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Mali

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

A&P	National anemia and parasitemia survey
ACT	Artemisinin-based combination therapy
AI	Active ingredients
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BMGF	Bill & Melinda Gates Foundation
CDC	U.S. Centers for Disease Control and Prevention
CHW	Community health worker
CSCOM	Community health center
CSREF	District referral health center
CY	Calendar year
DHIS2	District Health Information System 2
DHS	Demographic and Health Survey
DP	Dihydroartemisinin-piperaquine
DQA	Data quality assurance
Dual AI LLIN	Dual active ingredient long-lasting insecticidal nets (e.g., Interceptor G2)
EIPM	*Enquête sur les Indicateurs du Paludisme* (MIS)
EPI	Expanded Program for Immunization
EUV	End-user verification survey
FY	Fiscal year
GAVI	Global Alliance for Vaccines and Immunization
Global	Global Fund to Fight AIDS, Tuberculosis, and Malaria
HMIS	Health Management Information System
iCCM	Integrated community case management
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LBMA	*Laboratoire de Biologie Moléculaire Appliquée* (Laboratory of Applied Molecular Biology)
LMIS	Logistics management information system
MDA	Mass drug administration
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MOH	Ministry of Health and Social Development
MOP	Malaria Operational Plan
MRDQA	Malaria routine data quality assurance
MRTC	Malaria Research and Training Center
NMCP	National Malaria Control Program
OR	Operational research
OSPSANTE	*Outil de Suivi des Produits de Santé* (Monitoring Tool for Health Products)
OTSS	Outreach training and supportive supervision

PBO	Piperonyl butoxide
PCR	Polymerase chain reaction
PMI	U.S. President's Malaria Initiative
PPM	*Pharmacie Populaire du Mali* (central medical stores)
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SBC	Social and behavior change
SDP	Service delivery point
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal malaria chemoprevention
SP	Sulfadoxine-pyrimethamine
SPAQ	Sulfadoxine-pyrimethamine + amodiaquine
TA	Technical assistance
TES	Therapeutic efficacy study
TWG	Technical working group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Mali to end malaria. PMI has been a proud partner of Mali since 2007, helping to decrease child death rates by 47 percent between 2006 and 2018, and increasing the proportion of households with at least one insecticide treated net to 90 percent through investments totaling more than $320 million.

The proposed PMI fiscal year (FY) 2022 budget for Mali is $24 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Mali 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 Mali as well as other donors and partners.

Malaria remains a major public health problem in Mali—in 2020 it was the leading cause of morbidity (34 percent) and mortality (22 percent) according to data from the health information system. The 2018 Demographic and Health Survey estimated the prevalence of malaria in children 6 to 59 months of age at 19 percent based on rapid diagnostic tests (RDTs). This represents a decrease from a high of 52 percent in 2012, and a drop of 13 percentage points since 2015. Prevalence is much higher in rural areas than in urban areas (23 percent vs. 2 percent). The total number of confirmed malaria cases increased from 2017 to 2019, but declined again in 2020. Data from the 2015 Malaria Indicator Survey (MIS) indicate that *Plasmodium falciparum* accounted for 95 percent of all malaria infections. Malaria is endemic to the central and southern regions, where about 90 percent of Mali's population lives, and it is epidemic in the north due to the limited viability of *Anopheles* species in the desert climate.

Mali has seen significant improvements in key intervention indicators over the last several years, with 75 percent of the population having access to an insecticide-treated mosquito net (ITN) and 73 percent sleeping under an ITN the night before the survey (79 percent for children under five and 84 percent for pregnant women). The proportion of women receiving two or more doses of intermittent preventive treatment for pregnant women (IPTp) increased from 38 percent to 55 percent from 2015 to 2018. Nevertheless, there has been little change in the proportion of children with a fever for whom treatment was sought (53 percent in 2018), or those with fever who were tested for malaria (16 percent).

Most of PMI's support represents a continuation of activities funded in prior years. The major change for FY 2022 funding is the decision to withdraw the indoor residual spraying (IRS) in Mali in 2023, which was achieved in consultation with the NMCP based on an analysis of relative costs and coverage, as well as implementation challenges due to insecurity in Mopti region. PMI and the NMCP believe that shifting resources to less-costly prevention interventions, such as procurement and distribution of next-generation ITNs, is appropriate given the very high rates of ITN use in Mali. An effective exit strategy will be developed to guard against potential rebound and increase in malaria cases. This will include creating awareness on the IRS withdrawal for residents that previously received it and prioritize the distribution of dual active ingredient (AI) ITNs in the three IRS districts, increasing entomological surveillance and ensuring no stock out of malaria commodities among others.

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

Vector Control

In calendar year (CY) 2020, PMI/Mali supported:

- IRS in three districts in Mopti region, spraying a total of 129,302 structures and protecting 503,043 people.
- Entomological surveillance including insecticides resistance monitoring in 13 sites. Conducted cone bioassays to assess quality of spray and residual efficacy of Actellic 300CS, SumiShield® 50WG, and Fludora® Fusion WP-SB used for the 2020 IRS campaign.
- The final round of data collection for an ITN durability study that started in January 2018 in two health districts in Kayes region.
- Procurement of 1,564,200 nets for routine distribution to children and pregnant women.
- The calibration and validation of a portable high-performance liquid chromatography machine to determine the surface insecticide content of ITNs, with technical assistance (TA) from CDC.

With FY 2022 funding, PMI/Mali proposes to support:

- Entomological monitoring in 13 sites, including capacity-building for the NMCP and local institutions to improve the sustainability of activities.
- Procurement and distribution of standard, piperonyl butoxide (PBO) and dual active ingredient (Interceptor G2) nets for distribution through routine channels in the indicated districts.
- Monitoring performance and bio-efficacy for next-generation nets in Sikasso region. If feasible streamlined durability monitoring, evaluating chemical content (both through bioassays and biochemical analysis) and in depth efficacy analysis considering entomological and epidemiological parameters collected through regular monitoring activities.

Human Health

In CY 2020, PMI/Mali supported:

- Procurement of 7 million RDTs and 1,112,700 artemisinin-based combination therapy (ACT) treatments, of which 875,000 RDTs and 567,294 ACTs were distributed throughout the country.
- Four rounds of SMC that protected 1,097,422 children 3 to 59 months of age and 161,333 children 5 to 10 years of age in 11 districts of Kayes, Koulikoro, and Sikasso regions.
- Training of 393 ANC providers in antenatal care (ANC) and in malaria in pregnancy (MIP); 56 facility-based health workers in malaria diagnosis and treatment; 24 new community health workers in integrated community case management (iCCM); and 36 laboratory technicians in microscopy.
- 97 supportive supervision visits to health personnel who provide malaria prevention and treatment services.
- Revision and dissemination of MIP guidelines and training materials in Segou and Mopti regions.

With FY 2022 funding, PMI/Mali proposes to support:

- Procurement of 2.5 million RDTs, more than 2 million treatments for uncomplicated malaria, and 170,400 vials of injectable artesunate for the treatment of severe malaria
- Training and supervision to strengthen case management at both the facility and community levels.
- Procurement of nearly 4 million SP treatments for distribution to pregnant women during ANC visits.
- Strengthening of ANC and MIP services at the facility level in six regions.
- Procurement of more than 6 million blisters of sulfadoxine-pyrimethamine + amodiaquine (SPAQ) and operational costs for seasonal malaria chemoprevention in 11 districts.

Cross-Cutting and Other Health Systems

In CY 2020, PMI/Mali supported:

- Implementation of the PMI stockout reduction strategy for antimalarials (reviewed baseline, set targets, identified root causes of stockouts, and proposed solutions to mitigate stockouts).
- Distribution of malaria commodities from the central warehouses to the district warehouses nationwide.
- TA for the installation of prefabricated warehouses in Bamako to improve the storage of malaria products, as well as for three regional warehouses funded by another donor.
- Strengthening post-marketing surveillance for antimalarials through sampling and screening products.
- Implementation of District Health Information System 2 (DHIS2), analysis of surveillance data and production of monthly malaria bulletins, and training of 49 data managers and malaria focal points to use malaria routine data quality assurance (MRDQA) in Sikasso and Koulikoro.
- A stratification exercise to categorize health zones based on malaria transmission to inform programming.
- Operations research on the optimal package of MIP interventions and on the delivery of ANC/MIP services through outreach.
- A series of social and behavior change (SBC) activities to promote, in particular, acceptance of IRS and adherence to seasonal malaria chemoprevention (SMC) treatment.

With FY 2022 funding, PMI/Mali proposes to support:

- Implementation of two end-user verification (EUV) surveys during the high- and low- transmission seasons.
- Strengthening the national laboratory, including quality assurance and quality control of antimalarial drugs.
- DHIS2 to improve malaria data quality and use at all levels, including training, data quality assurance (DQA) activities, analysis, production of monthly malaria bulletins, and use of data for program improvement.
- Contribution to the cost of a nationwide Demographic and Health Survey (DHS) in 2023.
- Evaluation of quality of care of community health workers (CHWs) for pregnant women for treatment and prevention of malaria
- Support for SBC for SMC, with a focus on completion of each course of medication and attendance at all rounds.
- Support for SBC for ITN use, ANC and MIP, and prompt care-seeking.

I. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Mali to end malaria. PMI has been a proud partner of Mali since 2007, helping to decrease child death rates by 47 percent (2021 PMI annual report) and reducing malaria prevalence among children from 47 percent in 2012–2013 to 19 percent in 2018 (DHS) through investments totaling almost $344 million total through FY 2021.

The proposed PMI fiscal year (FY) 2022 budget for Mali is $24 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Mali 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 Mali as well as other donors and partners.

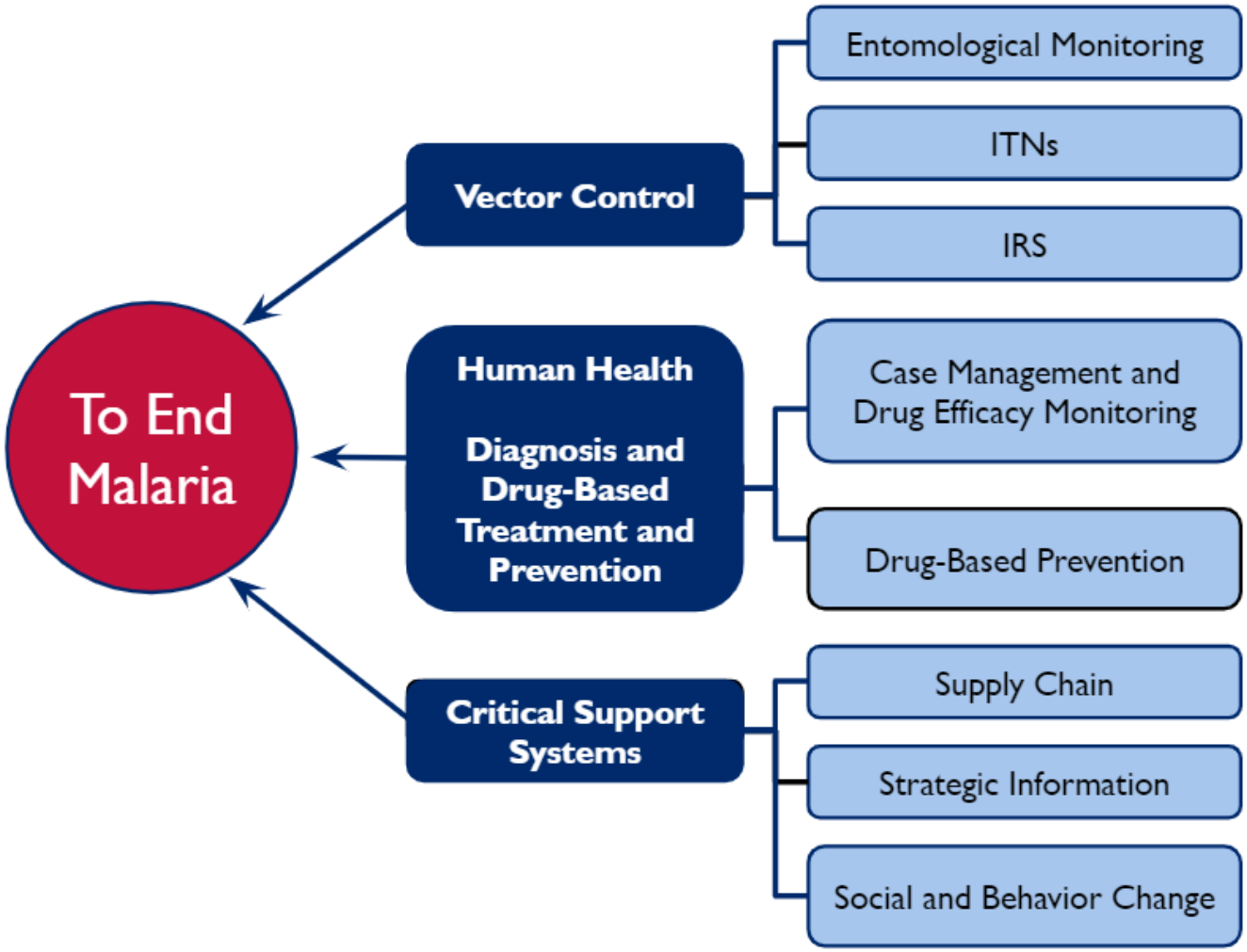
Mali at a Glance

- **Geography:** Mali is a vast, semi-arid, landlocked country in the Sahelian belt.
- **Climate and Malaria Transmission Seasonality:** Malaria is endemic to the central and southern regions, where about 90 percent of Mali's population lives and it is epidemic in the north due to the limited viability of Anopheles species in the desert climate. Malaria transmission varies in Mali's five geo-climatic zones. It occurs year-round in the Sudano-Guinean zone in the south, with a seasonal peak between June and November. The transmission season is shorter in the northern Sahelian zone, lasting approximately three to four months (July/August to October). Malaria transmission is endemic in the Niger River Delta and areas around dams with rice cultivation, and is endemic with low transmission in urban areas including Bamako and Mopti. Epidemics occur in the north (Gao, Kidal, and Tombouctou regions).
- **Population in 2021:** 21,770,046 (INSTAT/DNP)
- **Population at Risk of Malaria:** 21,770,046 (Procurement and Supply Chain Management Mali Gap Analysis 2021)
- **Principal Malaria Parasites:** *Plasmodium falciparum* (NMCP)
- **Principal Malaria Vectors:** *Anopheles gambiae (An. gambiae coluzzi)* (NMCP)
- **Malaria Case Incidence per 1,000 Population:** 125/1,000 (2020 NMCP)
- **Under-Five Mortality Rate:** 101 deaths per 1,000 live births (DHS 2018)
- **World Bank Income Classification and Gross Domestic Product:** Low income, 879.008 USD GDP/capita in 2019 (https://data.worldbank.org/country/mali)
- **Government Health Budget:** Mali healthcare spending in 2018 was $35 per capita and 3.88 percent of GDP (https://www.macrotrends.net/countries/MLI/mali/healthcare-spending)
- **Trafficking in Persons Designations, 2018–2020:** Tier 2 (DOS 2020 Trafficking in Persons Report)
- **Malaria Funding and Program Support Partners Include:**
    - U.S. President's Malaria Initiative (PMI)

    - Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund)
    - World Health Organization (WHO)
    - United Nations Children's Fund (UNICEF)
- **PMI Support of National Malaria Control Strategy:** The National Malaria Control Strategy aligns well with PMI-supported key intervention areas. The long-term goal of the NMCP/Ministry of Health (MOH) is to eliminate malaria by 2030. National objectives include the reduction of malaria mortality and malaria incidence by 60 percent between 2015 and 2024 (See III. Overview of PMI's support of Mali's Malaria Control Strategy for additional details.)
- **PMI Investments:** Mali began implementation as a PMI focus country in FY 2007. The proposed FY 2022 PMI budget for Mali is $24 million; this brings the total PMI investment to nearly $368 million.

PMI organizes its investments around the activities below, in line with the Mali National Malaria Strategy 2018–2022 and extended to 2024.

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



Building and strengthening the capacity of Mali'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/Mali will continue to rely on and engage with local partners and is expanding its local partner base. Finally, PMI/Mali will continue to consider working on private sector partnerships.

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 capacity-building efforts. In addition, while PMI understands it

[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.

will take time for Mali to fully finance its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Mali's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND PROGRESS

Malaria remains a major public health problem in Mali and is one of the priorities of the national health policy. In 2020 it was the leading cause of morbidity (34 percent) and mortality (22 percent) according to data from the health information system. Children under five years of age and pregnant women are the most affected. The 2018 Demographic and Health Survey estimated the prevalence of malaria in children 6 to 59 months of age at 19 percent based on rapid diagnostic tests (RDTs). This represents a decrease from a high of 52 percent in 2012 (see Figure 2). Prevalence is much higher in rural areas than in urban areas (23 percent vs. 2 percent). Prevalence was highest (30 percent) in Sikasso region (see Figure 3).

Figure 2. Trends in malaria prevalence

Percent of children 6 to 59 months of age who tested positive for malaria by microscopy/RDT

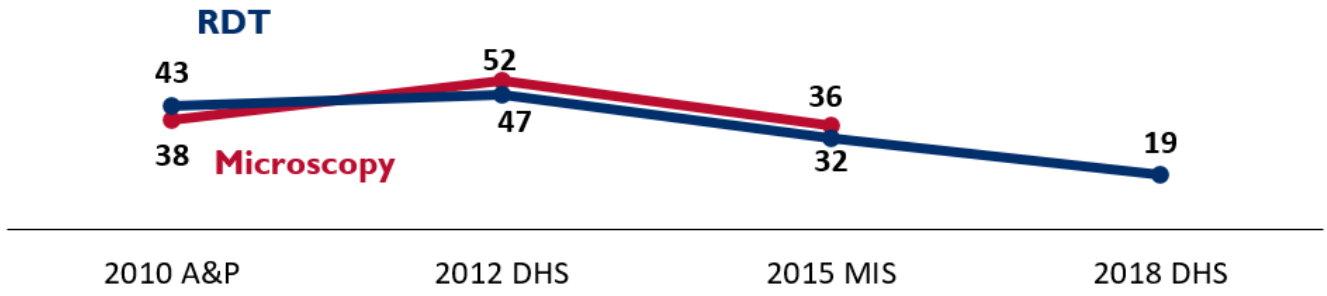
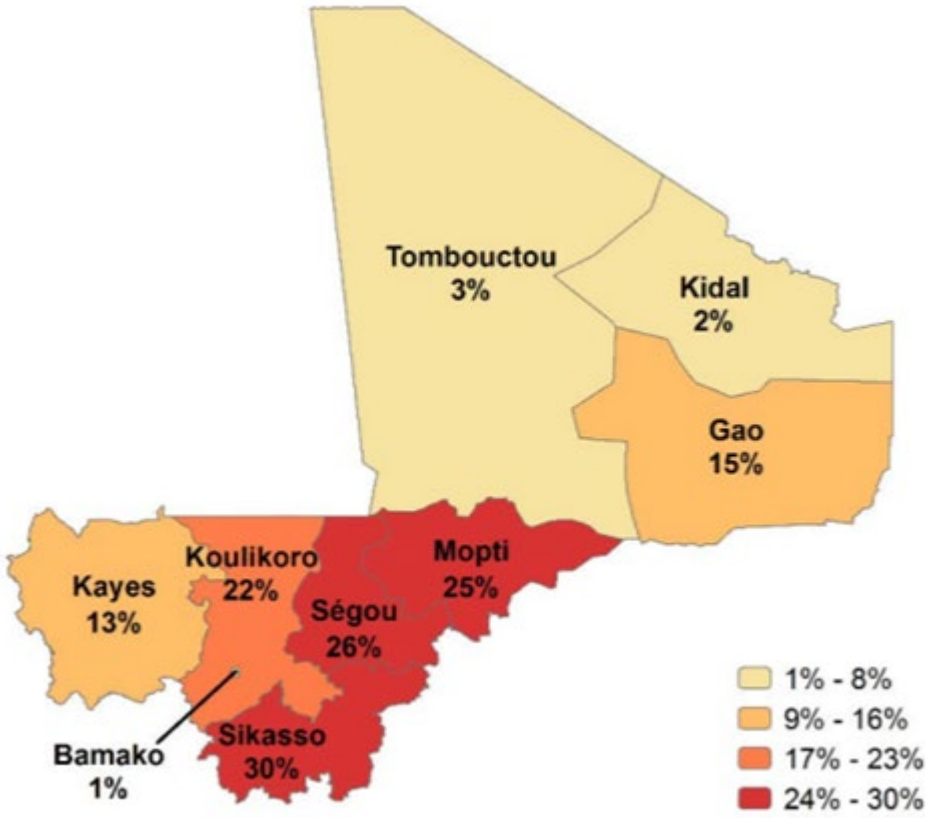


Figure 3. Malaria prevalence by geographic area

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



Data from the 2015 Malaria Indicator Survey (MIS) indicate that *Plasmodium falciparum* accounted for 95 percent of all malaria infections, while *P. malariae, P. vivax and P. ovale* together account for 5.2 percent. A 2012 study published by the Malaria Journal (Bernabeu, et al.) indicated a prevalence of *P. vivax* in 10 percent to 30 percent of all febrile cases in three northern regions.

Malaria is endemic to the central and southern regions, where about 90 percent of Mali's population lives, and it is epidemic in the north due to the limited viability of Anopheles species in the desert climate. Malaria transmission varies in Mali's five geo-climatic zones. It occurs year-round in the Sudano-Guinean zone in the south, with a seasonal peak between June and November. The transmission season is shorter in the northern Sahelian zone, lasting approximately three to four months (July/August to October). Malaria transmission is endemic in the Niger River Delta and areas around dams with rice cultivation, and is endemic with low transmission in urban areas including Bamako and Mopti. Epidemics occur in the north (Gao, Kidal, and Tombouctou regions) and in the northern districts of Kayes, Koulikoro, Mopti, and Ségou regions.

As seen in Table 1 below, Mali has seen significant improvements in key indicators over the last several years, including ITN ownership and use, care-seeking behavior, and under-five mortality. Parasitemia in children decreased by 13 percentage points between 2015 and 2018. There has been less improvement in coverage with IPTp for pregnant women and treatment of children with an ACT. The total number of confirmed malaria cases increased from 2017 to 2019, but declined again in 2020.

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

Indicator	2006, DHS	2010, A&P	2012, DHS	2015, MIS	2018, DHS
% Households with at least one ITN	50	85	84	93	90
% Households with at least one ITN for every two people	16	n/a	42	39	55
% Population with access to an ITN	30	62	65	70	75
% Population that slept under an ITN the previous night*	21	n/a	61	64	73
% Children under five years of age who slept under an ITN the previous night*	27	70	69	71	79
% Pregnant women who slept under an ITN the previous night*	29	n/a	73	78	84
% Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought[1]	56	59	47	49	53
% Children under five years of age with a fever in the last two weeks who had a finger or heel stick	n/a	4	12	14	16
% Children receiving an ACT among children under five years of age with a fever in the last two weeks who received any antimalarial drug	n/a	22	19	29	31
% Women who received two or more doses of IPTp during their last pregnancy in the last two years[2]	10	n/a	29	38	55
% Women who received three or more doses of IPTp during their last pregnancy in the last two years[2]	6	n/a	12	21	28
<5 mortality rate per 1,000 live births	191	n/a	98	n/a	101
% Children under five years of age with parasitemia by microscopy*	n/a	38	52	36	n/a
% Children under five years of age with parasitemia by RDT*	n/a	43	47	32	19
% Children under five years of age with severe anemia (Hb<8gm/dl)	22	26	21	20	16

*Recently DHS and MIS surveys have been fielded in Mali during the wet season. The 2012–2013 and 2018 DHS and the 2015 MIS were conducted during the high-transmission season.

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

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

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

Indicator	2016	2017	2018	2019	2020
# Suspect malaria cases[1]	N/A	2,910,831	3,572,794	4,500,669	4,335,950
# Patients receiving diagnostic test for malaria[2]	3,038,150	2,535,213	3,457,267	4,252,213	3,270,681
Total # malaria cases[3]	2,311,098	2,097,797	2,345,481	2,884,837	2,381,206
# Confirmed cases[4]	2,311,098	2,097,797	2,345,481	2,884,837	2,381,206
# Presumed cases[5]	n/a	n/a	n/a	386,014	706,095
% Malaria cases confirmed[6]	100%	100%	100%	94%	83%
Test positivity rate (TPR)[7]	70%	66%	78%	68%	73%
Total # under five years of age malaria cases[8]	985,452	905,282	1,020,499	1,065,218	916,244
% Cases in children under five years of age[9]	43%	43%	39%	37%	34%
Total # severe cases[10]	N/A	667,268	756,404	877,213	849,086
Total # malaria deaths[11]	1,344	1,050	1,001	1,454	1,708
# Facilities reporting[12]	N/A	1,357	1,376	1,455	1,535
% Data completeness[13]	95%	96%	97%	99%	98%

1. Number of patients presenting with signs or symptoms possibly due to malaria (e.g., fever). 2. RDT or microscopy, all ages, outpatient and inpatient. 3. Total reported malaria cases; all ages, outpatient and inpatient, confirmed and unconfirmed cases. 4. Diagnostically confirmed; all ages, outpatient and inpatient. 5. Clinical/presumed/unconfirmed; all ages, outpatient and inpatient. 6. # confirmed cases divided by total # cases. 7. Confirmed cases divided by # patients receiving a diagnostic test for malaria (RDT or microscopy). 8. Outpatient and inpatient, confirmed and unconfirmed. 9. Total # <5 cases divided by total # of cases. 10. Severe malaria is characterized by the presence of a positive parasitemia for Plasmodium falciparum associated with one or more of the clinical or biological signs of complications: impaired consciousness or coma, prostration (unable to walk or sit without assistance), multiple seizures (two or more within 24 hours), respiratory distress (acidosis), cardiovascular collapse, or shock (systolic BP <80 mm Hg in adults and 70 in children), jaundice, hemoglobinuria (Coca Cola or dark-colored urine), abnormal bleeding (coagulation disorder), or acute lung edema. 11. All ages, outpatient, inpatient, confirmed, and unconfirmed. 12. Total # of health facilities reporting data into the Health Management Information System (HMIS)/DHIS2 system that year. 13. # monthly reports from health facilities divided by # health facility reports expected.

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

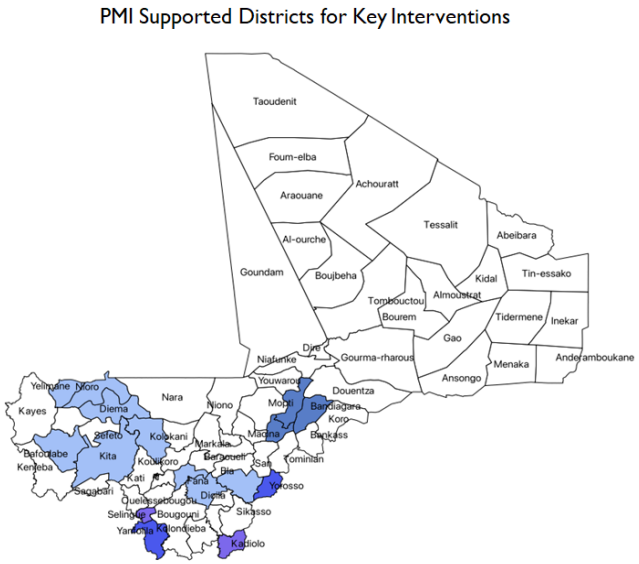
The NMCP conducted a midterm review of its 2018–2022 National Malaria Control Strategic Plan in late 2020, and they extended the Plan through 2024 to cover the period of the next Global Fund grant. The National Strategy focuses on malaria control and aligns well with PMI-supported key intervention areas, with the exception of larval source management, which PMI does not support. It has three objectives to be reached by 2024: reducing both malaria mortality and malaria incidence by 60 percent relative to 2015 levels, and strengthening NMCP coordination and management capacities at all levels of the health system. A longer-term goal of the NMCP/MOH is to eliminate malaria by 2030. To do this, the control actions will be strategically oriented to target interventions according to epidemiological characteristics.

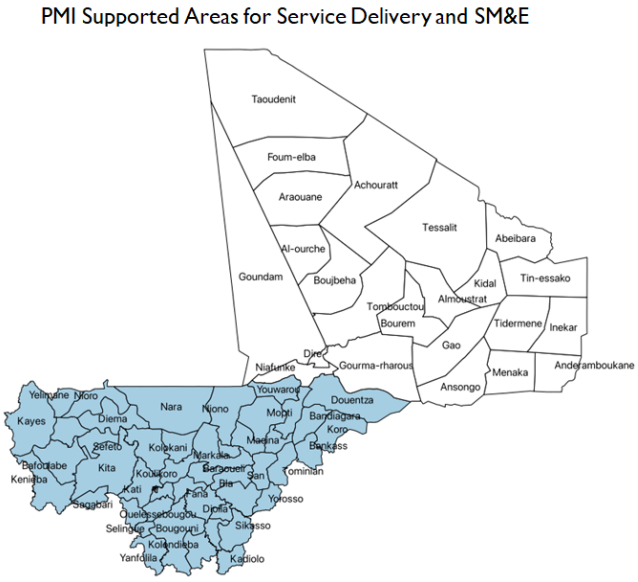
The National Malaria Control Strategic Plan includes the following specific objectives:

- Strengthen program coordination and management capacity at all levels.
- At least 85 percent of the population in malaria risk areas sleep under long-lasting insecticide treated nets (LLINs) by 2024.
- Protect at least 95 percent of the population in the target areas with IRS by 2024.
- Treat at least 95 percent of productive breeding sites in targeted areas by 2024.
- Cover at least 80 percent of pregnant women with IPTp (at least three doses) during their pregnancy by 2024.
- At least 80 percent of pregnant women use ITNs by the end of 2024.
- Cover at least 90 percent of targeted children per round of SMC.
- Ensure biological confirmation (RDT or microscopy) of 100 percent of suspected malaria cases seen in public, parapublic, confessional, and private health facilities.
- Ensure biological confirmation (RDT) of 100 percent of suspected malaria cases seen by CHWs.
- Ensure the correct management of 100 percent of confirmed malaria cases at all levels of the health pyramid, including CHWs.
- At least 90 percent of the population (target groups or not) know the malaria prevention measures by the end of 2024.
- Detect 100 percent of epidemics and emergencies within one week with an early warning system at the level of districts at risk of epidemics and sentinel sites.
- Manage 100 percent of epidemics and emergencies within two weeks of their detection.
- Ensure 100 percent promptness and 100 percent completeness of data at all levels.

PMI and Global Fund work closely together to coordinate support to the NMCP to achieve its malaria prevention and control goals and objectives throughout Mali. PMI supports provision of malaria commodities nationally (ACTs, RDTs, SP for IPTp, and ITNs for distribution through routine channels), while the Global Fund provides the majority of support for LLIN mass campaigns. Multiple partners support seasonal malaria chemoprevention. PMI has been the only partner supporting IRS in Mali. There are currently no partners supporting the treatment of breeding sites.

Figure 4. Maps of target areas for PMI interventions





IV. PARTNER FUNDING LANDSCAPE

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

Due to the U.S. Government fiscal year 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 calendar year 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	$9.2M	$4.9M	$4.7M	$0.7M	$3.5M	$2.2M	$25.2M
Global Fund	$14.6M	$1.9M	$3.8M	$0.0M	$0.8M	$6.7M	$27.8M
Gov[4]							$4.8M*
WHO					$0.1M		$0.1M
Total Per Category	$23.8M	$6.8M	$8.5M	$0.7M	$4.4M	$8.9M	$57.9M

*Total Gov investment not broken down by category

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	Cross-cutting and HSS[3]	Total Per Funder
PMI	$9.8M	$5.7M	$4.4M	$1.1M	$1.8M	$2.2M	$25.0M
Global Fund	$0.0M	$2.4M	$5.5M	$0.0M	$0.9M	$5.9M	$14.6M
Gov[4]					$4.2M		$4.2M
Total Per Category	$9.8M	$8.1M	$9.9M	$1.1M	$6.9M	$8.1M	$43.8M

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	Cross-cutting and HSS[3]	Total Per Funder
PMI	$8.2M	$5.4M	$6.0M	$0.9M	$1.3M	$2.2M	$24.0M
Global Fund							$0.0M
Gov[4]					$2.9M		$2.9M
Total Per Category	$8.2M	$5.4M	$6.0M	$0.9M	$4.2M	$2.2M	$26.9M

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. *Source: Tableau 7: Récapitulatif du budget du plan Suivi-Evaluation 2021–2024 par intervention.*

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]	$4.0M		$3.8M	$1.1M	$1.7M	$0.4M	$1.8M		$12.8M
Global Fund [3]		$11.0M		$1.1M	$0.0M		$1.5M		$13.6M
Gov[4]									$1.3M*
World Bank[5]							$3.6M		$3.6M
UNICEF							$1.5M		$1.5M
Total	$4.0M	$11.0M	$3.8M	$2.2M	$1.7M	$0.4M	$8.4M	$0.0M	$32.8M

*Source: *Plan Stratégique de lutte contre le Paludisme 2018–2022 Révisé, avec Extension à 2024* (Mali-NMCP Malaria Strategic Plan 2018–2022, with extension to 2024)

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]	$5.4M		$2.0M	$1.1M	$2.1M	$0.4M	$1.8M		$12.8M
Global Fund [3]		$0.0M		$0.5M	$1.3M		$2.3M		$4.0M
Gov[4]	$1.6M	$1.3M	$0.0M	$0.2M	$0.2M	$0.2M	$5.5M	$3.8M	$12.8M*
Total	$7.0M	$1.3M	$2.0M	$1.8M	$3.6M	$0.6M	$9.6M	$3.8M	$29.6M

*Source: NMCP Malaria Strategic Plan 2021–2024. These are only planning figures.

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

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]	$3.9M		$2.0M	$0.9M	$1.8M	$0.6M	$2.5M		$11.6M
Global Fund [3]									$0.0M
Gov	$1.6M	$1.0M	$0.0M	$0.3M	$0.3M	$0.3M	$5.5M	$3.8M	$12.5M*
Other									$0.0M
Total	$5.5M	$1.0M	$2.0M	$1.23M	$2.1M	$0.9M	$8M	$3.8M	$24.1M

*Source: NMCP Malaria Strategic Plan 2021–2024. These are only planning figures.

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 are not included.

III. 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 Mali 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 NMCP strategic plan emphasizes nationwide universal coverage of key malaria interventions for prevention and control of malaria, as well as specific interventions such as epidemic and entomological surveillance and targeted operational research (OR) in areas with unstable malaria transmission:

- Entomological monitoring for data-driven decision-making, including susceptibility evaluations throughout the country, in IRS and non-IRS areas
- Universal ITN coverage for all age groups (defined as one ITN for every two people)
- Targeted IRS in select high-risk areas
- Insecticide resistance management
- Larval source treatment

NMCP Approach

- Until 2020 the NMCP supported the distribution of ITNs to target populations through two main delivery channels: (1) phased (region-by-region) mass distribution campaigns every three years, aiming for a coverage of one net for every two persons; and (2) routine distribution through antenatal care (ANC) and expanded program for immunization (EPI) clinics targeting pregnant women and infants. With the support of the Global Fund, Mali will change its approach to one national mass distribution campaign in 2023, aiming to improve the impact on transmission and better utilize resources. Phased distribution campaigns will no longer occur in the interim.
- Following the targeted IRS strategy, the NMCP requested that PMI-supported IRS program be moved to the Mopti region as of 2016, based on the strategic decision that Mopti has consistently had the highest prevalence of malaria in the country during DHS/MIS surveys, and given that many people with no natural immunity to malaria migrate from the north to Mopti. The NMCP is very invested in the success of IRS in the Mopti region, heavily involved in IRS implementation, and is active in decisions regarding the choice of districts.
- The NMCP conducts insecticide resistance management through sustained resistance evaluation of the vector populations, specifically in areas of IRS implementation. The NMCP also alternates insecticides of different mechanisms of action and supervises data collection on the sentinel sites across the country.
- The NMCP has included larval source management in its national strategic plan, but it is not funded by the Government of Mali or any partner.

PMI Objective in Support of NMCP

PMI provides support to all NMCP Mali strategies for vector control, with the exception of the NMCP planned larval source management.

- Support entomological surveillance, including insecticides resistance monitoring in representative sites, especially in IRS intervention sites.
- Procure and support ITN distribution through routine health services and occasionally contribute to the purchase of additional nets for mass distribution campaigns. From 2023, the type of nets (i.e., standard,

dual AI, and PBO ITNs) procured by PMI will vary in some health districts to align with the type of nets procured by Global Fund through the mass campaigns in those districts.
- Support targeted IRS implementation in areas prioritized in collaboration with the NMCP until 2022.
- Support national capacity-building by training and hiring local personnel for the implementation of entomological activities.
- Strengthen local research institutions by supporting their implementation of entomological monitoring activities.

PMI-Supported Recent Progress (CY 2020 implementation)

- Conducted targeted IRS in three districts in Mopti region: Bandiagara, Djenné, and Mopti. Sprayed a total of 129,302 structures with 96.9 percent coverage and protected 503,043 people.
- Carried out cone bioassays to assess quality of spray and residual efficacy of Actellic 300CS, SumiShield® 50WG, Fludora® Fusion WP-SB used for the 2020 IRS campaign.
- Trained a total 441 people (366 men and 75 women) for the 2020 IRS campaign
- Conducted entomological surveillance, including insecticides resistance monitoring, in 13 sites.
- Supported Laboratoire de Biologie Moléculaire Appliquée (LBMA) to complete year 3 (36 months) ITN durability study that started in January 2018 in two health districts (Kita and Kenieba) in Kayes Region. The evaluated ITNs were deltamethrin-based (Yorkool and Permanet 2.0).
- Procured 1,203,200 nets for routine distribution to children and pregnant women.
- Provided reagents and test kits (insecticide, polymerase chain reaction [PCR] primers, and ELISA reagents for parasite and blood meal detection).
- Continued to support the calibration and validation of a portable high-performance liquid chromatography machine to determine the surface insecticide content of ITNs.

PMI-Supported Planned Activities (CY 2021–2022 implementation)

- Conduct IRS in three districts of Mopti region with SumiShield® 50WG in Bandiagara, Actellic® 300CS in Djenné and Fludora® Fusion WP-SB in Mopti.
- Carry out cone bioassays to assess quality of spray and the residual efficacy of the insecticides.
- Conduct insecticide resistance monitoring in 10 districts including the three IRS sites.
- Conduct vector bionomics monitoring monthly in six sentinel sites (Mopti, Bandiagara, Djenné, Tominian, Selingue, and Bougouni) and community-based vector surveillance in two sites in Mopti district.
- Procure approximately 1.9 million ITNs for routine distribution through ANC and EPI services. The type of nets will align to the type of nets distributed during the 2020 campaign for a specific health district.
- Support data collection on ITN use and household behaviour as part of ongoing bed net durability monitoring.

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

PMI Mali currently supports 13 entomological surveillance sentinel sites. Longitudinal vector survey is being carried out at eight sites: three in IRS areas of Mopti, Bandiagara, and Djenné; one unsprayed site (Tominian), one site in Selingue (Sikasso Region) where Interceptor G2 nets were distributed, Bougouni with pyrethroid-only ITNs; also Socoura and Tonguel (Mopti region) where pilot community-based vector surveillance is being conducted monthly using CDC light traps (see Table A-1). Activities being carried out at the sites include pyrethrum spray collection and human landing collection. Mosquito collections made within villages provide information on vector bionomics.

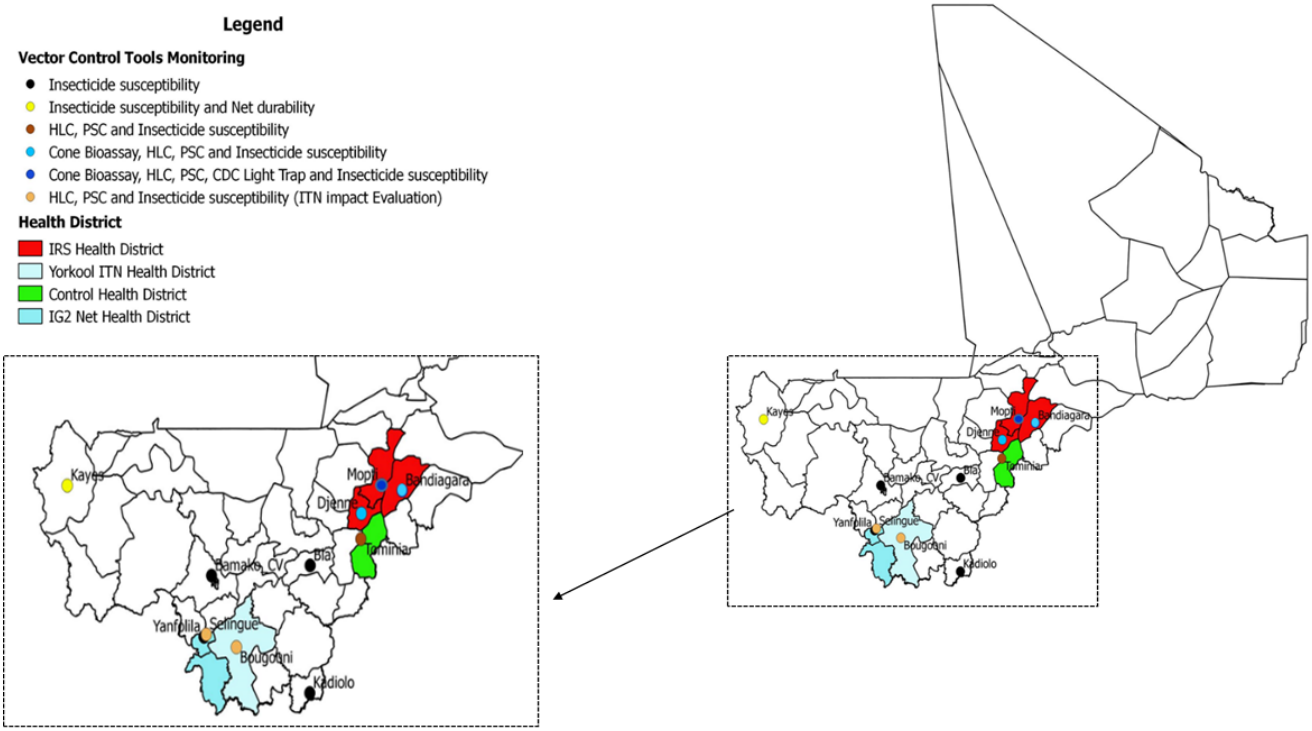
Table A-1. PMI funded entomological monitoring activities

Site	District	Activities	Supported by
Sarena	Mopti	Vector bionomics & insecticide resistance monitoring	PMI
Dandoli	Bandagiara	Vector bionomics & insecticide resistance monitoring	PMI
Madiana	Djenné	Vector bionomics & insecticide resistance monitoring	PMI
Ouena	Tominian	Vector bionomics	PMI
Tinko	Selingue	Vector bionomics & insecticide resistance monitoring	PMI
Bougouni Sud	Bougouni	Vector bionomics & insecticide resistance monitoring	PMI
Socoura	Mopti	Community-based vector surveillance	PMI
Tonguel	Mopti	Community-based vector surveillance	PMI
Kadiolo	Kadiolo	Insecticide resistance monitoring	PMI
Yanfolila	Yanfolila	Insecticide resistance monitoring	PMI
Bla	Bla	Insecticide resistance monitoring	PMI
Bamako	Bamako	Insecticide resistance monitoring	PMI
Kayes	Kayes	Insecticide resistance monitoring	PMI

Note: In Mali there are other monitoring sites across the country where local research institutions such as LBMA and Malaria Research and Training Center (MRTC) perform entomological monitoring activities.

In 2020, insecticide resistance data were collected from 10 sites (Figure A-1). There are three sites in IRS areas (Mopti, Bandiagara, and Djenné), four sites in Sikasso Region (Selingue, Bougouni, Kadiolo, and Yanfolila) where Interceptor G2 nets and Yorkool nets were distributed, one former IRS site in Bla (Segou Region), and two other sites with high malaria prevalence (Kayes and Bamako) were chosen in collaboration with the NMCP.

Figure A-1. Map of Mali showing 2020 PMI entomological surveillance sites



In 2020, longitudinal monitoring carried out from July to December revealed four different *Anopheles* species: *An. gambiae* s.l., *An. funestus* s.l., *An. pharoensis*, and *An. rufipes*. *Anopheles gambiae* s.l. was the predominant species accounting for 99 percent of the 12,166 *Anopheles* collected by human landing collection and pyrethrum spray collection followed by *An. pharoensis* (0.4 percent), *An. rufipe*s (0.3 percent) and *An. funestus* (0.1 percent) (Figure A-2). In the two sites in Mopti district where community-based surveillance was conducted using CDC light traps four *Anopheles* species were also collected, with *An. gambiae* s.l. representing 99.7 percent. PCR analysis of *Anopheles gambiae* s.l. shows a predominance of *Anopheles coluzzii* at all the sites except Bougouni and Sarena predominated by *Anopheles gambiae* while *An. arabiensis* was found only in Bandagiara and Selingue (Table A-2). The overall density of *An. gambiae* s.l. remained very low in the IRS sprayed sites compared with other districts. The mean indoor density was lowest (4.1) in the spray area of Djenné and highest (162) in the unsprayed district of Tominian. Peak biting times were between 11:00 p.m. and 6:00 a.m. while peak indoor resting density was observed from August to September in all districts.

The entomological inoculation rate (EIRs) calculated as a proxy for the risk of malaria infection showed very high EIR (119 infective bites per person) in Bougouni (Sikasso Region) with pyrethroid-only ITNs but 52 infectious bites per person in Selingue with Interceptor G2 ITNs. The EIR was also high in the unsprayed sites of Tominian with 114 infectious bites per person compared with neighboring sprayed Djenné with 13 infectious bites per person.

Figure A-2. Species composition of *Anopheles* collected by human landing catch and pyrethrum spray catches at the six routine surveillance sites in 2020

Table A-2. Distribution and bionomics of malaria vectors

Site/ District	Vector*	Season (month)	Preferred Biting Location	Peak Biting Time	Preferred Resting Location**	Preferred Host	Annual EIR
Sarena/ Mopti	***An. gambiae***	July–December	indoor/ outdoor	20.00 p.m.–07.00 a.m.	N/A	N/A	17.6
Dandoli/ Bandiagara	***An. coluzzii*** *An. gambiae* *An. arabiensis*	July–December	indoor/ outdoor	19.00 p.m.–06.00 a.m.	N/A	N/A	10.8
Madiana/ Djenné	***An. coluzzii*** *An. gambiae*	July–December	indoor/ outdoor	19.00 p.m.–06.00 a.m.	N/A	N/A	13.1
Ouena/ Tominian	***An. coluzzii*** *An. gambiae*	July–December	indoor/ outdoor	18.00 p.m.–06.00 a.m.	N/A	N/A	114.1
Tinko/ Selingue	***An. coluzzii*** *An. arabiensis*	July–December	indoor/ outdoor	20.00 p.m.–06.00 a.m.	N/A	N/A	52.5
Bougouni Sud	***An. gambiae*** *An. coluzzii*	July–December	indoor/ outdoor	20.00 p.m.–06.00 a.m.	N/A	N/A	119.2

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

** Marked as N/A if simultaneous indoor and outdoor collections are not conducted.

Please see PMI Mali VectorLink Annual entomology Report for additional information (link not yet available).

Key Question 2

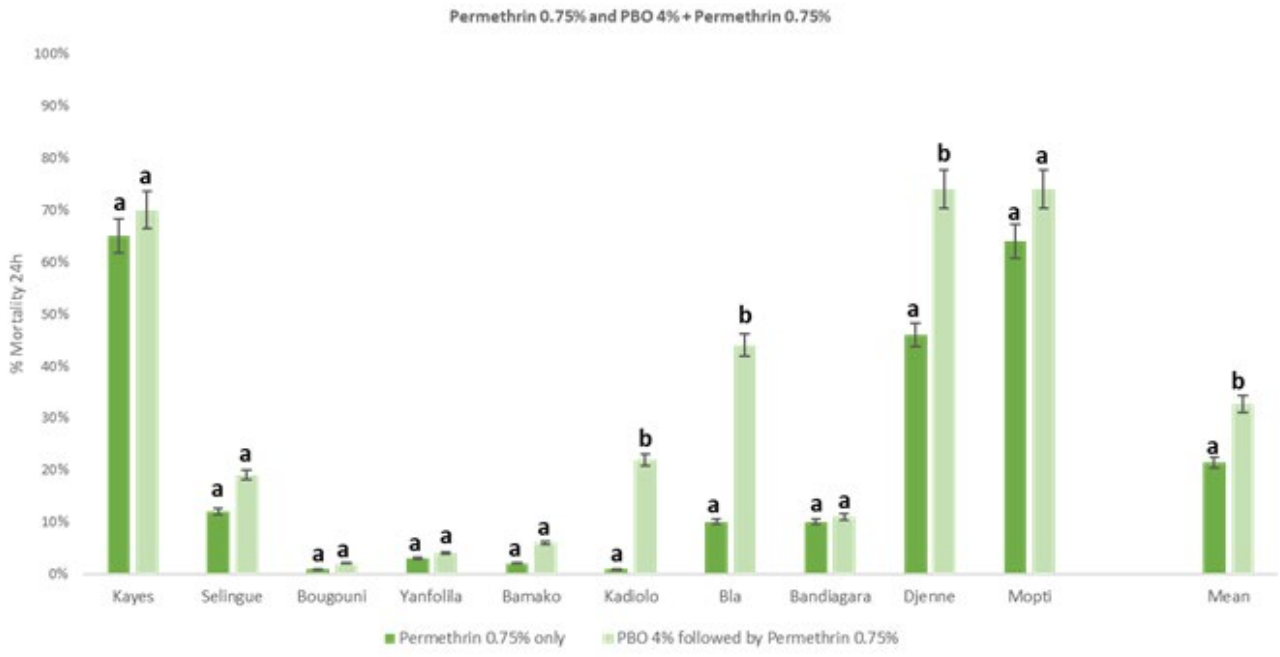
What is the current insecticide resistance profile of the primary malaria vectors?

Supporting Data

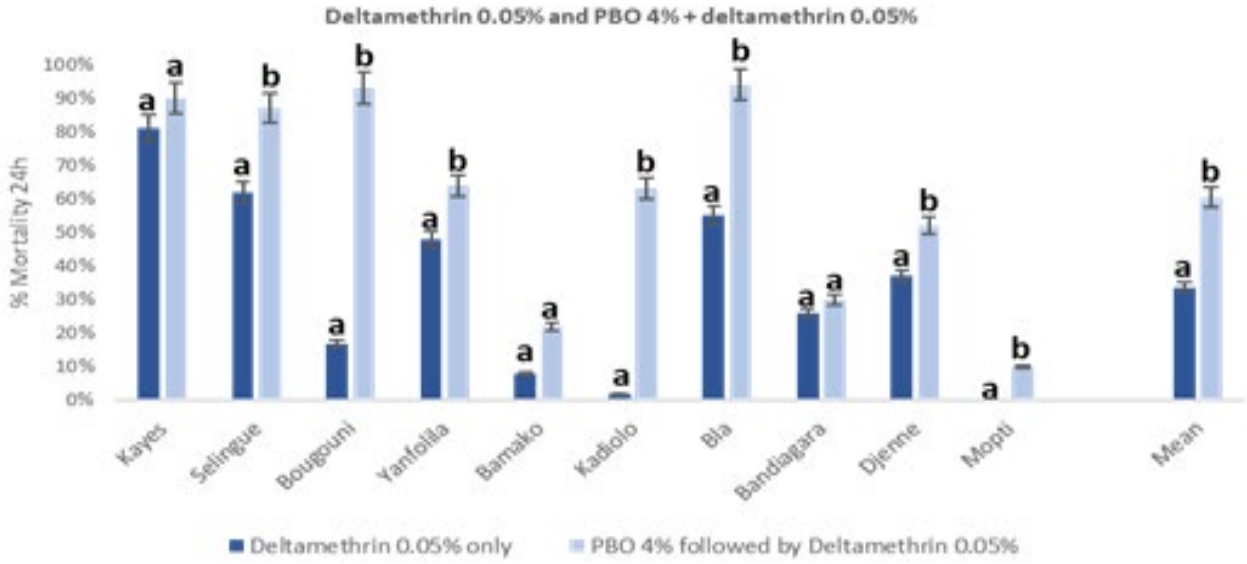
Malaria vector susceptibility status to insecticides was determined at 10 sites in 2020 including the IRS sites in Mopti, Bandagiara, and Djenné. Resistance to permethrin, deltamethrin, and alpha-cypermethrin was observed in all sites where testing has been conducted with the highest level of pyrethroid resistance found in Sikasso Region and Bamako. (Figure A-3). There was a significant increase in mortality when the specimens were pre-exposed to PBO before permethrin compared with permethrin-only in three out of the 10 sites; for PBO + deltamethrin, there was a significant increase in 7 out of 10 sites and 6 out of 10 sites for PBO + alpha-cypermethrin. The increase in mortality using PBO indicates the important role of metabolic resistance mechanisms in Mali. However, full susceptibility was not restored in any of the sites, and mortality did not reach the recommended WHO threshold level of 90 percent in most sites, suggesting alternative mechanisms of resistance are acting in those populations. *An. gambiae* s.l. was susceptible to chlorfenapyr at the dose of 200µg/bottle in 7 out of 9 sites tested. There was possible resistance at Bougouni and Selingue (with 90-96 percent mortality) where confirmatory testing is being conducted in 2021. The mosquitoes were fully susceptible to pirimiphos-methyl and clothianidin at the IRS sites of Mopti, Bandagiara, Djenné, and other sites where tested.

Figure A-3. Susceptibility status of *An. gambiae* s.l. with permethrin (A), deltamethrin (B) and alphacypermethrin (C) with or without PBO in Mali in 2020

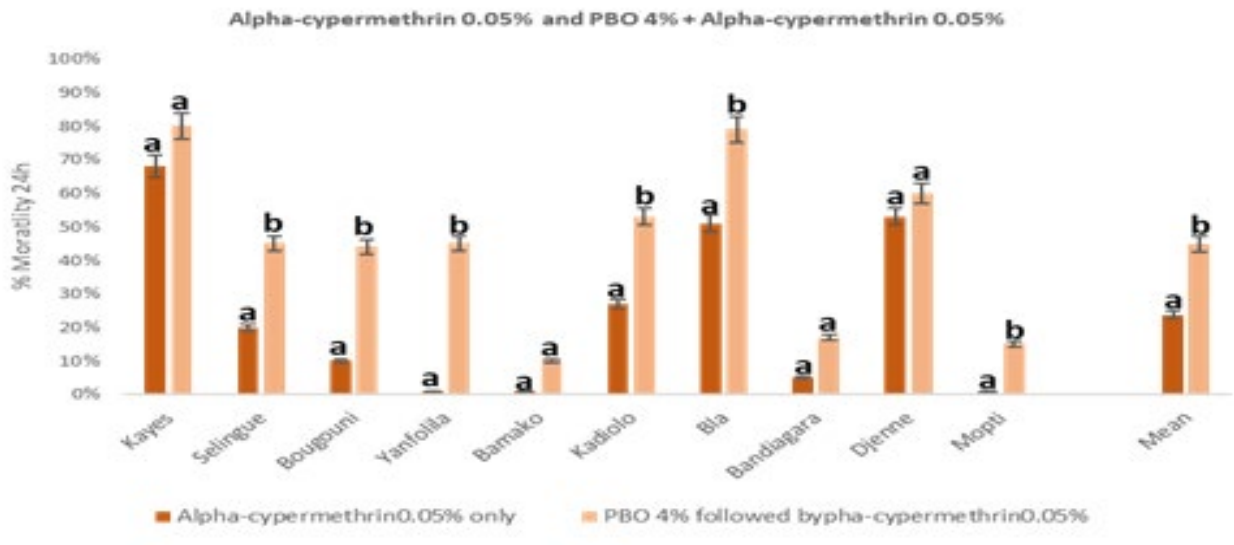
A



B



c



Superscript indicates whether % mortality with only permethrin, deltamethrin, and alphacypermethrin is significantly different from % mortality with pre-exposure to PBO. a = no significant difference P>0.05; b = significant difference P<0.05
*Please see PMI Mali VectorLink 2020 Annual entomology Report for additional information (link not yet available).

Conclusions for Entomologic Monitoring Investments

An. gambiae and *An. coluzzii* are the main malaria vectors found in all monitoring sites, though vector populations remained low in Mopti, Bandagiara, and Djenné districts as a result of continued annual IRS spraying. Vector density and biting rates were still high across other monitoring sites. The peak biting times between 11:00 p.m. and 6:00 a.m. suggest that sleeping under bed nets is still a good prevention method.

Malaria vectors were resistant to the three pyrethroids tested (deltamethrin, permethrin, and alpha-cypermethrin) at all the sites. Pre-exposure of mosquitoes to PBO before exposure to deltamethrin or permethrin showed increased mortality but susceptibility was not fully restored at any of the sites suggesting that PBO-based ITNs would probably provide limited benefit over standard pyrethroid nets in most districts, but could be used in some districts where mortality exceeded 70 percent (Kayes, Djenné, Mopti for permethrin-based PBO ITN and Kayes, Selengue, Bougouni, and Bla for deltamethrin-based PBO ITN). Mosquitoes from all the sites were fully susceptible to pirimiphos methyl and clothianidin, which support the selection of actellics CS (pirimiphos-methyl) and Fludora Fusion containing clothianidin currently used for IRS in Mopti, Bandagiara, and Djenné. The high pyrethroid resistance intensity observed at the different monitoring sites calls for diligent resistance management, including deploying next-generation ITNs, rotating insecticides in IRS areas, and continuous monitoring of susceptibility patterns in vector populations, particularly in intervention areas. In this context, it is key that similar data being collected by different projects be integrated into one database to inform programmatic decisions; while there is no formal initiative for this endeavor, PMI/Mali will continue to advocate and provide technical recommendations for an integrated platform for vector control decision-making.

Security concerns in Mali continue to impact performance of entomological monitoring and IRS activities, particularly in the northern part of the country. The entomological teams will continue to engage local leaders and community members to keep informed about the security concerns in areas of planned interventions and re-

assess the work plan if necessary to avoid exposing workers to danger. The capacity for entomological surveillance and insecticides resistance monitoring in Mali is good and PMI will continue to support the NMCP and local institutions to strengthen local capacity and sustainability of monitoring activities. Overall, the investment in entomological surveillance is worthwhile, but flatlined from the previous year (FY 2021 budget levels); the data is aiding the NMCP select potential areas with high transmission for distribution of new generation ITNs, particularly PBO and Interceptor G2 ITNs, instead of pyrethroid only ITNs.

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

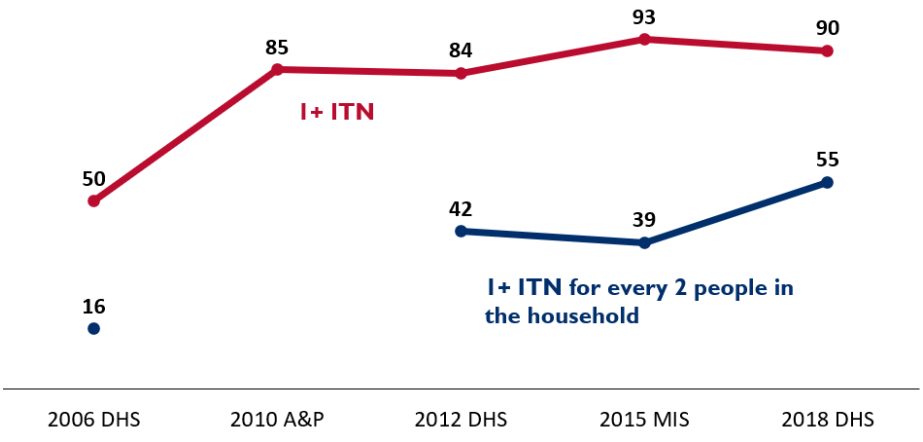
How has net ownership evolved since the start of PMI in the country?

Net ownership has continued to increase through sustained distributions campaigns. The latest available surveys indicated that 90 percent of households owned at least one net in 2018 (these estimations do not include the regional distribution campaigns that took place during 2019–2020 and that the ownership values vary across regions).

Supporting Data

Figure A-4. Trends in ITN ownership

Percentage of households that own ITNs



Key Question 2a

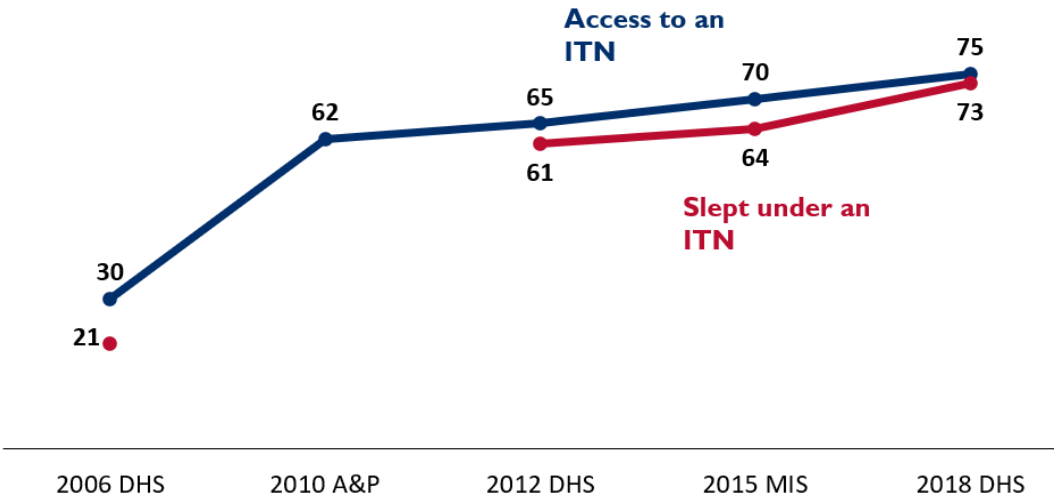
What proportion of the population has access to an ITN? Of those who have access, what proportion of the population reports using an ITN?

Supporting Data

The latest reports available indicate that at national level approximately 75 percent of the population have access to bed nets. The percentage of use is strongly correlated to ownership, indicating a good culture of use in the country. Note: The survey results available do not include the regional distributions campaign that took place in 2019–2020 and the estimations of access and use vary regionally.

Figure A-5. Trends in ITN access and use

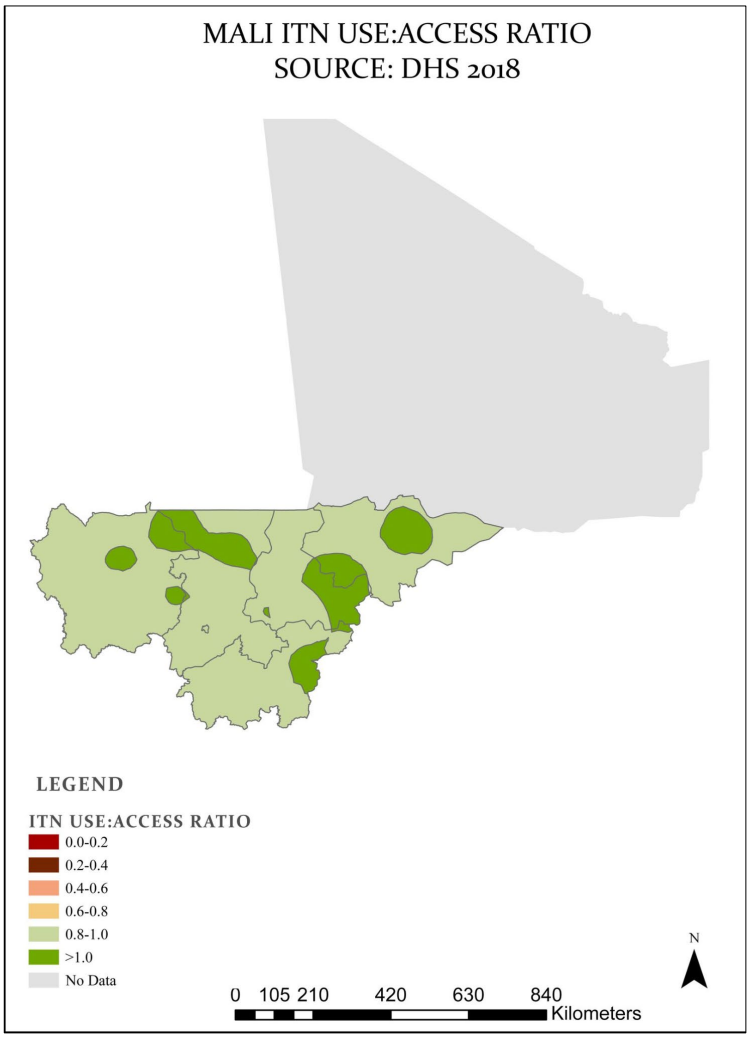
Percentage of household population with access to an ITN and percentage of those who slept under an ITN the night before the survey



Despite the increase in the proportion of households that have access to bed nets, and consistent acceptance and behavior of using bed nets, the need to increase ITN coverage levels within households still persists. PMI has traditionally allocated funds to support ITN distribution through routine services. The past few household surveys indicate that use of ITNs has been very high, given access, throughout Mali. Hence, efforts to increase access will likely increase use.

Figure A-6 below shows that there is a general very good access:use ratio in Mali. Data of use in the northern part of Mali is not available because of security reasons. However, there was a mass distribution campaign conducted in October–November 2019 in the north (Kidal, Tombouctou, and Gao) that is not registered on this map from 2018.

Figure A-6. Mali country map from ITN access and use



Key Question 2b

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

Supporting Data

The proportion of young children and pregnant women sleeping under an ITN has continually increased at the time of nearly every household survey since 2006. An analysis of the MIS 2015 data shows that young children use ITNs at higher rates than older children, and women of child-bearing age use ITNs at higher rates than men. Per the 2018 Mali DHS data (see Figure A-7), this trend persists even in households that have an insufficient number of ITNs, Note: The survey results available do not include the regional distribution campaigns that took place in 2019–2020.

PMI will continue to support routine ITN distribution for pregnant women attending ANC and for children attending EPI, and will continue to support SBC to maintain high use throughout the year and to promote access and appropriate net care.

Figure A-7. 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

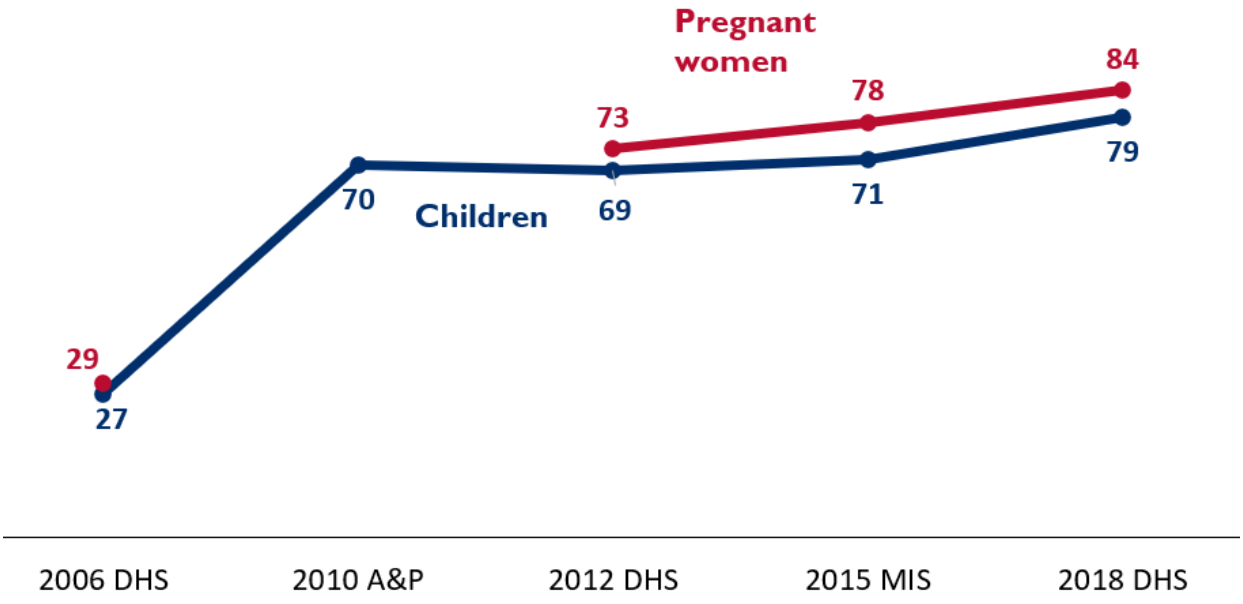
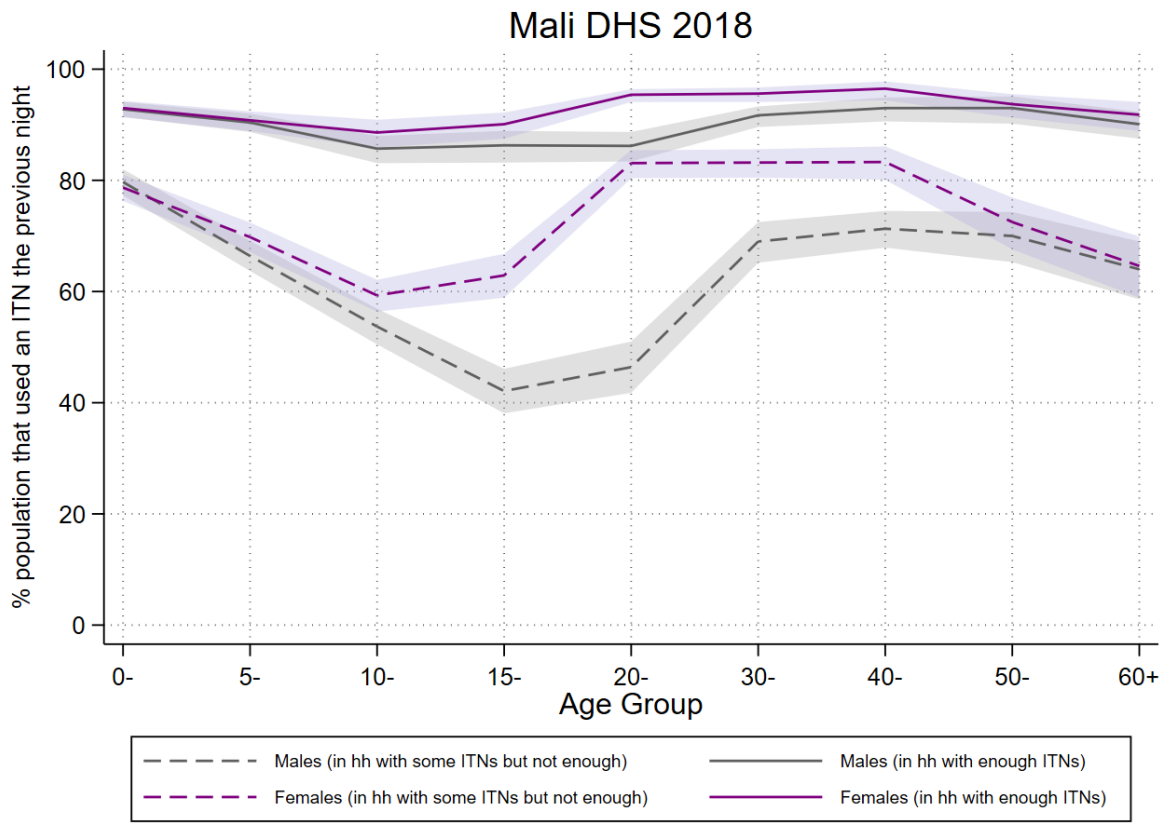


Figure A-8. Estimation of the proportion of people sleeping under an ITN the previous night

ITN use is disaggregated by age group, gender, and household ITN supply.



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?

Supporting Data

- Mali continues to have high access to (90 percent) and high use (79 percent) of ITNs. Analyses using DHS data and data on transmission season from Mapping Malaria Risk in Africa (MARA) indicate that ITN use in Mali is highly seasonal, peaking during high-transmission season and declining in the hot dry season (Koenker et al., 2019, https://doi.org/10.4269/ajtmh.19-0249).
- Use:access estimates indicate that residents of urban areas might have slightly lower use rates as well as some may prefer using insecticide sprays rather than ITNs for malaria prevention.
- Recent household surveys indicate that men (15 to 40 years of age) tend to have slightly lower use:access rates. This could be because other groups such as children and pregnant women receive ITNs at health facilities because they are at higher risk for severe malaria. Also, it might be because men in that age group do not sleep in the home at all times (work related, etc.) and/or they don't have access to ITNs.

No specific challenges were identified for the implementation of SBC activities related to vector control and bed net use. Please refer to Section 3.4 for information on how SBC interventions will be implemented in the country.

Key Question 4

What type of nets are being distributed via which channels?

Supporting Data

Standard pyrethroid-only nets had been distributed until 2020 through regional campaigns staggered yearly by regions and through routine distribution. PMI provides nets for continuous distribution channels nationwide. In CY 2020, the Global Fund supported a regional distribution campaign in Sikasso, including the pilot distribution of Interceptor G2 nets in four of ten health districts. PMI procured and distributed 60,000 Interceptor G2 nets for pregnant women and children attending EPI clinics in these same districts (see Figure A-8).

Table A-3. Insecticide treated net (ITN) distribution

Region	Mass Campaign June 2020	ANC/EPI
Mopti	1,589,748 pyrethroid only (Mainpol, Yorkol)	475,000 standard pyrethroid only (all regions except four districts of Sikasso)
Kayes	1,624,200 pyrethroid only (Mainpol, Yorkol)	xx pyrethroid
Koulikoro	2,114,587 pyrethroid only (Mainpol, Yorkol)	xx pyrethroid
Sikasso	1,627,039 pyrethroid only (Mainpol, Yorkol)	xx pyrethroid
Sikasso (Districts: Kadiolo, Yanfolila, Selingue, Yorosso)	535,399 IG2 (BASF)	60,000 IG2 (Bast)

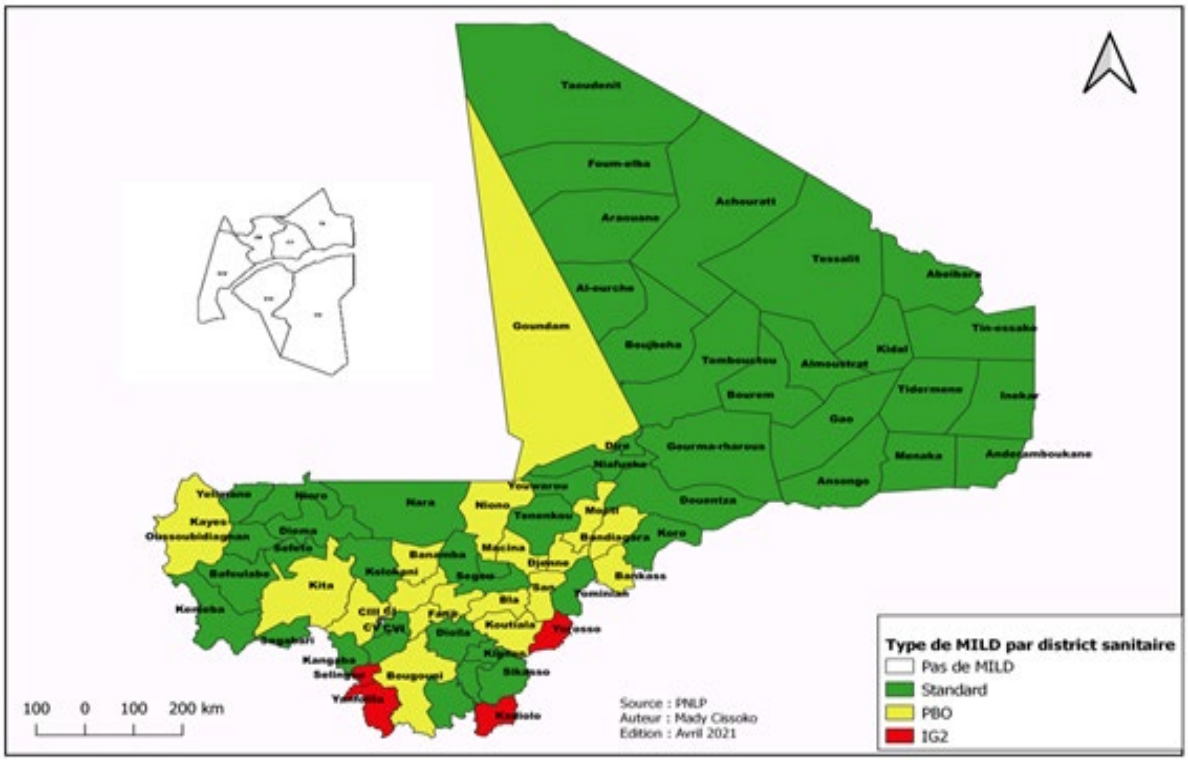
Key Question 5

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?

Supporting Data

With the support of the Global Fund, a national mass distribution campaign is planned for CY 2023. The change from regional campaigns to a national campaign aims to improve the impact on transmission and have a better use of resources. The type of nets will be pyrethroid-based, PBO or Dual AI/Interceptor G2, based on the evidence for insecticide resistance in the different health districts (see Table A-3).

Figure A-9. Type of ITN proposed* to be procured by the Global Fund for the 2023 mass distribution campaign



* At the time of writing, the Global Fund grant was not yet approved.

Table A-4. ITN Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	21,111,978	21,697,317	22,298,885
Total population at risk for malaria	21,111,978	21,697,317	22,298,885
PMI-targeted at-risk population	21,111,978	21,697,317	22,298,885
Population targeted for ITNs	21,111,978	21,697,317	22,298,885
Continuous Distribution Needs			
Channel 1: ANC	893,037	950,342	1,003,450
Channel 2: EPI	841,735	865,072	889,057
Channel 3: School	0	0	0
Channel 4:	0	0	0
Additional ITNs required to avoid ITN stockouts	867,386	907,707	946,253
Estimated Total Need for Continuous Channels	2,602,157	2,723,122	2,838,760
Mass Campaign Distribution Needs			
Mass distribution campaigns	0	0	11,921,720
Estimated Total Need for Campaigns	0	0	11,921,720
Total ITN Need: Continuous and Campaign	***2,602,157***	***2,723,122***	***14,760,479***
Partner Contributions			
ITNs carried over from previous year	1,289,374	833,217	95,095
ITNs from Government	300,000	500,000	500,000
ITNs from Global Fund	0	0	12,057,207
ITNs from other donors	0	0	0
ITNs planned with PMI funding	1,846,000	1,485,000	1,892,506
Total ITNs Contribution Per Calendar Year	***3,435,374***	***2,818,217***	***14,544,809***
Total ITN Surplus (Gap)	***833,217***	***95,095***	***(215,671)***

For 2021 through 2023, PMI will continue to support the procurement of nets for routine distribution through ANC and EPI services (approximately 5.2 million LLINs with 1.9 million in 2023). The type of nets procured will align to the type of nets procured by the Global Fund for a specific health district. In addition, for CY 2023, PMI will procure Dual AI/Interceptor G2 nets for routine distribution in the Mopti districts where IRS will no longer be implemented. PMI will procure Dual AI/Interceptor G2 nets for routine distribution for all of the districts in Mopti region if additional funds are available. The needs for mass campaigns are covered by the Global Fund.

Key Question 6

What is the current status of durability monitoring?

Supporting Data

A three year ITN durability monitoring study was completed in early 2021, although bioassays for 36 months are ongoing at the time of writing. The study was carried out by the local research institution LBMA.

Table A-5. Timing of durability monitoring

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
Dec 2017	Kenieba	Yorkool	March-May 2018	Dec 2018	Nov-Dec 2019	Nov-Dec2020
	Kita	Permanet 2.0				

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 (%)
Kenieba	6 (baseline)	0%	99.1%	66.6%
Kita		0%	100%	66.6%
Kenieba	12	1.7%	84.9%	70%
Kita		0%	95.4%	76.6%
Kenieba	24	10.7%	70.3%	70%
Kita		17.2%	91.8%	56.6%
Kenieba	36	45.3%	48.8%	in progress
Kita		22.4%	77.7%	

A three-year durability monitoring study compared two ITN brands (Yorkool and PermaNet 2.0) in two locations from the Kayes region in Mali with similar malaria epidemiology, climatic, and socio-ecological profiles. At the 36-month follow-up period, the proportion of Yorkool nets surviving in serviceable condition was lower than PermaNet 2.0 nets, because of high attrition due to wear and tear and lower physical integrity (Table A-6).

Of cohort nets remaining after 36 months, the proportion of serviceable nets (pHI≤642) was significantly lower for Yorkool nets in Kenieba (48.8 percent) than PermaNet 2.0 in Kita (77.7 percent). The nets still available and surviving in serviceable condition were 23.1 percent for Yorkool nets in Kenieba and was significantly higher at 58.8 percent for PermaNet 2.0 in Kita. The proportion of ITNs that meet optimal effectiveness through bioassay of *An. coluzzi* (at least 95 percent knockdown or 80 percent mortality) after 24 months was 70 percent for Yorkool from Kenieba and 56.6 percent for PermaNet 2.0 from Kita. The proportion of ITNs that met minimal effectiveness (75 percent knockdown or 50 percent 24-hour mortality) criteria was 100 percent for Yorkool from Kenieba and 96.6 percent for PermaNet 2.0 from Kita. Bioassays of 36-month samples are ongoing and final results will be presented as an addendum to the final durability monitoring report.

The median survival of Yorkool nets was 2.1 years in Kenieba and 3.4 years for PermaNet 2.0 in Kita. It should also be noted that 82.8 percent (Kenieba) and 73.3 percent (Kita) of the cohort nets were unused and still in the package six months after distribution, hence it could be argued that the median "in use" survival is even shorter. The reasons for the lower performance of Yorkool nets in Kenieba could be associated with product

specifications, with PermaNet 2.0 having a thicker fabric of 100 denier polyester compared with 75 denier of Yorkool, or sociocultural factors associated with ITN handling and use (washing, drying outdoors, presence of mice in house).

Finally, the C-Vue portable chromatographic device was used successfully for the first time in Mali to measure the surface level insecticide concentration of ITNs and produced results that were consistent with cone bioassays. The method has the added advantage that the net is not destroyed and sampling can be easily performed in the field with minimal disruption. This new technology allows for an affordable and locally available method to perform ITN durability monitoring in malaria endemic countries.

Durability monitoring is ongoing—conclusions and a link to final report will be presented at the end of the monitoring activity.

Conclusions for ITN Investments

In FY 2022, PMI will increase the funds for the procurement of ITNs for continuous distribution channels via ANC and EPI. PMI allocated funds to procure and distribute single pyrethroid, PBO and Interceptor G2/dual AI nets. Because of the decision to halt IRS implementation in the Mopti region, the IRS funds will be reprogrammed and allocated to procure and distribute dual AI nets through continuous distribution channels in those districts. Of note: Aiming to assess the efficacy of the G2 nets intervention, the PMI team in joint decision with the NMCP had established monitoring sites in Sikasso region, in areas were G2 nets were distributed. Entomological data was gathered as baseline (pre-distribution) and continues to be collected as part of the regular entomological monitoring activities. The aim is to perform an analysis with entomological, epidemiological, and biochemical variables of the nets (chemical content and bioassays) to evaluate net efficacy as part of a streamline durability monitoring.

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

1.3. INDOOR RESIDUAL SPRAYING (IRS)

Key Goal

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

Key Question 1

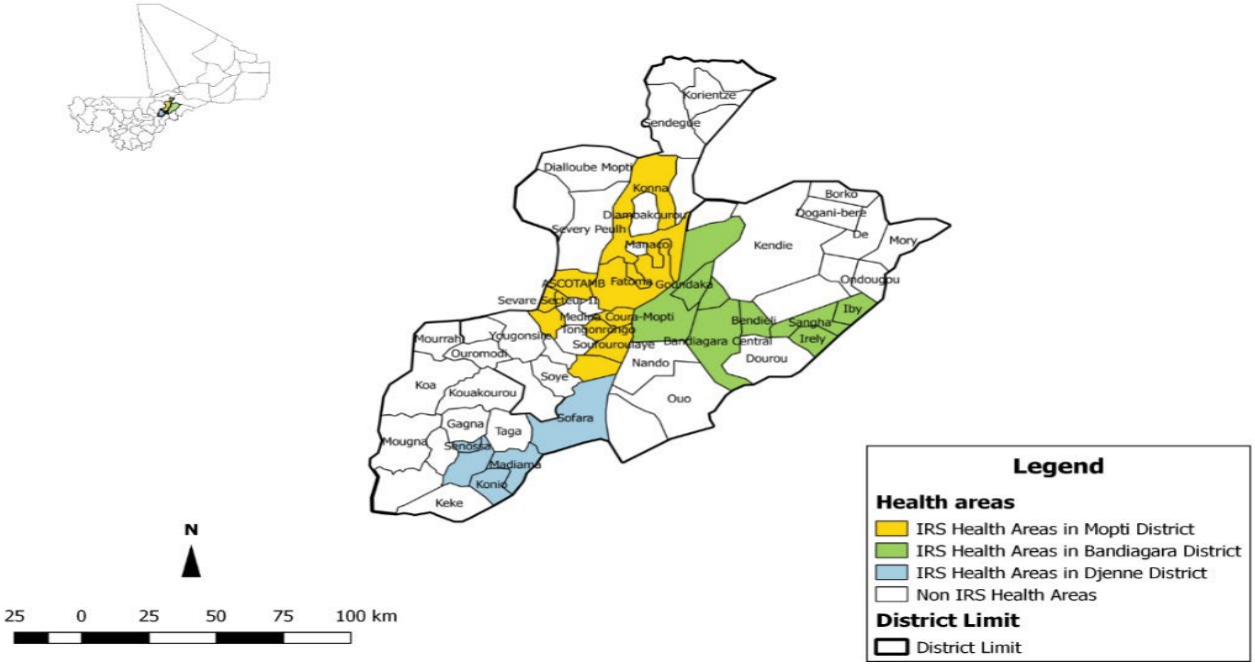
What areas are targeted for IRS and why?

Supporting Data

PMI currently supports IRS in three districts of Mopti region: Bandiagara, Djenné, and Mopti (Figure A-10). The malaria prevalence and reported incidence in Mopti region have decreased since IRS activities began there in 2016; nevertheless, the malaria burden in the Mopti region remains among the highest in Mali. The costly implementation of IRS limits its application to a few health districts in the country, prompting considerations for alternative malaria control strategies such as scale-up of next-generation ITNs. PMI will continue support for IRS in 2022 in Mopti, but there will be no IRS campaign for 2023.

IRS is also implemented by private stakeholders supported by gold-mine companies in various districts in Mali. The coverage is not officially reported and the IRS evaluations are carried out by independent stakeholders not related to PMI.

Figure A-10. Map of Mali showing the three IRS districts in Mopti region supported by PMI 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

In 2018 and 2019, the IRS campaign sprayed 160,723 and 148,198 structures, respectively, with a coverage rate of 96 percent and 97 percent, and protected more than 665,00 people each year. The 2020 campaign also achieved 97 percent coverage, with 503,043 people protected. Due to budget constraints, there is a significant reduction in the number of structures for the 2021 campaign with a target of 65,105 structures, protecting an estimated 269,823 people.

Table A-7. IRS Coverage

Calendar Year	Districts Sprayed (#)	Districts	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)
2018	4	Bandiagara, Bankass, Djenné, and Mopti	160,723	96	665,581
2019	3	Bandiagara, Djenné, and Mopti	148,198	97	690,793
2020	3	Bandiagara, Djenné, and Mopti	129,302	97	503,043
2021*	3	Bandiagara, Djenné, and Mopti	65,105	at least 85	269,823

*Denotes targets for current year

**The structure definition was modified between the 2019 and 2020 spray campaigns. As a result, in 2020, PMI VectorLink Mali started using the revised structure definition, which defines individual residential units within multi-unit buildings as individual structures, in contrast to the former definition, which defined standalone structures as one single structure regardless of the number of residential units within them.

Key Question 3

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

Supporting Data

Results from cone bioassay tests demonstrated high efficacy of Actellic 300CS (pirimiphos methyl: organophosphate) and SumiShield 50WG (clothianidin) used for IRS from 2018 to 2019. Results were similar across the three IRS districts with variation in residual efficacy on different surfaces (mud, painted mud, cement, and painted cement). The duration of efficacy as estimated by cone bioassays on the different surfaces across the three districts ranged from four to seven months (Table A-8). There was less variability in residual efficacy of the three IRS insecticides (Actellic 300CS, SumiShield 50WG, and Fludora Fusion WP-SB: clothianidin+deltamethrin) used for the 2020 IRS. The analysis showed that in Djenné (sprayed with Actellic 300CS), the 24-hour mortality rate remained above 80 percent after seven months. In Bandiagara (sprayed with SumiShield 50WG), the 72-hour mortality rate remained 100 percent seven months after spraying on all types of walls. In Mopti (sprayed with Fludora Fusion WP-SB), the 72-hour mortality rate with pyrethroid susceptible *An. coluzzii* remained above 80 percent after seven months on all the types of surfaces sprayed while duration of efficacy against wild pyrethroid resistant *An. gambiae* s.l. was up to four months. Cone tests with wild resistant *An. gambiae* s.l. could not be carried out beyond four months due to scarcity of larvae. For the 2021 spray campaign, cone bioassays on Fludora Fusion sprayed walls will be conducted using wild collected pyrethroid resistant field strain while susceptible insectary reared Kisumu strains will be used for Actellic 300CS-sprayed walls.

Table A-8. IRS Insecticide Residual Efficacy

Site/District	Year	Insecticide	Average Residual Efficacy (months)
Bandiagara, Bankass Djenné and Mopti	2018	Actellic 300CS (Pirimiphos-methyl: organophosphate) & SumiShield 50WG (clothianidin)	4-7
Bandiagara, Djenné and Mopti	2019	Actellic 300CS (Pirimiphos-methyl: organophosphate) & SumiShield 50WG (clothianidin)	4-7
Bandiagara, Djenné and Mopti	2020	Actellic 300CS (Pirimiphos-methyl: organophosphate); SumiShield 50WG (clothianidin) and Fludora Fusion WP-SB (clothianidin+deltamethrin)	7

Key Question 4

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

Supporting Data

There are currently three insecticides used in rotation in the three IRS districts: Actellic 300CS (Pirimiphos-methyl: organophosphate), SumiShield 50WG (clothianidin), and Fludora Fusion WP-SB (clothianidin+deltamethrin).

Table A-9. Insecticide Rotation Plan

Target Spray Area	2020	2021	2022*	2023*
Bandiagara	Clothianidin	Clothianidin	TBD	No IRS
Djenné	Pirimiphos-methyl	Pirimiphos-methyl	TBD	No IRS
Mopti	Clothianidin-Deltamethrin	Clothianidin-Deltamethrin	TBD	No IRS

*Denotes planned insecticide classes.

Conclusions for IRS Investments

The districts of Djenné, Mopti, and Bandiagara in the Mopti Region have been sprayed for five consecutive years. Recent cost analysis of the spraying operations showed that the IRS campaign is not protecting as many people relative to PMI's financial investment because of the high implementation cost of IRS and operational challenges due to insecurity in the region. Furthermore, the high operational costs preclude implementing IRS in no more than a few districts. Therefore, PMI believes that shifting resources to other less-costly prevention and control interventions, such as procurement and distribution of next-generation ITNs, could increase cost-efficiency, particularly given the very high rates of ITNs use in Mali.

The decision to withdraw IRS after CY 2022 was achieved in consultation with the NMCP. Therefore, IRS is not included in the FY 2022 MOP budget. Stopping IRS in the three districts of Djenné, Mopti, and Bandiagara requires replacement with an effective exit strategy to guide against potential rebound and increase in malaria cases. In this context, PMI will create awareness on the IRS withdrawal for residents that previously received it and prioritized the distribution of dual AI ITNs in the three IRS districts. Additional plans include (1) increasing entomological surveillance, including strengthening community-based vector surveys at the present IRS sites; (2) intensifying malaria epidemiological surveillance activities; (3) ensuring no stockout of malaria commodities; (4)

reinforcing community case management; and (5) continuing support for SBC communication to promote malaria awareness and care-seeking behaviors, maintain ITN care, and increase net use to cover anticipated increases in malaria cases.

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 Objectives

PMI supports the NMCP objectives to test (by RDT or microscopy) 100 percent of suspected malaria cases and to appropriately treat 100 percent of confirmed malaria cases at all levels of the health pyramid including the community level, as per the 2018–2024 National Malaria Strategic Plan.

NMCP Approach

In accordance with the National Malaria Control Policy, any suspected malaria case should be confirmed by microscopy (thick or thin film) or RDT before treatment. The biological diagnosis (RDT or microscopy) is offered free of charge according to decree No. 10-628 / P-RM of November 29, 2010, to children under five years of age and pregnant women. Microscopy is reserved for health facilities with a laboratory and RDTs are used at all levels of the health pyramid, including the community level. A suspected malaria case as defined in the 2021 Draft Clinical Management Training Manual is fever (axillary temperature ≥ 37.5 ° C) with one or more of the following: headache, muscle pain, joint weakness, chills, and stiffness.

The National Malaria Treatment Guidelines and associated training materials are being revised. Confirmed cases of uncomplicated malaria are treated with WHO-approved ACTs at all levels of the health pyramid. Children under five years of age and pregnant women receive ACTs free of charge. Confirmed cases of severe malaria are treated with injectable artemisinin derivatives (artesunate or artemether) or quinine. Free injectable artesunate-based kits are made available to health facilities for children under five years of age and pregnant women. Treatment of confirmed uncomplicated malaria in pregnant women is with quinine tablets in the first trimester and ACTs from the second trimester of pregnancy in accordance with WHO recommendations. Treatment of confirmed severe malaria in pregnant women is with injectable artesunate as the first-line, injectable artemether as the second-line, and injectable quinine as the third-line.

The national policy for malaria case management is the same in the private and public sectors. The proportion of caregivers seeking treatment or advice when a child has fever from the private or other sector (shop, market, traditional healer) has been rising in comparison with the public sector between 2006 and 2018 (Table A-10). In a study conducted in 2017, more than 42 percent of febrile children under five years of age presenting to urban private health facilities were prescribed an ACT and 19 percent were prescribed a non-ACT antimalarial (Ashton, 2019).

Table A-10. Sources of care for children with fever for whom advice or treatment was sought in the public and private sectors, Mali 2006–2018

	Medical Facility		Other
Year of survey	Public sector medical facility	Private sector medical facility	Shop, market, traditional healer
2006	49.9	11.5	38.9
2012	52.4	13.2	35.8
2015	50.6	11.7	29.5
2018	41.7	20.9	39.5

Source: DHS 2006, DHS 2012-13, MIS 2015, DHS 2018

At the end of 2020, the NMCP and its partners conducted an assessment of the involvement of the private for-profit sector in health. The main findings were the weak linkages between the private and public sectors, the lack of systematic laboratory confirmation of suspected malaria cases by the private sector due to the unavailability of free RDTs, noncompliance with the national malaria diagnosis and treatment guidelines and protocols; and lack of reporting on numbers of cases and deaths. The NMCP recently launched a strategy to improve the integration and adherence of the private sector to national policy, which is being supported by the Global Fund. The strategy includes involving the private sector in NMCP training programs, introducing RDTs into pharmacies, a monitoring/ supervision system, and introducing quality antimalarial diagnostic and treatment commodities (ACTs and RDTs) at subsidized prices to private pharmacies and clinics.

In 2010, Mali approved a National Community Health Strategy (*Soins Essentiels Communautaires*) which includes an integrated community case management (iCCM) package for malaria, acute respiratory infections, and diarrhea. Community health services are provided by community health workers (*Agents de Santé Communautaires*) at the village and household levels. These CHWs also provide primary care to newborns and some family planning services to eligible families. The National Community Health Strategy and CHWs are supported by an additional cadre of community health volunteers, the *relais*, whose role is to carry out SBC and health education to promote key health messages to complement community activities, including iCCM. The National Community Health Strategy recommends that CHWs be placed in villages located five kilometers or more from a health facility, that they cover two to three villages in a radius of three kilometers, and have a catchment population of approximately 1,500 people, whereas *relais* typically cover just one village. Support for the Government of Mali plan for nationwide implementation of the National Community Health Strategy and the iCCM package, which includes supervision, commodities, RDT confirmation, and quality assurance/quality control, and social and behavior change communication is incorporated into the most recent Global Fund grant.

Malaria is integrated into broader supervision activities and malaria-specific supervision (e.g., outreach training and supported supervision [OTSS]) is supported by PMI for case management and malaria in pregnancy interventions.

PMI Objective in Support of NMCP

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.

PMI supports implementation of the national malaria case management policy in southern and central Mali where more than 90 percent of the population live. USAID Office of Health bilateral programs support implementation of the national malaria case management policy in Segou, Mopti, and Sikasso regions and a PMI centrally funded program supports implementation of the policy in Kayes and Koulikoro regions and in Bamako.

PMI-Supported Recent Progress (CY 2020 implementation)

Activities supported by PMI include:

- In 2020, 1,112,700 ACTs and 7 million RDTs were procured, of which 999,780 ACTs and 3,215,425 RDTs were distributed throughout the country, including the north.
- In 2020, 393 ANC providers were trained in ANC and in MIP; 56 health facility providers were trained in malaria diagnosis and treatment; 24 new CHWs were trained in iCCM; 36 laboratory technicians were trained in microscopy and 97 supportive supervision visits were made to health personnel who provide malaria prevention and treatment services.
- In 2020, MIP guidelines and training materials were revised and disseminated in Segou and Mopti regions.

In 2020, the importation of commodities was slowed because of the COVID-19 pandemic and there were stockouts of RDTs and ACTs, which affected the capacity of the health system to test and treat malaria cases according to the National Malaria Treatment Guidelines.

PMI-Supported Planned Activities (CY 2021–2022 implementation)

Activities being supported by PMI in CY 2021–2022 include:

- Procurement and distribution of RDTs and ACTs throughout the country, including the north.
- Training and supportive supervision of ANC providers in ANC and in MIP, health facility providers in malaria diagnosis and treatment, and CHWs in iCCM.
- Training laboratory technicians in microscopy.
- Dissemination of Malaria in Pregnancy guidelines and training materials in Kayes, Sikasso and Koulikoro regions and in Bamako.
- Finalization and dissemination of revised National Malaria Treatment Guidelines and training materials to Kayes, Sikasso and Koulikoro regions and to Bamako.

Key Question 1a

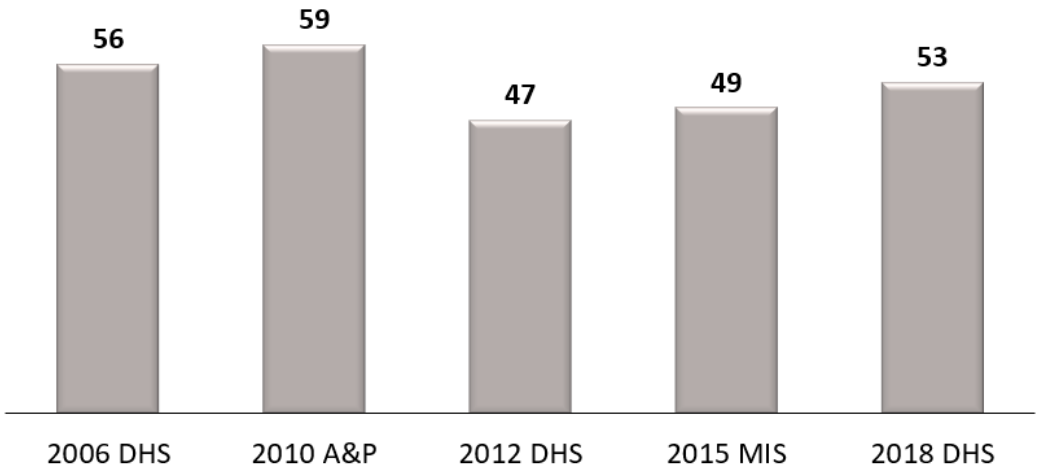
What is the status of care-seeking and/or access to care for children under five years of age with fever?

Supporting Data

Figure A-11 shows care-seeking for children with fever remained steady at 56 percent in 2006 and 53 percent in 2018. The percent for whom care or treatment was sought the same or next day increased from 15 percent to 27 percent during the same time period.

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

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



Note: Excludes treatment or advice from a traditional practitioner.

Key Question 1b

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

Supporting Data

Table A-11 summarizes some key barriers and facilitators to care-seeking. Commonly cited barriers to seeking care for sick children at health facilities include costs of consultations and nonsubsidized treatments often recommended during visits for fever, and geographic barriers, especially during the rainy season. Household roles and responsibilities for case management of ill children differ between communities and mothers are often not fully empowered to independently access resources or to make important health seeking decisions necessary to respond promptly to signs of severe childhood illness.

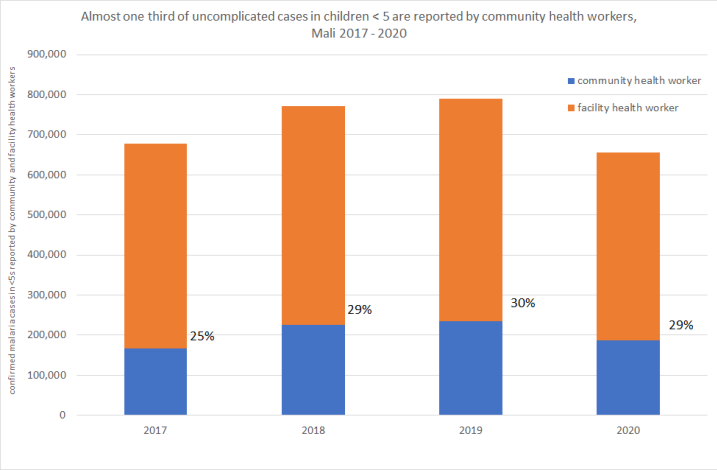
There is a continuing need for sensitization of all household and community members about the importance of seeking advice and treatment for fever, diarrhea, and acute respiratory infection as soon as possible. This is designated as one of the priority areas for funding SBC interventions. Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Table A-11. Key barriers and facilitators to care-seeking

Facilitator	Type of Factor	Data Source	Evidence
Free treatment	Environmental	Perez, F. 2009; Ponsar, 2011; Johnson, A.H. 2018	Studies by STC, MSF, Muso and others demonstrate an increase in consultations for fever/malaria when services are free.
Access to Community Health Workers	Environmental	DHIS2 data NMCP Annual reports	HMIS data indicate that CHWs are testing and treating one-third of uncomplicated malaria cases in children under five years of age (see Figure A-12).
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Household power structures	Social	Ellis, 2012; Ellis 2013	Case studies showed that although mothers tend to be the first to recognize signs of illness in their children, fathers and grandparents make decisions about whether, where, and when to seek care for the ill children.
Costs of consultation and treatment	Social/ Environmental	Ellis 2012; Ellis 2013	Mothers tend to have early awareness of children's illnesses but must wait for the head-of-household to decide whether they are willing to pay for care.

DHIS2 data demonstrate that CHWs test and treat approximately one-third of uncomplicated malaria cases among children under five years of age (Figure A-12).

Figure A-12. Proportion of uncomplicated malaria cases under five years of age being treated by CHWs, Mali 2017–2020



Source: DHIS2

Key Question 2a

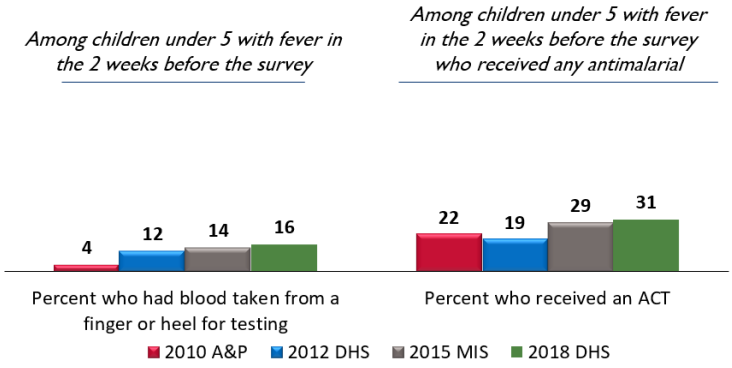
What proportion of patients are being tested and appropriately treated for malaria?

Supporting Data

Figure A-13 shows that the proportion of children with fever who had blood taken from a finger or heel for diagnostic testing increased from 4 percent in 2010 to 16 percent in 2018. Among children with fever who received any antimalarial, the proportion who received an ACT increased from 22 percent in 2010 to 31 percent in 2018.

Figure A-13. Trends in diagnosis and treatment of children with fever

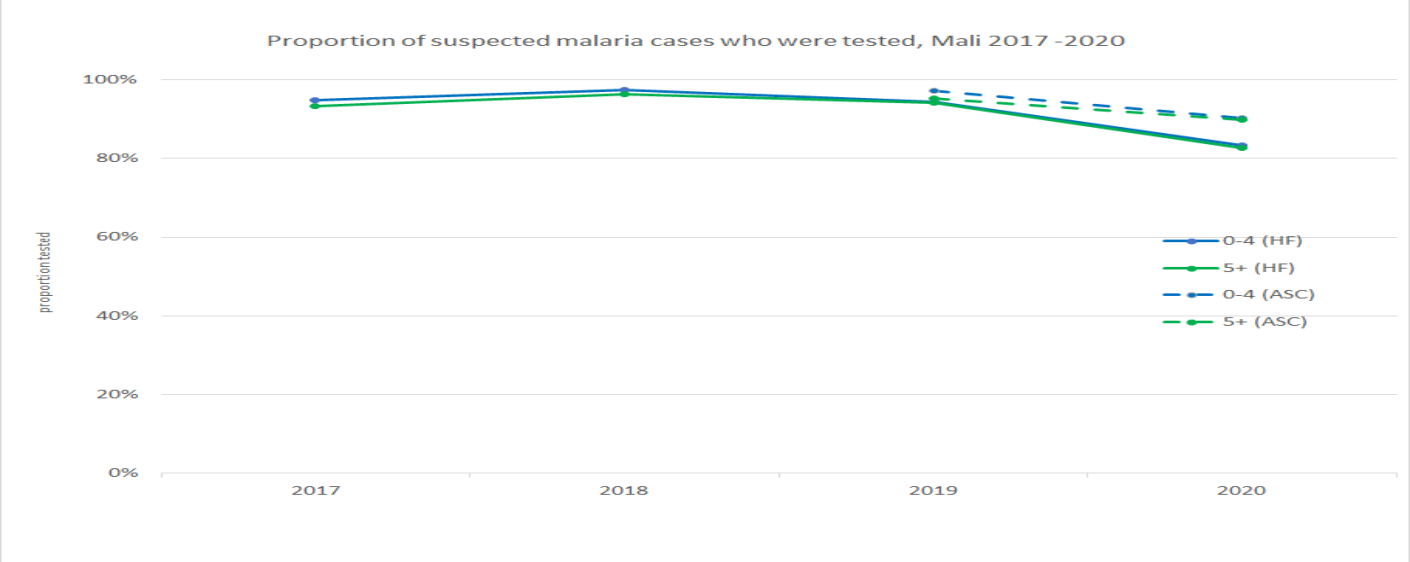
Among children under five years of age with fever in the two weeks before the survey and with fever in the two weeks before the survey who received any antimalarial



Source: 2010 A&P, 2012 DHS, 2015 MIS, 2018 DHS

DHIS2 data from health facilities and CHWs demonstrate that high proportions of suspected cases are being tested, although testing rates decreased in 2020 (Figure A-14).

Figure A-14. Proportion of suspected malaria cases that were tested by health workers in health facilities and by CHWs in the community, Mali 2017–2020



Source: DHIS2

DHIS2 data demonstrate that high proportions of those cases that have been confirmed are appropriately treated per the National Treatment Guidelines (Table A-12). OTSS+ data from PMI-supported regions (unpublished), show that the majority of providers correctly classify patients as having no malaria, uncomplicated and severe malaria. However, during OTSS+ visits, less than 20 percent of facilities demonstrated health workers with > 90 percent competence in the appropriate treatment of malaria cases in accordance with the WHO guidelines. These results can be explained by the insufficiency in the monitoring of providers.

Table A-12. High proportions of confirmed cases are treated appropriately

	Health Facilities				CHWs	
	0–4 years		5+ years		0–4 years	5+ years
	Uncomplicated cases	Severe cases	Uncomplicated cases	Severe cases	Uncomplicated cases	Uncomplicated cases
2017	96%	97%	94%	97%	97%	95%
2018	98%	99%	96%	99%	97%	96%
2019	100%	100%	97%	100%	100%	99%
2020	99%	97%	98%	100%	100%	98%

Source: DHIS2

Health workers began reporting presumptively treated cases in 2019 and available DHIS2 data indicate that significant numbers of reported malaria cases were treated presumptively in 2019 and 2020 (Table A-13). This has increased across age groups and in both community- and facility-based settings.

Table A-13. Proportion of malaria cases that were treated presumptively in 2019 and 2020

	Health Facilities				CHWs	
	0-4 years		5+ years		0-4 years	5+ years
	Uncomplicated	Severe	Uncomplicated	Severe	Uncomplicated	Uncomplicated
2019	13%	11%	13%	12%	7%	11%
2020	23%	18%	23%	19%	13%	29%

Source: DHIS2

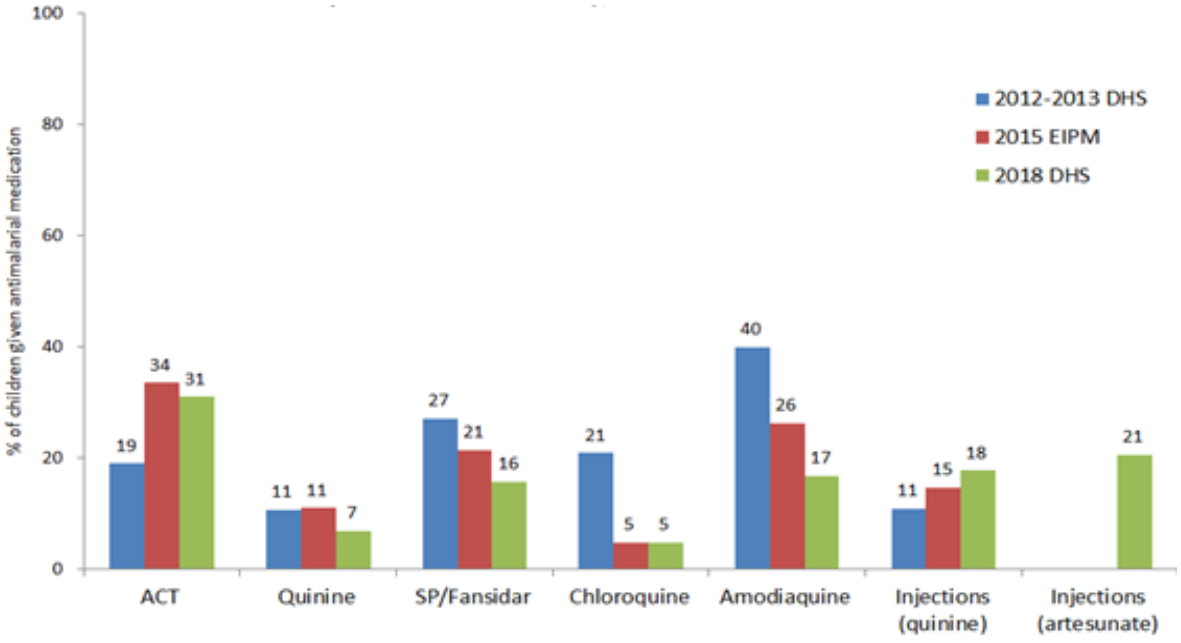
Key Question 2b

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

Supporting Data

Challenges affecting treatment of presumptive or confirmed cases of malaria include the preference of providers and clinicians for injectable treatments (Figure A-15). In addition, significant proportions of children with malaria (~60 percent) are receiving antibiotics (Ashton, 2019).

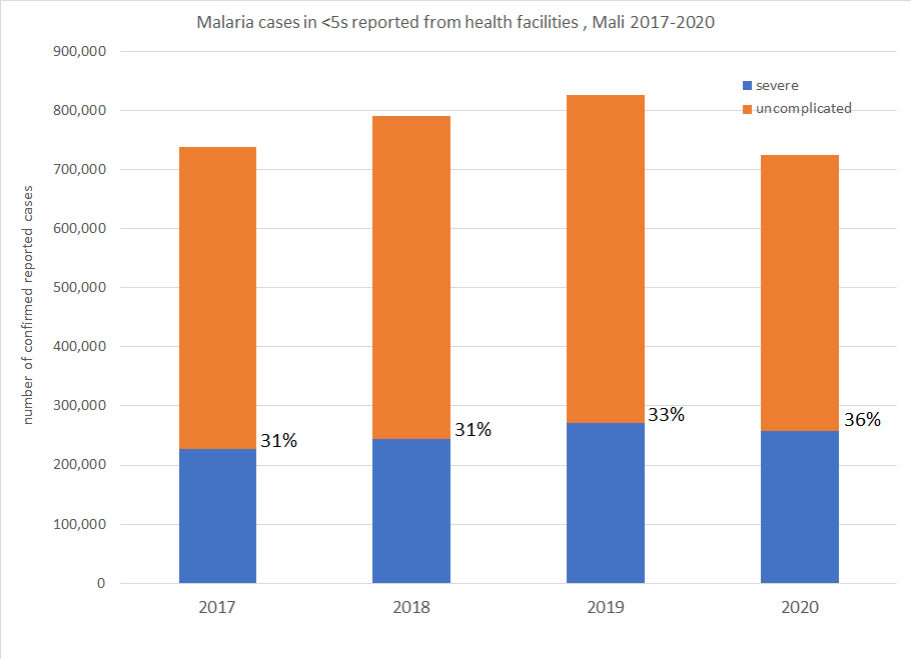
Figure A-15. Antimalarial medications given to children with history of fever (maternal recall), Mali 2012–2018



Source: 2012–2013 DHS, 2015 EIPM, 2018 DHS

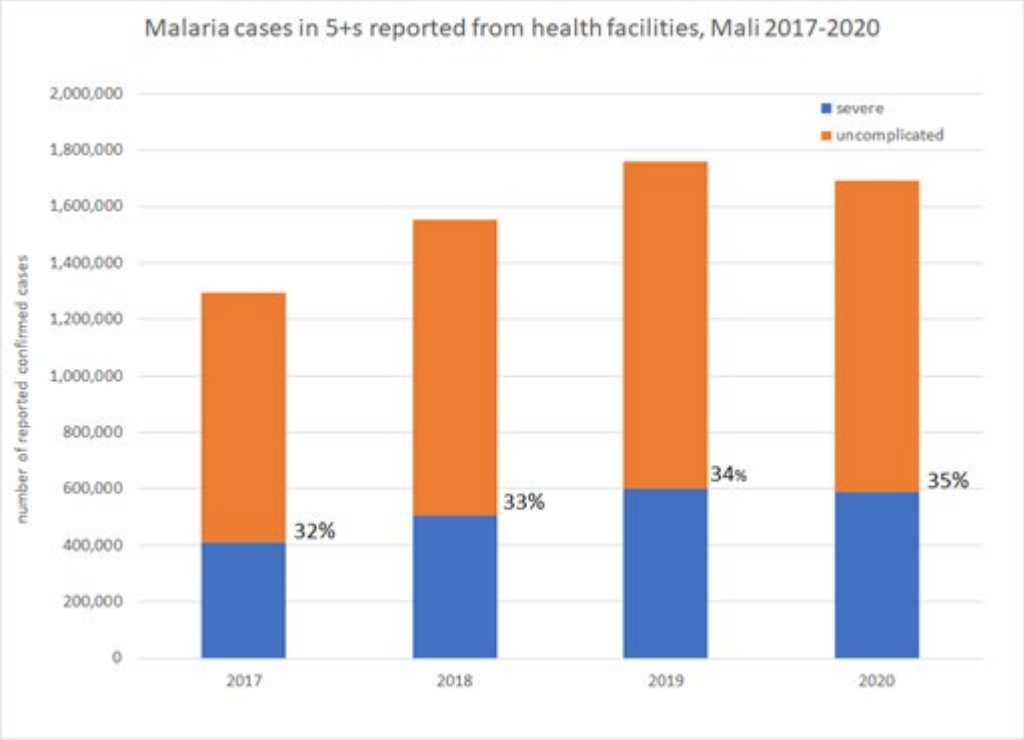
Approximately one-quarter of all malaria cases reported each year in children are classified as severe. The proportion of all cases reported as severe increased between 2017 and 2020 in both children and in persons five years of age and older (Figures A-16 and A-17). It is possible that clinicians are reporting uncomplicated cases as severe cases to justify treatment with injectable antimalarials. The Global Fund is currently planning an assessment of malaria surveillance that will also look at the misclassification of severe malaria cases. PMI plans to coordinate its response with the Global Fund once the findings are available. In the meantime, in addition to reinforcing training for providers on the management of severe malaria via OTSS+, PMI will provide SBC communication messaging, targeting both providers and patients on the acceptability of oral medications for uncomplicated malaria.

Figure A-16. More than 30 percent of confirmed cases of malaria among children under five years of age reported from health facilities are severe



Source: DHIS2

Figure A-17. More than 30 percent of confirmed cases of malaria among children five years of age and older and adults reported from health facilities are severe



Source: DHIS2

Finally, recently available DHIS2 and OTSS data indicate that health workers are treating suspected malaria cases without testing them and/or treating them even when the test results are negative (Table A-13). Treating febrile patients without a positive malaria test has been attributed to lack of provider's confidence in accuracy of RDTs, stockouts of RDTs, and inadequate training and supervision. In contrast, OTSS+ data from PMI-supported regions showed good adherence to test results with regard to treatment.

An important structural challenge that is having an impact on the capacity of providers to appropriately diagnose and treat patients are stockouts of RDTs and age-appropriate formulations of ACTs. The behavioral challenges affecting testing and treatment practices among providers are a priority area for SBC funding. Please refer to Section 3.4 for information on how SBC interventions will be directed to address these challenges.

Key Question 3

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

Supporting Data

Support for community health is split between PMI and the Global Fund. PMI provides initial training, refresher training, and supervision, and also procures ACTs and RDTs, which go into the national pool for CHW in the southern regions of the country (Sikasso, Mopti, Segou, Kayes, and Koulikoro). The Global Fund has agreed to cover the stipends/salary for all CHWs and supports training and supervision in the Northern regions of the country.

In 2021, a total of 3,104 CHWs were trained and functional. The Global Fund is supporting and will continue to support 1,300 CHWs, including CHWs who had previously been supported by USAID and the Malian Red Cross (along with the Global Alliance for Vaccines and Immunization [GAVI]). In addition, Global Fund COVID-19 grant funds will be used to bring on 1,200 new CHWs and to support the training/upgrading of CHWs on the management of malaria, which is being integrated into the community health package.

The Global Fund is supporting malaria case management in health facilities and in the community in the following areas (Table A-14):

- Procurement and distribution of malaria drugs and RDTs
- Training and supervision
- Outreach for hard-to-reach and insecure zones
- Strengthening the supply chain
- Scaling up the number of CHWs
- Supporting the active malaria case finding through community-based organizations

PMI will support facility-based service delivery by training providers on malaria case management, training laboratory technicians on malaria microscopy, and conducting OTSS+ of health facilities.

Table A-14. Support for malaria prevention and control interventions by Global Fund, GOM, UNICEF

Interventions	Nationwide	Comments
Commodity procurement and distribution (ACTs, injectable artesunate, RDTs)	X	Global Fund contribution (see gap analysis) and Government of Mali
SMC	Nationwide, except the North	Global Fund contribution (see gap analysis), UNICEF, and Government of Mali
Case management, MIP, iCCM, and SBC	X	Global Fund contribution (see gap analysis), UNICEF, and Government of Mali

Key Question 4

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

Supporting Data

Table A-15. RDT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	21,111,978	21,697,317	22,298,885
Population at risk for malaria	21,111,978	21,697,317	22,298,885
PMI-targeted at-risk population	21,111,978	21,697,317	22,298,885
RDT Needs			
Total number of projected fever cases	6,039,630	6,453,144	6,877,751
Percent of fever cases tested with an RDT	82.88%	82.88%	82.88%
RDT Needs (tests)	**5,005,645**	**5,348,366**	**5,700,280**
Needs Estimated based on HMIS Data			
Partner Contributions (tests)			
RDTs from Government	1,071,250		
RDTs from Global Fund	2,100,000	1,886,775	2,035,975
RDTs from other donors	0	0	0
RDTs planned with PMI funding	3,784,575	3,500,000	2,500,000
Total RDT Contributions per Calendar Year	***6,955,825***	***5,386,775***	***4,535,975***
Stock Balance (tests)			
Beginning Balance	2,351,000	4,301,180	4,339,589
- Product Need	5,005,645	5,348,366	5,700,280
+ Total Contributions (received/expected)	6,955,825	5,386,775	4,535,975
Ending Balance	4,301,180	4,339,589	3,175,284
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	2,502,823	2,674,183	2,850,140
Total Surplus (Gap)	***1,798,357***	***1,665,407***	***325,144***

Between 2021 and 2023, 16 million RDTs are needed in Mali. PMI procured 3,500,000 tests for 2021 using MOP20 funds and there is a remaining quantity of 284,575 tests funded with MOP19 funds to deliver in 2021. PMI will procure 3,500,000 tests in 2022 as per MOP21. The quantity planned for 2023 has been reduced due to a large carry over from prior years. No gaps are anticipated.

Key Question 5

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

Supporting Data

Table A-16. ACT Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	21,111,978	21,697,317	22,298,885
Population at risk for malaria	21,111,978	21,697,317	22,298,885
PMI-targeted at-risk population	21,111,978	21,697,317	22,298,885
ACT Needs			
Total projected number of malaria cases	3,581,953	3,613,760	3,848,864
Total ACT Needs (treatments)	***3,581,953***	***3,613,760***	***3,848,864***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	1,235,860	1,235,860	1,235,860
ACTs from Global Fund	950,353	872,560	1,264,980
ACTs from other donors *[specify donor]*	0	0	0
ACTs planned with PMI funding	1,600,020	1,678,500	2,076,171
Total ACTs Contributions per Calendar Year	***3,786,233***	***3,786,920***	***4,577,011***
Stock Balance (treatments)			
Beginning Balance	818,845	1,023,125	1,196,285
- Product Need	3,581,953	3,613,760	3,848,864
+ Total Contributions (received/expected)	3,786,233	3,786,920	4,577,011
Ending Balance	1,023,125	1,196,285	1,924,432
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	1,790,977	1,806,880	1,924,432
Total Surplus (Gap)	***(767,852)***	***(610,595)***	***0***

Approximately 11 million ACT treatments are needed during CY 2021–2023, of which PMI will be procuring 5.35 million treatments. Each year has a projected positive stock balance (central warehouse + regional warehouse + district warehouse + service delivery point [SDP]). The projected PMI amount planned for 2023 is 2,076,171 treatments of artemether-lumefantrine (AL) based on a quantification exercise conducted in June 2020. The end-of-year stock was reduced to six months and no gap is anticipated at the end of FY 2023.

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

The National Treatment Guidelines recommend that CHWs and health facility workers provide one dose of rectal artesunate for pre-referral treatment of malaria for children under five years of age. Approximately 330,000 suppositories are required for 20221–2023. Global Fund has historically covered all needs for rectal artesunate. Although the analysis currently shows gaps, PMI assumes that the Global Fund will adjust its orders as needed.

Intramuscular artesunate and artemether are used for treatment of severe cases in health facilities with physicians (District referral health centers [CSREFs] and community health centers [CSCOMs]). For 2021–2023, the overall need of artesunate injection is estimated at about 14.5 million vials. However, this is based on an estimated 15 percent to 18 percent of all malaria cases being classified as severe, a likely overestimate and yet less than the currently reported proportion of severe cases from HMIS (~30 percent). Less than 50 percent of the estimated severe malaria cases are in children under five years of age and pregnant women, which is one indication of the potential overdiagnosis of severe malaria. PMI will therefore procure 340,000 vials of injectable artesunate in 2023, understanding that this may lead to some stockouts until the irrational use of severe malaria products has been addressed. PMI plans to work with partners in the areas of SBC communication for case management to ensure rational use of severe malaria products. The Global Fund is also conducting an assessment of treatment practices that will help inform these activities. The gap analysis shows a gap of 4.3 million in 2023.

Table A-17. Inj, Artesunate Gap Analysis Table

Calendar Year	2021	2022	2023
Injectable Artesunate Needs			
Projected number of severe cases	660,154	542,064	577,330
Projected number of severe cases among children	303,671	249,349	265,572
Average number of vials required for severe cases among children	6	6	6
Projected number of severe cases among adults	356,483	292,715	311,758
Average number of vials required for severe cases among adults	10	10	10
Total Injectable Artesunate Needs (vials)	***5,386,856***	***4,423,242***	***4,711,010***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (vials)			
Injectable artesunate from Government	1,470,050	1,470,050	1,470,050
Injectable artesunate from Global Fund	448,524	1,621,833	907,549
Injectable artesunate from other donors [specify donor]	0	0	0
Injectable artesunate planned with PMI funding	160,000	160,000	340,800
Total Injectable Artesunate Contributions per Calendar Year	***2,078,574***	***3,251,883***	***2,718,399***
Stock Balance (vials)			
Beginning Balance	157,656	0	0
- Product Need	5,386,856	4,423,242	4,711,010
+ Total Contributions (received/expected)	2,078,574	3,251,883	2,718,399
Ending Balance	-3,150,626	-1,171,359	-1,992,611
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	2,693,428	2,211,621	2,355,505
Total Surplus (Gap)	***(5,844,054)***	***(3,382,980)***	***(4,348,115)***

Table A-18. RAS Gap Analysis Table

Calendar Year	2021	2022	2023
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose	83,109	68,235	72,725
Total Artesunate Suppository Needs (suppositories)	121,697	99,917	106,417
Needs Estimated based on # of providers offering pre-referral services			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	86,724	86,724	86,724
Artesunate suppositories from Global Fund	0	38,180	22,874
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	0	0	0
Total Artesunate Suppositories Available	***86,724***	***124,904***	***109,598***
Stock Balance (suppositories)			
Beginning Balance	2,848	0	24,987
- Product Need	121,697	99,917	106,417
+ Total Contributions (received/expected)	86,724	124,904	109,598
Ending Balance	-32,125	24,987	28,168
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	60,849	49,959	53,209
Total Surplus (Gap)	***(92,974)***	***(24,972)***	***(25,041)***

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 are no other antimalarial drugs used in Mali.

Key Question 8

Are first-line ACTs effective and monitored regularly?

Supporting Data

Therapeutic efficacy studies (TES) are regularly implemented by MRTC and by LBMA (with PMI funding and technical support) as shown in Table A-19. To date, there is no evidence that PCR-corrected efficacy of first-line ACTS being used in Mali is lower than 90 percent. Enrollment in the 2020–2021 TES is ongoing. As of May 2021, 94/160 participants between six months and 16 years of age have been enrolled in Dioro; 69/160 in Selingue; and 130/160.

Table A-19. Some completed and ongoing antimalarial therapeutic efficacy studies in Mali, 2013–2021

Most recent study year	Sites	PMI Funded (Y/N)	Treatment Arms	PCR-Corrected efficacy>90% (Y/N)
2015–2016[1]	Sélingué	Y	AL, ASAQ	Y
2020–2021	Sélingué, Missira, Dioro	Y	AL, dihydroartemisinin-piperaquine (DP)	results pending
2022	TBD	Y	TBD	

1. Diarra, Y., Koné, O., Sangaré, L., Doumbia, L., Haidara, D.B.B., Diallo, A.M., Sango, H.A., Sidibé, H., Mihigo, J., Nace, D., Ljolje, D., Talundzic, E., Udhayakumar, V., Eckert, E., Woodfill, C.J., Moriarty, L.F., Lim, P., Krogstad, D.J., Halsey, E.S., Lucchi, N.W., Koita, O. Therapeutic efficacy of artemether-lumefantrine and artesunate-amodiaquine for the treatment of uncomplicated *Plasmodium falciparum* malaria in Mali, 2015–2016. Malaria J. 2021

Key Question 9

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

Supporting Data

There are no other areas (e.g., lab strengthening, private sector support, etc.) that should be considered for PMI-support at this time.

Conclusions for Case Management Investments

No changes are proposed for case management activities. PMI will continue to procure needed diagnostic and treatment supplies for the entire country and will continue to support training and supportive supervision in case management and MIP in health facilities and at the community level in the five regions in central and southern Mali.

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 2018–2024 National Malaria Control Strategy objectives for drug-based prevention interventions are as follows:

- To reach at least 90 percent of the target population during each round of the annual seasonal malaria chemoprevention (SMC) campaign
- To reach at least 50 percent of pregnant women with at least three doses of IPTp during their pregnancy by 2023
- To prevent and respond to epidemics using mass drug administration (MDA) in high risk areas

NMCP Approach

MIP: The National Reproductive Health Policy was recently updated in 2020 and Mali adopted the WHO ANC model that comprises at least eight contacts between a pregnant woman and the healthcare system. IPTp is the main strategy for the prevention of malaria in pregnant women, and the policy states that pregnant women should receive at least three doses of IPTp. The first dose should be given during the 13th week of pregnancy and subsequent doses should be given at monthly intervals after that. The Government of Mali is looking at expanding the community distribution of IPTp, focusing on districts with high malaria burden and very low IPTp3 uptake.

The Malaria in Pregnancy technical working group (TWG) co-chaired by the NMCP and the National Reproductive Health Program holds quarterly coordination meetings with a broad range of stakeholders. In support of the NMCP, PMI works closely with the Global Fund to coordinate activities. PMI has taken the lead in procuring the SP needs for all of Mali while both PMI and the Global Fund contribute to the capacity-building of providers on IPTp through support for training and supportive supervision of ANC providers.

Semiannual supervision is conducted by the NMCP national level with regional and district colleagues at the regional and the district levels. Monitoring is done through the analysis of monthly data from the information system available in DHIS2. Monitoring is biannual and is carried out at CSCOM (sub-district), CSREF (district), and regional levels. Evaluations are implemented through operational surveys organized by the central level in collaboration with the partners.

The promotion of IPTp will continue as part of the implementation strategy. Sustained communication for women of childbearing age is carried out through women's associations with mass media and new local information and communication technologies. Social mobilization targeting women's groups and associations promotes IPTp. Advocacy actions are carried out with community leaders and political and administrative authorities.

To increase ANC coverage and use of SP, mobile strategies will be strengthened. Community-based administration of IPTp (once a pregnant woman has enrolled in ANC at a health facility) is being initiated. In addition, the offer of free IPTp services will be extended to the level of private health facilities and to pregnant woman who could benefit from them. Finally, particular attention will be paid to the consistent availability of the SP at all levels to limit the risks of stockouts through the monitoring of the stock management.

SMC is a vital part of the NMCP malaria control strategy and has continued to expand since its introduction.

- 2012: SMC started in Mali in one district (pilot phase)
- 2013: covered five districts
- 2014: covered 21 districts
- 2015: covered 48 districts
- 2016, 2017, and 2018: SMC covered children under five years of age nationally
- 2017 to 2018: PMI piloted SMC for children five to 10 years of age in Kita District
- 2019: PMI supported SMC in nine health districts in the Ségou and Mopti regions including coverage of children five to 10 years of age in three districts of Sikasso
- 2020: PMI supported SMC in 11 health districts in the Ségou, Mopti and Sikasso regions, extending the age groups to include children five to 10 years of age in three districts of Sikasso

The future implementation of SMC will be based on the results of a stratification exercise which has defined the eligible districts and the number of rounds (2, 3, 4, or 5) per health district per season. Due to resource limitations, the NMCP has not yet implemented the approach recommended by the stratification exercise. The targets of SMC will continue to be children three to 59 months of age, although the NMCP would like to expand to all children 5 to 10 years of age in the higher-risk districts; again, limited resources are currently precluding this expansion. SMC supported by PMI will continue to cover four rounds from July to October in 11 districts.

In Mali's SMC program, all eligible children with fever are tested for malaria before receiving SMC. If the malaria test is positive, then the child is treated with an ACT. In 8 of 11 SMC districts supported by PMI, children are screened for malnutrition during SMC campaigns. Children who are not severely malnourished receive the standard malaria preventative treatment of SPAQ. Children diagnosed with severe malnutrition do not receive SPAQ and are referred to health facilities for appropriate case management.

MDA: The NMCP strategy also calls for the utilization of MDA to respond to epidemics in low prevalence areas of Northern Mali. To date, this intervention has not been used and PMI has not planned to support it.

PMI Objective in Support of NMCP

PMI's SMC and IPTp objectives are to support Mali to achieve the National Malaria Control Strategy objectives above. PMI contributes to national drug-based malaria prevention programs (IPTp and SMC) in southern and central Mali, where more than 90 percent of the population lives. PMI procures SP for IPTp for the entire country. PMI supports implementation of IPTp in Segou, Mopti, Sikasso, Kayes, and Koulikoro regions, and SMC (commodities and operational costs) in 11 districts in the Kayes, Koulikoro, and Sikasso regions.

PMI-Supported Recent Progress (CY 2020 implementation)

During CY 2020, the following activities were supported related to MIP:

- Development and dissemination of reference and training documents for providers
- Development of an action plan for removing obstacles related to IPTp
- Training of 61 trainers and 332 providers on MIP
- Support provided to the MIP TWG

During CY 2020, the following activities were supported related to SMC:

- Training of 5,328 community distributors and 596 health staff in key areas of SMC
- 1,097,422 children 3 to 59 months of age were protected with SMC (received all three doses for four rounds)
- 161,333 children 5 to 10 years of age were protected with SMC (received all three doses for four rounds); 4,864,664 SPAQ blisters were procured and distributed

During CY 2020, the following activities were supported related to SBC:

PMI partners participated along with other partners in the development of clear messages regarding SMC, iCCM, early ANC attendance, and seeking care for children with fever early and from appropriate sources. This included sending 60,000 voice messages to pregnant women through interactive voice response on IPTp, LLINs, malaria, seeking care, and treatment during pregnancy.

PMI-Supported Planned Activities (CY 2021–2022 implementation)

SBC activities will focus on:

- The continued support to promote early and continued use of ANC, uptake of IPTp, and seeking care for malaria in pregnancy
- Sensitization messaging for ANC care providers
- The continued support of messages and communications approaches for case management, including early care-seeking for fever
- The correct administration of second and third doses of SMC drugs
- The acceptability of oral medications for uncomplicated malaria in lieu of injectables to ensure adherence to national guidelines by health workers for diagnosis and treatment

MIP: PMI will continue to conduct refresher training and supportive supervision (OTSS) on the new ANC/IPTp guidelines for healthcare providers, and will distribute ITNs to pregnant women through ANC. PMI is also supporting the implementation of two OR studies to increase uptake of MIP (see OR section for details).

SMC: In CY 2021, PMI will continue to support SMC in 11 districts of Kayes, Koulikoro and Sikasso regions, incorporating expanded age groups (children 5 to 10 years of age) in the three districts of Sikasso region. Activities will include support for microplanning, drug procurement, training, implementation, and independent monitoring of SMC at the community level. PMI will also coordinate activities with other partners through the NMCP TWG on SMC.

No changes are proposed for future drug-based prevention activities. PMI will continue to procure needed chemoprevention supplies for pregnant women throughout the country and SMC supplies for 11 districts. PMI will continue to support training and supportive supervision in IPTp in health facilities and at the community level in the five regions in central and southern Mali and SMC in 11 districts. Please see FY 2022 PMI 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 ANC visit, a minimum of three doses of IPTp in malaria endemic areas starting at 13 weeks gestational age, and effective case management of pregnant women with 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?

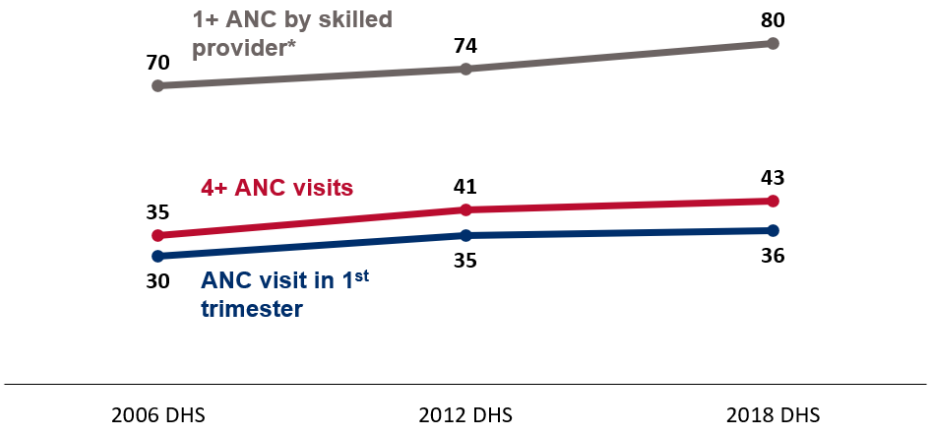
Supporting Data

In Mali, the majority (80 percent) of pregnant women attend at least one ANC visit (Figure A-18), but coverage among women living in rural areas is much lower than among those in urban areas. In 2018, only 37 percent of women living in rural areas attended the recommended four visits, in contrast to 67 percent of women living in

urban areas (DHS 2018). Approximately one-third (36 percent) of pregnant women attend their first ANC visit during the first trimester (DHS 2018).

Figure A-18. 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)



Source: 2006 DHS, 2012 DHS, 2018 DHS

Women who attended at least one ANC visit from a skilled provider increased between 2006 (70 percent) and 2018 (80 percent). During this same time period, women with at least four ANC visits increased from 35 percent to 43 percent, and women who attended their first ANC visit in the first trimester changed from 30 percent to 36 percent.

Key Question 1b

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

Supporting Data

Studies conducted in Mali indicate that access to healthcare services by women living in rural communities is influenced by distance to the health facilities, the quality of health services, the costs of health services, and social and cultural factors (Hill et al., 2014; Webster et al., 2013; and Breakthrough Research, 2020). In Mali, more than 40 percent of the population lives more than five kilometers from a health facility (*Système Local d'Information Sanitaire*, 2018). In addition, health facilities, especially those in rural areas, are often not equipped to provide the basic pregnancy-related laboratory tests or ultrasound for ANC.

To address access challenges, the MIP TWG, which is co-chaired by the NMCP and the National Reproductive Health Sub-Directorate, is actively advocating for the administration of IPTp by community health workers once a pregnant woman has initiated ANC. The TWG is planning an evaluation of the quality of care of diagnostic and treatment services for malaria for pregnant women and IPTp provided by CHWs.

The first cases of COVID-19 were detected in Mali at the end of March 2020. ANC coverage does not appear to have been substantially affected by the COVID-19 pandemic (Figure A-19). However, ANC coverage in Bamako,

where most of the COVID-19 cases have been reported, appears to have been declining since June 2019 (Figure A-20).

Figure A-19. ANC1 and ANC4+ coverage in Mali by quarter, January 2018–March 2021

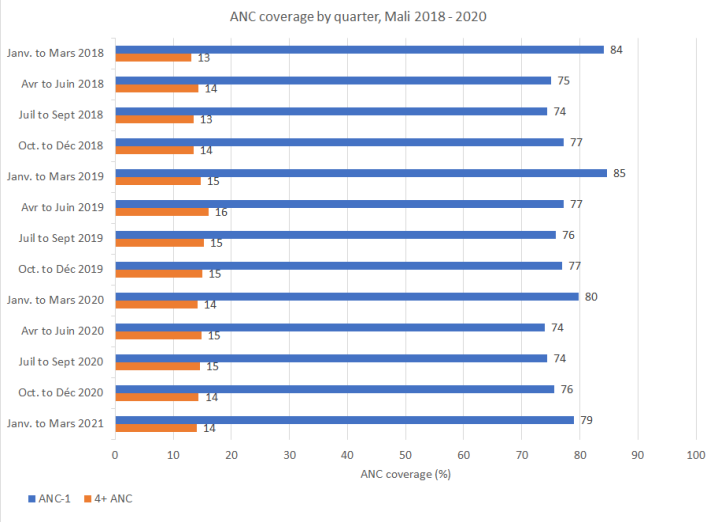
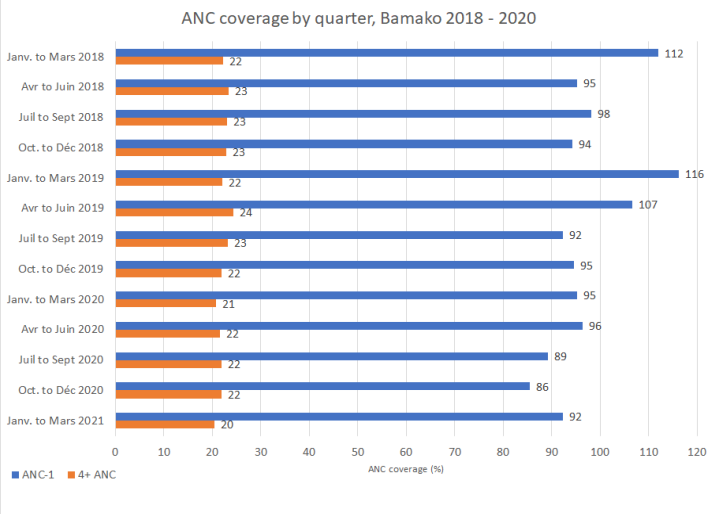


Figure A-20. ANC1 and ANC4+ coverage in Bamako by quarter, January 2018–March 2021



Source: DHIS2

ANC and IPTp are priority areas for funding SBC interventions. Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Key Question 2

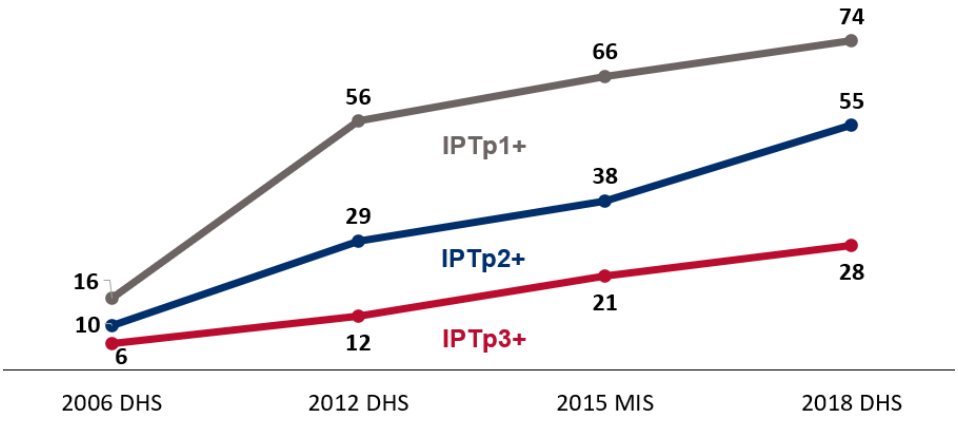
What proportion of pregnant women are receiving the recommended doses of IPTp?

Supporting Data

Figure A-21 shows that pregnant women who received at least one dose of IPTp increased from 16 percent in 2006 to 74 percent in 2018. During the same time period, women who received at least two doses increased

from 10 percent to 55 percent and women receiving three or more doses increased from 6 percent to 28 percent.

Figure A-21. 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



Key Question 3a

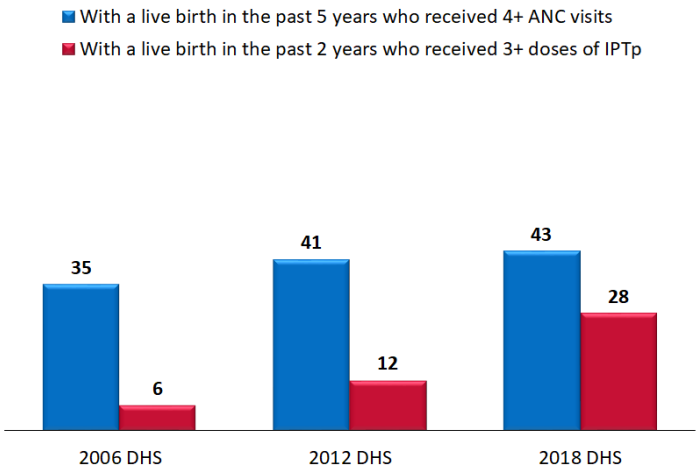
What is the gap between ANC attendance and IPTp uptake (i.e., missed opportunities for giving IPTp at ANC)?

Supporting Data

Figure A-22 shows that in 2018, 43 percent of women attended at least four ANC visits, while only 28 percent received at least three doses of IPTp. This gap has narrowed by 52 percent since 2006.

Figure A-22. Trends in missed opportunities for IPTp

Percentage of women 15 to 49 years of age



Source: 2006 DHS, 2012 DHS, 2018 DHS

Key Question 3b

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

Supporting Data

As described above, studies conducted in Mali indicate that access to ANC services is influenced by distance to the health facilities, the quality of health services, the costs of health services, and social and cultural factors. Stockouts of ITN and SP at the health facility level are also a limiting factor. The NMCP and stakeholders are working with the Reproductive Health Services Sub-Directorate to improve access and quality of ANC services and PMI is supporting training and supportive supervision of ANC service providers and community health workers. Efforts are being made to improve last-mile delivery of ITN and SP.

MIP services are one of the priority areas for funding SBC interventions. Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

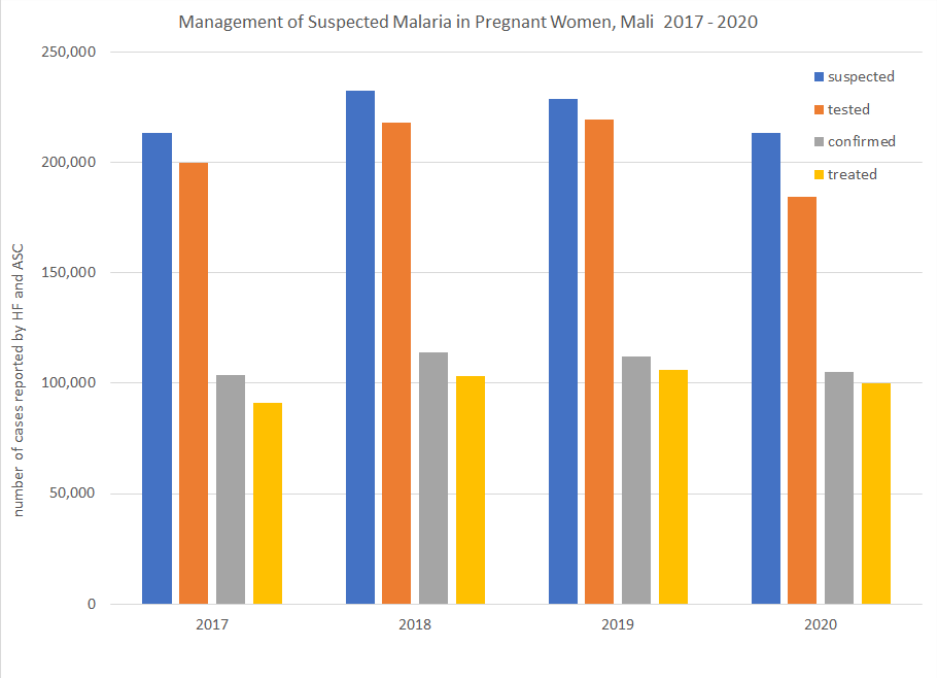
Key Question 4

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

The Mali MOH collects information about malaria in pregnant women through the routine health information system. High proportions of suspected cases of malaria in pregnant women are tested and high proportions of confirmed uncomplicated and severe cases are treated (see Figure A-23 and Table A-20).

Figure A-23. Numbers of suspected cases of malaria in pregnant women, pregnant women tested for malaria, confirmed cases (uncomplicated and severe), and cases treated (uncomplicated and severe) in Mali, 2016–2020



Source: DHIS2

Table A-20. Management of pregnant women suspected to have malaria in Mali, 2016–2020

	% tested	% positive	% treated
2017	94%	52%	88%
2018	94%	52%	91%
2019	96%	51%	95%
2020	87%	57%	95%

Source: DHIS2 data

Pregnant women with suspected malaria are evaluated by CHWs. If they are in the first trimester and found to be positive by RDT, they are referred for treatment to the nearest health facility. Starting in the second trimester, if the case is uncomplicated, CHWs may treat the patient. All cases of suspected severe malaria in pregnant women are referred to the nearest health facility for treatment. The proportion of pregnant women with uncomplicated malaria managed by CHWs rose from 1 percent in 2017 to 5 percent in 2019 and 2020. More than 40 percent of confirmed cases in pregnant women are reported (and treated) as severe cases.

The MIP TWG is concerned about the quality of care of diagnostic and treatment services for malaria in pregnant women and IPTp provided by CHWs. The TWG is planning an evaluation of the quality of care of these services.

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

PMI will procure the total SP needs in 2023 (4 million treatments, which includes the required end-of-year stock) to ensure a zero gap at the end of the year. A reprogramming will be requested to procure additional SP to ensure that the 2022 balance is not negative.

Stakeholders in Mali are concerned about the impact of the use of SP for SMC and for MIP on the selection of resistant parasites that could affect the efficacy of SP. In vivo SP efficacy studies conducted in 2010 (Coulibaly, 2014) and in 2018 (Kayentao, preliminary data) indicate that SP is still effective at clearing existing infections and at improving hemoglobin concentrations when administered as IPTp. It remains essential to continue to monitor the prevalence of mutations and levels of resistance and their impact on pregnancy outcomes. Additional in vivo SP efficacy studies are being planned for 2022–2023.

Conclusions for MIP Investments

No changes are proposed for PMI-supported MIP activities. PMI will continue to procure needed diagnostic and treatment supplies for pregnant women with suspected malaria and chemoprevention supplies for pregnant women throughout the country. PMI will continue to support training and supportive supervision in IPTp and malaria case management in health facilities and at the community level in the five regions in central and southern Mali. SP gaps will be addressed through strengthened commodity quantification, management and distribution including last mile distribution. PMI and the Global fund will continue to prioritize IPTp and ANC SBC.

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)

Key Goal

Support the national strategy for SMC targeting relevant geographic areas and age groups, with 4 rounds of prophylaxis among children 3 months to 5 years of age and extending it to 5 to 10 years of age in areas of higher transmission.

Key Question 1

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

Supporting Data

The quantity of SMC needed for PMI areas in 2023 is 6,072,846 co-blisters of SPAQ for four rounds. This will cover 790,437 children 3 to 59 months of age in 11 districts of Sikasso, Kayes, and Koulikoro regions. In addition, PMI will cover the SMC needs for all children 5 to 10 years of age in three Sikasso districts with the highest

malaria burden (235,902 children). Although there is a total gap of 3.5 million treatments in 2023, the Government of Mali has stated that it will cover this gap.

Table A-21. SMC Gap Analysis Table

Calendar Year	2021	2022	2023
Total population in the SMC targeted age range	4,149,382	4,257,494	4,354,506
SMC Drug (SP+AQ) Needs			
National population 3-11 months targeted for SMC	682,392	701,312	720,756
National population 12-59 months targeted for SMC	3,216,990	3,306,183	3,397,848
Total national population targeted for SMC	*3,899,382*	*4,007,494*	*4,118,604*
PMI population 3-11 months targeted for SMC	160,125	160,125	138,327
PMI population 12-59 months targeted for SMC	754,875	754,875	652,111
PMI population 5-7 years targeted for SMC	125,000	125,000	117,951
PMI population 8-10 years targeted for SMC	125,000	125,000	117,951
Total PMI population targeted for SMC	*1,165,000*	*1,165,000*	*1,026,339*
Total SP+AQ Needs (co-blisters) - Only at PMI supported districts	***6,776,000***	***6,776,000***	***6,072,846***
Total SP+AQ Needs (co-blisters) - National Needs including PMI targets	***19,907,282***	***20,382,976***	***20,716,781***
Partner Contributions (co-blisters, national)			
SP+AQ carried over from previous year	1,902,030	0	0
SP+AQ from Government	3,700,000	3,700,000	3,700,000
SP+AQ from Global Fund	6,140,430	6,405,331	7,417,235
SP+AQ from other donors	0	0	0
SP+AQ planned with PMI funding	6,780,000	6,780,000	6,072,846
Total SP+AQ Contributions per Calendar Year	*18,522,460*	*16,885,331*	*17,190,081*
Total SP+AQ Surplus (Gap)	***(1,384,822)***	***(3,497,645)***	***(3,526,699)***

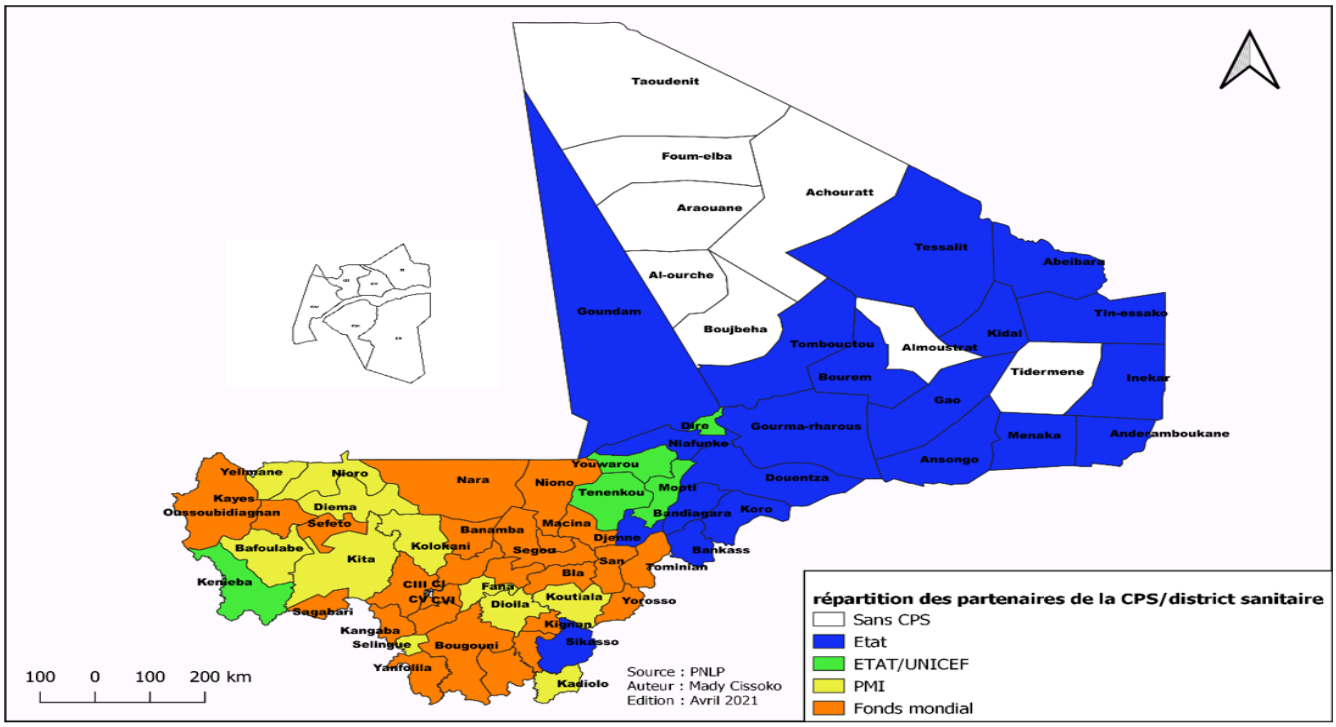
Key Question 2

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

Supporting Data

SMC is implemented nationwide in Mali except in Bamako and in some health districts in the north that have low malaria prevalence. Using FY 2022 funding, PMI will support SMC in 11 districts, with Global Fund, UNICEF, and the Government of Mali supporting the remainder. In the districts where PMI works, the support covers commodity costs as well as training, supervision, specific SBC activities aimed at community mobilization and adherence, and operational costs. At the national level, PMI also contributes to national coordination and micro-planning. PMI will support SMC in 11 districts of Kayes, Koulikoro, and Sikasso regions. PMI will target 1,026,339 children, of which 790,437 will be children 3 to 59 months of age and 235,902 will be children 5 to 10 years of age.

Figure A-24. SMC districts support by different partners:



Key Question 3

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

Supporting Data

Table A-22. Key barriers and facilitators to SMC acceptance and uptake

Facilitator	Type of Factor *(Internal, Social, or Environmental)*	Data Source	Evidence
Strong community appreciation of SMC	Social	OR studies and anecdotal reports	Diawara, F. et al., Malar J. 2017 Aug 10;16(1):325. Key findings: 99.9% of parents rated SMC as good or very good, primarily because it prevents malaria and improves their children's health.
Barrier	**Type of Factor *(Internal, Social, or Environmental)***	**Data Source**	**Evidence**
Suboptimal completion rates for each round	Internal	Monitoring data from Impact Malaria 2020	Although care-givers report that the child has completed the fourth round 93 percent of the time, observation of SMC cards and drug packaging indicate that the full course is taken only 63 percent of the time. The lower rate observed on the basis of the verification of the proof could be explained by the absence of proof-holders (SMC card and empty SPAQ packets) in the concessions at the time of the survey due to farming work. However, these data are from a small subsample of households during routine monitoring and do not represent a robust assessment of adherence.
Some reluctance to return for rounds 3 and 4	Internal	Adherence surveys from OR studies	PMI OR studies on SMC from 2014 to 2016, and 2017 to 2018; Diawara, F. et al., Malar J. 2017 Aug 10;16(1):325: Only 54 percent of target children completed four rounds of SMC.

Diawara, F. et al., Malar J. 2017 Aug 10;16(1):325.

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

Conclusions for SMC Investments

PMI has supported SMC in Mali since 2014, initially through OR activities to test program effectiveness, and later through the expansion to nationwide intervention. During this interval, parasitemia in children less than five years of age decreased from 32 percent in 2015 to 19 percent in 2018. PMI has maintained essentially the same number of SMC districts over time (some districts have split, requiring slight adjustments to the number of districts covered by PMI). With FY 2022 funding PMI will cover 11 districts in Kayes, Koulikoro, and Sikasso regions. PMI will also cover 790,437 children 3 to 59 months of age and 235,902 children 5 to 10 years of age in three higher-burden districts in Sikasso region. SMC appears to be a success in Mali and PMI will continue to support the SMC objectives of the NMCP.

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

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 Mali.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.1. SUPPLY CHAIN

NMCP Objective

A main component of the National Malaria Strategy (2018–2024) is to reach universal coverage of key malaria commodities, which cannot be achieved without consistent access and availability of essential malaria commodities through a functioning supply chain. The NMCP and PMI plan to increase the availability of malaria commodities through a strengthened supply chain and improved understanding and implementation of logistics and pharmaceutical management tools.

NMCP Approach

The central medical stores (*Pharmacie Populaire du Mali*, PPM) manages, procures, and distributes medicines for Mali's primary healthcare system, including commodities procured by the Government of Mali and key donors such as PMI and the Global Fund. PPM delivers all commodities from the central level to the regional level, but lacks the capacity to ensure reliable transportation of commodities to the community level. The PPM has five warehouses in the regions of Kayes, Koulikoro, Mopti, Sikasso, and Ségou, and three offices in Gao, Koutiala, and Tombouctou.

PMI Objective in Support of NMCP

PMI aims to build the capacity of PPM as a fully functional supply chain partner, including its capacity to store and distribute commodities, and maintain reliable logistics management.

PMI support includes:

- Improving coordination of supply chain actors across all level of national supply chain
- Setting up a logistics management unit
- Building capacity on quantification and transfer skills to national counterparts for sustainability, and support long-term quantification exercise to advocate for resources mobilization
- Strengthening data visibility through *Outil de Suivi des Produits de Santé* (Monitoring Tool for Health Products [OSPSANTE]) and its interoperability with DHIS2
- Streamlining parallel supply chains and creating a solid foundation for supply chain management capacity-building through training and hands-on support
- Improving storage capacity and conditions through the installation of prefabricated warehouses in Bamako and in three regions and their operationalizations

- Establishing permanent and effective communication between supply chain actors to improve the circulation or sharing of data/information for decision-making

PMI-Supported Recent Progress (CY 2020 implementation)

- Supported the NMCP to implement the PMI stockout reduction strategy of antimalarials (reviewed baseline, set targets, identified root causes of stockout, and proposed solutions to mitigate stockouts)
- Supported the NMCP and the national quantification committee to perform long-term forecasting and quarterly updates of the supply plan for malaria commodities
- Supported the Directorate of Pharmacy and Medicines (DPM) and regions to strengthen the coordination mechanism on supply chain management at the central and regional levels, and to establish a logistics management unit to increase country ownership and accountability to sustain all supply chain interventions.
- Provided technical assistance for the installation of prefabricated warehouses in Bamako to improve the storage of malaria products, as well as for three regional warehouses funded by another donor
- Supported the DPM to strengthen the functionalities of the OSPSANTE/logistics management information system (LMIS), to improve interoperability with DHIS2, and to improve the quality of logistics data by conducting a DQA
- Supported one EUV survey in September 2020
- Provided support to strengthen the capacities of the national laboratory of health physico-chemical laboratory (LCQM) to carry out quality control tests of priority essential medical products including malaria drugs.
- Provided technical assistance to the LCQM to help it comply with International Organization for Standardization (ISO) 17025:2017 requirements and develop a roadmap to progress toward achieving WHO prequalification and sustainability in 2021.
- Provided support to institutionalize (including training) a tool to conduct internal audits; the results of this tool will quantify their compliance with ISO 17025 accreditation / WHO prequalification
- Organized remote quality control training to test post-marketing surveillance samples
- Strengthened post-marketing surveillance for antimalarials through sampling and screening products, including staff training on quality assurance protocols; 191 samples of malaria drugs were collected, of which eight samples were found to be noncompliant (7 AL and 1 injectable artesunate)

PMI-Supported Planned Activities (CY 2021–2022 implementation)

- Support PPM and regions to improve the distribution of malaria products from the central warehouses to the district warehouses
- Support the NMCP to conduct two EUV surveys during the high- and low-transmission seasons
- Support the PPM and health districts to fill the gap in the distribution of malaria products through an outsourced transportation contract with a third-party logistics provider
- Develop and implement key performance indicators to govern the warehouse operations management at the central and regional warehouses of the PPM, and strengthen coordination between PPM and its partners through the organization of quarterly coordination meetings
- Conduct training of stock managers and decisions makers on LMIS, including paper-based

- Implement an eLMIS and develop an interoperability with SAGE X3 warehouse management systems to increase the visibility on real time of stock on hand across all levels of malaria supply chain and improve the ordering process and resupply of health facilities
- Support DPM to implement quality improvement of logistics data by conducting an annual DQA
- Collaborate with other donors and partners to improve commodity availability
- Continue to support the LCQM to implement post-marketing surveillance of malaria commodities and other quality assurance activities, as well as its efforts to achieve WHO prequalification status

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. Improve governance of quality assurance systems for medical products, including developing standard operating procedures for performance management, helping the national laboratory and DPM to establish an effective framework for collaboration, and conducting post-marketing surveillance.

Key Question 1

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

Supporting Data

Mali experienced stock levels below the minimum threshold for AL, RDTs, injectable artesunate, and SP throughout 2020 and early 2021. Stock levels improved for SP and some AL formulations in late 2020 and 2021. However, it must be noted that these stock levels are typically minimal at the central level because the commodities are quickly distributed for use at the lower levels of the health pyramid.

With respect to injectable artesunate, DHIS2 data shows that more than 30 percent of malaria cases are reported as severe. This is a gross overestimate because providers incorrectly classify uncomplicated cases as severe. The NMCP estimates this figure to be closer to 15 percent to 18 percent of the total malaria cases, which in itself is likely to be an overestimate. In addition, the PPM preferentially procures artemether injectable over injectable artesunate given that it is cheaper. PMI will be working with country partners to ensure the proper classification of cases and more rational use of injectable artesunate (see case management section). In addition, PMI will be placing an order of 160,000 vials of artesunate injectable 60mg using reprogrammed funds to be delivered in 2021 to help with the gap until TA for case management corrects the overuse of injectables.

Key Question 2

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

Supporting Data

A percentage of SDPs were stocked out of one or more packs of AL particularly in Q2 2020 and Q1 2021. There was a short period in 2020 when a small proportion of SDPs (less than 5 percent) were stocked out of all pack sizes, thereby not being able to treat the malaria patients presenting at facilities. According to the EUV conducted in September 2020, the main reason for stockouts at SDPs is that products were not available at district

warehouses (33 percent). Other reasons recorded include products ordered but not received at the time of the survey (25 percent) and that products were received late (17 percent). At the regional and district levels, reasons for stockouts included unavailability at the central warehouses due to COVID-19. Nevertheless, about 40 percent of facilities had all four presentations of AL throughout the year. In 2020, several SDPs were stocked out of RDTs and SP. PMI will monitor stocks in collaboration with PSM to ensure stockouts are kept to a minimum in 2022–2023.

Key Question 3

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

Supporting Data

Table A-23. NMCP Annual Report data and OPSANTE consumption data

2020 (January to December 2020)	Source of Data	Value
Number of suspected malaria cases tested by RDTs (a)	DHIS2	2,549,158
Number of RDTs consumed (b)	OSPSANTE	2,372,486
Difference (a-b)/a and (a-b)	Calculation	6.93% 176,672
Number of confirmed uncomplicated malaria cases	DHIS2	1,551,103
Number of confirmed severe malaria cases	DHIS2	833,103
Total number of confirmed malaria cases (c)	DHIS2	2,384,206
Number of ACTs (treatments) consumed (d)	OSPSANTE	2,463,317
Difference (c-d)/c and (c-d)	Calculation	-3.32% -79,111

In 2020, there were small discrepancies (less than 10 percent) between the reported numbers of suspected cases tested and the numbers of RDTs consumed. More ACTs were consumed than the total number of confirmed cases; however, this discrepancy was less than 5 percent. In 2020, multiple pediatric blisters were used to treat adults because the medication was nearing the expiration date. Further exploration may help us understand the roles of reporting issues, waste due to commodity expiration or other causes, use of multiple pediatric treatment courses for adults to explain these discrepancies.

Roll Back Malaria (RBM)supported the NMCP in the quantification of health products in 2021 with Global Fund support. Part of this includes a DQA to look at patient and consumption data, including the use of artesunate

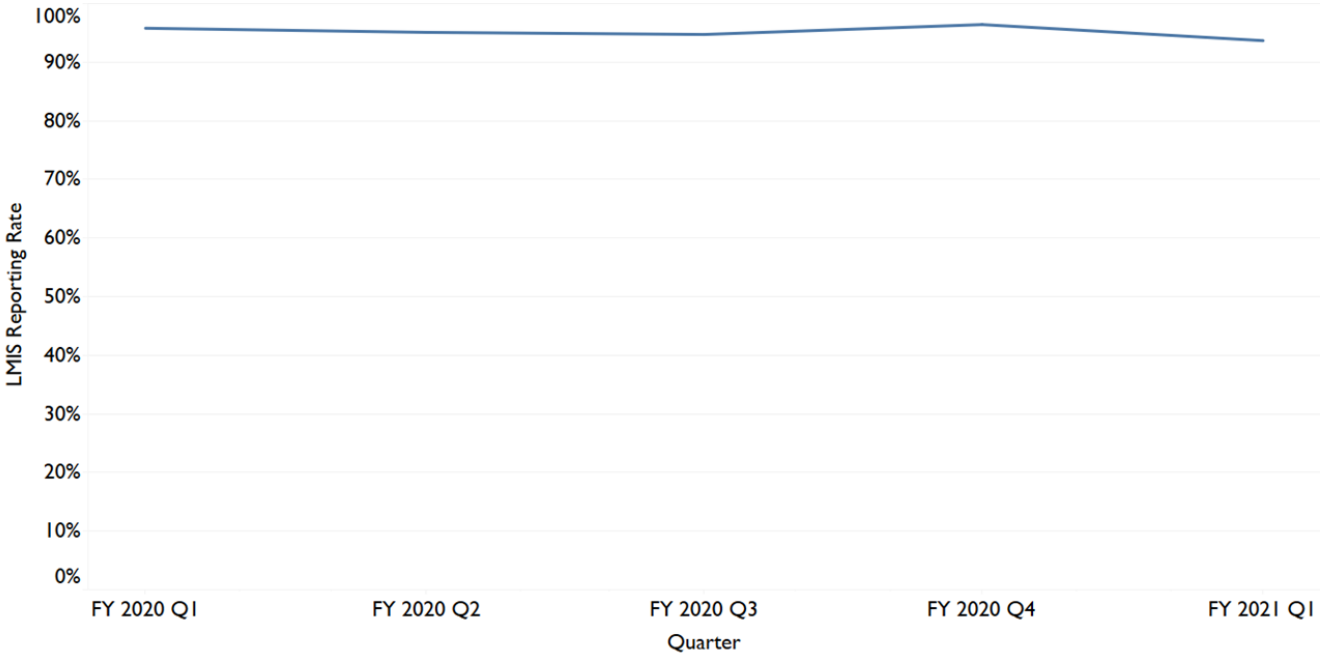
injectable. The recommendations of the assessment will be available in September 2021 to be included in the comments for the grant. In addition, PMI will work with service delivery partners to promote the rational use of severe malaria medicines. These will include raising awareness of the issue at national and regional coordination meetings on supply chain management, information, education, and communication and SBC communication as well as enhanced supervision and coaching of providers.

Key Question 4

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

Supporting Data

Figure A-25. LMIS reporting rate (OSPSANTE)



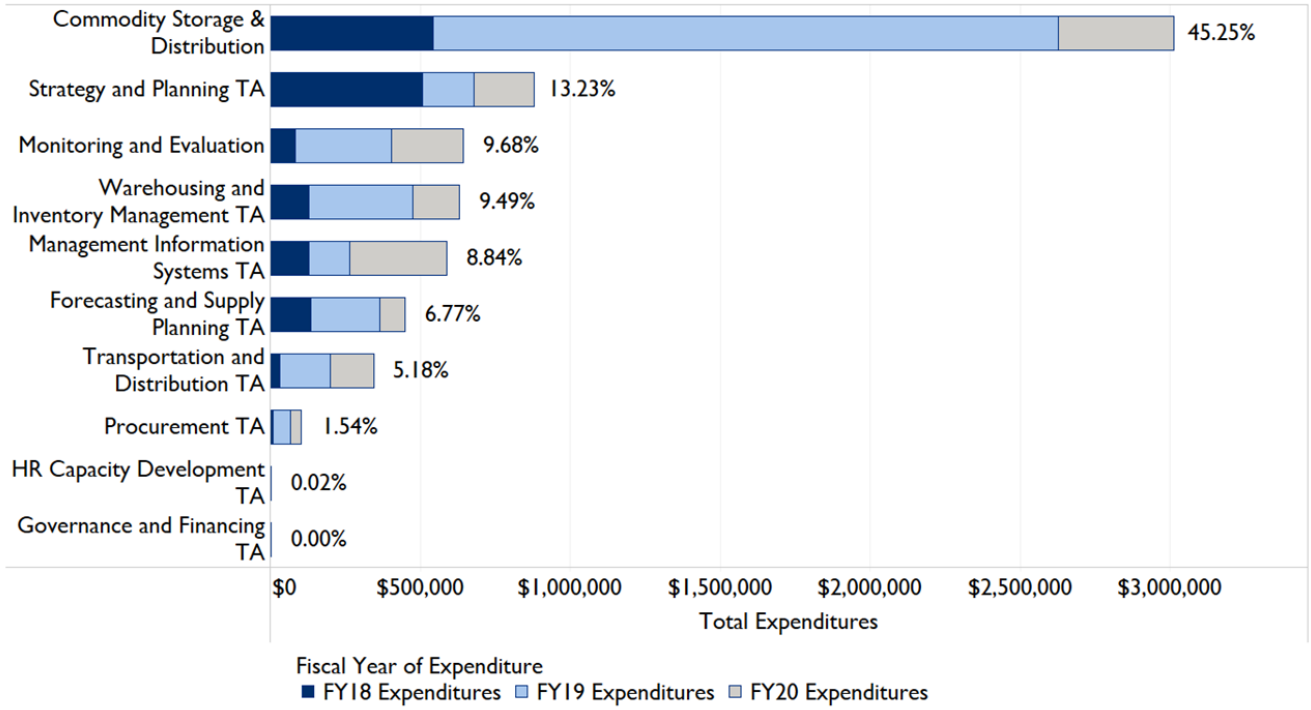
The LMIS reporting rate through OSPSANTE has been consistently above 90 percent and is used to provide visibility into timely and quality logistics data. The LMIS is the main source of data.

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?

Supporting Data

Figure A-26. PMI Supply chain investment by technical area



In-country storage and distribution are a major cost driver in terms of the areas of TA supported by PMI in 2018–2020, mostly due to the high cost of storage and distribution of ITNs via ANC and EPI. Monitoring and evaluation, and TA in warehousing, inventory management, forecasting, and distribution all account for less than 10 percent of all expenditures.

PMI is implementing a stockout reduction strategy in its priority countries. As part of the stockout strategy baseline, forecasting and distribution were priorities that were identified to improve the availability of stock at SDPs. This will be a focus area in the next 12 to 18 months.

In addition, PMI will work with partners to provide TA for behavior change among prescribers through supervision, coaching and EUVs to ensure the rational use of severe malaria case products.

Key Question 6

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

Supporting Data

Challenges or bottlenecks that slowed or prevented implementation of supply chain activities:

- The World Bank project, which contributed to buying ACTs, RDTs, and injectable artesunate, and to implementing SMC in 20 districts, ended in 2019 and the commodities procured in 2019 were used in 2020

- Lack of host-country skilled human resources to carry out supply chain functions, especially at peripheral levels
- Low internet connectivity at peripheral levels negatively impacted malaria commodity data entry in DHIS2 and data transfer in OSPSANTE
- COVID-19
- Stockout of malaria products at health facilities despite the availability of those products at PPM warehouses
- Limited transportation capacity of PPM to move malaria products down to regions and districts, as well as for the distribution of malaria products from district warehouses to health facilities
- Gap in training on LMIS (paper-based LMIS, OSPSANTE/DHIS2) at district and health facility levels
- Limited coordination of supply chain interventions at district level—the district coordination meetings do not address malaria supply chain issues

Conclusions for Supply Chain Investments

Despite an effective LMIS system at the central level and the availability of malaria products at PPM warehouses, Mali experienced extensive stockouts of products at health facilities. PMI will strengthen the support to training on LMIS at the peripheral levels and support the coordination of supply chain activities at the district level.

At this time, there are no implications for reprogramming, but in 2022 we will assess whether any gaps have emerged. We will also encourage the Government of Mali to plan for other means to support emerging needs.

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

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

NMCP Objective

The NMCP's objective for SM&E, per the 2018–2024 National Malaria Strategic Plan, is to ensure 100 percent promptness and 100 percent completeness of data at all levels.

Sub-objectives include:

- Providing timely information in a form appropriate for the needs of national programs and sharing with local and international partners
- Using data to improve delivery of health services at the peripheral level
- Contributing to the lasting improvement of health systems in Mali

NMCP Approach

The interventions that will contribute to achieving the objectives include staff capacity-building, improving data quality, implementation of an integrated quality assurance system for malaria data, building the evidence base for malaria, continuous and systematic data analysis, and OR. The monitoring and evaluation policy is carried out through the HMIS. Its function is to provide the information necessary for the management of health programs and encompasses public, community and private sector data. This includes the organization of coordination meetings at different levels of the health pyramid with the participation of civil society and the private sector. The

NMCP would like to increasingly use routine and survey data to guide its decision-making. The NMCP, with the support of the Global Fund, has begun a process of stratifying interventions based on malaria burden within different regions in the country. The approach is to:

- Target interventions based on epidemiologic data
- Optimize use of existing data through systematic analysis and improved presentation of the data
- Promote malaria surveillance activities, including training workers at all levels to use DHIS2 and improving supervision

PMI Objective in Support of NMCP

PMI's objectives and approach for SM&E align well with those of the NMCP. PMI-Mali strives to improve malaria data quality and use at all levels, including the district level, in coordination with other major partners and donor agencies, while encouraging NMCP leadership in SM&E activities.

PMI-Supported Recent Progress (CY 2020 implementation)

- PMI/Mali continued to support routine surveillance in 2020, including training and supervising health workers in the collection, analysis, and use of HMIS data on the DHIS2 platform, with a focus on analysis of surveillance data and production of monthly malaria bulletins. Improvements were seen in reporting timeliness, higher data quality (measured by MRDQAs), and increased capacity to use data for decision-making.
- Supported revision of the mandate of the malaria SM&E TWG and organized one meeting.
- Supported review of the NMCP's health and malaria indicators and the customization of new indicators and data elements.
- Organized meetings of malaria SM&E partners to improve coordination and collaboration, to discuss quality of population size estimates, and a regional meeting in Sikasso to institutionalize culture for data analysis, dissemination, and use for decision-making.
- Supported stratification of zones based on malaria transmission.
- Analyzed routine data to assess the impact of COVID-19 on malaria service delivery.
- Trained 17 people from the NMCP and partners as malaria routine data quality assurance (MRDQA) trainers. They then trained 49 data managers and malaria focal points to use MRDQA in Sikasso and Koulikoro.

PMI-Supported Planned Activities (CY 2021–2022 implementation)

- PMI will continue to support the NMCP in organizing national-level meetings for the M&E thematic group, stakeholders' meeting on the quality of demographic data and data visualization, and malaria Health, Safety & Environment implementing partners.
- Support the annual review and updating of health indicators in DHIS2.
- Validate the malaria program's revised strategic and monitoring and evaluation plan.
- Update the malaria surveillance guide based on the new stratification of transmission risk and ensure that is aligned with the WHO Global Technical Strategy for Malaria.

- Bamako, Kayes, and Koulikoro will receive SM&E support only from PMI funds, while Mopti, Sikasso, and Segou are also supported by the USAID Health System Strengthening bilateral project. The PMI funds for these regions represent a contribution.
- Support the NMCP to develop and disseminate monthly malaria bulletins, and Sikasso and Kayes regions to produce quarterly malaria bulletins.
- Organize an annual workshop in Sikasso and Kayes to review performance of malaria indicators, discuss challenges, lessons learned, and priorities for SM&E capacity strengthening.
- Engage malaria stakeholders to discuss plans for remote support using digital technology and media resources. Equip two regions and districts with information technology tools/resources and digital technology applications for remote technical support.
- Develop procedures and tools for updating population size estimates at the operational level.
- PMI will also support the systematic use of the MRDQA tool in all health regions by training a pool of central- and regional-level trainers in use of the tool. PMI will also promote the implementation of the recommendations. This includes supporting the 10 districts of Sikasso to conduct quarterly supervision and monthly data quality control meetings with data quality assessments using the MRDQA tool.

Table A-24. Available malaria surveillance sources

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
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
suMalaria 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
Household Surveys	Demographic Health Survey (DHS)					p	
Household Surveys	Malaria Indicator Survey (MIS)			p			
Household Surveys	Multiple Indicator Cluster Survey (MICS)						
Household Surveys	EPI survey						
Health Facility Surveys	Service Provision Assessment (SPA)						
Health Facility Surveys	Service Availability Readiness Assessment (SARA) survey						
Health Facility Surveys	Other Health Facility Survey						
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)	X	X		p		
Malaria Surveillance and Routine System Support	Malaria Rapid Reporting System						
Other	EUV	X	X	X	p	p	p
Other	School-based Malaria Survey						
Other	Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey						
Other	Malaria Impact Evaluation						
Other	Entomologic Monitoring Surveys	X	X	X	p	p	p

* X denotes completed activities, and P denotes planned activities.

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

Key Question 1

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

Supporting Data

Key Question 2

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

Supporting Data

In addition to the activities mentioned above, with FY 2022 funding, PMI will focus its support in two key areas. PMI will provide technical support to the Mali NMCP to strengthen malaria SM&E and improve health information system governance, while also supporting efforts to improve data quality, analysis, and use. This will be done in several ways, including:

- Scaling up remote technical support to strengthen SME capacity at subnational levels
- Developing digital tools to improve monitoring of malaria program performance to assist in decision-making
- Strengthening capacity at the operational level to regularly analyze data, monitor the performance of malaria indicators and disseminate results to improve service delivery
- Improving the quality of weekly malaria surveillance data and developing dashboards for real-time surveillance of malaria epidemics in at-risk districts

Key Question 3

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

Supporting Data

Table A-25. Outcomes of HMIS strengthening efforts

	Indicator	2019	2020**
Timeliness	% of reports received on time	48.9%	56.5%
Completeness*	"Confirmed malaria cases for children under 5 years of age" was reported in 1,443 of health facility-month in 2019 and in 1,468 health facility-month in 2020.	99.6%	98.2%
Accuracy	Populate with most recent DQA data	N/A	81%

*Analysis based on the composite indicator confirmed cases under 5 = sum of uncomplicated cases U5 confirmed by TDR + uncomplicated cases U5 confirmed by microscopy + severe cases U5 confirmed by TDR + severe cases U5 confirmed by microscopy.

*** Malaria specific (MRDQA) RDQA: combined data (100 health facilities in 20 districts) for Koulikoro and Sikasso from the 2021 MRDQA. Data quality assessment covered April–June 2020 for Sikasso and October–December 2020 data for Koulikoro.*

Key Question 4

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

Supporting Data

Socio-political instability may hamper efforts to strengthen surveillance in the northern regions of Tombouctou, Kidal, Gao, and Mopti.

Conclusions for Surveillance, Monitoring, and Evaluation Investments

PMI-Mali will continue to strengthen malaria surveillance and data use throughout the country but may need to consider instability and feasibility when targeting areas for SM&E activities.

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

3.3. OPERATIONAL RESEARCH

NMCP Objective

The NMCP objective is to utilize operational research (OR) to test the best approaches to reduce the continued high burden of malaria in Mali and to evaluate interventions targeting defined at-risk communities.

NMCP Approach

The NMCP does not have a research agenda per se, but works with the robust research community in Mali to develop projects and studies that contribute to better understanding of the etiology and transmission of malaria, vector dynamics, and intervention approaches. The research community includes the National Institutes of Health- funded International Center of Excellence for Malaria Research located at the University of Bamako, the Malaria Research and Training Center, and the Laboratory of Biological and Molecular Analysis (LBMA), as well as other partners and donors. Study and program evaluation protocols are reviewed by the NMCP and by the MOH and/or the University of Bamako Institutional Review Boards.

PMI Objective in Support of NMCP

PMI supports operational research (OR) and program evaluation (PE) activities that are in line with PMI's overall OR/PE strategy and contribute to the improvement of PMI supported interventions in Mali. PMI provides TA to the extent possible in the design and implementation of NMCP OR and PE activities.

PMI-Supported Recent Progress (CY 2020 implementation)

Operations research on the Optimal Package of MIP interventions began in 2019 and will be completed in December 2021. The results are expected to contribute to the mitigation of barriers to IPTp uptake at both the level of the provider and of pregnant women. It is a three-arm, cluster-randomized intervention study at health facilities and in their catchment communities. The study evaluates the impact of enhanced training and supervision of health workers and the impact of community SBC activities on IPTp coverage, compared with the current

standard training and implementation strategy (control). The first intervention targets health workers (training and supervision) and the second intervention combines the first intervention (targeting health workers) with a community-based promotion campaign to promote IPTp.

A separate study on the delivery of ANC/MIP services through outreach started in January 2021 and will finish by December 2022. The first primary objective of this study is to determine whether access to antenatal services by pregnant women is increased by improving the capacity of community health centers to provide basic ANC services and by delivering ANC services through outreach to women living further than five kilometers from a health facility. The second primary objective is to assess whether pregnant women can serve as a sentinel population for monitoring malaria program indicators (e.g., ITN use, healthcare-seeking behavior) and epidemiological indicators (e.g., malaria prevalence).

PMI-Supported Planned Activities (CY 2021–2022 implementation)

Key Goal

PMI will support PE/OR that helps to evaluate coverage of at-risk populations and quality and efficacy of interventions, monitor reductions in malaria transmission and disease burden, test effectiveness of new or evolved priority interventions and strategies, or explore new metrics and mechanisms to assess intervention impact.

Key Question 1

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

Supporting Data

In consultation with the NMCP, many technical challenges and operational bottlenecks in program interventions have been identified that require PE/OR including delivery of IPTp by CHWs, delivery of SMC to older age groups, and impact of targeted interventions (e.g., IRS, new generation bed nets, door-to-door delivery of SMC for all three doses) on defined high-risk communities.

PMI support for PE/OR activities in Mali is prioritized according to:

- Usefulness of findings to MOH for program planning (e.g., which interventions have the most impact?)
- PMI and the Global Fund coordinated funding of PE/OR activities
- PMI and NIH coordination of funding and implementation of programmatic research conducted by the University of Bamako including MRTC and LBMA

Below is a list of key ongoing program evaluations and OR activities with the funding source.

Table A-26. Ongoing program evaluation and operational research

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
PMI Mali	MRTC	Impact of community mobilization combined with training and supervision of health workers on ANC and IPTp coverage	In Segou Region, to finish by the end of 2021
PMI Mali	MRTC	Impact of providing ANC services to women living > 5 km from a health facility on ANC and IPTp coverage Assessment to determine if pregnant women can serve as a sentinel population for monitoring malaria program indicators (e.g., ITN use, healthcare-seeking behavior) and malaria prevalence	In Kita and another district in Kayes Region, to finish by the end of 2022
BMG	MUSO	Impact of home visits by community health workers on ANC and IPTp coverage and on detection and treatment of malaria in all ages	Ongoing
?	Pr Ibrahim Téguété / Pr K Kayentao	Pilot the delivery of IPTp during the eight contacts between a pregnant woman and the healthcare system recommended in the updated National Reproductive Health Policy	Planned for 2021 in Kita District in Kayes Region
NIH?	Pr K Kayentao / MRTC	Treatment efficacy of Pyramax in pregnant women with malaria	Ongoing
PMI	Pr Ousmane Keita / LBMA	In vivo study of SP efficacy in pregnant women	Ongoing
NIH	M Toure / MRTC	SMC with DHA-PQ and SP-AQ in children under five years of age and in children five to nine years of age	Ongoing in Koulikoro Region
NIH	MRTC	Malaria vaccine trials	
NIH	MRTC	Malaria vaccine combined with SMC	

Key Question 2

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

Supporting Data

As described in the MIP section (Section 2.2.1), the Malaria in Pregnancy TWG, which is co-chaired by the NMCP and the National Reproductive Health Sub-Directorate, is concerned about the quality of care of diagnostic and treatment services for malaria in pregnant women and IPTp provided by community health workers. The TWG is planning an evaluation of the quality of care of these services.

Stakeholders in Mali are also concerned about the impact of the use of SP for SMC and for MIP on the selection of resistant parasites that could affect the efficacy of SP. In vivo SP efficacy studies conducted in 2010 (Coulibaly, 2014) and in 2018 (Kayentao, preliminary data) indicate that SP is still effective at clearing existing infections and at improving hemoglobin concentrations when administered as IPTp. It remains essential to continue to monitor the prevalence of mutations and levels of resistance and their impact on pregnancy outcomes. Professor Kayentao and his colleagues at MRTC are planning an in vivo SP efficacy study for 2022–2023, which could be combined with Professor Koita's work at LBMA.

Please see Section 2.2.1.

Key Question 3

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

Supporting Data

PMI is supporting SP resistance studies being conducted by LBMA. PMI has proposed that MRTC and LBMA combine their study objectives into one protocol.

Conclusions for Program Evaluation and Operational Research Investments

As described above and in the MIP section (Section 2.1.1), there is concern about the quality of care of diagnostic and treatment services for malaria in pregnant women and IPTp provided by CHWs. Stakeholders in Mali are also concerned about the impact of the use of SP for SMC and for MIP on the selection of resistant parasites that could affect the efficacy of SP.

Proposed PE/OR topics for MOP funding include an evaluation of the quality of malaria diagnostic and treatment/preventive services provided to pregnant women by CHWs.

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

In August 2019, the Mali National Malaria Control Program (NMCP) developed a five-year (2019–2023) Malaria Control Communication and Advocacy Plan with the financial and technical support of PMI. The vision of this communication and advocacy plan is "Malaria-free Mali, with a population sufficiently informed about malaria and adopting favorable behaviors to ensure prevention and early care, by 2030."

This plan aims to harmonize the fight against malaria in Mali and strengthen communication channels regarding resource mobilization and knowledge and beliefs of the actors and service beneficiaries to affect behavior change and ownership of malaria interventions.

NMCP Approach

The malaria Communication and Advocacy Plan is based on an approach commonly known as strategic communication, which integrates multiple communication activities into a coherent set of elements to better support the program. Communication actors attempt to reach specific audiences by means of effective strategic communication interventions, tools, and channels adapted to the context of malaria control in Mali. These include:

- Interpersonal communication
- Community mobilization
- Social mobilization

- Communication through media
- Advocacy
- Capacity strengthening

Following a recommendation of the RBM Partnership Communications Working Group, and with the support of its partners, the Mali NMCP created an integrated Malaria Communication Working Group (*Groupe de Travail Communication sur le Paludisme*, GTCP). The main purpose of this working group is to ensure coordination among communication stakeholders; sharing of information, materials, and research findings in the fight against malaria; and supporting the implementation of the NMCP Malaria Communication and Advocacy Plan. The TWG meets quarterly to discuss SBC issues in general and occasionally to prepare the World Malaria Day and National Malaria Week, and the National SMC campaigns. The TWG develops or adapts messages and communication tools for use in the health facilities and at the community level.

The Communication Working Group has the following specific objectives and activities:

- Coordinating the implementation of the national advocacy plan
- Coordinating multimedia and multi-sectoral communication campaigns about malaria
- Advising the MOH and its technical and financial partners and providing them with tools needed to implement the *RBM Strategic Framework for Malaria Social and Behaviour Change Communication 2018–2030*
- Advocating for more financial resources to implement malaria communication interventions
- Monitoring and evaluating studies, research, and surveys before, during, and after the implementation of communication activities
- Documenting and sharing success stories about malaria
- Contributing to strengthening collaboration among the various communication stakeholders

PMI Objective in Support of NMCP

PMI Mali contributed significantly to the writing of the 2019–2023 Malaria Control Communication and Advocacy Plan and to the establishment of the SBC TWG headed by NMCP, which comprises stakeholders from the government communication entities, nongovernmental organizations, and donors. PMI supports SBC activities in SMC and IRS targeted geographic areas, and nationwide for routine ITN distribution.

The NMCP of Mali and PMI have common SBC objectives, which are to promote:

- Correct and consistent net use
- Early and frequent ANC attendance
- Acceptance of intermittent preventive treatment of malaria in pregnancy (IPTp)
- Prompt care-seeking for fever
- Adherence to national guidelines for health workers

SBC activities to promote the attainment of these objectives are being implemented throughout the country with support from donors including PMI and the Global Fund. The Global Fund 2021–2024 grant strongly supports SBC activities in the areas of MIP, ITNs, SMC, and case management, based on interpersonal communication and the use of new technologies.

Communication support will also be developed and shared nationwide through radio and TV spots on IPTp, ITNs, and SMC. Interpersonal communication will be the central pillar of the Global Fund grant to reach the hard-to-reach populations who do not have access to mass media. Social and language barriers will be addressed via the same channel.

PMI-Supported Recent Progress (CY 2020 implementation)

During 2020, PMI supported the following SBC activities:

Indoor residual spraying:

To ensure high spray coverage rates, PMI used various strategies before and during the spray campaign to create awareness and encourage households and communities to accept IRS while minimizing person-to-person contact in observance of the COVID-19 restrictions. These strategies included embedding mobilizers within spray teams and using mass media communication.

PMI worked with regional and district public health officials to contract 11 local radio stations in the three spray districts. Because Fludora® Fusion WP-SB was used for the first time in Mali in 2020, the project developed specific messages to dispel any concerns about the new insecticide's effectiveness, compared with the two that were used in previous years.

Starting one month before the spray campaign began, during the campaign, and for one week after the campaign, community radio stations continuously broadcast announcements with spray information and schedules. In addition, during the campaign, PMI partner staff hosted weekly radio programs in collaboration with the national, regional, and district-level authorities and community leaders to support mobilization.

Mobilizers also visited individual houses on the day before the spray operators were scheduled to arrive to remind beneficiaries of their preparation responsibilities. They then returned with the spray teams and afterward to reiterate key messages and provide information about insecticide effectiveness.

SMC:

PMI adapted the SBC SMC messages in the context of COVID-19 and developed communication supports such as posters/job aids and T-shirts and hats for SMC drug distributors and their supervisors. Radio spots were also broadcast in Mopti, Segou, and Sikasso regions in addition to public criers and volunteers used in villages, mosques, and churches.

The following activities were accomplished:

- Number of public criers trained/used; 3,667
- Number of volunteers trained/used: 3,667
- Number of job aid/messages developed: 4,160
- Number of radios used to disseminate the SBC messages for SMC: 22

Case management and MIP:

PMI partners participated along with other partners in the development of clear messages regarding SMC, iCCM, early ANC attendance, and seeking care for children with fever early and from appropriate sources. This included

sending 60,000 voice messages to pregnant women through interactive voice response on IPTp, LLINs, malaria, seeking care, and treatment during pregnancy.

In addition, PMI partners were involved in the RBM Social and Behavior Change (SBC) Working Group in Mali through:

- Participation in the development of the RBM CHW SBC Toolkit, an activity prioritized during the 2019 Working Group Meeting
- Technical inputs and review of Module 4 of the toolkit, "Malaria Prevention, Testing, and Treatment Messaging"
- Technical inputs regarding key behavioral determinants related to MIP, malaria care-seeking behaviors, malaria testing, and malaria treatment
- Review of the module to ensure messaging and programmatic recommendations incorporated gender considerations

PMI-Supported Planned Activities (CY 2021–2022 implementation)

During 2021 and 2022, PMI-supported SBC activities will focus on IRS, SMC, ITN, and MIP activities.

- PMI will work with the NMCP/MOH Malaria Communication TWG to build upon communication activities from past IRS campaigns. For 2021, the project will support the NMCP/MOH in conducting activities that strengthen information, education, and communication and IRS mobilization in the spray areas in Mopti region. As in past years, mobilizers will work to increase community acceptance of IRS, awareness and understanding of malaria prevention and control, and the role of the community in IRS campaigns. Specifically, to avoid residents lodging complaints because the insecticide sprayed in 2021 is different from previous years, PMI will promote insecticide rotation through SBC messages.
- PMI will follow up on/monitor communication and awareness activities conducted by the radio stations' partners before, during, and after the 2021 spray campaign. PMI partner's specific monitoring tools include a monitoring mechanism/guide, a radio programming and broadcasting grid, and a Message Delivery Plan Monitoring Sheet. Each radio partner is responsible for a biweekly progress report.
- PMI will also work with the NMCP Malaria Communication TWG and regional and district health staff to implement the 2023 World Malaria Day (April 25) activities in the three spray districts. The project will organize radio broadcasts in the districts, on the theme of the fight against malaria in general and vector control through IRS and ITN for routine distribution for women attending antenatal care and children attending immunization programs.
- PMI will revitalize and build capacity of social mobilization committees (women, youth, and men groups) to conduct regular SBC activities on the importance of sleeping under ITNs, using health services, and completing eight ANC contacts, especially following up on IPTp for pregnant women at the household level.
- PMI will coach/supervise volunteers/relais and social mobilization committees on SBC techniques for adoption of healthy behaviors.
- PMI will conduct interpersonal communication with decision-makers at the household level about the malaria symptoms of children under five years of age and pregnant women and early care-seeking at health centers in case of symptoms.
- PMI will plan monthly meetings with SMC providers to develop a monthly calendar for household visits.

- PMI will strengthen messages on how to conduct surveillance at household and community level for early pregnancy detection by health workers.
- PMI will also support health facilities and health workers to provide quality interpersonal communication in three regions (Segou, Sikasso, and Mopti). PMI will also support SBC for SMC activities in Kayes, Koulikoro, and Sikasso.
- PMI will continue supporting SBC activities to maintain or increase the level of net use and proper care. Additional SBC support will be provided in areas receiving PBO or dual AI ITNs.

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 correct and consistent use of malaria interventions, thereby improving the overall quality of malaria control efforts that will contribute to reductions in malaria.

Key Question 1

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

Supporting Data

The key behaviors that PMI will emphasize are as follows (see Table A-29 below):

- Early and frequent ANC attendance
- Demand creation for IPTp among patients/clients
- Prompt care-seeking for fever
- Adherence to national guidelines by health workers for diagnosis and treatment

According to 2018 DHS, only 36 percent of initial ANC visits occur during the first trimester. This is due to various barriers, including financial, cultural, and health workers' behavior. SBC will contribute to overcoming those barriers. The new Mali Health Reform, which recommends that pregnant women get free access to all health services, will help to address the financial barriers to care-seeking during pregnancy.

Table A-27. Prioritized behaviors with FY 2022 funds

Behavior	Target Population	Geographic Focus	Justification
Early and frequent ANC attendance	Traditional leaders, decision-makers, and heads of families	PMI focus regions (all south of Mali)	Women present late for ANC for a variety of sociocultural and logistical, and financial reasons, rendering it hard to achieve the recommended eight ANC visits over the course of the pregnancy. In Mali, although the majority (80 percent) of pregnant women attend at least one ANC visit, only 37 percent of women living in rural areas attended the recommended four visits, in contrast to 67 percent of women living in urban areas (DHS 2018). The number of pregnant women receiving the third and fourth doses of IPT remains relatively low (DHS 2018).
Prompt care-seeking for fever	Patient/care givers	PM focus regions	A number of patients/caregivers do not attend health centers at the onset of fever for financial reasons and also for the belief that it is a temporary condition. According to 2018 DHS, 39.5% of people first go to shops, markets, and traditional healers to seek treatment for malaria. However, it is important to seek care promptly to avoid severe malaria and facilitate diagnosis and treatment by healthcare providers.
Correct administration of second and third doses of SMC drugs	Mothers and caregivers	PMI focus SMC districts	The Independent SMC Monitoring conducted in 2020 by the NMCP revealed a number of reasons for the non/incorrect administration of the second and third doses of SMC drugs: ● Caregivers forgetting to administer the drugs ● Child refusing medications ● Keeping the drugs for the next episode of malaria ● Fear of presumed side effects of SPAQ (loss of appetite, vomiting, etc.) Appropriate SBC messages will be developed to strengthen the administration of the second and third doses of SMC to children by mothers and caregivers. Community health workers will also be used to sensitize caregivers to administer the second and third doses of SMC at home.
Adherence to national guidelines by health workers for diagnosis and treatment	Patients / Health workers	PMI focus regions	Health workers at some Community Health Centers overuse injectable antimalarials due to misclassification of malaria cases as severe. The major issue is that they consider high fever (>=39 C) and vomiting as signs of severe malaria, highlighting lack of understanding of the definition of severe malaria (as stated in the WHO, 2015 case management manual). PMI funds will be used to train, supervise, and coach health workers (OTSS) at all levels on diagnostic and treatment of severe malaria. SBC messaging will focus on the acceptability of oral medications for uncomplicated malaria in lieu of injectables.
Adherence to national guidelines by health workers for MIP	Service providers	PMI focus regions	According to DHS 2018, there is a huge gap between IPTp1 (70%) and IPTp3 (28%). Providers have the main responsibility and power to provide SP at ANC visits, continuing to improve awareness and understanding of the need for SP during pregnancy through interpersonal communication. Increased investments into provider in-service training, refresher training, and supply chain management for SP will contribute to increasing IPTp3 rates.

Key Question 2a

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

Supporting Data

Although we have no specific data, reports from service providers indicate that traditional leaders, decision-makers, and heads of families may not be aware of the benefits of early ANC. Women and families may not be aware of the new Government of Mali Health Reform, which guarantees free health services for all pregnant women and children under five.

According to a report published by the Population Council in January 2020 entitled *Comprehensive Formative Research on Health Beliefs, Practices, and Behaviors in Mali:*

- Both health facility and transport costs, along with distance to facilities, posed barriers to women seeking care for themselves and for their children, with women reporting the longest-traveled distances.
- Women who sought ANC and delivered at a health center were more likely to make postnatal visits, though similar barriers to postnatal care-seeking applied, including cost, husband support, and stigma of severe post-delivery complications.

An earlier USAID/PMI-funded project found that many pregnant women hide their pregnancy for various reasons. For instance, some fear bad practices on behalf of their "enemies."

Key Question 2b

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

Supporting Data

Caregivers must be made aware that early care-seeking could protect their children from developing severe malaria and even reduce treatment costs.

According to a report published by the Population Council in January 2020 entitled *Comprehensive Formative Research on Health Beliefs, Practices, and Behaviors in Mali,* the most commonly cited barrier to seeking care at health facilities was cost, especially during the rainy season. Another barrier to prompt care-seeking with a qualified health worker for women seeking care for themselves and for their children is long distance and traditional belief.

Key Question 2c

For correct administration of second and third doses of SMC drugs, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

The following reasons for not administering the second and third doses of SMC drugs were reported in the Independent Monitoring Report conducted in 2020 by the NMCP:

- Caregivers forgetting to administer the drugs
- Low educational level of care providers
- Child refusing medications
- Keeping the drugs for the next episode of malaria
- Fear of presumed side effects of SPAQ (loss of appetite, vomiting, etc.)
- Weak interpersonal communication regarding the importance of administering the second and third doses of SMC drugs

More information is needed to understand the most effective methods of encouraging children to take medications, as well as helping care-givers understand medication schedules, knowing that the majority of them in rural settings are not literate.

Key Question 2d

For adherence to national guidelines by health workers for diagnosis and treatment, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

According to DHIS2, in 2020 23 percent of uncomplicated malaria cases and 19 percent of severe malaria cases in children at least five years of age were treated presumptively.

This is issue might have to do with:

- Unavailability of diagnostic equipment and supplies (RDTs, microscopy, reagents, etc.)
- Unavailability of up-to-date national diagnosis treatment guidelines
- Insufficient number of qualified health workers
- Absence of treatment algorithms
- Insufficient supervision of health workers

Key Question 2e

For adherence to national guidelines by health workers for MIP, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Supporting Data

According to DHS 2018, there is a huge gap between IPTp1 (70 percent) and IPTp3 (28 percent). This is in part due to:

- Healthcare workers misunderstanding when IPTp doses should be given (e.g., interval between doses, which months of pregnancy)
- Many women not given IPTp-SP by directly observed therapy because of healthcare workers' fears of side effects (dizziness, nausea, fatigue) if IPTp-SP when given on an empty stomach
- Women attending ANC who are ill may not receive IPTp-SP
- The unavailability of up-to-date national MIP guidelines
- The insufficient number of qualified health workers
- Insufficient supervision of health workers

Key Question 3

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

Supporting Data

The NMCP has strong capacity to conduct close supervision, and develop strong SBC messages via interpersonal communication and mass media messages targeting caregivers using different communication channels such as local radio, new technologies, pictorial instructions on packaging, and reminders by health providers at all levels.

Conclusions for SBC Investments

With FY 2022 funds, PMI Mali intends to ensure:

- Support for SBC to increase the use and proper care of nets through communications activities including radio and TV spots, posters, mobile communications, and internet-based media (website, YouTube, webTV, WebRadio, Viber, Twitter, etc.) to reach its target populations (pregnant women, youth, health service providers, etc.)
- Support for messages and communications for seasonal malaria chemoprevention for care providers, with a focus on completion of each course of medication and attendance at all rounds
- Continued support to promote early and continued ANC visits by pregnant women, uptake of IPTp, and seeking care for a case of malaria in pregnancy—improving the capacity of ANC care providers to counsel women on ANC and IPTp
- Continued support for SBC interventions for case management, including early care-seeking for fever by pregnant women, caregivers, and the general population

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

3.5. OTHER HEALTH SYSTEMS STRENGTHENING

NMCP Objective

The objectives of the National Strategic Malaria Control Plan 2018–2024 are to reduce malaria morbidity and mortality and to coordinate the planning, implementation, and evaluation activities of all stakeholders at all levels including the public and private sectors, nongovernmental organizations, research institutions, funding partners.

NMCP Approach

The NMCP approach for reducing malaria morbidity and mortality is to target malaria prevention and control interventions according to the epidemiological and entomological characteristics of different zones. The NMCP needs accurate epidemiological, entomological, and climate data to map these zones to plan, implement, and monitor these targeted interventions for reducing malaria incidence and mortality. The MOH has a field epidemiology and laboratory training program (FELTP) and has been conducting frontline and intermediate training since 2014. To date, the frontline trainees have been providing useful district level epidemiologic data on malaria without any support from PMI. The Minister of Health and the NMCP Director have requested that PMI support at least one FELTP per year who will focus on malaria epidemiology.

The NMCP approach for strengthening program coordination and management at all levels of the health system includes interventions to improve program management; mobilize additional resources; improve coordination with the NMCP across all levels; strengthen the NMCP organizational structure; improve the technical capacity of NMCP personnel; strengthen planning, implementation, and monitoring and evaluation; and improve coordination of stakeholders.

PMI Objective in Support of NMCP

PMI helps strengthen the technical and managerial capacity of the NMCP. PMI will also support the National Laboratory of health in its role ensuring the quality of medications in the country. The NMCP has requested that PMI support at least one FELTP resident in an advanced training program, either in Burkina Faso or Morocco in the coming year. This program would include training in response activities, database analysis and surveillance system evaluations. The resident supported by PMI would focus their field experience on malaria topics and be mentored by staff at the NMCP. PMI will continue to fund participation of residents in this program. PMI will also continue to support trainees in the Mali FETP Frontline training program to improve capacity of frontline health professionals and the public health workforce.

PMI-Supported Recent Progress (CY 2020 implementation)

PMI-Supported Planned Activities (CY 2021–2022 implementation)

Support for the FETP activities will continue.

Key Goal

- Provide support for one FELTP resident participating in the Advanced training program to be engaged in malaria-specific projects.

The major challenge in Mali is the insecurity, especially in the north, which has remained following the 2012 political crisis and which continued in 2021. Due to the insecurity, PMI does not directly implement activities in the four regions of the north but does provide essential malaria commodities and technical assistance to partners and the government who are providing services in the area. Occasionally the insecurity issues occur further south, disrupting activities in the Mopti and Segou regions. PMI works closely with the NMCP to ensure that malaria programming reaches all regions of the country through a network of partners.

Conclusions for Additional Health Systems Strengthening Investments

Despite the insecurity issues, the NMCP has continued to provide strong leadership for malaria control and the country has made continued progress as evidenced by the nationwide decline in parasitemia from 47 percent among children under five years of age in 2012 to 19 percent in 2018

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