

The following document is an abbreviated malaria operational plan. The principles guiding development of this document—country-led, inclusive, consultative with a broad audience, and transparent—are consistent with best practices that the U.S. President’s Malaria Initiative (PMI) has instituted since its inception. While an in-depth background of malaria in this country can be found in the detailed [FY 2018 malaria operational plan](#) on [pmi.gov](#), this abbreviated document provides a high-level overview of PMI’s program in this country, including key strategic updates, country data and progress updates, and a detailed list of activities to be supported with FY 2019 U.S. Government PMI funding.

This abbreviated malaria operational plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2019 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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PRESIDENT'S MALARIA INITIATIVE

SENEGAL

Abbreviated Malaria Operational Plan FY 2019

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ABBREVIATIONS AND ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
CDC	Centers for Disease Control and Prevention
cDHS	Continuous Demographic and Health Survey
DHA-PQP	Dihydroartemisinin-piperaquine
DHS	Demographic and Health Survey
DOT	Directly observed therapy
DSDOM	<i>Dispensateur de soins à domicile</i> (village malaria worker)
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
IDB	Islamic Development Bank
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MoH	Ministry of Health
MOP	Malaria Operational Plan
NMCP	National Malaria Control Program
PECADOM	<i>Prise en charge à domicile</i> (home-based management of malaria)
PMI	U.S. President's Malaria Initiative
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SM&E	Surveillance, monitoring, and evaluation
SMC	Seasonal malaria chemoprevention
SP	Sulfadoxine-pyrimethamine
SP-AQ	Sulfadoxine-pyrimethamine/amodiaquine
TDY	Temporary duty assignment
UCAD	<i>Université Cheikh Anta Diop</i>
USAID	United States Agency for International Development

I. INTRODUCTION

This abbreviated fiscal year (FY) 2019 Malaria Operational Plan (MOP) presents an implementation plan for Senegal, based on the strategies of the U.S. President's Malaria Initiative (PMI) and the National Malaria Control Program (NMCP) and building on investments made by PMI and other partners to improve and expand malaria-related services. It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The [FY 2018 MOP](#) contains a more detailed and comprehensive description of the malaria situation in Senegal, country health system delivery structure, Ministry of Health (MoH) organization, and PMI's progress through April/May of 2017. This abbreviated MOP describes critical changes/updates to overall NMCP and PMI strategic approaches, as well as newly proposed activities under each technical area to be supported with FY 2019 funds.

II. OVERVIEW OF PMI IN SENEGAL

Senegal began implementation as a PMI focus country in FY 2007. The proposed FY 2019 PMI budget for Senegal is \$24 million.

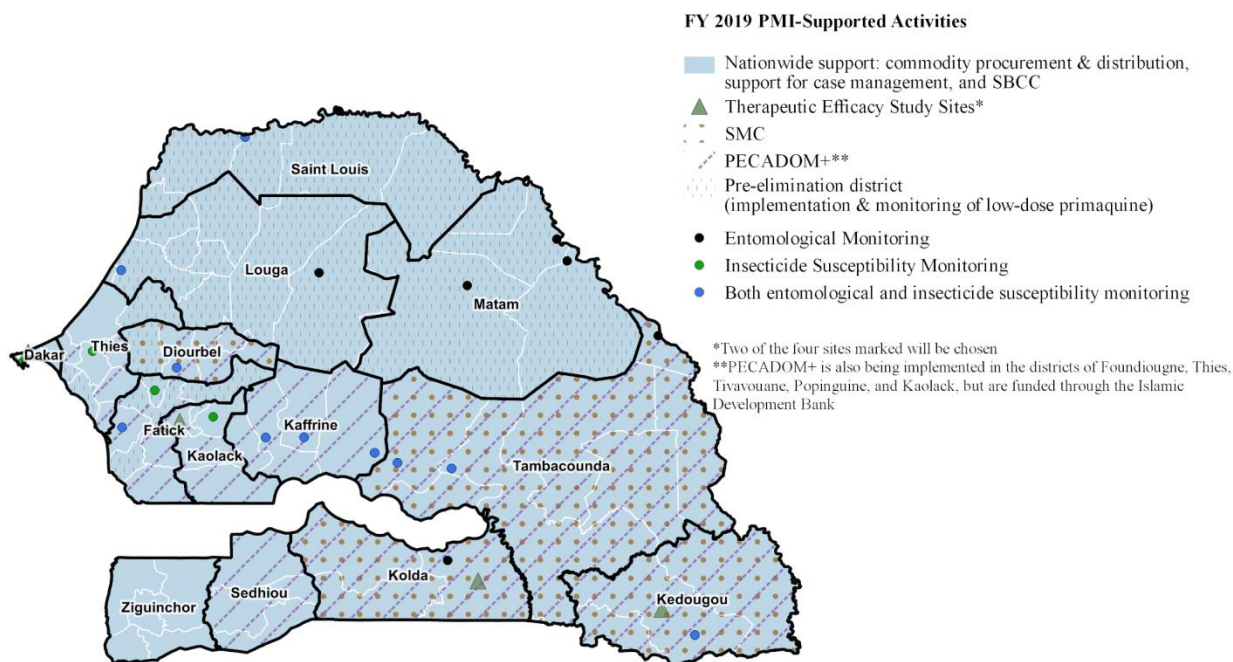
In FY 2017, PMI provided almost half of the funding needed for implementation of NMCP-planned activities. Funded interventions are in line with the country's national malaria control strategy and build on investments made by PMI and other partners (mainly The Global Fund to Fight AIDS, Tuberculosis, and Malaria [Global Fund] and the Islamic Development Bank [IDB]) to improve and expand malaria-related services in Senegal.

PMI takes into account other funding mechanisms in the country and coordinates with other donors to ensure complementarity and avoid duplication. For instance, IDB has taken over indoor residual spraying (IRS) in 13 districts within pre-elimination areas in the north, while PMI supports a post-IRS withdrawal plan through SBCC interventions related to the IRS withdrawal in the four former IRS districts in the central region, the use of insecticide-treated mosquito nets (ITNs), and the promotion of prompt care seeking behaviors. There will also be enhanced monitoring of commodities and incidence in the area. PMI and the Global Fund both contribute to the procurement of long-lasting ITNs, the scale-up of home-based management of malaria (*prise en charge à domicile* or *PECADOM*), and reinforcement of surveillance and monitoring and evaluation efforts. In 2017, a financial and programmatic mapping of the three major donors' contributions to the NMCP was performed by an independent consultant and shared with all three donors. As a result, the NMCP is currently working on developing an integrated annual workplan that identifies all planned activities and major funders to ensure better coordination.

PMI adopts a two-pronged approach in Senegal, with procurement of commodities for nationwide coverage and a tailored approach that is responsive to region/district specific epidemiologic profiles and programmatic needs. More specifically, 46 percent of FY 2019 PMI funding in Senegal supports the procurement of malaria control commodities (ITNs, SP-AQ for SMC, RDTs, ACTs, primaquine, rectal artesunate, injectable artesunate, and warehousing and distribution costs). The remaining budget covers various malaria prevention and treatment activities targeting the high incidence, southeastern regions of Kolda, Kédougou, Sédhiou, and Tambacounda and includes active case management (PECADOM Plus) in 40 districts, seasonal malaria chemoprevention (SMC) campaigns during high transmission season, and cross-cutting interventions such as health systems strengthening, capacity building, surveillance,

monitoring, and evaluation (SM&E), and SBCC. In four regions (Saint Louis, Kaolack, Kaffrine, and Ziguinchor), some elimination related activities are also covered.

Figure 1: Geographic Distribution of FY 2019 PMI-Supported Activities



III. STRATEGY UPDATES

While there are no major changes in the NMCP strategy this year, there are a few activities to highlight:

- As stated in the National Strategic Plan (2015-2020), decentralization of malaria control activities is a specific objective of the NMCP. Following a pilot of decentralized implementation of malaria control activities in the Sédhiou Region in 2017, the NMCP decided to expand this decentralized approach to five regions (Diourbel, Kaolack, Tambacounda, Kédougou, and Kolda) in 2018.
- In 2018, the NMCP decided to stop IRS implementation with PMI funding and have IDB support IRS in hotspots in pre-elimination areas. With FY 2019 funds, the NMCP has expressed interest in resuming PMI support for IRS implementation. However, the focus areas for the next IRS campaign will shift from the previously targeted central region, where transmission is low, to districts (TBD) in higher transmission areas, with the goal of reducing incidence in those areas to the levels of low incidence/pre-elimination areas. Districts will be chosen based on epidemiologic and entomologic data currently being collected. Please refer to the IRS section of this document for further information
- The geographic coverage of SMC is changing to take into account the epidemiological context, which shows a continued decrease in malaria transmission and burden, leading to the Sédhiou

Region no longer meeting World Health Organization eligibility criteria for SMC. Therefore, Sédhiou will be replaced after the 2018 campaign by Touba and Diourbel Districts in the Diourbel Region. These districts better meet the selection criteria and have much larger populations. The plan is to incrementally increase the total target for SMC over the next couple of years based on available funding.

- IDB will provide a total of \$36 million to Senegal for three years from 2017-2019. In this financing agreement, 89 percent of the funding is a loan and 11 percent is a grant. The geographic focus of IDB funding is pre-elimination areas in the north and central regions of the country, namely 25 districts in six regions (Diourbel, Fatick, Louga, Matam, Saint Louis, and Thiès) with a total population of nearly four million. The activities they support in the 25 northern districts include IRS in 13 health districts, ITN distribution, increasing coverage of three doses of intermittent preventive treatment for pregnant women (IPTp3), introduction of low-dose primaquine, the implementation of PECADOM Plus, and support of surveillance and response.
- An expansion of the geographic reach and frequency (shift toward year-round implementation) of active case management (PECADOM Plus) has been adopted by the NMCP following an annual review of this intervention. It was demonstrated that in high malaria burden areas greater impact can be achieved by conducting active sweeps throughout the year, as opposed to only during high transmission season, and by expanding the geographic range of PECADOM Plus in other areas where transmission is still high.
- Availability of commodities has improved, as shown in the 2017 Service Provision Assessment. For example, availability of artemisinin-based combination therapy (ACT) for adults has increased from 91 percent in 2015 to 95 percent in 2016. However, stockouts of sulfadoxine-pyrimethamine (SP) for pregnant women are still an issue. To address this issue and improve commodity availability, the MoH has come up with an emergency plan that details urgent activities that should be undertaken. These activities include security stocks and contracting with the private sector for commodity distribution among others. Furthermore, rehabilitation of regional warehouses located in high burden malaria areas is underway.

IV. DATA UPDATES AND EVIDENCE OF PROGRESS

The fifth Continuous Demographic and Health Survey (cDHS) in Senegal was implemented in 2017 and the final report was being prepared at the time of the preparation of this abbreviated MOP in early 2018. The preliminary results are presented below in Table 1. Based on the preliminary results, most key indicators remained at the level of the prior survey with some decline in ITN ownership and use. Once final results are available, changes to key indicators will be further assessed.

Figure 2: Parasite Prevalence by Region in Senegal, 2017

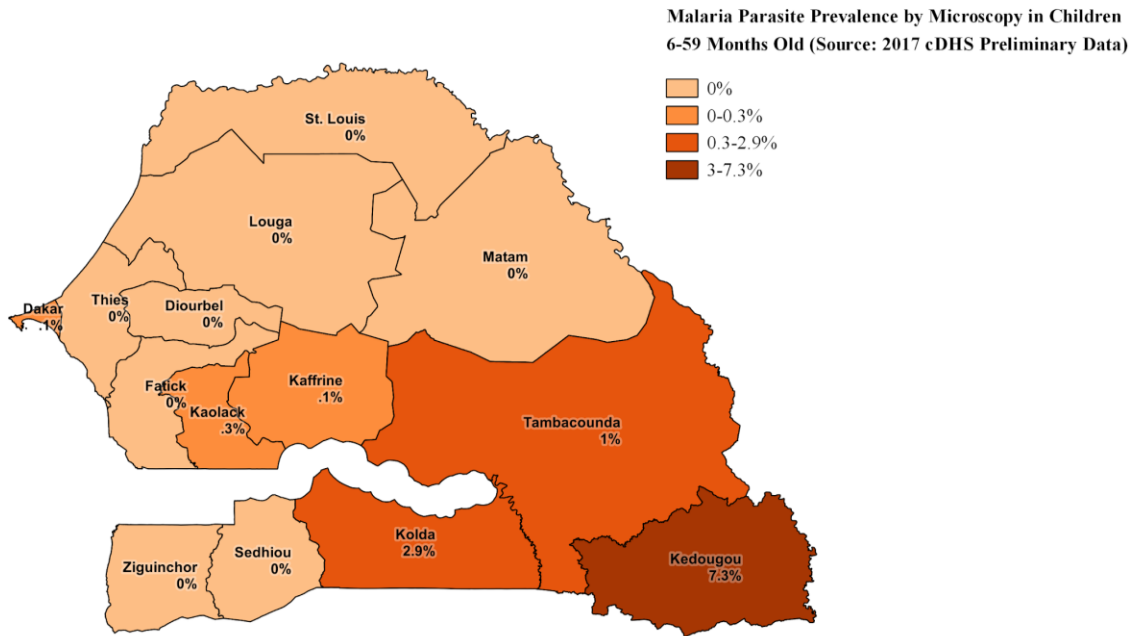


Figure 3: Malaria Incidence (per 1000 population) by Region and District, 2017

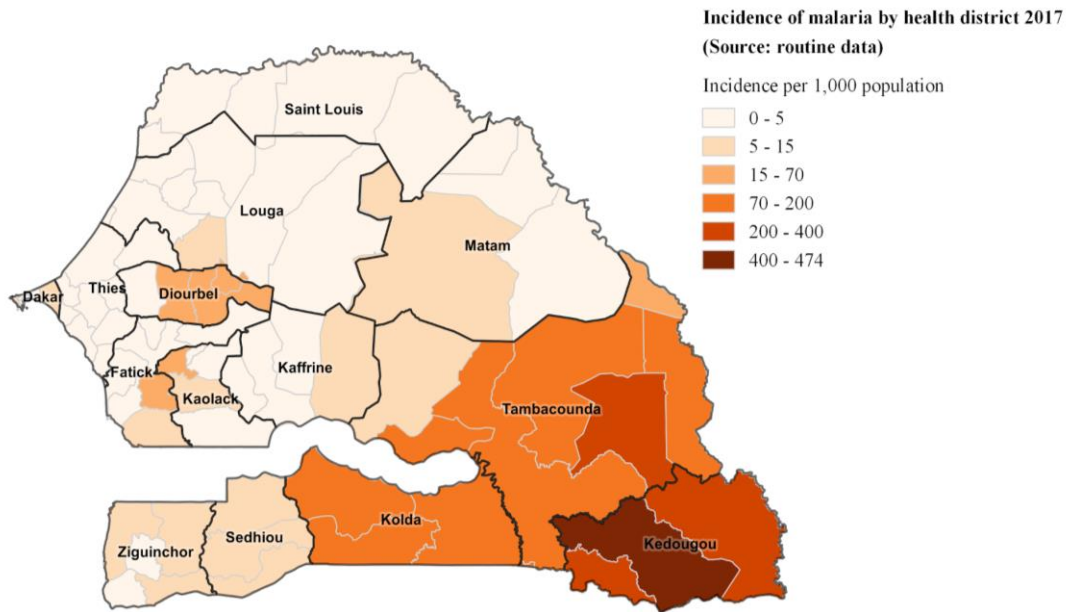


Table 1: Evolution of Key Survey-Based Malaria Indicators in Senegal from 2005 to 2017

Indicator	2005 DHS	2006 MIS	2010/2011 DHS	2014 cDHS*	2016 cDHS*	2017 cDHS* ¹
% Households with at least one ITN	20%	36%	63%	74%	82%	78%
% Population with access to an ITN	10%	18%	38%	58%	76%	65%
% Children under five who slept under an ITN the previous night	7%	16%	35%	43%	67%	54%
% Pregnant women who slept under an ITN the previous night	9%	17%	37%	38%	69%	54%
% Population that slept under an ITN the previous night	6%	12%	29%	40%	63%	N/A
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	40%	n/a	44%	54%	50%	50%
% Children under five with fever in the last two weeks who had a finger or heel stick	n/a	n/a	10%	12%	13%	16%
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs ²	n/a	n/a	41%	11%	29%	28%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	12%	49%	39%	40%	60%	61%
% Women who received three or more doses of IPTp during their last pregnancy in the last two years ³	3%	7%	13%	3%	22%	22%
Under-five mortality rate per 1,000 live births	121	n/a	72	54	51	n/a
% children under five with parasitemia (by microscopy , if done)	n/a	n/a	3%	1%	1%	0.4%
% children under five with parasitemia (by RDT , if done)	n/a	n/a	3%	1%	1%	1%

¹ Results listed are from the cDHS 2017 preliminary tables; the full report is not yet available (as of April 2018)

² Proportion obtained from low number of respondents (<100 since 2012)

³ IPTp3 estimates from STATcompiler

* cDHS data collection takes place from February to September

Table 2: Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems in Senegal from 2012 to 2017

Indicator	2012	2013	2014	2015	2016	2017
Total # Cases (Confirmed and Presumed)¹	390,225	475,141	290,831	502,084	356,272	398,377
# Confirmed Cases²	280,241	366,687	265,624	492,253	349,540	395,706
# Presumed Cases³	109,984	108,454	25,207	9,831	6,732	2,671
Total # <5 Cases⁴	46,091	62,633	41,807	65,682	52,759	53,547
Total # Malaria Deaths⁵	649	815	500	526	325	284
Data Completeness (%)⁶	93%	94%	94%	97%	99%	100%
Test Positivity Rate (TPR)⁷	50%	48%	38%	35%	23%	19%

¹ Total # cases: Total number of reported malaria cases. All ages, outpatient, inpatient, confirmed and unconfirmed cases

² # confirmed cases: Total diagnostically confirmed cases. All ages, outpatient, inpatient

³ # presumed cases: Total clinical/presumed/unconfirmed cases. All ages, outpatient, inpatient

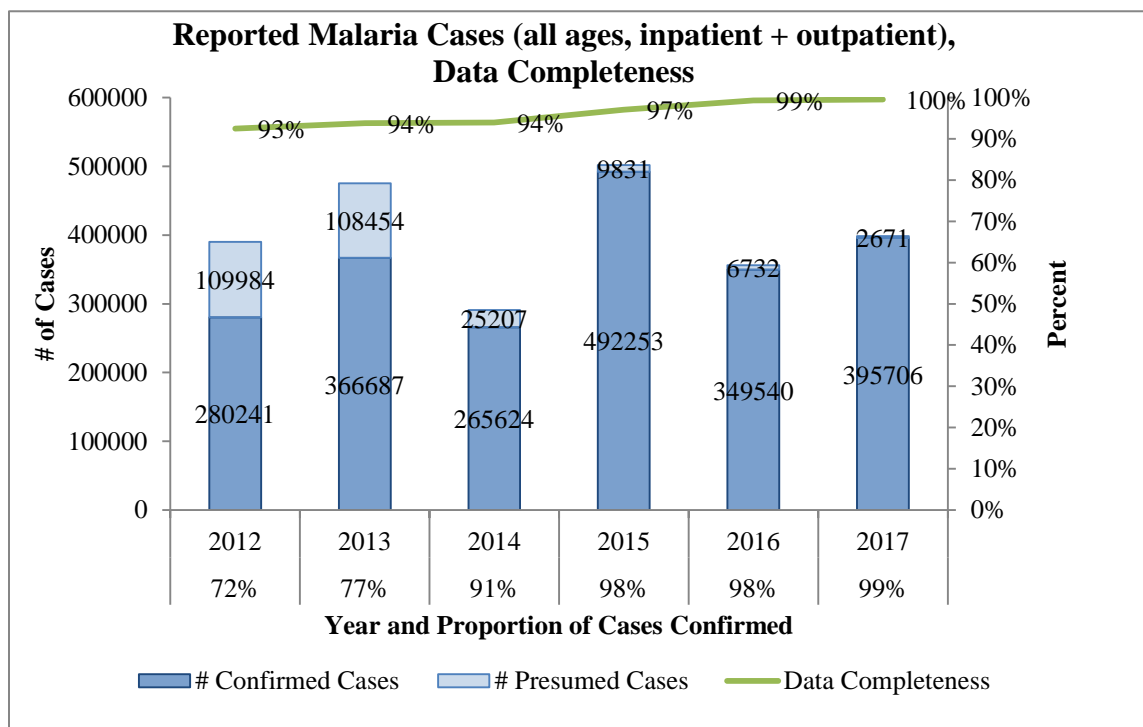
⁴ Total #<5 cases: Total number of <5 cases. Outpatient, inpatient, confirmed, and unconfirmed

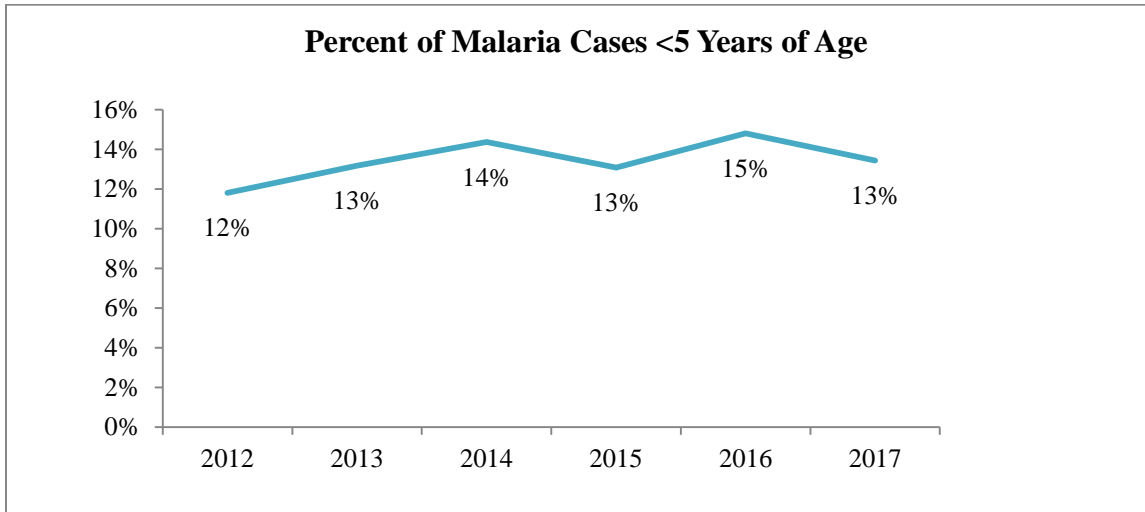
⁵ Total # Malaria Deaths Reported: All ages, outpatient, inpatient, confirmed, and unconfirmed

⁶ Data completeness: Number of monthly reports received from health facilities/Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered)

⁷ Test Positivity Rate (TPR): Number of confirmed cases (#2 above)/Number patients receiving a diagnostic test for malaria (RDT or microscopy)

Figures 4 and 5: Trends in Key Malaria Indicators Reported in Routine Surveillance Systems





V. NEW OR EXPANDED ACTIVITIES AND KEY CHANGES

1. Vector control

a. Entomologic monitoring and insecticide resistance management

The geographic scope of entomologic monitoring will adapt to the proposed vector-control interventions. In-country entomologists from the NMCP, *Université Cheikh Anta Diop* (UCAD), the *Institut Pasteur Sénégal*, and implementing partners are reviewing the current sites. The plan is to decrease the number of former IRS sites monitored, increase monitoring in new IRS sites, and expand monitoring to monthly in sites that are currently only twice per year and to correspond with NMCP sites.

b. Insecticide-treated nets

With FY 2019 funds, PMI will procure 1,450,000 ITNs for routine distribution channels, including ANC, primary care, community, school based, and social marketing. With a national campaign in 2019, ITNs procured for routine distribution will aim to maintain high coverage levels across the country. Of these, PMI is procuring 75,000 conical ITNs specifically for social marketing in urban areas.

The findings from a culture of net use study conducted in Senegal in 2012-2013 indicate that rectangular nets are often seen as “inadequate” for the type of sleeping spaces in the areas sampled. Conical nets are preferred given that they require a single anchor point, which is easier to install and remove on a nightly basis and which is more convenient in places where sleeping spaces also serve as common spaces during the day. In urban settings, respondents preferred conical nets to cover two sleeping spaces. In another study done in 2009, the community members sampled said they did not like white nets which remind them of burial cloths. In a durability study performed in 2014-2017, the conical PermaNet brand nets were more likely to be retained during three-year follow-up (9.4 percent retention) than five other brands (ranging from 0 to 6.3 percent retention), after adjusting for setting and education level of the head of household. Additionally, conical nets had a higher proportion of use at two (30.6 percent) and three years (9 percent) follow-up than other brands (Dione 2018).

Social marketing of two types of nets (conical and rectangular) side-by-side allows for the provision of nets that are more acceptable for sleeping spaces in urban settings (based on previous findings), while

simultaneously comparing which nets are preferred by paying customers and collecting data as part of activity implementation. This activity has included and will continue to include SBCC components. The results of market research showed that, for many people, nuisance avoidance is a more important factor for net use than malaria prevention. The social marketing campaign emphasizes getting a good night's sleep, the protective qualities of the nets ("MILDA: The mosquito net that kills mosquitoes"), their affordability ("1,000 FCFA for 1,000 nights"), and where to obtain them (pharmacies, grocery stores, gas stations). TV and radio spots were produced and broadcast in major urban areas. Newspaper inserts and internet banners were also used to reach a wide audience.

c. Indoor residual spraying

With FY 2019 funds, PMI will reintroduce IRS in Senegal to help reduce the malaria burden in high burden districts. The exact location of IRS is under discussion and will depend on entomological and epidemiological data. The proposed funding will potentially cover up to three districts.

2. Malaria in pregnancy

Current malaria in pregnancy (MIP) interventions will be expanded in order to reach the coverage goal of 80 percent IPTp3 coverage by 2020 in targeted districts. In 2017, fifteen district action plans for improving ITPp uptake were developed and funded with the support of USAID Neema. Thirteen out of fifteen of the districts are located in the four southern regions and two in northern regions.

3. Drug-based prevention

a. Seasonal malaria chemoprevention

PMI will continue to support SMC and provide coverage for approximately 906,478 children aged 3-120 months in the four highest transmission regions in Senegal.

Geographic Reach

The geographic areas to be covered by the 2019 and 2020 SMC campaigns have been readjusted based on the evolving malaria epidemiology in Senegal to cover a total of 15 districts. For instance, the Sédhiou Region has seen a big improvement, with an incidence rate estimated at 11 per 1000 and less than 6000 cases in 2017 in children <5 years old during the high transmission season. The Diourbel Region, on the other hand, registered 58,000 cases with an incidence of 34 per 1000 in children <5 years old in the high transmission season, making the region rank fourth in morbidity and second in mortality rates nationally. Therefore, Sédhiou will be replaced with Diourbel (Touba and Diourbel Districts) for the upcoming SMC campaigns. In both of these districts, over 80 percent of malaria cases occur during four months (September to December) and the incidence during the transmission season among children <5 years of age was 21 per 1000 in Touba and 12 per 1000 in Diourbel. Since SMC has not been implemented in Diourbel, incidence disaggregated for children between 5-10 years old has not been reported, but will be as part of the monitoring and evaluation of SMC in the area.

The plan is to conduct monthly sweeps for three months in the regions of Diourbel, Kolda, and Tambacounda, and for four months in Kédougou, based on the respective length of malaria transmission season in these regions.

The NMCP has envisioned implementing activities to prevent any rebound from occurring in Sédhiou. First, weekly reporting of cases is being put in place in all malaria service-delivery points, including health posts and health centers nationwide. Second, SBCC activities for net usage and early care-seeking will be intensified using community-based organizations. Finally, routine net distribution will be

strengthened following the 2019 mass distribution campaign, which should ensure good ITN coverage. Specific communication campaigns regarding interruption of SMC campaigns will be similar to campaigns developed for areas where IRS is being discontinued.

Target Age Group

Since 2013, programmatic implementation of SMC by the NMCP in Senegal targeted individuals up to 120 months (10 years) due to the substantial malaria burden in older children. A cluster-randomized clinical trial conducted in Senegal and published in November 2016¹ reported that introduction of SMC in this expanded age group was associated with an overall reduction in malaria incidence in untreated age groups, indicating indirect benefit to the communities where children were targeted.. An accompanying publication confirmed the safety of SMC with sulfadoxine-pyrimethamine/amodiaquine (SP-AQ) distributed among children aged 3-120 months when delivered by community health workers (² Preliminary results for an impact evaluation of the SMC campaigns of 2014-2016 in Southern Senegal (regions of Kédougou, Kolda, Sédhiou, Tambacounda) confirmed a high coverage rate of the target population and minimal adverse events (<0.1 percent), but indicated a need to better monitor proper treatment completion (taking drugs on all three days every month) to ensure optimal intervention impact. The evaluation estimated a 44-percent decrease of uncomplicated malaria cases among children aged 3-120 months and a 36-percent decrease of severe cases. This was accompanied by a 43-percent decrease in all-age malaria-related deaths at the health facility level in targeted regions. In addition, participation in the SMC campaign was not reported to have any negative impact on other preventive interventions such as ITN coverage (JL Ndiaye, UCAD, unpublished data; all data presented during 2017 SMC campaign evaluation workshop). Based on these findings, Senegal has maintained its commitment to implement SMC campaigns to this expanded age group. The NMCP and its local partners have been able to ensure well above 80-percent coverage of the expanded target group, with over 94-percent coverage over the past three seasons, confirming the operational feasibility of the approach at a community level.

Directly Observed Therapy

During the 2017 SMC campaign, the NMCP piloted the integration of directly observed therapy (DOT) in two districts on day two and day three of each monthly sweep (in addition to standard DOT on day one) to ensure compliance with the SMC guidelines. During the pilot phase, which was performed in the health district of Goudomp, the reallocation of actors during the campaign was tested, particularly the community health workers who were hired for five days. Under the previous model they would spend three days going door-to-door to identify and provide treatment to targeted children and two days performing follow-up to catch any target that was initially absent from the household during the first visit. Under the pilot, more volunteers were recruited, but the campaign was restricted to three days (instead of five), keeping the cost relatively unchanged. This operational approach proved effective and the NMCP plans to expand it to all targeted districts to ensure a more effective SMC campaign and optimal impact of the intervention.

Operational Costs

Funds are slated to support the planning, implementation, training, supervision, and monitoring of the three-day DOT strategy, as well as transportation, materials/equipment, and evaluation at the end of the season.

¹ B Cisse et al, PLOS Medicine DOI:10.1371/journal.pmed.1002175, November 2016.

² JL Ndiaye et al., Plos One DOI:10.1371/journal.pone.0162563, October 2016.

4. Case management

Each year, the NMCP has organized training on malaria case management for new *dispensateur de soins à domicile* (DSDOMs), as well as refresher trainings for existing DSDOMs. This takes a considerable amount of time and is logistically challenging, particularly in remote areas in the southeastern region. To address these challenges, the NMCP would like to pilot an mHealth training platform called LEAP, which has been used in Kenya to train over 36,000 health workers using SMS, games, audio sessions, and practical exercises. The pilot will take place in the Kédougou Region and will train 210 DSDOMs. There will be an initial in-person training and then subsequent trainings will be conducted through the LEAP platform. Monitoring will be conducted during the pilot and an evaluation will be conducted once the trainings are completed to inform a decision whether or not to expand the program throughout the country.

Additionally, an evaluation of the implementation of pre-referral rectal artesunate in combination with the use of injectable artesunate for severe malaria is planned using FY 2019 funds.

5. Cross-cutting and other health systems strengthening

a. Pharmaceutical management

No new activities or significant changes are proposed. However, the commodity fee has been increased to reflect the anticipated revised agreement between the MoH and USAID.

b. Social and behavior change communication

There is an increase in SBCC funding for FY 2019. The scope of regional communication activities will be expanded based on a proposed evaluation in 2019 of the implementation of newly developed communication plans. The regional communication plans were developed based on the results of a study in 2018 that identified determinants of behaviors that could impact the effectiveness of health interventions. The core targeted behaviors are:

1. The use of mosquito nets every day, by all family members.
 - Determinants: Self-efficacy, brand recognition, and socio-cultural beliefs
2. Every pregnant woman receives three or more doses of SP in monthly intervals from the fourth month of pregnancy.
 - Determinants: Risk perception, quality of services and social support
3. Early care-seeking outside of the home for children with fever.
 - Determinants: Risk perception, social support, and socio-cultural beliefs

The increase in funds will also be used for SMC specific messaging in the four regions targeted, which includes expansion into the new and densely populated region of Diourbel. The plan is to roll out intensive SBCC activities in the four target regions of Diourbel, Kolda, Tambacounda, and Kédougou, with the goal of increasing uptake of services and compliance with the SMC guidelines throughout the high transmission season in these regions. Plans are in place to conduct an in-depth study, funded by the Global Fund and IDB, on determinants (qualitative and quantitative in both control and pre-elimination areas) in 2018.

c. Surveillance, monitoring, and evaluation

No new activities or significant changes are proposed. The activities listed under “Pre-Elimination” in the FY 2018 MOP have been moved under the “Surveillance, Monitoring, and Evaluation” section of the accompanying budget tables.

Table 3. Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Survey Activities	Year								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Household Surveys	Demographic Health Survey (DHS)		X	X	X	X	X	(X)*		
	Malaria Indicator Survey (MIS)					X*!				(X)
	Universal Coverage Evaluation		X							
Health Facility Surveys	Service Provision Assessment as part of cDHS		X	X	X	X	X	(X)*		
Malaria Surveillance and Routine System Support	Malaria epidemic surveillance	X	X	X	X	X	X	(X)	(X)	(X)
	Case investigation	X*	X*	X	X	X	X	(X)	(X)	(X)
	Support to DHIS2 Integrated Routine Information System	X*	X*	X*	X*	X	X	(X)	(X)	(X)
Other Surveys	Malaria Impact Evaluation		X				X*			
	SMC M&E			X	X	X	X	(X)	(X)	(X)

! This MIS was funded by the Global Fund and was implemented in July 2016. This survey obtained coverage estimates at the district level, nationally. This survey did not include biomarkers. The cDHS does not provide estimates at the regional or district level on an annual basis. For regional estimates in the cDHS, data from two continuous surveys are aggregated.

* Not funded by PMI

() Not yet completed

d. Operational research

No new activities or significant changes are proposed.

e. Other health systems strengthening

No new activities or significant changes are proposed.

6. Staffing and administration

PMI Senegal supports staffing and administration that follows PMI policy, as articulated in the FY 2018 MOP.