and care-seeking for fevers and ANC. The partner will also generate the SBC content that will be utilized by the NMCP and the service delivery partner to improve the quality of malaria case management at health facilities. Additionally, the partner will support the appropriate use of media, including community radio, to target ITN care and use and appropriate care-seeking in the provinces of Nampula, Zambezia, Manica, and Cabo Delgado.
- The malaria SBC partner will also improve malaria SBC design, implementation, and monitoring capacity of the MOH and implementation partners at the central, provincial, and district levels.
- Building on previous support, there is value in continuing implementation of an integrated SBC package using community radio and religious leaders.
- The overall financial investment in FY 2022 is a slight expansion, reflecting the growing importance of SBC in facilitating appropriate access and use of the other priority investments such as RDTs and IRS.

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

Not applicable

NMCP Approach

Not applicable

PMI Objective in Support of NMCP

One of the National Malaria Strategic Plan's objectives is to strengthen the program management skills at central, provincial, and district levels to effectively achieve the other NMSP strategic objectives. Five main strategies were defined to achieve this objective:

1. Establish the NMCP organigram and ensure program staff at all levels have the required capabilities to perform their roles.
2. Ensure the effectiveness of program management.
3. Establish appropriate internal mechanisms for effective communications and coordination within the NMCP, partners, the private sector, and the Malaria Technical Advisory Committee.
4. Establish effective and accountable partners to secure adequate resources and their appropriate use.
5. Ensure effective coordination and communications on procurement and supply chain management.

PMI-Supported Recent Progress (FY 2020)

- PMI continued to provide technical and financial support for Field Epidemiology Laboratory Training Program (FELTP) residents in the advanced training program. Currently, there are two current cohort FETP residents who are working on projects utilizing routine HMIS and entomological data. For their theses, these residents are doing a secondary analysis of data from the SBC Magoe study to determine factors associated with malaria prevention behaviors among women of reproductive age and are evaluating the association between housing construction material, community environmental context, and vector abundance using routinely collected entomological data. A third student from the previous cohort finalized and defended her thesis, which looked at malaria mortality in the province of Zambezia.
- Due to the COVID-19 impact, PMI was not able to continue providing support to Peace Corps volunteers on malaria-related interventions, but did support printing and dissemination of SBC materials to Peace Corps community partners.
- PMI staff supported the NMCP to develop emergency plans in response to humanitarian and natural emergencies as well as the COVID-19 pandemic.
- PMI supported the four target provinces to analyze monthly data and provide feedback to districts to review the data in the National Monitoring and Evaluation System (SIS-MA) on time before the closing date.

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

- PMI will continue its support to the residents currently completing their theses, described above. PMI will also support two new FELTP residents who will work with the malaria program to address programmatic needs.
- PMI will provide TA for the inclusion of malaria content in the intermediate FrontLine FELTP course.
- PMI will continue its support to Peace Corps volunteers' implementation of malaria activities once volunteers return to Mozambique. This is anticipated to happen as early as CY 2022.
- PMI will provide TA for the development of the new NMCP strategic plan and for a malaria emergency response plan to strengthen system preparedness and resilience.
- PMI will provide TA to NMCP to strengthen the provincial and district technical teams' management capacity to provide oversight and supervision of malaria interventions.
- PMI will provide TA for the implementation of the digital platform for data collection and analysis during the integrated supervision visits. Also, PMI will support the HMIS data reporting, analysis, and use for decision-making at the provincial, district, and health facility levels.
- Additionally, PMI will support the Grants Under Contract to civil society organizations and CBOs to improve individual health-seeking behaviors through SBC.

Key Goal

Key Question 1

How has the country used FETP investments to strengthen the NMCP?

Supporting Data

Investments in FETP have strengthened the NMCP by adding trained human resources to the NMCP and malaria partners and by generating action-oriented analyses and data to inform programming. The M&E lead of the NMCP is a PMI-funded FELTP graduate and FELTP graduates fill critical M&E and research roles in various NMCP partner institutions. Additionally, current FELTP residents provide critical human resources that help strengthen NMCP monitoring and implementation such as by supporting the monitoring of a recent mass drug administration campaign. Analyses of the HMIS, entomological, and DQA systems by residents have helped refine the systems and FELTP resident evaluations have generated important data on CHW commodity kit availability and acceptance of IRS, and have piloted a new hot spot analysis system. Each of these exercises has generated data that has strengthened the NMCP communication, commodity, and SM&E systems.

Conclusions for Additional Health Systems Strengthening Investments

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