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Senegal

Malaria Operational Plan FY 2023

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

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

CONTENTS

ABBREVIATIONS

ACT	Artemisinin-based Combination Therapy
AI	Active Ingredient
ANC	Antenatal Care
BMGF	Bill & Melinda Gates Foundation
CCPLP	Cadre de Concertation des Partenaires de Lutte contre le Paludisme (Malaria Partners Coordination Committee)
cDHS	Continuous Demographic and Health Survey
DHA-PQ	Dihydroartemisinin Piperaquine
DHIS2	District Health Information System 2
DSISS	*Division du Système d'Information et des Statistiques Sanitaires* (Division of Social and Health Information Systems)
DSDOM	*Dispensateur de Soins à Domicile* (Home Caregiver)
FTAT	Focal Test and Treat
FY	Fiscal Year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
HMIS	Health Management Information System
IDB	Islamic Development Bank
IPTp	Intermittent Preventive Treatment for Pregnant Women
IRS	Indoor Residual Spraying
ITN	Insecticide-treated Mosquito Net
KKT	Kedougou, Kolda and Tambacounda Regions
MACEPA	Malaria Control and Elimination Partnership in Africa
MDA	Mass Drug Administration
MIP	Malaria in Pregnancy
MOH	Ministry of Health
MOP	Malaria Operational Plan
NMCP	National Malaria Control Program
NSP	National Strategic Plan
OR	Operational Research
PE	Program Evaluation
PECADOM	*Prise en Charge à Domicile* (Home-based Management of Malaria)
PBO	Piperonyl Butoxide
PMI	U.S. President's Malaria Initiative
PNA	*Pharmacie Nationale d'Approvisionnement* (Central Medical Stores)
RDT	Rapid Diagnostic Test
SBC	Social and Behavior Change
SMC	Seasonal Malaria Chemoprevention
SM&E	Surveillance, Monitoring, and Evaluation

SP	Sulfadoxine-pyrimethamine
SPAQ	Sulfadoxine-pyrimethamine/amodiaquine
TES	Therapeutic Efficacy Study
UCAD	*Université Cheikh Anta Diop*
USAID	U.S. Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

To review specific country context for Senegal, please refer to the Country Malaria Profile located on the U.S. President's Malaria Initiative's (PMI's) Senegal landing page, which provides an overview of the country's malaria situation, key indicators, the National Malaria Control Program (NMCP) strategic plan, and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, PMI supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, *End Malaria Faster*, envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in sub-Saharan Africa and three programs across the Greater Mekong Subregion in Southeast Asia to control and eliminate malaria. Senegal began implementation as a PMI partner country in FY 2008.

Rationale for PMI's Approach in Senegal

Senegal's National Strategic Plan (NSP) was updated in 2021 and covers the period 2021–2025. The NSP focuses on improving malaria control in higher-burden zones and initiating malaria elimination efforts in the very low-burden zones of the country. PMI has adopted a two-pronged approach to support the Senegal NSP: 1) support a comprehensive package of malaria prevention and treatment activities—*prise en charge à domicile* (PECADOM) Plus, seasonal malaria chemoprevention (SMC), social and behavior change (SBC), use of new types of insecticide-treated mosquito nets (ITNs), and health systems strengthening)—targeting the high incidence in the southeastern regions of Kedougou, Kolda, and Tambacounda (KKT) and 2) support elimination activities in the northern regions of Louga, Matam, and St. Louis.

Overview of Planned Interventions

The proposed FY 2023 PMI funding for Senegal is $22.5 million. PMI will support the following intervention areas with these funds:

1. Vector Monitoring and Control

PMI will support entomological, insecticide resistance, and ITN durability monitoring, strengthening of field and laboratory capacity and sustainability at regional, district, and community levels, and facilitation of the national vector control committee. Specifically, this will include:

- Entomological monitoring in 25 sentinel sites and 14 insecticide resistance monitoring sites in 14 districts.
- Standard durability monitoring of 2022 ITN campaign nets for the third and last year of the durability monitoring.
- Procurement and distribution of piperonyl butoxide (PBO) and/or dual active ingredient (AI) ITNs to address gaps and high pyrethroid resistance for continuous distribution channels, including in indoor residual spraying (IRS)-withdrawal districts.

2. Malaria in Pregnancy

Protecting pregnant women against malaria remains a key aspect of PMI/Senegal's strategy. With FY 2023 funding, PMI/Senegal plans to fund training and supportive supervision for antenatal care (ANC) providers on the prevention and treatment of malaria during pregnancy. PMI will also continue supporting the implementation of intermittent preventive treatment for pregnant women (IPTp) delivered at the community level in 20 districts, complementing investments of other stakeholders, to collectively meet nationwide needs and increase the proportion of pregnant women who receive the recommended three doses of sulfadoxine-pyrimethamine. Support also includes training for new health facility-level providers as needed on prevention and treatment of malaria during pregnancy. The training includes topics such as the importance of ITN use in pregnancy, diagnosis and management of malaria in pregnancy (MIP), counseling, and interpersonal communication skills.

3. Drug-based Prevention

PMI will support SMC in 16 eligible districts, with an increase in the number of cycles in some districts to better cover the transmission season. PMI will support the NMCP in all stages of the strategy, from planning to evaluation, including the training of operational staff and drug distribution by community health workers (CHWs).

4. Case Management

PMI will support the NMCP strategy by providing case management support at all levels. This includes training and supportive supervision at national, health facility, and community levels, including the private sector. PMI will continue to expand PECADOM and PECADOM Plus, geographically and temporally, to ensure a year-round implementation instead of just focusing on high transmission periods. PMI will also support training to laboratory technicians and quality control for malaria diagnosis. PMI will procure and distribute case management medicines and support therapeutic efficacy studies for first-line artemisinin-based combination therapies (ACTs). PMI will also support case management activities in elimination areas through malaria case investigation and response.

5. Health Supply Chain and Pharmaceutical Management

PMI supports the NMCP's goal of ensuring permanent availability of antimalarial medicines and products for all health structures and the country's vision of building an efficient system of regulation and control that guarantees the entire population's access to quality-assured health products. With FY 2023 funding, PMI will continue to support activities as it has in the recent past, which include commodity quantification and procurement, capacity strengthening, coordination with the central medical stores and other partners, improving country capacity for storage and distribution of commodities, monitoring product quality, the development of supply chain management policies and documentation, and technical assistance to improve the governance for medical product quality assurance systems and the country and regional regulatory systems.

6. Social and Behavior Change

PMI contributes to the NMCP's SBC strategy by supporting efforts on the acceptance and correct and consistent use of proven interventions such as SMC, MIP, ITNs, and mass drug administration (MDA), as well as reinforcing early care-seeking behavior. PMI supports approaches that tailor SBC activities to reflect the intervention in the local context and specific to the epidemiological profile of different parts of the country. With FY 2023 funds, PMI plans to support institutional communication and SBC activities with a focus on:

- MIP, SMC, and proper ITN usage through community-based organizations. The focus is on the KKT regions for the promotion of increased first ANC visits as well as increased use of bed nets by children under five years of age and pregnant women.
- Communication channels will include broadcasting, radio spots, community meetings, posters, banners, T-shirts, and regular home visits by community-based organizations

7. Surveillance, Monitoring, and Evaluation

PMI will continue to contribute to the implementation of the annual continuous Demographic Health Survey (cDHS) to support the improvement of data collection and quality at the district, facility, and community levels, and to provide support through peer supervision and training through the malaria monitoring and evaluation course. The support for elimination activities will be for the operational costs of case investigations and response (reactive focal test and treat [FTAT] or focal mass drug administration, and training of health workers and CHWs to perform these investigations and include weekly reporting into the health management information system (HMIS) in districts where incidence is <5 per 1,000 in the Louga, Matam and St. Louis regions.

8. Operational Research and Program Evaluation

PMI has supported the NMCP in evaluating a mass drug administration (MDA) study and the development and evaluation of tools for the control of urban malaria vectors, in particular in and around religious schools (*daaras*) where children live and study in high densities and sleep outdoors and where *Anopheles* larval habitats are abundant. With FY 2023 funding, no new operational research and program evaluation activities are proposed.

9. Capacity Strengthening

PMI will contribute to strengthening the capacity of the NMCP and the Ministry of Health (MOH) through:

- Quarterly malaria partners coordination meetings to review planned activities, facilitate information sharing, and ensure better coordination of malaria-related activities across the country.
- Strengthening of the HMIS system, particularly its governance and management at the central level.
- The successful malariology course to increase the cadre of trained staff at the district level capable of leading program implementation of malaria control and elimination activities.
- Technical assistance for the management of the Fixed Amount Reimbursement Agreement under the government to government (G2G) mechanism to support the preparation and monitoring of the G2G agreement between PMI and the NMCP.
- Support for participation in international scientific and professional meetings for MOH and NMCP staff to learn best practices, share experiences, and develop networks.

CONTEXT AND STRATEGY

1. Introduction

Senegal began implementation as a U.S. President's Malaria Initiative (PMI) partner country in fiscal year (FY) 2008. This FY 2023 Malaria Operational Plan (MOP) presents a detailed implementation plan for Senegal, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners. PMI is proposing activities that build on partner investments to improve and expand malaria-related services, including investments by the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This document provides an overview of the strategies and interventions in Senegal, describes progress to date, identifies challenges and relevant contextual factors, and provides a description of activities that are planned with FY 2023 funding. For more detailed information on the country context, please refer to the Country Malaria Profile, which provides an overview of the country's malaria situation, key indicators, the NMCP strategic plan, and the partner landscape.

2. U.S. President's Malaria Initiative

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

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

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

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

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

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

3. Rationale for PMI's Approach in Senegal

3.1. Malaria Overview for Senegal

Senegal has reported an increase in malaria morbidity and mortality in the past two years. The country registered 2.2 million and 2.6 million suspected malaria cases in 2020 and 2021, respectively, resulting in 445,313 and 536,850 confirmed cases, a malaria incidence of 26.7 and 31.2 per 1,000 population, and reported malaria-related deaths of 373 and 399 in 2020 and 2021, respectively. The NMCP cited the COVID-19 pandemic as a driver of this increase, as well as a longer than normal rainy season. Of the total malaria confirmed cases in 2021, 421,471 cases were registered in the Kedougou, Kolda, and Tambacounda (KKT) regions, representing 78.5 percent of the total malaria cases. These three regions also registered 46.3 percent of malaria-related deaths in Senegal. The Dakar region alone registered 71 malaria deaths (18 percent), due to the fact that most cases are transferred to Dakar where the majority of the tertiary hospitals are located. This recent increase in cases constitutes a threat to achieve the 2021–2025 National Strategic Plan (NSP) objectives to reduce malaria incidence by at least 75 percent, reduce malaria mortality by at least 75 percent, and interrupt local transmission in at least 80 percent of eligible districts by 2025 and the goal of reaching elimination by 2030.

To combat these increases, Senegal is focused on intensifying malaria control interventions in higher-burden zones and initiating malaria elimination efforts in the very low-burden zones of the country. Given the growing challenge of insecticide resistance, the country is progressively introducing piperonyl butoxide (PBO) and dual active ingredient (AI) nets, starting in the KKT regions and the surrounding districts, with the goal to shift completely to distribution of dual AI nets in calendar year 2024. The country is also increasing the number of seasonal malaria chemoprevention (SMC) rounds in certain districts to ensure adequate coverage during the transmission period. Senegal is expanding the *prise en charge à domicile* (PECADOM) and PECADOM Plus programs, geographically and temporally, and expanding community IPTp in areas with low IPTp coverage.

Malaria case investigation and response is being implemented in areas with incidence <5 cases per 1,000 population. Focal test and treat (FTAT) or focal mass drug administration approaches with dihydroartemisinin piperaquine (DHA-PPQ) plus single low-dose primaquine are used in response. Senegal is developing a malaria elimination acceleration action plan for 2022 to 2025 to boost the NSP's elimination objective. In the short term, the elimination objectives will be aligned with those of the NSP 2021–2025. For the long-term to 2030, the country plans to move toward an effective interruption of local transmission throughout the country. Surveillance in particular will have to be strengthened, and the notification of all cases will have to be adhered to by all public and private structures and also at the community level.

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

3.2. Key Challenges and Contextual Factors

The key challenges in Senegal that could stall progress are:

- The need for a revision of the NMCP structure and hierarchy to link the NMCP at a higher level of the Government of Senegal to get more attention from the Secretary General or President's office
- Making elimination a national issue by developing a cross-sectoral framework for malaria elimination
- The need to increase government funding allocated to health and the inclusion of malaria control activities in government budget lines
- The need to increase community engagement to accelerate and maintain elimination
- The emergence of potential health threats such Ebola and the COVID-19 pandemic
- Climate change (increased or longer rains or drought), which potentially affects activity plans

- Recurrent health worker strikes
- Insecurity, particularly in southern zones
- Ending of key funders' agreements—Islamic Development Bank (IDB) and the German Agency for International Cooperation)—without a clear plan to fill the financial gap
- Low availability of commodities for transmission interruption (ultra-sensitive rapid diagnostic tests [RDTs], DHA-PQ, and primaquine)

3.3. PMI's Approach for Senegal

PMI contributes to the country's overall malaria strategy by adopting a two-pronged approach in Senegal:

- Support a comprehensive package of malaria prevention and treatment activities targeting moderate to high burden regions, with a strategic focus on the high-incidence southeastern regions of KKT. This package includes the following: active case management (PECADOM Plus) in 35 districts; SMC campaigns (expanding to five rounds in the highest burden districts in KKT while continuing to support three or four rounds in the other districts in KKT); continuous distribution of new types of ITNs; and cross-cutting interventions such as health systems strengthening, capacity strengthening, surveillance, monitoring, and evaluation (SM&E), and social and behavior change (SBC).
- Support elimination-related activities in eligible districts (<5 cases/1,000 annual incidence) of the northern regions of Louga, Matam, St. Louis, and beyond.

The remaining PMI budget funds the procurement of commodities (ITNs, sulfadoxine-pyrimethamine/amodiaquine [SPAQ] for SMC, RDTs, ACTs, rectal artesunate, primaquine, and injectable artesunate) for nationwide coverage and support for SM&E and health system strengthening activities at the central level.

PMI supports the national elimination strategy by providing technical and financial support to the development of the Senegal Malaria Elimination Acceleration Plan and supports capacity strengthening to the NMCP elimination division and partners' coordination on elimination. PMI procures primaquine and ACTs for the response to case investigations (either FTAT or focal mass drug administration) to interrupt malaria transmission and also supports case investigation implementation in 17 eligible (annual incidence <5 per 1,000 population) districts located in the three northern regions of Louga, Matam, and St. Louis, and in the southwestern region of Ziguinchor.

PMI continues to support the expansion of the PECADOM and PECADOM plus programs, geographically (to include new health districts and health posts) and temporally (to ensure year-round implementation instead of just focusing on high

transmission periods), and supports the community health strategy by providing equipment and incentives to the *dispensateur de soins à domicile* (DSDOMs, or home caregivers) and supporting training and supervision for community health workers (CHWs) and their supervisors. PMI is also supporting the development and implementation of the Senegal Digital Community Health Initiative. A significant portion of PMI-supported activities are funded through a government to government (G2G) agreement directly with the NMCP, other Government of Senegal Ministry of Health (MOH) entities, and university and research institutions, with another local partner supporting the management of this G2G agreement. PMI is also supporting the development and adaptation of malaria interventions to efficiently reach specific vulnerable populations, such as children in Koranic schools (*daaras*).

3.4. Key Changes in this MOP

There are no significant changes in the strategy, activities, or budget levels compared to the previous MOP. Due to budget constraints, there are no changes to the SMC-targeted districts with corresponding planned number of rounds; similar quantities of dual AI nets are planned for procurement; and support for the PECADOM program is maintained.

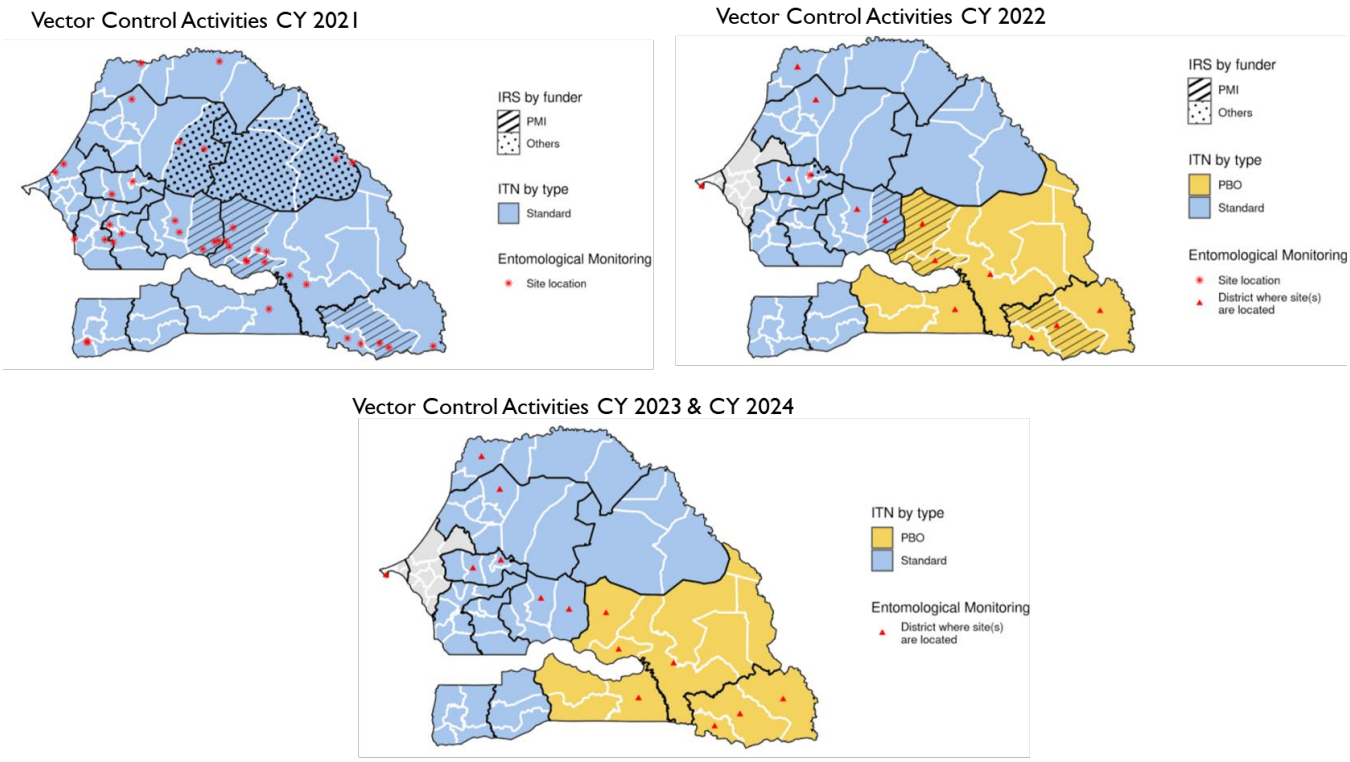
II. OPERATIONAL PLAN FOR FY 2023

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

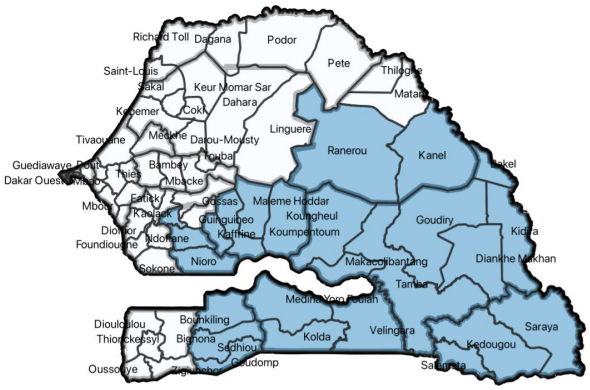
The NMCP's Malaria Strategic Plan promotes an integrated vector management strategy, including vector surveillance, enhanced insecticide resistance management and vector resistance reduction, continuous and mass distribution of ITNs, geographically targeted IRS, and larval source management. While the national strategy includes larval source management approaches, PMI does not currently support these activities. PMI supports the NMCP's goals for vector control including entomological surveillance, distribution of new types of ITNs via mass campaigns and continuous channels, and combating insecticide resistance. PMI has supported longitudinal entomological monitoring at sentinel sites around the country, but is transitioning to expanded insecticide resistance monitoring to support the selection of appropriate vector control tools. PMI supports vector control activities in the Sahelian, Sahelo-Sudanese, Sudano-Sahelian, Sudanese, and Sudano-Guinean zones specifically, with some central-level support for planning and supervision. PMI supports the NMCP in achieving ITN coverage of one ITN per 1.8 persons and new types of nets in high malaria burden areas to achieve maximum impact through the procurement and distribution of PBO and dual AI ITNs as needed to fill gaps. PMI-supported entomological monitoring sites for 2022 are shown in Figure 1.

Figure 1. Map of Vector Control and Entomological Monitoring Activities in Senegal in 2021, 2022, and 2023 & 2024



** Maps include ITNs through campaigns only. PMI supports Dual AI net distribution through routine distribution in the KKT region and neighboring districts.*
*** Grey districts were not covered with ITNs through mass campaigns due to insufficient number of nets to cover the entire country and prioritization of higher burden areas.*

Figure 2. Map of PMI Support for Dual AI Nets through Routine Distribution



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

PMI supported the following vector control activities:

- Vector monitoring in 34 sentinel sites across five geographical zones within 19 health districts, and insecticide resistance monitoring in 19 districts in partnership with the NMCP and local research institutions (*Laboratoire*

d'Écologie Vectorielle et Parasitaire of Cheikh Anta Diop University [*Université Cheikh Anta Diop*, or UCAD]).

- Larval surveillance for *An. stephensi* conducted in Dakar and Touba around all airports and sea cargo, and dry ports.
- Procurement and distribution of 1,709,800 standard ITNs nationwide through continuous distribution channels (free at antenatal care [ANC] and Expanded Program on Immunization visits, and subsidized for others through health facilities and community-based organizations). Forty five percent of these nets were distributed from July to September, coinciding with the beginning of the rainy season (the high transmission period).
- Technical support to NMCP on all ITN-related activities, including reception, storage, transportation, replenishment, M&E, and supervision.
- Organization of monthly supervision of routine ITN distribution and joint supervision with NMCP quarterly, prioritizing supervision in Dakar and Thies regions, which are not included in the universal campaign.
- Implementation of a social inclusion pilot for ITN distribution in *daaras* to close equity gaps in ITN distribution in Senegal, helping to protect populations who are unreached with routine ITN distributions.
- Implementation of SBC activities to improve demand for ITNs, increase appropriate use, promote care, and mitigate against misuse. For more information, please refer to the SBC section.
- Launch of the 2022 ITN mass distribution campaign from May 30 to June 24.
- Planning, implementation, and evaluation of the third year of IRS in four districts, covering 141,717 structures and protecting 556,620 people (including 13,445 pregnant women and 99,323 children under 5 years of age) from May 31 to July 29, 2021. For more information about IRS, please refer to the most recent End of Spray Report.
- Training of five district (Fatick, Louga, Matam, St. Louis, Thies) malaria focal points in community-based mosquito surveillance.
- Entomological capacity strengthening through support to insectary and laboratory facilities and trainings at UCAD.
- Support for national vector control working group meetings to facilitate review of country vector bionomics and insecticide resistance data and inform vector control decision-making.
- Hosting and leading of a regional entomology training for NMCP trainees from other countries.

For more information about entomological monitoring, please refer to the 2021 Entomological Report.

1.3. Plans and Justification for FY 2023 Funding

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

1.3.1. Entomological Monitoring

PMI will continue to support entomological surveillance, including longitudinal monitoring in 25 sites in 14 districts and insecticide resistance monitoring in 14 districts, which is a reduction from 34 sites in 19 districts in FY 2022. Data from the last five years have not shown a substantial change in vector bionomics in the sites that have been removed. To allow for more intensive, question-driven monthly surveillance, the total number of longitudinal monitoring sites has been reduced to those specifically which receive vector control interventions, representative sites of all the different geographical zones, and those where community-based entomological activities have been initiated. Following the 2022 mass ITN campaign, standard durability monitoring will be conducted to determine the useful life of new types of nets which are a primary malaria vector control intervention in the country. IRS was conducted in the past, and high burden IRS withdrawal districts have received new types of ITNs. In addition, activities for enhanced surveillance of *An. stephensi* will be included in Dakar and Touba—two major urban areas in Senegal—in accordance with PMI's *An. stephensi* action plan guidance for high risk countries. PMI is also continuing to provide technical assistance to strengthen the capacity of local research institutions at the national, regional, and district levels, and facilitate coordination among research institutions, NMCP, and the national vector control working group to support the localization of entomological activities.

Summary of Distribution and Bionomics of Malaria Vectors in Senegal

As of 2021, the primary vector found in all ecological zones is *Anopheles gambiae* s.l., with *An. arabiensis* as the predominant and most widespread species of the *An. gambiae* complex in four of the five zones, and *An. gambiae* s.s. was the dominant species in the Sudano-Guinean zone. *Anopheles coluzzi* was also noted in all surveyed areas, but was most common in the Sudanese zone. Other vectors detected include: *An. funestus* s.l., *An. pharoensis*, *An. rufipes*, *An. squamosus*, *An. nili*, *An. coustani*, and *An. ziemanni*. Peak transmission occurs from July to October. The preferred biting location of *An. gambiae* s.l. is outdoors in IRS sites, and outdoor and indoor biting rates are similar in these sites. The mean indoor resting density (IRD) of *An. gambiae* s.l. is 1.4 females per room per night, with the highest IRD in Sudano-Sahelian zones. Peak biting time of *An. gambiae* s.l. is from midnight to 3:00 a.m. The entomological inoculation rate of *An. gambiae* s.l. populations varied according to the geographical

zones and was higher in the Sudanese and the Sudano-Guinean zones. Infected females were found in *An. arabiensis*, *An. gambiae* s.s., and *An. coluzzii*.

Status of Insecticide Resistance in Senegal

Anopheles gambiae s.l. was resistant to all pyrethroids in the sites where the tests were conducted, with varying levels of intensity of resistance according to the sites or pyrethroid insecticides. Low resistance intensity to deltamethrin and permethrin was detected in Kedougou, and moderate resistance to deltamethrin, alpha-cypermethrin, and permethrin was detected in all the other sites. The PBO synergist assay test was conducted in nine sentinel districts, including IRS and PBO-ITN distribution sites. Pre-exposure to PBO substantially increased mortality of all pyrethroids with reversal to full susceptibility of *An. gambiae* s.l. in the high burden districts of Koungheul, Koumpentoum, and Tambacounda. Susceptibility to pirimiphos-methyl was recorded in all sites, but for bendiocarb, only *An. gambiae* s.l. in Koungheul was susceptible. Susceptibility of *An. gambiae* s.l. to clothianidin 4 micrograms/bottle was recorded at all sites tested, except at Koumpentoum (95.5 percent). Susceptibility of *An. gambiae* s. l. to chlorfenapyr was detected at 100 micrograms/bottle at 11 out of 12 sites tested.

1.3.2. Insecticide-treated Nets

PMI will continue to support the procurement, storage, and distribution of ITNs through routine channels. In response to evidence of pyrethroid resistance at all entomological monitoring sites, PMI/Senegal will continue to transition to new types of ITNs (e.g., PBO synergist or dual-insecticide ITNs) in coordination with the Global Fund and NMCP. PMI will also provide technical assistance to the central, regional, and district levels for routine distribution of ITNs to strengthen capacity and improve distribution systems. PMI will support the implementation of innovative urban-friendly interventions for ITN distribution and use to address chronic barriers in this realm, using Dakar as a pilot area. PMI will support the NMCP's M&E unit to digitize the ITN routine distribution reporting system. PMI will also continue to support durability monitoring of standard and PBO ITNs.

PMI will support SBC activities focused on the introduction of new types of nets with reinforced messaging on net use. Please see the SBC section for details on challenges and opportunities to improve intervention uptake or maintenance.

ITN Distribution in Senegal

In Senegal, ITNs are distributed via mass campaigns every three years and continuous distribution every year. The most recent mass distribution campaign occurred in 2022. Continuous distribution channels include: 1) distribution to pregnant women at ANC, 2) distribution during Expanded Program on Immunization encounters for children 0–23 months old, 3) distribution through community-based organizations, 4) distribution to children 24-49 months old in outpatient clinics, and 5) health facilities, where ITNs are

subsidized for the general population. Other distribution channels include religious schools (*daaras*), via social inclusion efforts. Widespread pyrethroid resistance has been reported throughout the country; with FY 2023 funding, PMI will procure 781,500 dual AI nets for routine distribution in the high transmission KKT regions and surrounding districts.

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

Table 1. Planned Standard Durability Monitoring

Campaign Date	Site	Brand	Pre-distribution	Baseline	12-month	24-month	36-month
June 2022	Koungheul	Olyset (Permethrin)	May 2022	Aug 2022	June 2023	June 2024	June 2025
June 2022	Koumpentoum	Olyset Plus (Permethrin + PBO)	May 2022	Aug 2022	June 2023	June 2024	June 2025

1.3.3. Indoor Residual Spraying (IRS)

PMI will not support IRS in Senegal with FY 2023 funds. PMI's last year of support for IRS in Senegal was in 2022.

Table 2. PMI-Supported IRS Coverage

Calendar Year	District	Structures Sprayed (#)	Coverage Rate (%)	Population Protected (#)	Insecticide
2021	Kédougou, Makacolibantang, Koumpentoum, and Koungheul	141,717	97.2%	556,620	clothianidin and clothianidin + deltamethrin
2022	Kédougou, Makacolibantang, Koumpentoum, and Koungheul	138,427*			clothianidin + deltamethrin and pirimiphos-methyl

*Planned

IRS Insecticide Residual Efficacy in Senegal

Wall bioassays were conducted using laboratory strains of *An. coluzzi* and wild populations of *An. gambiae* s.l. following the 2021 IRS campaign in four IRS districts. Both clothianidin and clothianidin + deltamethrin were found to remain on both mud and cement walls for at least eight months.

2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

As malaria infection during pregnancy continues to be a public health problem in Senegal, with substantial risks for the mother, her fetus, and the newborn, the protection

of pregnant women remains a major intervention in PMI/Senegal's strategy. The NMCP recommends that all pregnant women receive at least three doses of sulfadoxine-pyrimethamine (SP) as intermittent preventive treatment during pregnancy, beginning as early as 13 weeks gestational age and administered one month apart until delivery. Additional doses can be given up to childbirth, respecting the interval of at least one month between doses. It also includes the provision of ITNs at the first ANC visit and effective case management of malaria per World Health Organization (WHO) and NMCP guidelines.

Despite progress over the past five years, disparate levels of IPTp2 and IPTp3 coverage are still observed in some districts of Senegal, as seen in routine health data. To fill gaps in coverage, the NMCP and the health system piloted a district-driven initiative of IPTp delivery at the community level in 10 districts in 2019. In this approach, CHWs distribute SP to pregnant women starting in the second trimester of pregnancy, after the first dose of SP is provided at a health facility and a census of this target population is completed. Based on the NMCP annual epidemiological report, districts that implemented the pilot showed an increase in IPTp3 coverage of 27 percent by the end of 2020.

2.2. Recent Progress (between April 2021 and March 2022)

- Supported the implementation of IPTp at the health facility level in eight regions (Diourbel, Kaffrine, Kaolack, Kolda, Kedougou, Sedhiou, Tambacounda, and Ziguinchor) and the pilot of community IPTp in 20 health districts across the nation.
- Supported the orientation of seven providers in Kedougou health district on IPTp at the community level.
- Supported the training of 15 CHWs (*Bajenu Gox*,[1] DSDOM) on the importance of IPTp and malaria prevention and promoted the early ANC attendance and uptake of SP to prevent malaria in pregnancy.

2.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of malaria in pregnancy (MIP) activities that PMI proposes to support in Senegal with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

[1] While neither a nurse nor a midwife, the Bajenu Gox (Wolof for "neighborhood godmother") is most often an experienced woman respected in her community. See https://www.idrc.ca/en/stories/bajenu-gox-senegals-health-keepers

Senegal will continue to support MIP activities as described in the Recent Progress section (2.2). Please see the Social and Behavior Change section for details on challenges and opportunities to improve intervention uptake or maintenance.

As SP procurement is currently covered by the Global Fund, PMI will advocate for it to be included in the next grant that begins in 2024. Please refer to the **SP Gap Analysis Table** in the annex for more detail on planned quantities and distribution channels.

3. Drug-based Prevention

3.1 Seasonal Malaria Chemoprevention

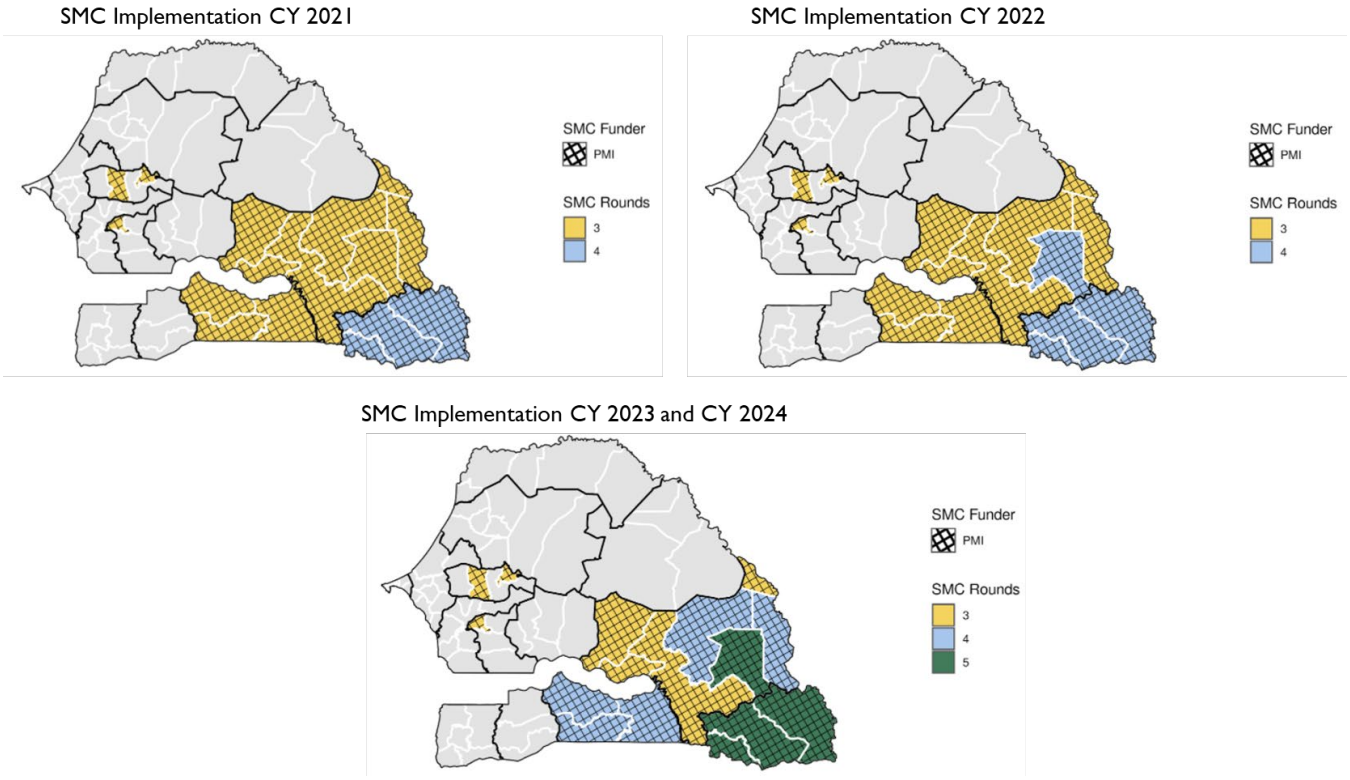
PMI Goal and Strategic Approach

The NMCP's Malaria Strategic Plan promotes SMC as a malaria prevention intervention in areas with highly seasonal malaria transmission. PMI supports the use of SMC as defined in WHO guidance.

PMI is the only partner supporting SMC in Senegal, covering 16 health districts. This includes procurement of SPAQ to meet the needs of the eligible population as well as all aspects of implementation (planning, training, paying distributors, SBC activities, etc.). PMI also supports the NMCP SMC activities (planning, training, etc.) at the central level.

The SMC strategy began in Senegal in 2013, uses the door-to-door approach, and targets children from 3 months to 10 years of age. Since 2019, to ensure high treatment coverage, directly observed treatment for all three doses was scaled up to all target districts. Apart from adapting to the COVID-19 context, the implementation approach will remain the same in the 16 target districts. To ensure success of the strategy and improved monitoring of SMC implementation, planning meetings and evaluations are organized after each round. An SMC newsletter is also produced each year for the dissemination of information relating to this activity.

Figure 3. Map of Seasonal Malaria Chemoprevention Implementation in Senegal



3.2. Recent Progress (between April 2021 and March 2022)

PMI supported SMC covering 729,025 children between 3 months to 10 years of age in 16 districts for three cycles, and specifically four cycles for the Kedougou region. A campaign coverage (administrative estimate of coverage) of 87 percent was achieved in the 2021 campaign.

- Following WHO recommendations and to better cover the malaria transmission season and increase the protection of targeted children, a progressive increase in the number of monthly cycles in the target districts was proposed. This decision was based on a recent analysis of the monthly malaria burden and rainfall data identifying the duration of both the rainy season and the malaria transmission season in targeted districts. This phased approach started in 2022 with the increase from three to four monthly rounds in Dianke Makhan in Tambacounda region. Beginning in 2023, the number of monthly rounds will increase from four to five in the Kedougou region and the district of Dianke Makhan, and from three to four rounds in the Kolda region, as well as in the districts of Kidira and Goudiry in the Tambacounda region.

3.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of SMC activities that PMI proposes to support in Senegal with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Senegal will continue to support SMC activities as described in the Recent Progress section (3.2).

All SPAQ will be procured by PMI. Please refer to the **SPAQ Gap Analysis Table** in the annex for more detail on the planned quantities and distribution channels.

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

4. Case Management

4.1. PMI Goal and Strategic Approach

Senegal adopted ACTs as first-line treatment in 2006 and introduced RDTs in 2007. Senegal considers artesunate-amodiaquine, artemether-lumefantrine, and dihydroartemisinin-piperaquine as co-first-line ACTs. Artesunate-amodiaquine is only used in areas where SMC is *not* implemented. In pre-elimination areas where incidence is <5/1,000, any confirmed case of malaria is given a single low-dose of primaquine along with an ACT (dihydroartemisinin-piperaquine is preferred).

Universal testing for fevers became policy in 2017. HRP2/3-based RDTs are used at the health post and community levels, and microscopy at higher levels. Recently, the NMCP introduced the use of molecular biology (loop mediated isothermal amplification, or LAMP) in the diagnosis of malaria in low incidence settings.

Senegal monitors antimalarial efficacy by implementing therapeutic efficacy studies (TES) in two sentinel sites each year and conducts post-marketing quality control of antimalarials at all levels of the health system, including the private sector and the community level. Injectable artesunate has been adopted as the first-line treatment for severe malaria at health centers, hospitals, and some rural health posts that are inaccessible during the high-transmission season. Injectable artemether and quinine are also used as second-line treatment for severe malaria cases. Rectal artesunate as pre-referral treatment has been adopted at health posts and at the community level for children up to five years of age. Primaquine (single low dose) is used as a gametocytocidal in pre-elimination zones in the treatment of confirmed malaria cases.

Health care for children under five years of age is provided free of charge at formal health facilities, which are reimbursed by the government universal health insurance scheme, and this has been extended to the community level.

The NMCP has adopted WHO recommendations regarding case investigation and active case detection in districts in which annual incidence is fewer than five cases per 1,000 population. In those areas, a confirmed malaria case detected passively at any service delivery point triggers an investigation of the patient's residential compound, and a reactive FTAT or focal mass drug administration approach is implemented. All eligible members in the index case's residential compound are treated with dihydroartemisinin-piperaquine and low-dose primaquine, and messaging about malaria preventive measures is provided in the five neighboring households.

PMI contributes to the NMCP's case management strategy nationwide, with more support going to the higher-transmission areas in the southeastern regions of Kedougou, Kolda, and Tambacounda. Other financial partners, including IDB (historically) and the Bill & Melinda Gates Foundation (BMGF), are supporting molecular surveillance, case investigation, and reactive case detection in the pre-elimination zones. PMI provides partial funding for operational cost of case investigations and response in the pre-elimination zones.

PMI provides capacity strengthening through training and supportive supervision to health facilities at all levels, including the private sector. High-level malaria management training is provided to district health officers, while malaria prevention and case management training is provided to health workers at health centers, health posts, health huts levels, and home-based CHWs. PMI and the Global Fund support training and supervision in the KKT regions, while BMGF and PMI support the pre-elimination regions.

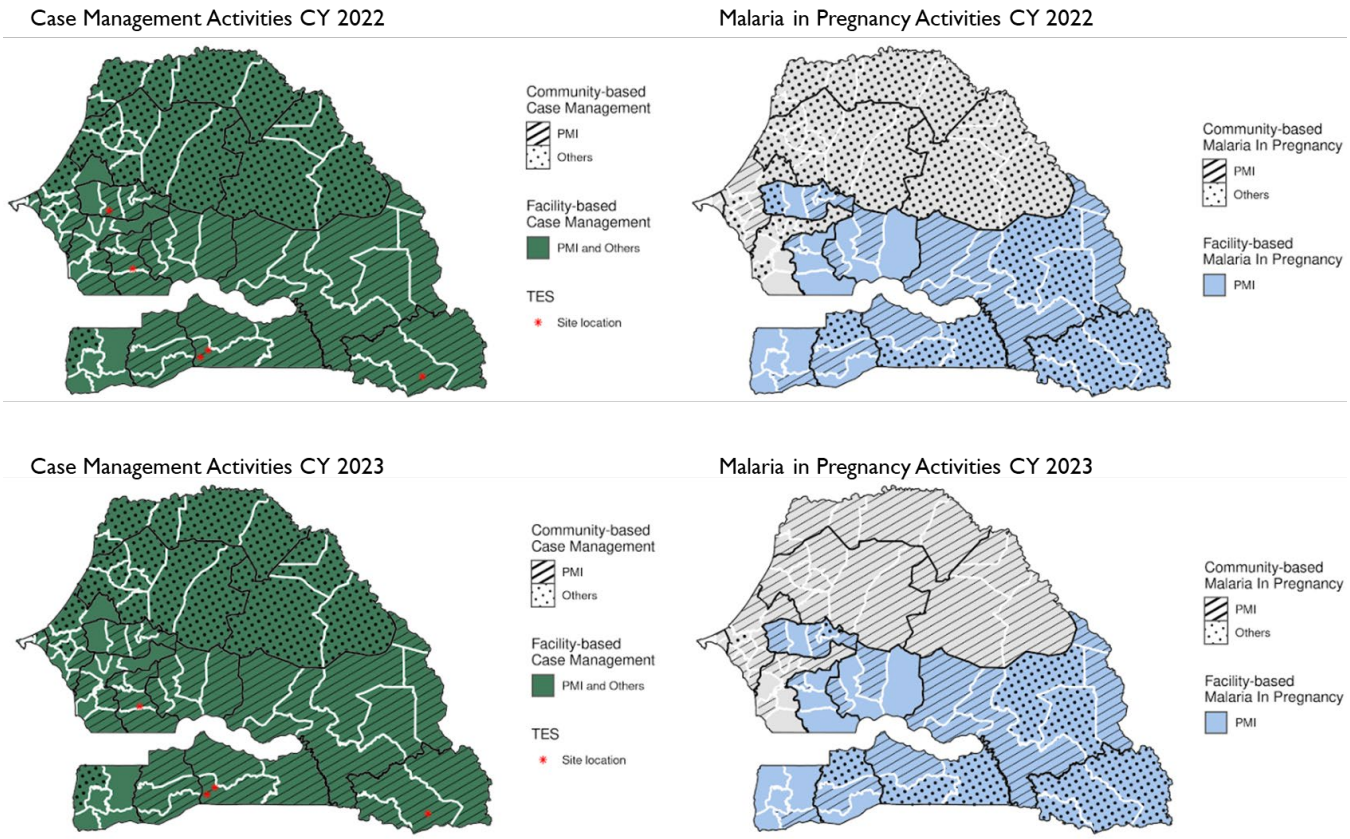
Historically, PMI ensured the procurement and distribution of RDTs, ACTs for routine case management, injectable artesunate, and rectal artesunate for the entire country, with the IDB procuring the dihydroartemisinin-piperaquine for the pre-elimination health zone. However, IDB support ended in 2021, and PMI is now the only partner procuring all case management commodities for the entire country.

Two types of services are available for malaria case management at the community level:

- **Health huts:** Health huts, staffed by CHWs, offer an integrated package of maternal and child health interventions, which has included malaria case management with RDTs and ACTs since 2008.
- **Home-based management of malaria (PECADOM),** implemented by a DSDOM. The PECADOM has subprograms PECA *Daara* for Koranic schools,

PECA *Ecole* for conventional schools, *and* PECA *Ferlo* for northern elimination areas. The PECADOM program is offered for both passive and active case detection and treatment. For more information on the PECADOM program, please see the Country Malaria Profile.

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



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

National-level Case Management Activities

- Collaborated and coordinated with malaria donor organizations (Global Fund, WHO, PATH Malaria Control and Elimination Partnership in Africa [MACEPA]), MOH entities contributing to the fight against malaria (Maternal and Child Health, community health division, the direction of planning and research, the division of numerique health), and research institutions to update the national malaria case management guidelines.
- Supported three meetings of the national Malaria Partners Coordination Committee (*cadre de concertation des partenaires de la lutte contre le*

paludisme [CCPLP]). This platform gathers all malaria stakeholders for key information sharing and decision-making.
- Conducted the annual implementation of External Competency Assessment of Malaria Microscopists course, implemented by UCAD in partnership with the NMCP, WHO, WHO's Regional Office for Africa, and Amref Health Africa. All participants (24/24) achieved microscopist accreditation.
- Supported the 2021 national evaluation of community case management and the 2022 planning workshops.

Commodities

- Procured and distributed 3.2 million malaria RDTs to meet the country's total needs.
- Procured and distributed 500,000 ACTs to meet the country's total needs.
- Procured and distributed 75,000 vials of parenteral artesunate to cover 62 percent of needs, which, together with the existing stock in the country, covered the country's total needs.
- Procured and distributed 30,000 rectal artesunate suppositories to meet the country's total needs

Facility Level

- Supported 152 on-site training and supportive supervision visits in 77 health facilities, including 37 health posts and three health centers in the region of Kedougou, and 37 hospitals nationwide.
- Monitored progress in case management indicators during supportive supervision visits. Indicators included the use of diagnostic testing prior to treatment and adherence to diagnostic test results. Feedback and recommendations were provided to promote data use and improve best practices.

Community Level

- Supported on-site training and supportive supervision or mentorship visits reaching 1,646 DSDOMs, including 1,413 in the KKT region and 233 in the region of Sedhiou.
- Trained 470 supervisors in on-site training and supportive supervision for CHWs and DSDOMs.
- Supported the monthly supervision of all DSDOMs, particularly during the high transmission period from June to December.
- Procured equipment for CHWs, including 11,805 waterproof vests; produced and distributed registers and reporting tools for all DSDOMs and health huts (staffed by CHWs).
- Funded incentives for DSDOMs implementing PECADOM Plus.

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

PMI supported Senegal's effort toward elimination through coordination, capacity strengthening, and malaria case investigation activities in 17 malaria elimination districts with annual malaria incidence of less than five per thousand. Elimination activities included the following:

- Supported a malaria elimination readiness assessment to identify strengths, weaknesses, challenges, and opportunities toward malaria elimination.
- Financially and technically supported the initial workshops for the development of the acceleration plan for malaria elimination and continued to boost cross-sectoral coordination to accelerate the elimination process.
- Supported the training and orientation of 498 regional and district health managers on the District Health Information System 2 (DHIS2) tracker, a software developed and synchronized with DHIS2 for malaria case investigations in the regions of Louga, Matam, and St. Louis.
- Trained 676 health managers and health workers at facility and community levels on malaria case investigation and response in the regions of Louga, Matam, and St. Louis.
- Supported the supervision of health workers and CHWs in all seven districts.
- Procured 20,000 primaquine tablets and supported their distribution along with IDB-procured DHA-PPQ in pre-elimination zones.

4.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of case management activities that PMI proposes to support in Senegal with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

National-level Case Management Activities

PMI will continue to support training and supervision activities as described in the Recent Progress section (4.2). Activities will include:

- Support the malariology training for health managers from medical regions and districts.
- Support the annual implementation of External Competency Assessment of Malaria Microscopists course, implemented by UCAD in partnership with the NMCP, WHO, WHO’s Regional Office for Africa, and Amref Health Africa.
- Support annual maintenance of microscopes and the implementation of quality control programs for both microscopy and RDTs in conjunction with

the NMCP and UCAD at all levels of the health system, including the private sector, health facilities at the district level, military medical centers, and hospitals.

Commodities
PMI will procure ACTs, RDTs, injectable artesunate, and primaquine as described in the Recent Progress section (4.2). As stock is sufficient and consumption in the country is low due to a decrease in severe malaria cases, PMI will not budget to procure rectal artesunate suppositories and will wait for the forthcoming WHO recommendation to determine its future use.

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

Facility Level
PMI will support training and supervision for malaria case management at the facility level in eight regions, including the KKT regions, as described in the Recent Progress section (4.2).

PMI will continue to support the training and refresher training of 16 laboratory technicians from health facilities at the district level, military medical centers, and hospitals for microscopy (five-day training). Trainees are selected based on personnel needs and/or diagnostic performance recorded in previous supervisory reports.

Support will also be provided for annual supportive supervision of 140 laboratories from health facilities at the district level, military medical centers, and hospitals. Regional workshops will be held with laboratory technicians to read thick smear slides from health facilities, and a slide bank will ensure quality and improve performance of diagnosis with microscopy.

Community Level
PMI will continue to support community-level training and supervision for malaria case management in eight regions, including the KKT regions, as described in the Recent Progress section (4.2). PMI will continue the expansion of PECADOM and PECADOM Plus in the southeastern regions of the country. For calendar year 2024, between 160 and 200 new DSDOMs are expected to be recruited. PMI will procure and distribute tools (registers, reporting tools, SBC materials) and equipment such as bicycles and waterproof vets.

4.4. Monitoring Antimalarial Efficacy

Table 3. Ongoing and Planned Therapeutic Efficacy Studies (TES)

Ongoing TES			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2022	Dalaba (Kédougou district) and Bagadadji (Kolda district)	AL, ASAQ	UCAD
Planned TES (funded with previous or current MOP)			
Year	**Site name**	**Treatment arm(s)**	**Plan for laboratory testing of samples**
2023	TBD	AL, ASAQ	UCAD

AL = artemether-lumefantrine; ASAQ = artesunate-amodiaquine

4.5. Case Management Elimination Activities

PMI will continue the case investigation and response in the elimination regions of St. Louis and Louga and the eligible districts of the region of Matam, and the districts of Oussouye and Thionckessyl in the region of Ziguinchor. This will include training, supervision, and support to investigation operations. In these areas, each index case at the facility level will be treated with a combination of ACT and a single low dose of primaquine as recommended by WHO guidelines.

Please see the Social and Behavior Change section for details on challenges and opportunities to improve case management uptake or maintenance.

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

Under the NMCP's NSP 2021–2025, the program aims to ensure permanent availability (0 percent stockouts) of medicines (including ACTs, SP, primaquine, injectable artesunate, and rectal artesunate) and antimalarial products (ITNs and RDTs) for at least 99 percent of structures. To support those goals, according to the NSP, a variety of interventions will facilitate continuous improvement of the health supply chain and quality of medicines, including commodity quantification, capacity strengthening, logistics management information system monitoring, coordinating with the central medical stores (the *Pharmacie Nationale d'Approvisionnement*, or PNA) and other partners, improving country capacity to store and distribute commodities, monitoring the quality of antimalarial drugs and products, and developing supply chain management policies and relevant documentation. PMI/Senegal fully aligns with the NMCP's supply chain strategy, implementing activities like those noted in the NSP to support the country's goal of achieving continuous availability of antimalarial products at the health facility and community levels.

In addition, Senegal's 2019–2023 Integrated Strategic Plan for the Directorate for Pharmacy and Medicines (*Direction de la Pharmacie et des Médicaments*) and the National Medicines Control Laboratory (*Laboratoire Nationale de Contrôle des Médicaments*) describes its vision as building "an efficient system of regulation and control which ensures the development and application of quality standards, and which guarantees access to medicines and other quality health products that are effective and safe for the entire population." The plan recognizes that despite progress over the past decade, areas of weakness which persist include scarce financial resources, insufficient human resources, poor information systems, and insufficient coordination and communication among relevant stakeholders. PMI/Senegal supports the Integrated Strategic Plan through activities around two objectives: improving the governance for medical product quality assurance systems, and improving the country and regional regulatory systems to assure the quality of products in the public and private sectors. For more information on the health supply chain system in Senegal, please see the Country Malaria Profile.

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

PMI supported the following investments in health supply chain and pharmaceutical management systems strengthening:

- Supported the PNA to coordinate and collaborate with the NMCP and other health supply chain stakeholders by assisting with the quarterly PNA health program meetings, where participants discussed supply chain coordination issues, updated stock status of key commodities and supply plans, and defined a new commodity report template.
- Supported the NMCP to develop and implement annual or semi-annual quantification and a multi-year supply plan, and to revise as needed.
- Collaborated with the NMCP to streamline the complex health commodity importation process, negotiating and lobbying for waivers and authorizations for unregistered products, and coordinating the receipt of commodities.
- Supported the national post-marketing surveillance (PMS) unit to implement their first risk-based PMS protocol, training the PMS unit and sample collectors on the approved protocol. PMI deployed five teams to sample 301 antimalarial medicines (artemether-lumefantrine, artesunate, SP, and SPAQ) from five regions (Dakar, Kolda, Djourbel, Kaolack, Kedougou, and Tambacounda) and supported a workshop to disseminate the sampling results and discuss regulatory measures.
- Supported the National Medicines Control Laboratory to identify and recruit a local qualified International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) 17025-accredited metrology service provider to calibrate all equipment to solve a major gap in the laboratory's

quality management system, and provided technical assistance for equipment preventive and breakdown maintenance and the development of relevant protocols.
- Provided technical assistance to the PNA in the re-launching of *Yeksi naa* (Senegal's informed push model of quantification and distribution of commodities, which has been defunct since 2019), identifying strengths and weaknesses to help the PNA improve last-mile distribution going forward.

5.3. Plans and Justification with FY 2023 Funding

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

Senegal will continue to support health supply chain strengthening and pharmaceutical management activities as described above, with no major shifts from the activities noted in the Recent Progress section (5.2).

6. Social and Behavior Change

6.1. PMI Goal and Strategic Approach

PMI's SBC support to the NMCP's Malaria Communication Strategy fully aligns with and contributes to the NMCP objectives at the central and local operational levels. PMI contributes to the NMCP's SBC strategy by supporting efforts on the acceptance and correct and consistent use of proven interventions such as SMC, ITNs, ANC attendance, IPTp, and IRS, as well as reinforcing early care-seeking behavior for prompt case management.

The overarching goal of Senegal's current national malaria communication as described in its NSP 2021–2025 has two specific objectives:

- To bring 80 percent of the population to adopt healthy behaviors with regards to malaria prevention measures and case management by 2025.
- Increase NMCP institutional communication activities from 33 percent to 80 percent, thereby improving visibility and recognition of NMCP-led progress in the fight against malaria).

PMI supports the NMCP to achieve its communication objectives, which are designed to:

- Increase the proportion of the population sleeping under ITNs to >80 percent.

- Increase the proportion of pregnant women who take at least three doses of SP under directly observed treatment at ANC to >80 percent.
- Increase the proportion of people who seek care at health facilities within 24 hours of the onset of fever to >80 percent.
- Increase compliance in the treatment of uncomplicated malaria.
- Have at least 80 percent of embassy, airport, hotel, and port officials share aspects of traveler malaria chemoprophylaxis according to NMCP guidelines.
- Strengthen partnerships with the private sector, media, local government, parliament, and other government departments.

Finally, PMI continues to strengthen capacity through training of community actors and service providers, developing contextually tailored SBC work plans, implementing mass media activities, translating SBC materials into local languages, and distributing communications materials.

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

PMI has supported various community mobilization and SBC activities in Senegal. These include both ongoing SBC activities through mass media and interpersonal communications, and targeted activities promoting specific interventions, such as ITN distribution or SMC campaigns. Typical communications activities in Senegal have included community meetings on a specific topic, home visits, theater, community radio (radio spots as well as interviews and programming), and social mobilization with focus topics, using speeches, music, skits, banners, and t-shirts to convey messages. Topics of ongoing SBC at the community level include the importance of owning and using ITNs, prompt care-seeking in case of fever, recognition of danger signs, the importance of ANC visits, and the importance of receiving the recommended doses of IPTp.

In close collaboration with the NMCP, PMI supported:

- Production of materials to strengthen malaria-related communication, including regarding ITN availability and use in accordance with standards.
- Production of 7,000 malaria flipcharts, 7,000 information sheets, and radio and television spots.
- 3,633 home visits conducted by 222 community actors in 56 health posts.
- 17,253 people sensitized, including 10,487 women on the importance of IPTp uptake and ITNs.
- Production and distribution of communication tools for targeted communities including 3,900 t-shirts, 3,550 caps, 100 banners, 110 training guides, and 1,560 IRS pocket guides for CHWs and supervisors.
- Production and distribution of SMC communication tools (57,576 t-shirts and caps, 1,252 polo shirts, 16,717 bibs, 16,717 bags, 4,509 scarves, 378 banners, and 3,545 posters)

Additionally with PMI support, community mobilizers reached 310,085 people through door-to-door visits during and after the IRS campaign with communication messaging in the four IRS-targeted districts of Kedougou, Makacoulibantang, Koumpentoum, and Koungheul. SBC activities included mass media messaging such as broadcasting of radio spots in local languages, and interactive broadcasts on local radio stations. All messages emphasized the benefits of IRS and the preparations to be made by the household members before, during, and after the spraying.

One major challenge to the effective implementation of SBC activities was the NMCP's lack of planning for and reporting of them. PMI assessed the need to increase capacity strengthening and to develop a more strategic and evidence-based intervention plan. Other marked challenges in malaria-focused areas are:

- MIP: While uptake of IPTp2 and IPTp3 increased from 2020 to 2021, Senegal still lags behind its goal to reach at least 80 percent of IPTp3 uptake (pregnant women who received all three doses of SP). Investment is needed to increase sensitization of pregnant women on the importance of completing all recommended IPTp doses and to increase CHWs' capacity to improve referral and follow-up methods.
- SMC: The major challenge encountered with the SMC strategy has been uptake refusals in urban areas of targeted regions, particularly in the districts of Diourbel and Kaolack, with COVID-19 further exacerbating this trend. In addition, some children have had minor adverse reactions, which, if not managed properly, can lead to an increase in refusals. Vomiting due to the bitter taste of the medication is also a concern for parents. It is important to have a map of the areas with recurrent refusals and to have context-specific communication plans to improve the coverage rate, specifically in the communes (Diourbel, Touba, Kedegou).
- Case management: Prompt and early care-seeking continue to be affected by socio-cultural behaviors. A thorough analysis of barriers and triggers for care-seeking is necessary to develop appropriate SBC interventions.
- In the context of elimination, the decrease of malaria cases leads to a trivialization of the disease, which leads people to delay care-seeking. Inability to access health facilities in some areas during the transmission period can lead people to seek traditional methods of treatment or no treatment/testing.
- ITN ownership and proper usage: Senegal reported a decrease in bed net usage from 2019 to 2021 among the general population and among women and children. SBC activities with a focus on usage of ITNs, especially for pregnant women and children, need to be increased.

6.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of SBC activities that PMI proposes to support in Senegal with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Priorities

Malaria in Senegal remains unequally distributed among the regions with pronounced disparities between districts, particularly in the three PMI focus regions (Kolda, Tambacounda, and Kédougou) which carry the bulk of the malaria burden. PMI support for SBC will continue to focus mainly on these high burden regions with an integrated package of activities aiming to increase uptake and utilization of core malaria interventions (ITN, SMC, MIP) and treatment services (early care-seeking, and access to RDTs and ACTs). Channels of communication will include mass media through radio and TV, and interpersonal communication through community-based organizations working with CHWs. At the national level, PMI will support the NMCP for SBC messaging and advocacy during special events such as SMC campaigns, ITN distribution campaigns, and World Malaria Day. Targeted regional communication activities will include the procurement of communication tools and technical support for the design of SBC materials.

While PMI supports SBC activities that promote the uptake and maintenance of all key malaria interventions, the following three behaviors will be prioritized with FY 2023 funds:

Table 4. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Low uptake of IPTp3	Pregnant women and heads of households	Kolda, Diourbel, Kédougou, Tambacounda, Sédhiou	While IPTp3 coverage increased from 53.6% in 2019 to 64.8% in 2020, the strategic objective for 2020 of 80% coverage has not been reached. PMI plans to target high burden regions with SBC combined with mobile outreach at the community level to increase IPTp3 coverage to the national target of 80%.
Inadequate use of nets	All population with a particular focus on pregnant women and caregivers of children under five years of age	All regions	Bed net usage decreased by 29% from 2019 to 2021. PMI support for vector control is shifting from use of IRS to a broad introduction of new types of nets (PBO and dual AI), prioritizing high burden areas and neighboring regions. Specific communication will include information about the new types of nets. To ensure optimal impact of PMI's investment in new types of nets, communication activities around use of nets will be reinforced.
Delayed care-seeking	All population	All regions	Studies reveal knowledge gaps in the efficacy of ACTs and misconception around the cost of services when seeking malaria treatment, education on self-treatment, and use of traditional medicines. PMI plans to intensify support to promote early care-seeking

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
			behavior to avert severe cases in both elimination and control settings. As malaria burden is very low in elimination settings, the perceived risk of malaria may be very low as well, even though the risk for severe disease is higher due to waning immunity in the population. Therefore, the type of SBC activities around care-seeking may be different for elimination and control settings.

Additional Support Activities

PMI's specific focus will be to support SBC activities in the high burden southeastern region of the country. Additionally, with the proposed implementation of PBO and dual AI nets, the SBC activities strengthening the use of ITNs and highlighting the added value of PBO/dual AI nets will be reinforced in the districts where these new ITNs will be distributed. PMI plans to provide additional SBC support activities such as:

- Coordination at the national level with the mapping of SBC activities in collaboration with Global Fund and other stakeholders.
- Increase in district-specific technical assistance for SBC activities.

7. Surveillance, Monitoring, and Evaluation

7.1. PMI Goal and Strategic Approach

In Senegal, PMI collaborates with the NMCP, the Global Fund, and BMGF-supported partners in providing technical assistance and resources for SM&E activities. The NMCP objective for SM&E is to ensure 100 percent prompt and complete routine reporting at all levels and use of data for SM&E of the 2021–2025 Strategic Plan. To achieve this objective, the NMCP will focus on strengthening SM&E capacity and continue to focus on strengthening the routine information system at national, regional, district, facility, and community levels. The NMCP has worked closely with the Division of Social and Health Information Systems (*Division du Système d'Information et des Statistiques Sanitaires*, or DSISS) to fully integrate the NMCP's parallel malaria reporting system into the national health management information system (HMIS) that uses the DHIS2 platform, and worked with the MOH to improve the quality of the malaria data. As Senegal pushes toward elimination, the stated objectives of the NMCP in surveillance are to: 1) detect 100 percent of epidemics and emergencies within one week with an early warning system, 2) control 100 percent of epidemics and emergencies within one week of detection, and 3) monitor vector resistance to insecticides.

Senegal's approach to achieving these objectives is to continue to strengthen its surveillance system as it works toward elimination. Senegal's strategy is to support the following:

- Reporting by epidemic surveillance sites of all data on a weekly basis, and analysis of data to identify hotspots.
- Introduction of mobile health system to facilitate reporting of data at community level and reporting of weekly case counts.
- Supervision of health facility and CHWs, using tablet computers to streamline analysis and feedback.
- Strengthening of epidemic prediction and detection and community-based surveillance.
- Strengthening the documentation of index cases and the investigation of cases and epidemic situations.
- Strengthening of entomological surveillance and monitoring the effectiveness of insecticides.

PMI continues to support key data collection and analysis activities, including continued collaboration with the DSISS and the NMCP to increase use of the HMIS in DHIS2. The NMCP continues to evaluate the completeness and timeliness of data and perform data quality checks through quarterly reviews at the district level and onsite verification with supervision by the DSISS and the MOH. PMI supports technical assistance to the continuous Demographic and Health Survey (cDHS) for data analysis and dissemination. The cDHS is a survey that the National Statistics and Demographic Agency began implementing annually starting in 2012. PMI also supports capacity strengthening through the malariology and SM&E courses and continued supervision and data quality improvement at the central, regional, and district levels.

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

Central Level

- Continued support for weekly reporting from sentinel sites, routine HMIS data collection with the production of the annual epidemiologic bulletin.
- Continued improvement in data completeness, from 95.7 percent to 97.8 percent completeness at the national level.

Regional/District/Community Level

- Continued support for the inclusion of data from the private sector, resulting in an increase in private sector data completeness of the structures currently in the HMIS from 64.9 percent to 87.8 percent.
- Support for case investigations and training of health staff in investigation procedures in pre-elimination zones with incidence <5/1,000.

- Improvement in completeness of community-level data from 86.1 percent to 99.0 percent.

7.3. Plans and Justification with FY 2023 Funding

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

With FY 2023 funding, PMI will continue to contribute to the implementation of the cDHS. PMI also will continue to support the improvement of data collection and quality at the district, facility, and community levels, as well as supporting peer supervision and training through the malaria surveillance, monitoring, and evaluation course.

Historically the IDB was a major funding partner for elimination activities implemented in Senegal, with PMI providing strategic and focused support in targeted northern regions. The IDB project ended in 2021, leaving a gap in resources to support all elimination activities that Senegal would like to implement. While future funding from the Islamic Development Bank is not guaranteed, due to the priority of supporting activities in the KKT region and resulting funding constraints, PMI has reduced support for case investigations and response to again focus on support for three regions (Louga, Matam and St. Louis). Specifically, PMI is pulling back support for the expansion to Diourbel, Fatick and Thies regions as was proposed in the FY 2022 MOP. With FY 2023 funds, PMI will support the operational costs of case investigations and training of health workers and CHWs to perform these investigations, which will include their weekly reporting into the HMIS in districts where incidence is <5 per 1,000.

The NMCP requested support for the development of a malaria repository, but this will not be possible in FY 2023 due to funding constraints and other intervention priorities. However, PMI will continue discussions on this need with the NMCP and the Global Fund.

Table 5. Available Malaria Surveillance Sources

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Household Surveys	Demographic Health Survey			P	P	P	P
Household Surveys	Malaria Indicator Survey	X	X				
Health Facility Surveys	Service Provision Assessment			P	P	P	P
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies	X	X	X	P	P	P

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response	X*	X*	X*	P*	P*	P*
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System						
Malaria Surveillance and Routine System Support	Weekly Surveillance Bulletin	X	X	X	P	P	P
Other	End-user verification	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

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

8. Operational Research and Program Evaluation

8.1. PMI Goal and Strategic Approach

There is one operational research (OR)-related specific objective in the updated Senegal National Malaria Strategic Plan 2021–2025:

- Increase from 26% to 60% (gross execution of planned activities) the promotion and implementation of operational research activities

The NSP indicates that the objective of operational research is to guide the strategic plan implementation and provide evidence for innovative initiatives. Three interventions are related to this specific objective:

- Intervention 1: Promotion of operational research
- Intervention 2: Development of operational research topics of national interest
- Intervention 3: Implementation of operational research topics of national interest

As described in the NSP, to promote operational research at all levels, the NMCP, in collaboration with the committee for Research and Training within the framework of

theMalaria Partners Coordination Committee (CCPLP), will identify operational research needs on an annual basis. These various operational research projects will be submitted to the CCPLP Committee for Research and Training for validation. These priorities will form the basis for resource mobilization. The implementation of these projects will ensure efficiency in decision-making. For better coordination, a framework for sharing malaria research results will be used. This will involve organizing annual workshops to share research results on malaria. Both Global Fund and PMI were approached to support these efforts (operational costs for the CCPLP and annual scientific workshops).

In Senegal, PMI financially supports program- and policy-relevant OR and program evaluation (PE) activities proposed by the NMCP. In-country or headquarters-based PMI staff participate as co-investigators in specific OR/PE activities (usually the ones funded by PMI), and the PMI in-country team participates actively in the CCPLP. In addition, PMI Resident Advisors and malaria specialists participate as lecturers in training modules on operational research as part of the malariology training course organized by the NMCP, and as guest lecturers at national universities when requested.

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

Study: Mass drug administration with DHA-PQ and primaquine to reduce malaria in a moderate-low transmission setting in Senegal: a cluster randomized controlled trial (core-funded),

Objective: To determine the effect of three rounds of mass drug administration (MDA) with DHA-PQ and low-dose primaquine on village-level confirmed malaria case incidence compared to standard of care SMC when provided in the context of optimized control (proactive community case management + PBO nets).

- December 2020 baseline survey data analyzed:
    - 2,352 participants from 497 households across 60 villages (control and intervention arms)
    - Parasite prevalence was 7 percent across all ages (by microscopy), PCR data are still being analyzed.
    - High use of PBO nets (94 percent).
    - Participants with parasitemia were more likely to be younger (<20 yo).

- Successful implementation of MDA campaign. Three rounds of MDA (DHA-PQ + single low-dose primaquine) were administered in July, August, and September 2021.

    - 184 drug delivery teams targeting about 9,955 participants living in 30 villages (intervention arm)
    - Operational coverage increased across the three rounds, from 79 percent to 90 percent

- Completion of endline survey in December 2021 and ongoing analysis of microscopy slides to determine parasite prevalence (secondary outcome).
- Completion of data collection of 2021 village-level malaria incidence data to analyze primary outcome. Collection of 2022 data is ongoing.
- Reagents and consumables for the serological and molecular characterization have been procured and shipped to Senegal.
- Ongoing costing exercise to evaluate the cost-effectiveness of MDA compared to SMC.
- Two abstracts submitted to the American Society of Tropical Medicine and Hygiene 2022 (acceptability of MDA; operational challenges and lessons learned). An additional abstract will be submitted on the short-term impact of MDA.

Table 6. PMI-funded Operational Research/Program Evaluation Studies in Senegal

Recently Completed OR/PE Studies	Status of Dissemination	Start date	End date
Mass drug administration with DHA-PQ and primaquine to reduce malaria in a moderate-low transmission setting in Senegal: A cluster randomized controlled trial (core-funded)	Ongoing analysis of samples/results report/manuscript under development	10/2020	12/2022
Ongoing or Planned OR/PE Studies	**Status**	**Start date**	**End date**
Framework to assess and remediate barriers to care-seeking for febrile illness in Senegal (formative research)	Concept note and protocol developed	Fall 2022	Spring 2023
Assessing innovative intervention packages for urban malaria control in Senegal	Concept note under development	Summer 2023	Winter 2023

Table 7. Non-PMI-funded Operational Research/Program Evaluation Studies Planned/Ongoing in Senegal

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
BMGF	• UCAD • Harvard University • Broad Institute • MOH/NMCP	Integrating genomic data into real-world malaria surveillance and decision-making strategy	2020–2023
BMGF	• PATH/MACEPA • UCSF • MOH/NMCP	Identification of high-risk populations for malaria and characterization of their movement and exposure profiles to develop	2019–2022

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
	• UCAD	specific intervention strategies (formative research). Interventions to be tested in pilot phase among gold miners and residents of residential Koranic school	
BMGF	• MOH/NMCP • PATH (MACEPA)	Impact evaluation of cross-border interventions (Senegal/Gambia)	Initiated in 2021
BMGF	• Universite de Thies • MOH/NMCP • London School of Hygiene & Tropical Medicine	Impact assessment of non-SMC administration in southern Senegal in 2018 due to health system challenges	2020–2022
WHO/Special Program for Research and Training in Tropical Diseases	• Universite de Thies • MOH/NMCP	Monitoring SMC and IPTp efficacy through antenatal clinics in southeast Senegal	2019–2022
WHO	• MOH/NMCP • PATH/MACEPA	Project 1.7 mRCTR in Saraya District: Community-based testing and treatment response to malaria	2022–2023
UK Research and Innovation	• Thies University • MOH/NMCP • MOH/NTD • London School of Hygiene & Tropical Medicine	Investigating the feasibility and effectiveness of integrating helminth control with SMC in Senegalese children (Kedougou)	Initiated in January 2021
Sanofi	• Thies University • MOH/NMCP	Identification of strategies for a significant, rapid, and sustainable reduction of the malaria burden in the regions of Kolda, Kédougou, and Tambacounda (red zone)	Initiated in 2022

8.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of OR/PE activities that PMI proposes to support in Senegal with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

No OR/PE activities are proposed with FY 2023 funding.

9. Capacity Strengthening

9.1. PMI Goal and Strategic Approach

PMI supports many of the priority areas presented in the Senegal 2021–2025 NSP, with a particular focus on capacity strengthening for the NMCP and operational-level actors, promoting stronger coordination among partners, and decentralization.

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

PMI supported NMCP capacity strengthening priorities. Specific interventions included the following:

- Supported three meetings of the CCPLP (Malaria Partners Coordination Committee) which brought together NMCP staff, in-country partners, the Global Fund, PMI, WHO, and other partners to discuss and guide the NMCP.
- Placed a health systems strengthening malaria advisor within the NMCP to provide managerial and capacity strengthening support to the NMCP.
- Supported the NMCP and other MOH entities in the management of the Fixed Amount Reimbursement Agreement.
- Supported the malariology course that is offered to health staff at various levels to allow for in-country training opportunities.
- Supported participation in international scientific and professional meetings to provide NMCP staff (central and field level) opportunities to learn best practices, share experiences, and develop networks. Meetings included the American Society of Tropical Medicine and Hygiene and the Pan African Malaria conferences.
- Supported local governments to include malaria and other health priorities in their development plans and increased participation of communities in decision-making regarding health issues. This included participatory budgeting, training of local elected officials of the Health Technical Commissions, and promoting synergy and multisectoriality of interventions by actors in the fight against malaria at the institutional and territorial levels. Twelve workshops targeting local elected authorities have been conducted in the regions of Kolda, Kedougou, Sedhiou and Ziguinchor, resulting in 12 engagements from mayors to include malaria activities in their local development plans.

9.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of capacity strengthening activities that PMI proposes to support in Senegal with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Senegal will continue to support capacity strengthening activities as described in the Recent Progress section (9.2), with no major shifts.

10. Staffing and Administration

A minimum of three health professionals oversee PMI in Senegal. The single interagency team led by the USAID Mission Director or their designee consists of a Resident Advisor representing USAID, a Resident Advisor representing the Centers for Disease Control and Prevention, and one or more locally hired experts known as Foreign Service Nationals. The PMI interagency team works together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners.

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	17,738,795	18,275,743	18,818,198
Total population at risk for malaria	17,738,795	18,275,743	18,818,198
PMI-targeted at-risk population	17,738,795	18,275,743	18,818,198
Population targeted for ITNs	17,738,795	18,275,743	18,818,198
Continuous Distribution Needs			
Channel 1: ANC	453,226	500,298	549,491
Channel 1: ANC Type of ITN	PBO and Single Pyrethroid	Dual AI and Single Pyrethroid	Dual AI
Channel 2: EPI	213,318	234,650	245,316
Channel 2: EPI Type of ITN	PBO and Single Pyrethroid	Dual AI and Single Pyrethroid	Dual AI
Channel 3: School	6,084	6,692	6,996
Channel 3: School Type of ITN	PBO and Single Pyrethroid	Dual AI and Single Pyrethroid	Dual AI
Channel 4: Community	245,496	257,187	268,877
Channel 4: Community Type of ITN	PBO and Single Pyrethroid	Dual AI and Single Pyrethroid	Dual AI
Channel 5: Sanitaires	568,990	596,085	623,179
Channel 5: Type of ITN	PBO and Single Pyrethroid	Dual AI and Single Pyrethroid	Dual AI
Estimated Total Need for Continuous Channels	1,487,114	1,594,911	1,693,859
Mass Campaign Distribution Needs			
Mass distribution campaigns	6,976,485		
Mass distribution ITN type	PBO and Single Pyrethroid		
Estimated Total Need for Campaigns	6,976,485	0	0
Total ITN Need: Continuous and Campaign	**8,463,599**	**1,594,911**	**1,693,859**
Partner Contributions			
ITNs carried over from previous year	116,667	231,113	33,350
ITNs from Government	0	0	0
Type of ITNs from Government			
ITNs from Global Fund	4,745,200	0	
Type of ITNs from Global Fund	Single Pyrethroid		
ITNs from other donors (IDB)	2,000,000	0	
Type of ITNs from other donors	Single Pyrethroid		
ITNs planned with PMI funding	1,832,845	1,397,149	781,500
Type of ITNs with PMI funding	Dual AI and PBO	Dual AI and Single Pyrethroid	Dual AI

Calendar Year	2022	2023	2024
Total ITNs Contribution Per Calendar Year	**8,694,712**	**1,628,262**	**814,850**
Total ITN Surplus (Gap)	**231,113**	**33,350**	**(879,009)**

Table A-2. RDT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	17,738,795	18,275,743	18,818,198
Population at risk for malaria	17,738,795	18,275,743	18,818,198
PMI-targeted at-risk population	17,738,795	18,275,743	18,818,198
RDT Needs			
Total number of projected suspected malaria cases	3,150,000	3,003,000	3,066,000
Percent of suspected malaria cases tested with an RDT	100%	100%	100%
RDT Needs (tests)	3,150,000	3,303,300	3,372,600
Needs Estimated based on HMIS Data			
Partner Contributions (tests)			
RDTs from Government	0	0	0
RDTs from Global Fund	0	0	0
RDTs from other donors	0	0	0
RDTs planned with PMI funding	3,200,000	3,500,000	3,622,600
Total RDT Contributions per Calendar Year	**3,200,000**	**3,500,000**	**3,622,600**
Stock Balance (tests)			
Beginning Balance	861,750	911,750	1,108,450
- Product Need	3,150,000	3,303,300	3,372,600
+ Total Contributions (received/expected)	3,200,000	3,500,000	3,622,600
Ending Balance	**911,750**	**1,108,450**	**1,358,450**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	787,500	825,825	843,150
Total Surplus (Gap)	**124,250**	**282,625**	**515,300**

Table A-3. ACT Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	17,738,795	18,275,743	18,818,198
Population at risk for malaria	17,738,795	18,275,743	18,818,198
PMI-targeted at-risk population	17,738,795	18,275,743	18,818,198
ACT Needs			
Total projected number of malaria cases	617,400	630,630	643,860
Total ACT Needs (treatments)	**617,400**	**630,630**	**643,860**
Needs Estimated based on HMIS Data			
Partner Contributions (treatments)			
ACTs from Government	0	0	0
ACTs from Global Fund	0	0	0
ACTs from other donors	0	0	0
ACTs planned with PMI funding	500,000	630,630	602,609
Total ACTs Contributions per Calendar Year	**500,000**	**630,630**	**602,609**
Stock Balance (treatments)			
Beginning Balance	319,616	202,216	202,216
- Product Need	617,400	630,630	643,860
+ Total Contributions (received/expected)	500,000	630,630	602,609
Ending Balance	**202,216**	**202,216**	**160,965**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	154,350	157,658	160,965
Total Surplus (Gap)	**47,866**	**44,559**	**0**

Table A-4. Inj. Artesunate Gap Analysis Table

Calendar Year	2022	2023	2024
Injectable Artesunate Needs			
Projected number of severe cases	12,748	12,648	12,548
Projected number of severe cases among children	2,810	2,760	2,710
Average number of vials required for severe cases among children	7	7	7
Projected number of severe cases among adults	9,888	9,838	9,788
Average number of vials required for severe cases among adults 11 to 25 years of age	8	8	8
Average number of vials required for severe cases among adults older than 25 years of age	5	5	5
Total Injectable Artesunate Needs (vials)	**67,986**	**85,115**	**84,445**
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	0	0	0
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	75,000	85,115	84,445
Total Injectable Artesunate Contributions per Calendar Year	**75,000**	**85,115**	**84,445**
Stock Balance (vials)			
Beginning Balance	60,520	67,534	67,534
- Product Need	67,986	85,115	84,445
+ Total Contributions (received/expected)	75,000	85,115	84,445
Ending Balance	**67,534**	**67,534**	**67,534**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	16,997	21,279	21,111
Total Surplus (Gap)	**50,538**	**46,255**	**46,423**

Table A-5. RAS Gap Analysis Table

Calendar Year	2022	2023	2024
Artesunate Suppository Needs			
Number of severe cases expected to require pre-referral dose (or expected to require pre-referral dose based on number of providers for the service)	8,100	8,400	8,700
Total Artesunate Suppository Needs (suppositories)	**26,730**	**27,720**	**28,710**
Needs Estimated based on HMIS Data			
Partner Contributions (suppositories)			
Artesunate suppositories from Government	0	0	0
Artesunate suppositories from Global Fund	0	0	0
Artesunate suppositories from other donors	0	0	0
Artesunate suppositories planned with PMI funding	30,000	36,000	0
Total Artesunate Suppositories Available	**30,000**	**36,000**	**0**
Stock Balance (suppositories)			
Beginning Balance	42,720	0	0
- Product Need	26,730	27,720	28,710
+ Total Contributions (received/expected)	30,000	36,000	0
Ending Balance	**45,990**	**8,280**	**(28,710)**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	6,683	6,930	7,178
Total Surplus (Gap)	**39,308**	**1,350**	**(35,888)**

Table A-6. SP Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	17,738,795	18,275,743	18,818,198
Total Population at Risk for Malaria	17,738,795	18,275,743	18,818,198
PMI Targeted at Risk Population	17,738,795	18,275,743	18,818,198
SP Needs			
Total Number of Pregnant Women	647466	667065	686864
Percent of pregnant women expected to receive IPTp1	87%	92%	97%
Percent of pregnant women expected to receive IPTp2	80%	85%	90%
Percent of pregnant women expected to receive IPTp3	70%	75%	80%
Percent of pregnant women expected to receive IPTp4	29%	34%	39%
Total SP Needs (doses)	**1,722,260**	**1,907,805**	**2,101,805**
Needs Estimated based on HMIS Data			
Partner Contributions (doses)			
SP from Government	0	0	0
SP from Global Fund	914,100	1,540,950	0
SP from other donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Contributions per Calendar Year	**914,100**	**1,540,950**	**0**
Stock Balance (doses)			
Beginning balance	707,029	0	
- Product Need	1,722,260	1,907,805	2,101,805
+ Total Contributions (Received/expected)	914,100	1,540,950	0
Ending Balance	**(101,131)**	**(366,855)**	**(2,101,805)**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	430,565	476,951	525,451
Total Surplus (Gap)	**(531,696)**	**(843,806)**	**(2,627,256)**

Table A-7. SMC Gap Analysis Table

Calendar Year	2022	2023	2024
Total country population	17,738,795	18,275,743	18,818,198
Total population in the SMC targeted age range	4,661,755	4,802,865	4,945,422
SMC Drug (SP+AQ) Needs			
National population 3-11 months targeted for SMC	84,689	86,975	89,324
National population 12-59 months targeted for SMC	445,657	457,690	470,047
National population 60-120 months targeted for SMC	364,092	373,923	384,018
Total national population targeted for SMC	**894,438**	**918,588**	**943,389**
PMI population 3-11 months targeted for SMC	84,689	86,975	89,324
PMI population 12-59 months targeted for SMC	445,657	457,690	470,047
National population 60-120 months targeted for SMC	364,092	373,923	384,018
Total PMI population targeted for SMC	**894,438**	**918,588**	**943,389**
Total SP+AQ Needs (co-blisters)	**4,534,281**	**6,551,028**	**6,551,028**
Partner Contributions (co-blisters, national)			
SP+AQ carried over from previous year	453,702	434,871	434,871
SP+AQ from Government	0	0	0
SP+AQ from Global Fund	0	0	0
SP+AQ from other donors	0	0	0
SP+AQ planned with PMI funding	4,515,450	6,551,028	6,551,028
Total SP+AQ Contributions per Calendar Year	4,969,152	6,985,899	6,985,899
Total SP+AQ Surplus (Gap)	**434,871**	**434,871**	**434,871**

Table A-8. Primaquine Gap Analysis Table

Calendar Year	2022	2023	2024
Total Country Population	17,738,795	18,275,743	18,818,198
Total population at risk for malaria	17,738,795	18,275,743	18,818,198
PMI-targeted at-risk population	17,738,795	18,275,743	18,818,198
Primaquine Needs			
Total projected number of malaria cases	617,400	630,630	643,860
Total projected number of Pf cases	60,554	63,042	64,701
Total projected number of Pv cases	0	0	0
Total projected number of mixed cases (Pf + Pv)	60,554	63,042	64,701
Total Primaquine Needs (tablets)	**115,052**	**119,780**	**122,932**
Needs Estimated based on HMIS Data			
Partner Contributions (tablets)			
Primaquine from Government	0	0	0
Primaquine from Global Fund	0	0	0
Primaquine from other donors	0	0	0
Primaquine planned with PMI funding	20,000	119,780	122,932
Total Primaquine Contributions per Calendar Year	**20,000**	**119,780**	**122,932**
Stock Balance (tablets)			
Beginning Balance	2,700	0	0
- Product Need	115,052	119,780	122,932
+ Total Contributions (received/expected)	20,000	119,780	122,932
Ending Balance	**(92,352)**	**0**	**0**
Desired End of Year Stock (months of stock)	3	3	3
Desired End of Year Stock (quantities)	28,763	29,945	30,733
Total Surplus (Gap)	**(121,115)**	**(29,945)**	**(30,733)**