This 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 funding available to support the plan outlined here is pending finalization of the FY 2020 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.

U.S. PRESIDENT'S MALARIA INITIATIVE

SENEGAL

Malaria Operational Plan FY 2020

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ABBREVIATIONS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
ANSD	*Agence Nationale de la Statistique et de la Démographie*
AS/AQ	Artesunate-amodiaquine
BMGF	Bill and Melinda Gates Foundation
CCPLP	*Cadre de Concertation de Partenaires de Lutte Contre le Paludisme* (Malaria Partners Coordination Committee)
CDC	Centers for Disease Control and Prevention
cDHS	Continuous Demographic and Health Survey
CPC	*Consultations Primaires Curatives*
CY	Calendar year
DHIS2	District Health Information System
DOT	Directly observed therapy
DSDOM	*Dispensateur de soins à domicile* (village malaria worker)
DSISS	*Division du Système d'Information Sanitaire et Sociale*
FY	Fiscal year
GDP	Gross Domestic Product
GoS	Government of Senegal
GHI	Global Health Initiative
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
HMIS	Health Management Information System
IDB	Islamic Development Bank
IEC	Information, education, communication
IPTp	Intermittent preventive treatment for pregnant women
IRD	Research and Development Institute
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LLIN	Long-lasting insecticidal net
MiP	Malaria in pregnancy
MIS	Malaria indicator survey
MoH	Ministry of Health
MOP	Malaria Operational Plan
NMCP	National Malaria Control Program
NSP	National Strategic Plan
OCB	*Organisation Communautaire de Base*
PECADOM	*Prise en charge à domicile* (home-based management of malaria)

PMI	U.S. President's Malaria Initiative
PPMRm	Procurement Planning and Monitoring Report for malaria
PRA	*Pharmacie Regionale d'Approvisionnement*
RDT	Rapid diagnostic test
SBC	Social and behavior change
SMC	Seasonal Malaria Chemoprevention
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine/pyrimethamine
SPA	Service Provision Assessment
UCAD	*Université Cheikh Anta Diop*
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

I. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Senegal to end malaria. PMI has been a proud partner of Senegal since 2008, helping to decrease child death rates by 58 percent and increase insecticide treated net (ITN) ownership from 20 percent to 85 percent and the number of children under five years of age who reported sleeping under an ITN from 7 percent to 61 percent (DHS 2005 and cDHS 2017) through investments totaling almost $296 million.

The proposed PMI fiscal year (FY) 2020 budget for Senegal is $24 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Senegal for FY 2020. Developed in consultation with the National Malaria Control Program (NMCP) and key stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Senegal as well as other donors and partners.

Senegal at a glance

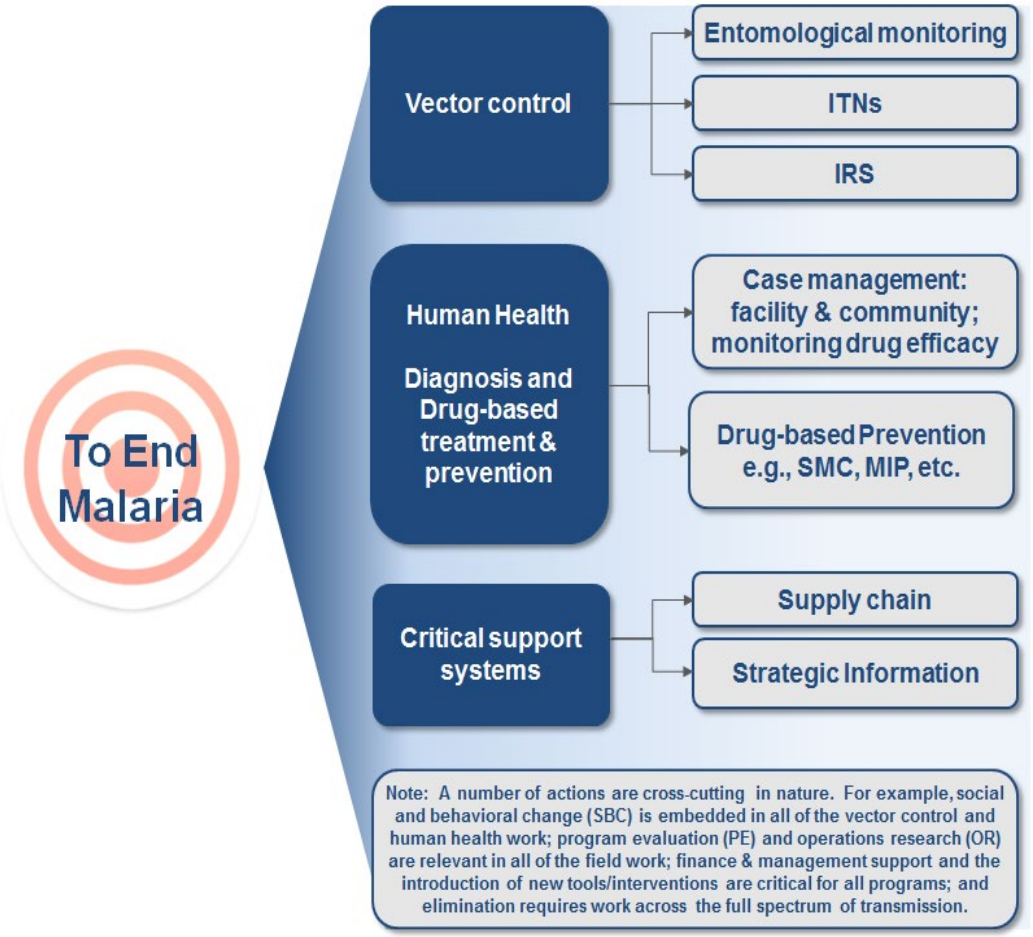
- **Geography:** The Republic of Senegal is a country in West Africa, located just above the equator. Senegal is bordered in the north by Mauritania, Mali to the east, Guinea to the southeast, Guinea-Bissau to the southwest, and the Atlantic Ocean to the west. The Gambia also occupies a narrow piece of land, along the banks of the Gambia River, which separates the southern region of Senegal from the rest of the country. Rolling, sandy plains constitute the majority of the country, apart from the Fouta Djallon foothills in the southeast and Bambouk Mountains on the Mali border. On the coast between Dakar and St. Louis in the north, there is a strip of shifting dunes. The northern part of the country is a hot, dry Sahelian plain with little vegetation. South of Dakar, there are shallow estuaries along the coastline, fringed with palm trees.
- **Climate:** Senegal has a warm and tropical climate with temperatures ranging from warm to extremely hot throughout the year. The coolest temperatures are on the coast with the hottest temperatures in the east on the Malian border. The dry season runs from December through April. The rainy season can run from May through November.
- **Population in 2019:** 16,209,125 (National Statistics and Demographic Agency - ANSD)
- **Population at risk of malaria:** 100% (WHO World Malaria Report)
- **Principal malaria parasites:** *Plasmodium falciparum* (University of Cheikh Anta Diop - UCAD)
- **Principal malaria vectors:** *Anopheles gambiae senu strictu* and *An. coluzzii* predominate in the humid zones of the south, *An.arabiensis* predominantly in the dry

zones of the north and central regions. Other vectors include *An. melus, An. funestus, An. nili, An. pharoensis* (University of Cheikh Anta Diop - UCAD)

- **Malaria incidence per 1000 population (2018):** 33.9 (Senegal Annual Malaria Epidemiology Bulletin)
- **Under-five mortality rate:** 51 deaths per 1,000 live births (Senegal, cDHS 2018)
- **World Bank Income Classification & GDP (2018):** Senegal is a lower-middle income country with a GDP per capita of $1,522 (https://data.worldbank.org/indicator/ny.gdp.pcap.cd)
- **Political system:** Senegal is a presidential republic, with an elected National Assembly. The President is permitted to stand for two terms of five years. Senegal is one of the most politically stable countries in Africa. Free and fair presidential elections in March 2012 brought Macky Sall to the presidency.
- **Trafficking in Persons designations, 2016-2018:** Tier 2 ((https://www.state.gov/wp-content/uploads/2019/06/2019-Trafficking-in-Persons-Report.pdf)
- **Malaria funding and program support partners include (but are not limited to):**
    - Global Fund to Fight AIDS, Tuberculosis and Malaria (GF)
    - U.S. President's Malaria Initiative (PMI)
    - World Health Organization (WHO)
    - Islamic Development Bank (IDB)
    - Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
- **PMI Support of National Malaria Control Strategy:** PMI-funded interventions are in line with Senegal's national malaria control strategy and build on investments made by PMI and other partners (mainly The Global Fund and the IDB) to improve and expand malaria-related services in Senegal. 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. (See III. Overview of PMI's support of Senegal's Malaria Control Strategy for additional details)
- **PMI Investments:** Senegal began implementation as a PMI focus country in FY 2007. The proposed FY 2020 PMI budget for Senegal is $24 million; that brings the total PMI investment to nearly $320 million.

PMI organizes its activities and planning levels around the activities in Figure 1, in line with the national malaria strategy.

Figure 1. PMI's Approach to End Malaria



PMI's approach is both consistent with and contributes to USAID's Journey to Self-Reliance framework. Building and strengthening the capacity of Senegal's people and institutions – from the central level to communities – to effectively lead and implement evidence-based malaria control and elimination activities remains paramount to PMI. As denoted in Table 2 (the budget table), nearly all of PMI's planned support for FY 2020 in the areas of vector control, human health, supply chain and strategic information contain elements of capacity building and system strengthening. A particular feature of PMI/Senegal's support for building local capacity is its direct funding agreement with the NMCP, in place since 2012 and averaging more than $4 million per year. These funds support both central level activities executed directly by the NMCP (such as program supervision and sub-contracts for operational research) and operational activities implemented by regions and districts in accordance with NMCP guidance and oversight.

PMI/Senegal will also continue to rely on and engage with local partners, such as the University Cheikh Anta Diop (UCAD), the Research for Development Institute (IRD), and the Institut Pasteur Dakar, and is expanding its local partner base to reach the private health sector (both for profit and not-for-profit) as well as local communities by supporting more effective engagement

of their local authorities. Finally, PMI/Senegal will continue to rely on private sector partnerships such as the Senegalese Sugar Company, pharmaceutical wholesalers such as Laborex, Sodpharm, Ubiform and Duopharm for ITN distribution in urban pharmacies.

To accelerate the journey to self-reliance, PMI developed a programmatic inventory to assess the strengths and persistent challenges of Senegal's program (see Annex B). The activities proposed in this MOP are tailored to draw on these strengths and address the weaknesses, which will be monitored to evaluate the effectiveness of capacity building efforts. In addition, while PMI is cognizant that it will take time before Senegal is capable of fully financing its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Senegal's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND MALARIA CONTROL PROGRESS IN SENEGAL

Malaria is endemic throughout Senegal and 100 percent of the population is at risk of the disease. The country can be divided into two epidemiological zones: the tropical zone in the south and southeast, with year-round transmission peaking during the rainy season and lower transmission during the rest of the year; and the Sahelian zone in the north, with higher transmission toward the end of the rainy season and very low transmission during the rest of the year. Over the last nine years, the national parasite prevalence decreased from 5.9 percent in 2008 to less than 1 percent in 2017 (Fig. 2). There are three administrative regions in the south - Tambacounda, Kolda, and Kédougou - that have the highest malaria burden, with an estimated prevalence of 1 percent, 3 percent and 7 percent, respectively (Fig. 4).

Figure 2. Trends in Malaria Prevalence, *Percent of Children Age 6-59 Months Who Tested Positive for Malaria by Either Microscopy or RDT*

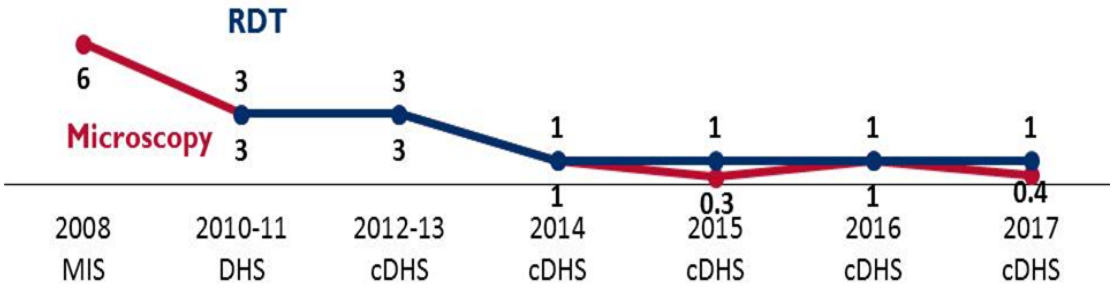


Figure 3. Trends in Prevalence of Low Hemoglobin, *Percent of Children Age 6-59 Months with Moderate-to-Severe Anemia (hemoglobin < 8.0 g/dl)*

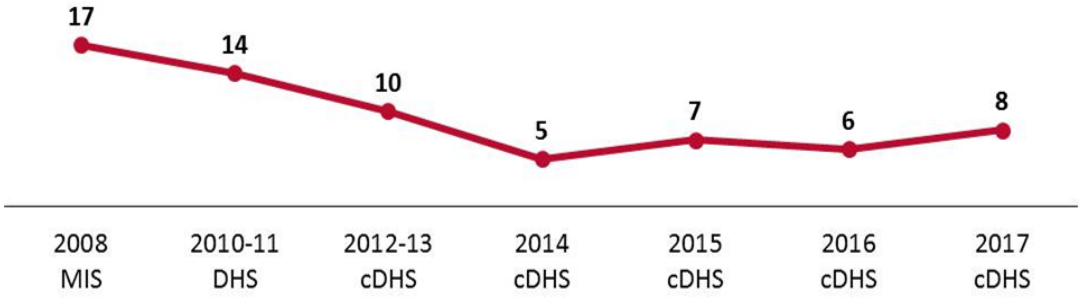


Figure 4. Malaria Parasite Prevalence among Children Under Five Years of Age by Geographic Area

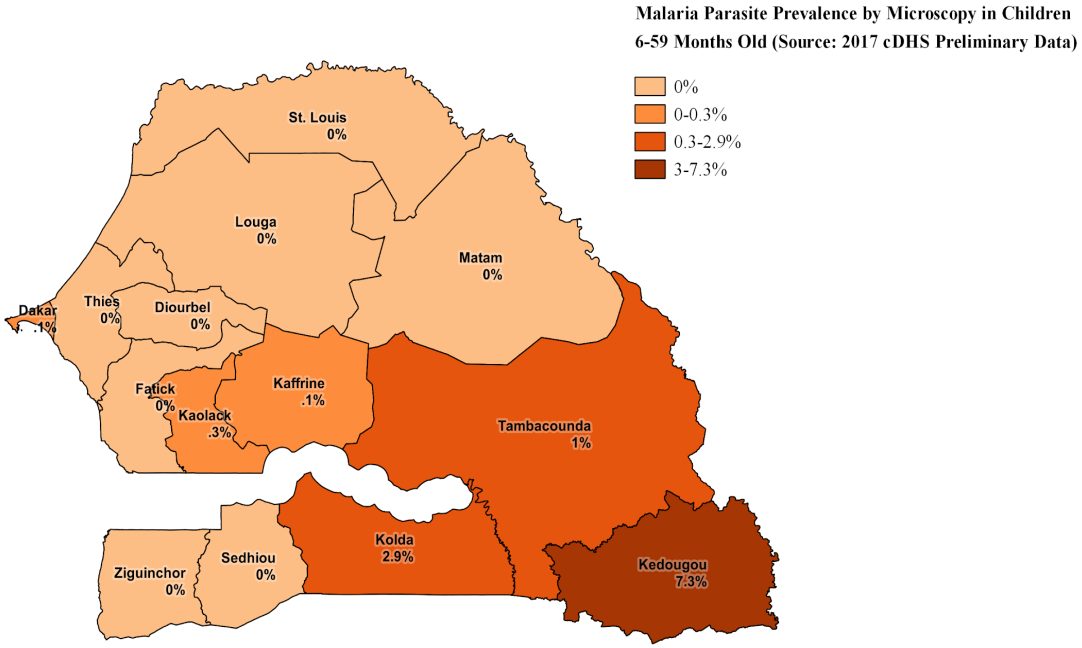


Figure 5. Malaria incidence by geographic area - health districts (2017 & 2018)

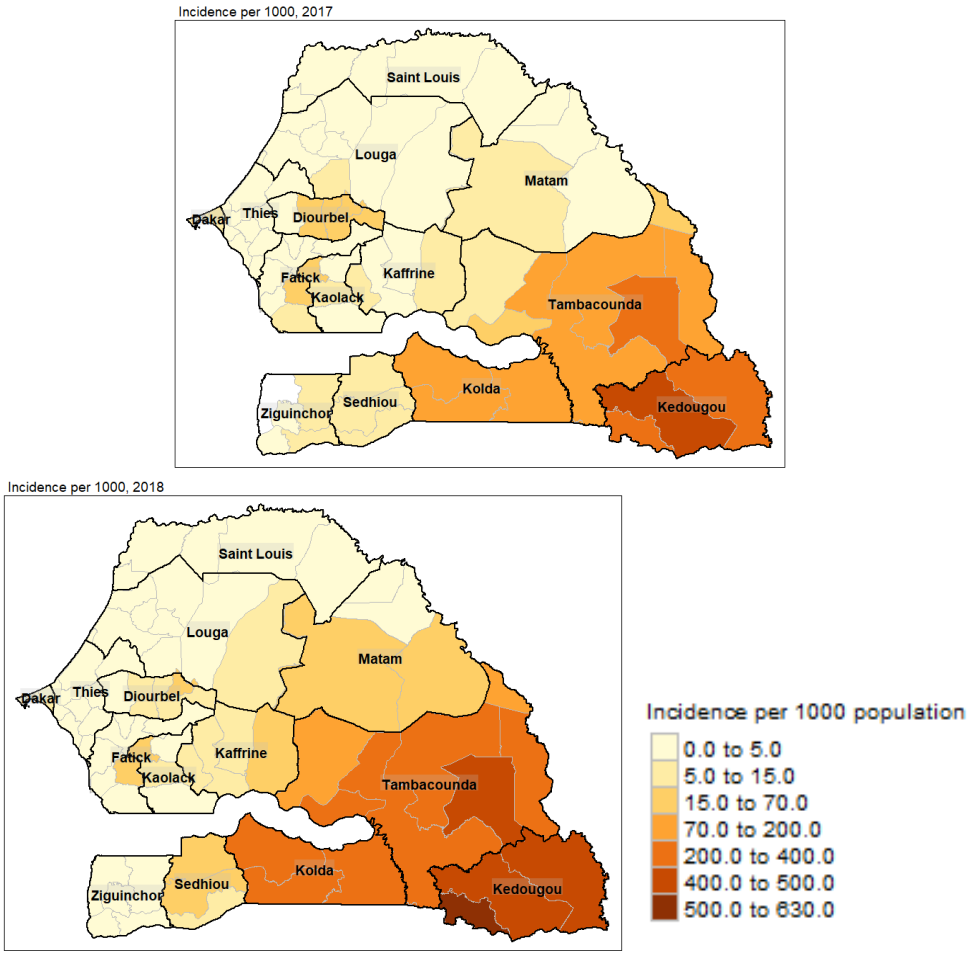


Figure 6. Key indicators for malaria prevention and treatment coverage and impact indicators from Demographic Health Surveys (DHS) and Continuous DHS (cDHS) from 2005-2018.

Indicator	[2005, DHS]	[2010, DHS]	[2014, cDHS]	[2016, cDHS]	[2017, cDHS]	[2018, cDHS]
% Households with at least one ITN	20	63	74	82	85	77
% Households with at least one ITN for every two people	3	17	36	56	50	39
% Population with access to an ITN	10	38	58	76	73	62
% Population that slept under an ITN the previous night	6	29	40	63	57	52
% Children under five years of age who slept under an ITN the previous night	7	35	43	67	61	56
% Pregnant women who slept under an ITN the previous night	9	37	38	69	62	56
% Children under five years of age with fever in the last two weeks for whom advice or treatment was sought[1]	40	49	54	50	51	53

Indicator	[2005, DHS]	[2010, DHS]	[2014, cDHS]	[2016, cDHS]	[2017, cDHS]	[2018, cDHS]
% Children under five years of age with fever in the last two weeks who had a finger or heel stick	n/a	10	7	13	16	14
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	n/a	41	11	85	66	n/a
% Women who received two or more doses of IPTp during their last pregnancy in the last two years[2]	12	39	40	60	63	64
% Women who received three or more doses of IPTp during their last pregnancy in the last two years[2]	n/a	13	3	22	22	22
Under-five mortality rate per 1,000 live births	121	72	54	51	56	51
% Children under five years of age with parasitemia (by **microscopy,** if done)	n/a	3	1	1	0.4	n/a
% Children under five years old with parasitemia (by **RDT**, if done)	n/a	3	1	1	1	n/a
% Children under five years of age with severe anemia (Hb<8gm/dl)	20	14	5	6	8	n/a

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

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

Figure 7. Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems

Indicator	2014	2015	2016	2017	2018
# Suspect malaria cases[1]	722,382	1,421,221	1,559,054	2,035,693	2,096,124
# Patients receiving diagnostic test for malaria[2]	697,175	1,411,390	1,552,322	2,033,022	2,090,323
Total # malaria cases[3] (confirmed and presumed)	290,831	502,084	356,272	398,377	536,745
# Confirmed cases[4]	265,624	492,253	349,540	395,706	530,944
# Presumed cases[5]	25,207	9,831	6,732	2,671	5,801
% Malaria cases confirmed[6]	91%	98%	98%	99%	99%
Test positivity rate (TPR)[7]	38	35	23	19	25
Total # <5 malaria cases[8]	41,807	65,682	52,759	53,547	90,098
% Cases under 5[9]	14%	13%	15%	13%	17%
Total # hospitalized for malaria[10]	12,636	17,846	9,918	10,463	13,350

Indicator	2014	2015	2016	2017	2018
Total # malaria deaths[11]	500	526	325	284	555
# Facilities reporting[12]	1342	1435	1498	1535	1,591
Data form completeness (%)[13]	94%	97%	99%	100%	98%

Data sources and comments: N/A = not available

Definitions:

[1] Number of patients presenting with signs or symptoms considered to be possibly due to malaria

[2] Number of patients receiving a diagnostic test for malaria (RDT or microscopy). All ages, outpatient, inpatient

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

[4] # confirmed cases: Total diagnostically confirmed cases. All ages, outpatient, inpatient.

[5] # presumed cases: Total clinical/presumed/unconfirmed cases. All ages, outpatient, inpatient.

[6] % Malaria Cases confirmed: # confirmed cases (#4 above) / Total # cases (#3 above)

[7] Test Positivity Rate (TPR): Number of confirmed cases (#4 above)/Number of patients receiving a diagnostic test for malaria (RDT or microscopy) (#2 above)

[8] Total #<5 cases: Total number of <5 cases. Outpatient, inpatient, confirmed, and unconfirmed.

[9] Total # <5 cases (#8 above) / Total # of cases (# 3 above)

[10] As there may not be a standard definition across countries, please specify if there is such a variable available and the definition that is used; if "severe malaria" is not used or collected but "hospitalized for malaria" is a standard in the country, please insert that label and the relevant data by year.

[11] Total # Malaria Deaths Reported: All ages, outpatient, inpatient, confirmed, and unconfirmed.

[12] Total # of health facilities reporting data into the HMIS/DHIS2 system for that year.

[13] 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).

III. OVERVIEW OF PMI'S SUPPORT OF SENEGAL'S MALARIA CONTROL STRATEGY

The Senegal 2016-2020 National Strategic Plan (NSP) states a goal of reaching the threshold for pre-elimination (defined by the NMCP as annual incidence <5 cases per 1,000) by 2020. 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. In line with the national strategy, USAID/Senegal is implementing a suite of mechanisms referred to as the USAID/Senegal Health Program (2016-2021). With the improvement of maternal and child health indicators in many regions, USAID decided to concentrate its investments in high burden regions to significantly impact the key drivers of mortality. In low burden regions, USAID is supporting targeted investments leveraging GOS resources and systems.

As a result, in Senegal PMI has adopted a two-pronged approach. More than half of PMI funding in Senegal supports a comprehensive package of malaria prevention and treatment activities targeting the high incidence south-eastern regions of Kolda, Kédougou, Sédhiou, and Tambacounda, including: active case management (PECADOM Plus) in 35 districts; SMC campaigns during the high transmission season; and cross-cutting interventions such as health systems strengthening, capacity building, SM&E, and SBC, and some elimination related activities in two regions (Saint Louis and Matam). The remaining budget covers the procurement of commodities (ITNs, SP/AQ for SMC, RDTs, ACTs, rectal artesunate, injectable artesunate)

for nationwide coverage and nationwide SM&E and health system strengthening activities. See Figure 8, for details indicating the classification of regions as defined by the NMCP.

Figure 8. Senegal NMCP Supported Malaria Interventions Across Transmission Zones

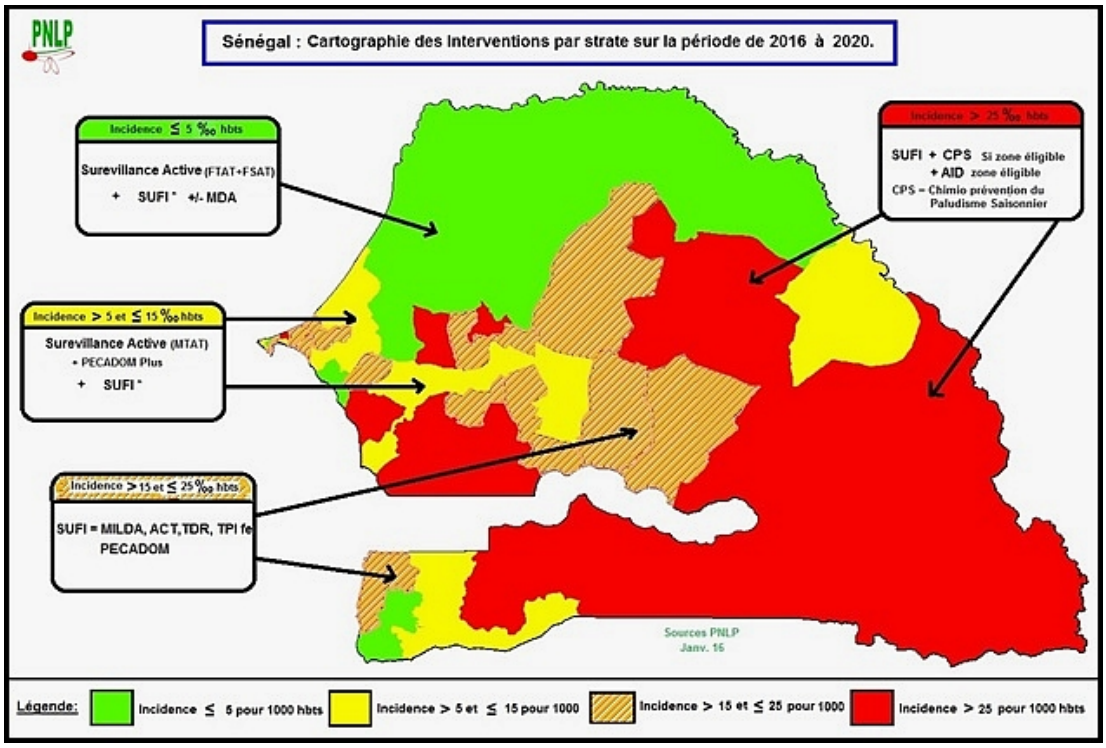


Figure 9. PMI Intervention Support Map

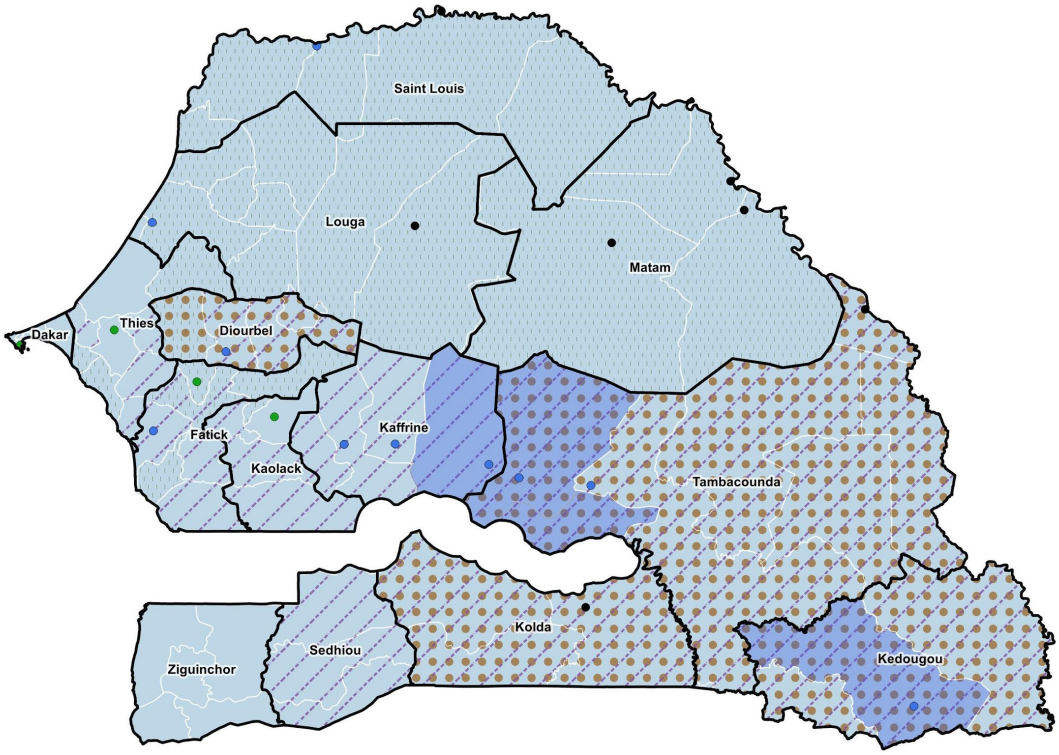


Figure 10. FY 2020 PMI-Supported Activities

Nationwide support: commodity procurement & distribution, support for case management, and SBCC

SMC

PECADOM+*

Pre-elimination district
(implementation & monitoring of low-dose primaquine)

Entomological Monitoring**

Insecticide Susceptibility Monitoring

Both entomological and insecticide susceptibility monitoring

IRS

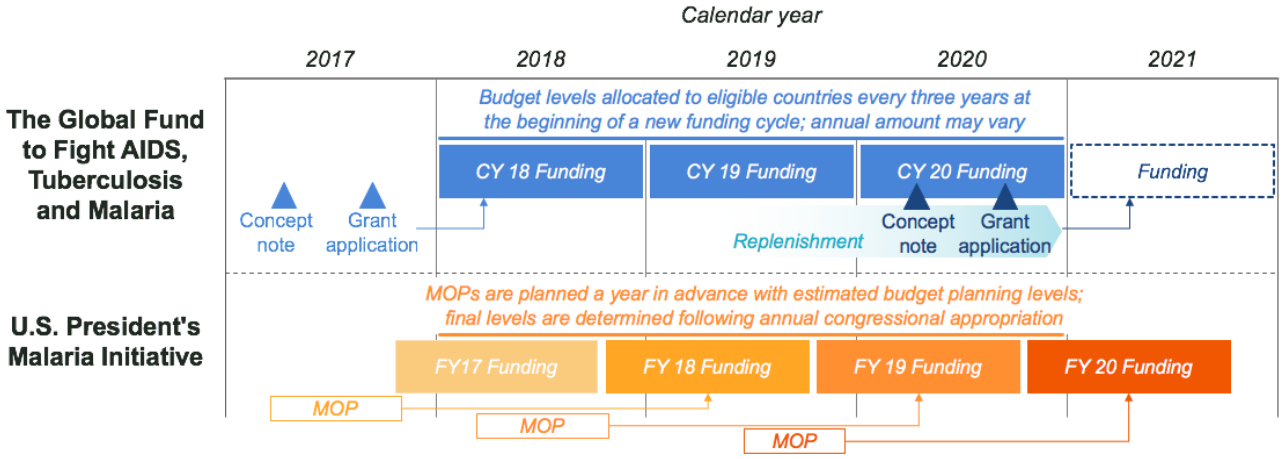
*Indicates where PECADOM+ is supported by PMI. See Case Management section for detais on other donor support of this activity.
**A subset (TBD) of existing sites will be chosen to perform more frequent monitoring visits

IV. PARTNER FUNDING LANDSCAPE

PMI emphasizes the importance of partner alignment on malaria control. With the recognition that each of the agencies emphasizes complementary funding support for the national malaria control effort in a given country, over the last year, PMI, Global Fund, and the Bill and Melinda Gates Foundation (BMGF) set out to harmonize financial, supply chain, and programmatic data, and this effort remains ongoing as of the time of this MOP. A harmonized financial taxonomy has been developed for PMI and Global Fund (i.e., mapping cost categories across organizations).

Figure 11 visualizes the annual cycle of PMI funding and the MOP implementation year. As the figure illustrates, any given FY MOP funds activities that take place during the next FY. For example, a FY18 MOP funds implementation during FY19 whereas Global Fund funding (and often, other partners and host country governments) is based on a three-year grant cycle on a calendar year (CY) timeframe during which activities were implemented. Annual PMI country budget allocations depend largely on the U.S. Congress' total overall malaria funding appropriation to USAID in a given fiscal year, as well as other considerations (e.g. previous funding levels, activity and program pipelines, other donor contributions, known commodity needs/gaps, progress on ongoing PMI-supported activities, clear evidence of continued government commitment to malaria control).

Figure 11: PMI and Global Fund Funding Cycle Alignment



Footnote: In some cases, Global Fund's funding may come in partway through the calendar year. Funding levels in "Section IV - Partner Funding Landscape" and commodity procurement amounts listed in "Annex A - Intervention Specific Data" may differ given the lag between the year that funding was planned and the year when procurement orders were placed. Differences may be a reflection of timing and/or based on changes in commodity consumption levels at country level, changes in commodity costs, or other donor orders.

Figures 12 - 14 summarize contributions by external partners and the host country government in calendar years 2018-2020, with the goal of highlighting total country investments. For Senegal, data are available for PMI (FY 18) and Global Fund (CY 2018-20). As the Global Fund 2021-23

grant funding cycle is not yet underway at the time of this PMI FY20 MOP development, Global Fund country investments for the 2021 implementation period and beyond are not yet known. Note that the host country government invests substantial funding into the national-to-local infrastructure and service delivery for malaria and many other programs. However, there has not been a standardized method for attributing those investments to malaria specifically. Thus, it may not yet be possible in the FY 2020 MOP cycle to attribute funding from the host country's government. There may be similar challenges for other partners.

Figure 12. Annual Budget by Level 1 Category

Year[1]	Funder	Vector Control	Case Management	Drug-Based prevention[2]	Supply Chain[3]	Monitoring, Evaluation & Research	Other Cross-Cutting and Health Systems Strengthening	Total
FY17/CY18	PMI	$9.2M	$5.8M	$3.4M	$1.5M	$1.5M	$3.6M	**$25.0M**
	Global Fund	$15.8M	$.3M	$0.1M	$0.7M	$1.3M	$2.2M	**$20.3M**
	Host Gov[4]	-	-	-	-	-	-	**$0.7M**
	IDB	$7.0M	-	-	-	-	$0.2M	**$7.2M**
	BMGF					$0.1M	$0.9M	**$1M**
	Total	**$32.0M**	**$6.1M**	**$3.5M**	**$2.2M**	**$2.8M**	**$6.9M**	**$54.2M**
FY18/CY19	PMI	$8.8M	$7.1M	$2.7M	$1.1M	$1.0M	$3.3M	**$24.0M**
	Global Fund	$7.4M	$.2M	$0.1M	$0.2M	$0.7M	$1.6M	**$10.2M**
	Host Gov[4]	-	-	-	-	-	-	**$0.7M**
	IDB	$0.2M	$0.5M	-	-	-	-	**$0.7M**
	BMGF					$0.1M	$0.9M	**$1M**
	Total	**$16.4M**	**$7.8M**	**$2.8M**	**$1.3M**	**$1.8M**	**$5.8M**	**$36.6M**
FY19/CY20	PMI	$8.1M	$7.3M	$3.9M	$1.0M	$.6M	$3.2M	**$24.1M**
	Global Fund	$1.8M	$.4M	$.1M	$.2M	$1.8M	$1.6M	**$5.9M**
	Host Gov[4]	-	-	-	-	-	-	**0.6M**
	IDB	-	$2.5M	-	-	-	$1.5M	**4.0M**

Year[1]	Funder	Vector Control	Case Management	Drug-Based prevention[2]	Supply Chain[3]	Monitoring, Evaluation & Research	Other Cross-Cutting and Health Systems Strengthening	Total
	BMGF					$3.3M	$8M	**$11.3M**
	UCSF					$0.09M		**$0.09M**
	Total	**$9.9M**	**$10.2M**	**$4.0M**	**$1.2M**	**$5.8M**	**$14.3M**	**$46.0M**

Footnotes;

[1.] Each year's figures represent the FY for PMI and CY for GFATM that most closely align. Global Fund budget data accurate as of July 1, 2019. PMI budget data accurate as of Sept 1, 2019.

[2.] Drug-based prevention, including SMC and MIP where relevant;

[3.] Covers management of in-country warehousing & distribution of malaria commodities, except for ITNs which are separately captured under "Vector Control".

[4.] Host country contribution includes operational expenses, staff salary support and indirect investments. Budget listed for CY20 has not yet been voted into law and should only be considered as proposed contribution

Note: Categories shown reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative; potential for categories to continue to evolve through FY 2020 MOP process, as well as for additional donors and host country governments to adopt and reflect funding using the same categories.

Figure 13. Annual Budget by Level 3 Category, Detailed Breakdown for PMI and Global Fund

Level 1 Category	Level 3 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
Vector Control	Procure ITNs for Continuous Distribution	$6.6M	-	$0.5M	-	$3.7M	-
	Distribute ITNs via Continuous Distribution	-	$0.0M	$0.3M	$0.0M	$0.2M	$0.0M
	Procure ITNs for Mass Campaigns	$1.6M	$10.3M	$4.6M	-	-	-
	Distribute ITNs via Mass Campaigns	-	$1.7M	-	$5.7M	-	$0.0M
	Other ITN Implementation*	$0.2M	-	$0.1M	-	-	-
	IRS Implementation[4]	$0.2M	-	$2.5M	-	$3.5M	-
	Procure IRS Insecticide[4]	-	-	-	-	-	-
	Other IRS*	-	-	-	-	-	-
	Entomological Monitoring	$0.6M	$0.1M	$0.8M	$0.1M	$0.6M	$0.0M
	SBC for Vector Control[5]	-	$1.8M	-	$1.6M	-	$1.7M
	Other vector control measures	-	$0.01M	-	$0.01M	-	$0.01M

Level 1 Category	Level 3 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
	Removing human rights- and gender-related barriers to vector control programs**	-	-	-	-	-	-
Case Management	Active Case Detection**	-	-	-	-	-	-
	Community-based case management	-	$0.3M	-	$0.2M	-	$0.4M
	Facility-based case management	-	$0.0M	-	-	-	-
	Private-sector case management	-	-	-	-	-	-
	Procure ACTs	$0.3M	-	$1.0M	-	$2.2M	-
	Procure Drugs for Severe Malaria	$0.2M	-	$0.5M	-	$0.7M	-
	Procure Other Diagnosis-Related Commodities	$0.02M	$0.01M	-	$0.01M	-	$0.10M
	Procure Other Treatment-Related Commodities	$0.02M	-	$0.001M	-	$0.001M	-
	Procure RDTs	$1.7M	-	$1.9M	-	$1.8M	-
	Therapeutic Efficacy	$0.2M	$0.0M	$0.2M	$0.0M	$0.2M	$0.0M
	SBC for Case Management[5]	-	-	-	-	-	-
	Other Case Management	$3.3M	-	$3.6M	-	$2.4M	-
Drug-Based Prevention[2]	Procure SMC-Related Commodities	$1.0M	-	-	-	$2.2M	-
	SMC Implementation	$1.4M	-	$2.1M	-	$1.3M	-
	Prevention of Malaria in Pregnancy Implementation	$0.6M	$0.1M	$0.6M	$0.1M	$0.3M	$0.1M
	Procure IPTp-Related Commodities	$0.5M	-	-	-	-	-
	IPTi**	-	-	-	-	-	-
	SBC for Drug-Based Prevention[5]	-	-	-	-	-	-

Level 1 Category	Level 3 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
	Other Prevention**	-	-	-	-	-	-
Supply Chain[3]	In-Country Supply Chain[3]	$0.6M	-	$0.5M	-	$0.3M	-
	Supply Chain Infrastructure	-	-	-	-	-	-
	Ensuring Quality	-	$0.2M	-	$0.2M	-	$0.2M
	Pharmaceutical Management Systems Strengthening	$0.9M	-	$0.6M	-	$0.7M	-
	Supply Chain System Strengthening	-	$0.4M	-	-	-	-
Monitoring, Evaluation & Research	Reporting, Monitoring, and Evaluation	$1.5M	$0.2M	$0.5M	$0.0M	$0.3M	$0.0M
	Program and data quality, analysis and operations research	-	$1.2M	$0.2M	$0.6M	-	$1.1M
	Surveys	-	$0.03M	$0.3M	-	$0.3M	$0.8M
	Other Data Sources**	-	-	-	-	-	-
	Support for FETP*	-	-	-	-	-	-
Other Cross-Cutting and Health Systems Strengthening	Integrated service delivery, quality improvement, and national health strategies**	-	$0.6M	-	$0.1M	-	$0.1M
	Financial management systems**	-	-	-	-	-	-
	Community responses and systems**	-	$0.04M	-	$0.1M	-	$0.1M
	Support for PCV and SPAs*	$0.0M	-	$0.0M	-	$0.0M	-
	Cross-Cutting Human Resources for Health**	-	$0.5M	-	$0.6M	-	$0.6M
	Central and Regional Program management[6]	$1.1M	$0.2M	$1.3M	-	$0.8M	-
	In-Country Staffing and Administration*	$1.5M	-	$1.0M	-	$1.5M	-
	Other Program Management**	-	$0.8M	-	$0.8M	-	$0.9M

Level 1 Category	Level 3 Category	FY17/CY18[1]		FY18/CY19[1]		FY19/CY20[1]	
		PMI	Global Fund	PMI	Global Fund	PMI	Global Fund
	SBC Unspecified[5]	$1.0M	-	$1.0M	-	$0.8M	-
Total		**$25.0M**	**$20.3M**	**$24.0M**	**$10.1M**	**$24.0M**	**$5.9M**

Footnotes:

1. Each year's figures represent the FY for PMI and CY for GFATM that most closely align;
2. Drug-based prevention, including SMC and MIP where relevant;
3. Covers management of in-country warehousing & distribution of malaria commodities, except for ITNs which are separately captured under "Vector Control";
4. May include the cost of IRS insecticides if full cost of IRS implementation including commodities was bundled within single line in prior year's Table 2;
5. SBC was not historically split in the PMI budget across intervention areas, hence the row “SBC (unspecified)” for the FY2020 MOP cycle. Going forward, SBC proposed activities will be categorized across vector control, case management, and prevention (new categories).
6. PMI Proposed Activity "National-level support for case management" rolls up under "Case Management" Level 1

Note: Categories shown reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative; potential for categories to continue to evolve through FY 2020 MOP process, as well as for additional donors and host country governments to adopt and reflect funding using the same categories.

* Category currently funded by PMI only

** Category currently funded by Global Fund only

Figure 14. Annual Budget, Breakdown by Commodity

Year[1]	Funder	ITNs for Continuous Distribution	ITNs for Mass Distribution	IRS Insecticide[4]	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
FY17/CY18	PMI[2]	$6.6M	$1.6M	-	$0.3M	$1.7M	$0.2M	$1.0M	$0.5M	**$11.9M**
	Global Fund[3]	-	$10.3M	-	-	-	-	-	-	**$10.3M**
	Host Gov[5]	-	-	-	-	-	-	-	-	**-**
	Other[6]	-	-	-	-	-	-	-	-	**-**
	Total	**$6.6M**	**$11.9M**	**-**	**$0.3M**	**$1.7M**	**$0.2M**	**$1.0M**	**$0.5M**	**$22.2M**
FY18/CY19	PMI[2]	$0.5M	$4.6M	-	$1.0M	$1.9M	$0.5M	-	-	**$8.5M**
	Global Fund[3]	-	-	-	-	-	-	-	-	**-**
	Host Gov[5]	-	-	-	-	-	-	-	-	**-**
	IDB	-	-	-	$0.5M	-	-	-	-	**$0.5M**
	Other[6]									
	Total	**$0.5M**	**$4.6M**	**-**	**$1.5M**	**$1.9M**	**$0.5M**	**-**		**$9.0M**

Year[1]	Funder	ITNs for Continuous Distribution	ITNs for Mass Distribution	IRS Insecticide[4]	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
FY19/CY20	PMI[2]	$3.7M	-	-	$2.2M	$1.8M	$0.7M	$2.2M	-	**$10.6M**
	Global Fund[3]	-	-	-	-	-	-	-	-	-
	Host Gov[5]	-	-	-	-	-	-	-	-	-
	Other[6]	-	-	-	-	-	-	-	-	-
	Total	**$3.7M**	**-**	**-**	**$2.2M**	**$1.8M**	**$0.7M**	**$2.2M**	**-**	**$10.6M**

Footnotes:

[1.] Each year's figures represent the FY for PMI and CY for Global Fund that most closely align. Global Fund budget data accurate as of July 1, 2019. PMI budget data accurate as of Sept 1, 2019 ;

[2.] PMI commodity costs are fully loaded, including costs for the ex-works price of the commodity, quality control, freight, insurance, and customs.

[3.] Global Fund commodity costs in the table above only include ex-works commodity value in a given year. Additional costs, including quality control, freight, insurance, and customs totaled $1.9 million over the CY 2018-2020 period;

[4.] IRS insecticide; for PMI, IRS insecticide commodity costs may be inextricable from IRS implementation costs in historical data – field left blank where this is the case.

Note: Categories shown reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative; potential for categories to continue to evolve through FY 2020 MOP process, as well as for additional donors and host country governments to adopt and reflect funding using the same categories.

V. ACTIVITIES TO BE SUPPORTED WITH FY 2020 FUNDING

Please see the FY 2020 budget tables (Tables 1 and 2) for a detailed list of activities PMI proposes to support in Senegal with FY 2020 funding. Please refer to www.pmi.gov/resource-library/mops for the latest tables. Key data used for decision-making can be found in Annex A.

ANNEX A: INTERVENTION-SPECIFIC DATA

1. VECTOR CONTROL

NMCP objective
Senegal's 2016-2020 Strategic Plan includes a vector control plan with three major objectives: ● Increase the percentage of the population sleeping under a long-lasting ITN to at least 80 percent, ● Protect at least 90 percent of the population in zones targeted for IRS, and ● Treat at least 95 percent of productive larval sites in selected zones. The country's national policy for ITNs is universal coverage. IRS is implemented only in targeted districts, as described below.
NMCP approach
The overarching strategy for malaria prevention related to long-lasting ITNs is to increase access to nets by strengthening distribution mechanisms. Two distinct approaches are employed: ● Mass distribution of long-lasting ITNs to achieve/maintain universal coverage every three years, quantification based on one long-lasting ITN per 1.8 persons; and ● Routine distribution to allow ongoing access to long-lasting ITNs and maintain high coverage. The channels used include antenatal care visits, social marketing, schools and community organizations. ITNs are provided free of charge to pregnant women during their first antenatal care visit. They are also offered at a subsidized price of 500 FCFA (approximately $0.85) to clients visiting health facilities for any reason and at the community level through health huts and community-based organizations. Socially marketed nets are sold for 1,000 FCFA (approximately $1.69) in pharmacies in Dakar and eight other urban centers across the country. The NMCP has adopted a targeted approach for IRS: a) districts with a yearly incidence between 15 and 30 per 1,000 may have targeted IRS and b) districts with an incidence greater than 30 per 1,000 will receive IRS over the whole district. Routine health system data and entomological parameters such as indoor biting and resting rates will be used to assist in determining where IRS may be appropriate. In addition, the entomologic evaluation of the IRS includes cone bioassays of sprayed walls, entomologic monitoring of effects on vector population and susceptibility of populations to insecticides.

PMI objective, in support of NMCP

PMI continues to support entomological monitoring including bionomics and insecticide resistance monitoring. PMI has long supported mass campaigns and the following routine distribution channels: antenatal care, health facilities, and community-based organizations. PMI has supported school-based distribution in the past and this will resume in 2020 in an effort to maintain high levels of coverage following the 2019 national mass campaign. PMI currently supports social marketing of ITNs in the private sector, but this activity will end in 2021. IRS will restart in 2020. PMI does not support larviciding.

PMI-supported recent progress (past ~12-18 months)

- PMI supports entomological monitoring in 24 sites including insecticide resistance monitoring in 15 of those sites to assist in vector control decisions.
    - *Anopheles gambiae* s.s. was the predominant vector in the south and *An. arabiensis* in the north. *An. coluzzii* was sympatric in many areas with the previous two species. *An. funestus* was found in limited areas and predominates in Ndoffane and Nioro.
    - Resistance to pyrethroid insecticides was widespread. Pre-exposure to Piperonyl butoxide significantly increased susceptibility to deltamethrin and permethrin. Resistance to Pirimiphos-methyl was detected only in the suburbs of Dakar. No resistance was detected to clothianidin at all sites. For chlorfenapyr, mosquitoes appeared completely susceptible at all sites except Dakar suburbs.
    - Molecular analyses revealed the presence of several mutations associated with insecticide resistance from most of the sentinel sites. These include *L1014S* (*kdr-east*), *L1014F* (*kdr-west*), and *Ace1R* and were found in *An. gambia*e s.s., *An. coluzzii* and *An. arabiensis*.
    - Surveys of larval sites in Diourbel, a pocket of relatively high malaria incidence in the northwestern part of the country, revealed the presence of a ravine responsible for the presence of *An. gambia*e s.l. during the dry season.
- PMI supported the distribution of more than 3.5 million ITNs through the following channels during FY 2019:
    - 3 million ITNs for the universal coverage campaign organized in May and August 2019.
    - 420,922 ITNs distributed through routine channels from October 2018 to September 2019. Routine distribution of nets was stopped from May to August, the period of the national mass campaign.
    - 126,126 ITNs distributed through social marketing in urban areas.

- An evaluation of the routine ITN distribution system was conducted in September 2019. It showed that the key components of an effective routine distribution system are in place and that there is strong demand for ITNs by the population. Challenges include difficulty in maintaining continuous and adequate stocks at all levels of the system and insufficient financial resources to support last mile transport for the nets that are sold at the community level.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- PMI will continue to support entomological monitoring including insecticide resistance monitoring and durability of IRS insecticides. In addition, PMI will conduct a landscape analysis of Koalack to better understand why this area has relatively high malaria incidence.
- PMI/Senegal will continue to support distribution through the existing routine channels, with a target of distributing nearly 2 million ITNs. The team will give particular attention to implementing the recommendations of the routine distribution system assessment. The social marketing activity will increase its use of community radio stations in order to reach more people with messaging that promotes ITN use.
- Indoor residual spraying will be carried out in four districts of high malaria incidence in the southeastern portion of the country.

1.A. ENTOMOLOGICAL MONITORING

Key Goal

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

Do you propose expanding, contracting, or changing any entomological monitoring activities? If so, why and what data did you use to arrive at that conclusion?

Funding levels for this activity will remain the same. Nevertheless, a team of in-country entomologists will reassess the activities conducted at each sentinel site. The total number of sites monitored will be reduced but more visits will be made to some sites, thus improving longitudinal monitoring at those sites. Residual efficacy monitoring of insecticides used for IRS will be conducted in the IRS districts and insecticide resistance monitoring will be conducted in 15 sites.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

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

Supporting Data

Figure A1. Entomological Sentinel Sites and Activities in Senegal

District	Sentinel Site	Entomological Activity	Frequency	Former IRS and Control Districts
Sahelian				
Podor	Ndiayène Pendao and Niandane	HLC, PSC	Once or twice in rainy season	
Richard Toll*	Mbagame, Rosso Béthio, Ndiandiou, Maka Diama, Taba Darou Salam, Mallé, Gnith, Ronkh, Khor, and Reynabé	HLC, PSC		
Sudano-Sahelian				
Thies**	Thiaye and Beer	HLC, PSC, and IRM	Every two months	
Tivaouane**	Ngadiaga, Ndiambalo, and Touba Taw Fekh	HLC, PSC, and IRM		
Linguere	Barkedji and Ouarkhokh	HLC, PSC	Once or twice in rainy season	
Ranerou	Oudalaye and Fourdou	HLC, PSC		
Matam	Sadel and Nabadji Ciwol	HLC, PSC		
Kanel	Haouré and Dembankané	HLC, PSC		
Bakel	Gabou and Moudéry	HLC, PSC		
Diourbel	Keur Serigne Mbaye Sarr and Keur Cheikh Anta	HLC, PSC, and IRM	Monthly	
Dakar Suburbs	Pikine, Guédiawaye, Mbao, and Rufisque	IRM	Monthly	
Sudanese				
Nioro	Bamba Diakhatou and Ndramé Ndimb	HLC, PSC, and IRM	Monthly	X
Ndoffane	Tawa Mboudaye and Sagnanème	HLC, PSC, and IRM	Monthly	X (Control)
Koumpentoum	Village 1 and Kouthiaba	HLC, PSC, and IRM	Monthly	X

District	Sentinel Site	Entomological Activity	Frequency	Former IRS and Control Districts
Tambacounda	Koussanar	HLC, PSC, and IRM	Monthly	X (Control)
Koungheul	Ida Mouride and Pakal**a**	HLC, PSC, and IRM	Monthly	X
Kaffrine	Thiamène Kathiote	HLC, PSC, and IRM	Monthly	X (Control)
Malem Hodar	Maka Belal and Tip Saloum	HLC, PSC, and IRM	Monthly	X
Diofior	Simal and Palmarin Diakahnor	HLC, PSC, and IRM	Every two months	
Niakhar***	Toucar and Kothiokh	HLC, PSC	Twice in rainy season and once in dry season	
Sudano-Guinean				
Dianke Makha	Gouta and Soutouta	HLC, PSC, and IRM	Monthly	
Kédougou	Tomboronkoto and Bandafassi	HLC, PSC, and IRM	Monthly	
Vélingara	Madina Dianguet and Bonkonto	HLC, PSC, and IRM	Monthly	
Oussouye***	Mlomp and Kajilon	HLC, PSC	Every two months	

* In Richard Toll, HLC was carried out in two sites (Ross Bethio and Maka Diama) and PSC in all nine villages.

**These two districts are in Niayes, an ecological area where the water table outcrops and the main economic activities of people are market gardens. PSC was conducted in all sites except Thiaye and Ndiambalo.

***Entomological activities in these districts are supported by the Global Fund, but are included in this report at the request of the national-level NMCP.

Figure A2. Map of Entomological Monitoring Sites in Senegal

Figure A3. Relative Abundance of Anopheles Species or Species Complexes throughout Senegal

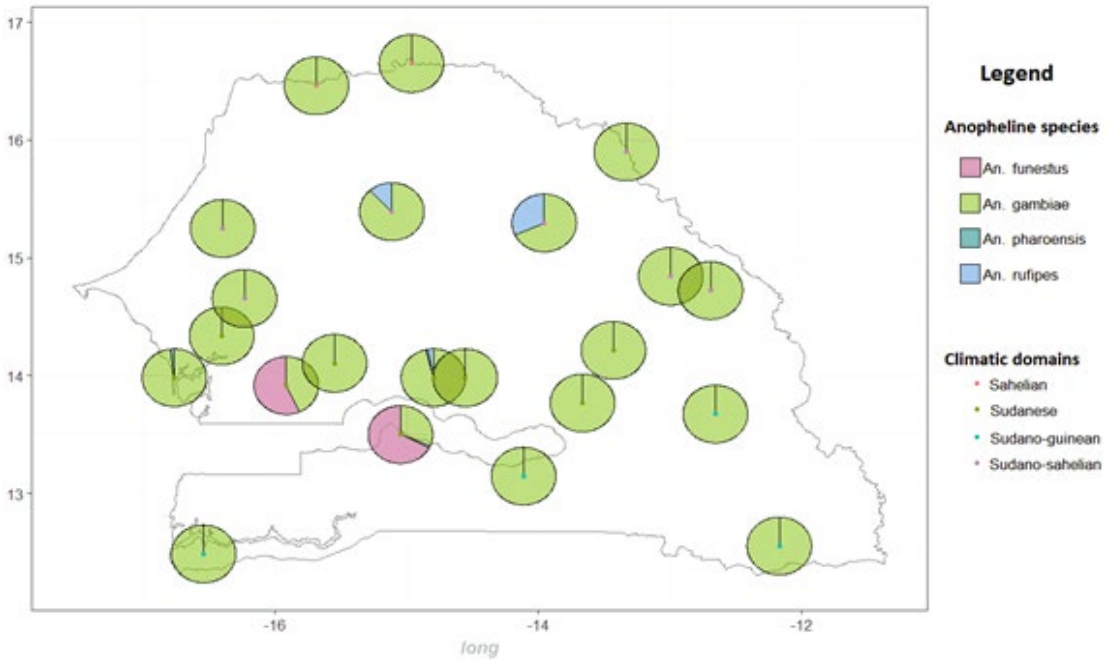


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Figure A4. Relative Abundance of Members of the *Anopheles gambiae* Complex

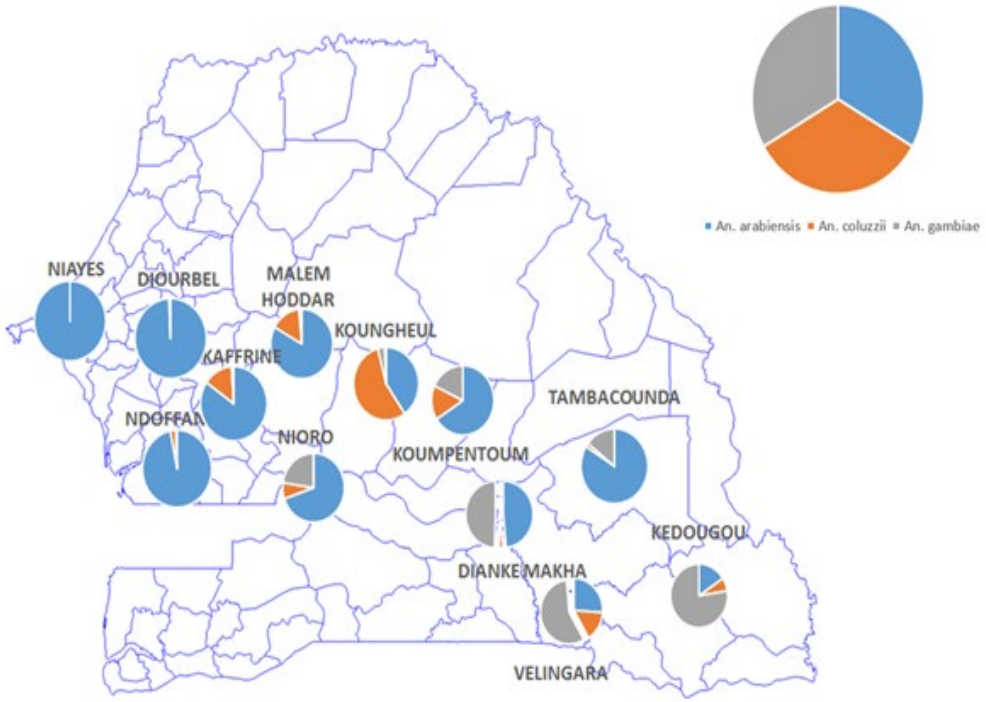


Figure A5. Sentinel Site Data where Monthly Collections Took Place for Seven Months of the Year

District	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR
Diourbel	*An. arabiensis*	*An. pharoensis*	September	Varies by month	Animals: sheep, bovine, horse	0.017	0.07
Koungheul	*An. coluzzii*	*An. arabiensis*	September	indoor	horse	0.037	0.02
Nioro	*An. funestus*	*An. arabiensis*	August-October	outdoor	horse	f=0.004 g=0.012	0.010 0.008
Ndoffane	*An. funestus*	*An. arabiensis*	July-August	outdoor	horse	f=0.009 g=0.009	0.060 0.010

District	Major Vector	Minor Vector	Peak Abundance	Preferred Biting Location	Preferred Host	Peak Sporozoite Rate	Annual* EIR
Tambacounda	*An. arabiensis*	*An. gambiae*	September	outdoor	horse	0.025	0.010
Diankhe Makha	*An. Gambiae* s.s.	*An. arabiensis*	September	indoor	human	0.033	1.61
Velingara	*An. gambiae* s.s.	*An. arabiensis*	September	indoor	human	0.023	0.42
Kédougou	*An. gambiae* s.s.	*An. arabiensis*	September	indoor	human	0.019	0.58

*Calculated from collections from July 2018 to January 2019.

Conclusion[1]

- Entomological monitoring takes place in 24 districts (Figures A1 and A2). The "sentinel site" is generally composed of one to three villages within that district (except in Richard Toll where nine villages were samples because mosquito numbers were so low).The sentinel sites are distributed throughout the country to include different ecological areas and former IRS sites and monitoring is supported by PMI at all the districts except two Niakhar and Oussouye, funded by the Global Fund. Insecticide resistance monitoring takes place in 15 of the districts.
- Members of the *An. gambiae* complex predominate throughout most of the country except Ndoffane and Nioro where *An. funestus* was the most abundant species collected (Figure A3). *Anopheles pharoensis* was the second most abundant species in two districts of Linguere and Renerou, relatively dry areas of the country.
- Of the members of the *An. gambiae* complex, *An. arabiensis* predominates in the north and central areas (Figure A4). *Anopheles coluzzii* is relatively abundant in the central areas north of the Gambia and *An. gambiae* s.s. predominates in southeastern Senegal where malaria incidence is the highest. Please note that the relative abundance of species may vary at different times of the year.
- Mosquito abundance is generally highest in September (Figure A5). The preferred feeding location (indoor versus outdoor) depended on the location and time of year but in

[1] See the Vectorlink Senegal 2018 Final Entomological Monitoring Report for more data related to this section

most cases, the endophagic rate was somewhere between 0.48 to 0.52. The preferred host in most cases was the horse, especially in areas where *An. arabiaensis* and *An. funestus* predominate. In the southeast (Dianke Makha, Kédougou, and Velingara), the preferred host was humans. Sporozoites were not detected in all districts. Highest infection rates and EIRs were found in the southeast.

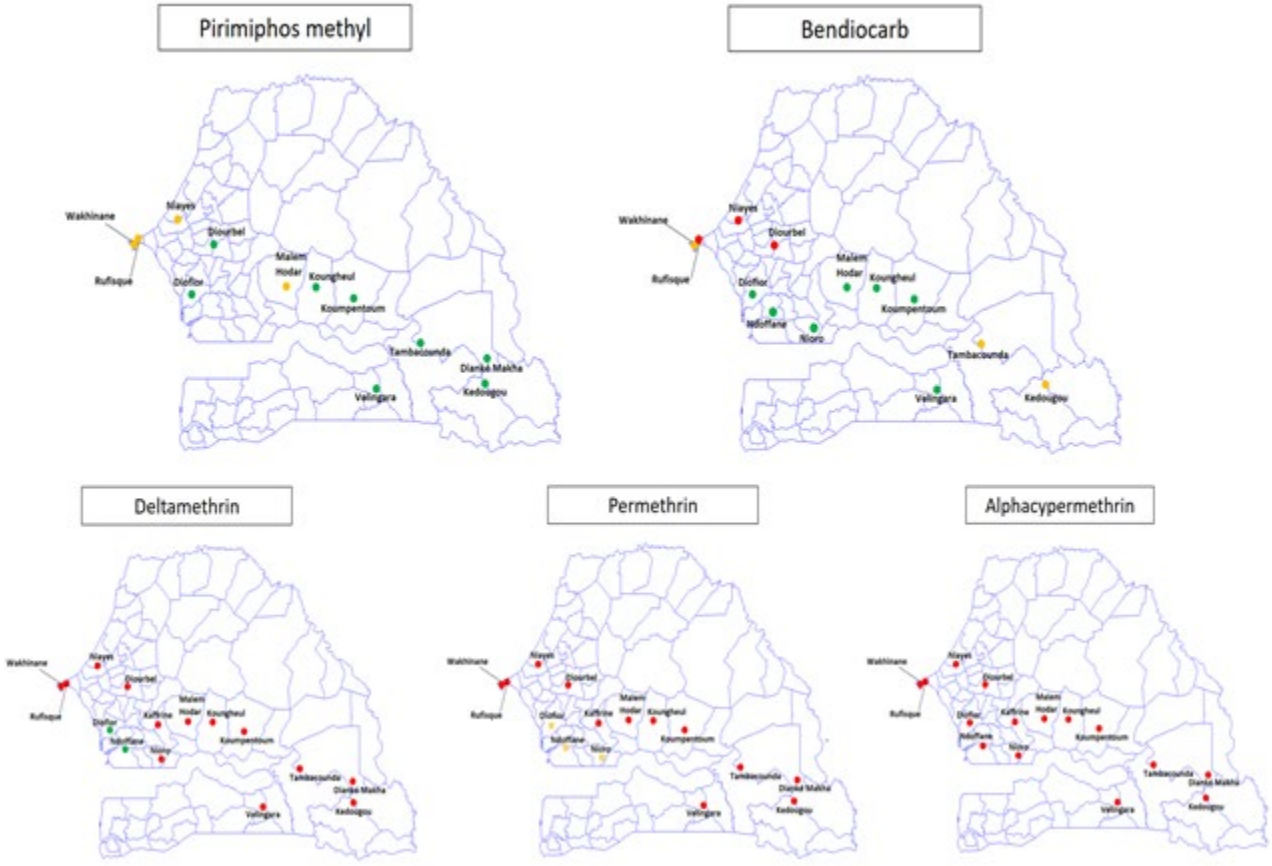
The ecology of malaria transmission varies considerably throughout Senegal. The areas where the highest malaria incidence occurs, i.e. the southeastern part of the country, is where *An. gambiae* s.s. is the most abundant species collected and this species by far prefers to feed on humans.

Key Question 2

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

Supporting Data

Figure A6. Susceptibility Status of Five Insecticides at Sentinel Sites throughout Senegal



Note: green = susceptible, yellow = suspected resistance, red = resistant)

Figure A7. Percent mortality of *An. gambiae* s.l. with intensity assay with WHO tube method

Districts	Deltamethrin				Permethrin				Alpha-cypermethrin			
	1X	5X	10X	Intensity	1X	5X	10X	Intensity	1X	5X	10X	Intensity
Wakhinane	67.5	90.4	90.5	**High**	6.89	85.6	95.5	**High**	1.9	-	-	**High***
Rufisque	15.9	87.5	91	**High**	8.8	41.2	85.0	**High**	8.9	-	-	**High***
Niayes	60.2	86.4	92.03	**High**	27.6	83.8	94.0	**High**	25.0	-	-	**High***
Diourbel	54.1	88	98.9	**Moderate**	45.9	81.8	92.2	**High**	47.7	-	-	**High***
Nioro	77.0	99.1	n/a	**Low**	90.0	100	n/a	**Low**	75.9	-	-	**Moderate***
Ndoffane	98.2	n/a	n/a	-	90.5	97.0	n/a	**Moderate***	65	-	-	**Moderate***
Diofior	100	n/a	n/a	-	94.1	100	n/a	**Low**	81.3	91.0	98.0	**Moderate**
Kaffrine	69.3	80.0	99.1	**Moderate**	50,9	93,8	100	**Moderate**	72.3	-	-	**Moderate***
Malem Hodar	64.7	95.1	100	**Moderate**	66,1	87.0	93.6	**High**	5.5	85.9	-	**Moderate***
Koungheul	72.8	100	n/a	**Low**	61,9	87.1	100	**Moderate**	78.3	95.9	97.9	**High**
Koumpentoum	79.0	96.1	-	**Moderate***	66	82.4	-	**Moderate***	77.7	91.3	-	**Moderate***
Tambacounda	87.4	-	-	**Moderate***	87.9	94.3	-	**Moderate***	89.0	-	-	**Moderate***
Vélingara	56.7	82.5	96.1	**High**	31.4	80.9	100.0	**Moderate**	34.2	85.9	-	**Moderate***

Districts	Deltamethrin				Permethrin				Alpha-cypermethrin			
	1X	5X	10X	Intensity	1X	5X	10X	Intensity	1X	5X	10X	Intensity
Dianké Makha	18.8	91.6	-	**Moderate***	25.0	63.1	-	**High***	43.1	-	-	**High***
Kédougou	65.4	61.4	84.7	**High**	29.0	71.0	93.2	**High**	53.2	55.0	-	**High***

*Test not completed for all concentrations due to a lack of sufficient numbers of mosquitoes.

Figure A8. Mortality of *An. gambiae* s.l. Exposed to deltamethrin+permethrin with or without Pre-exposure to PBO Using WHO Papers

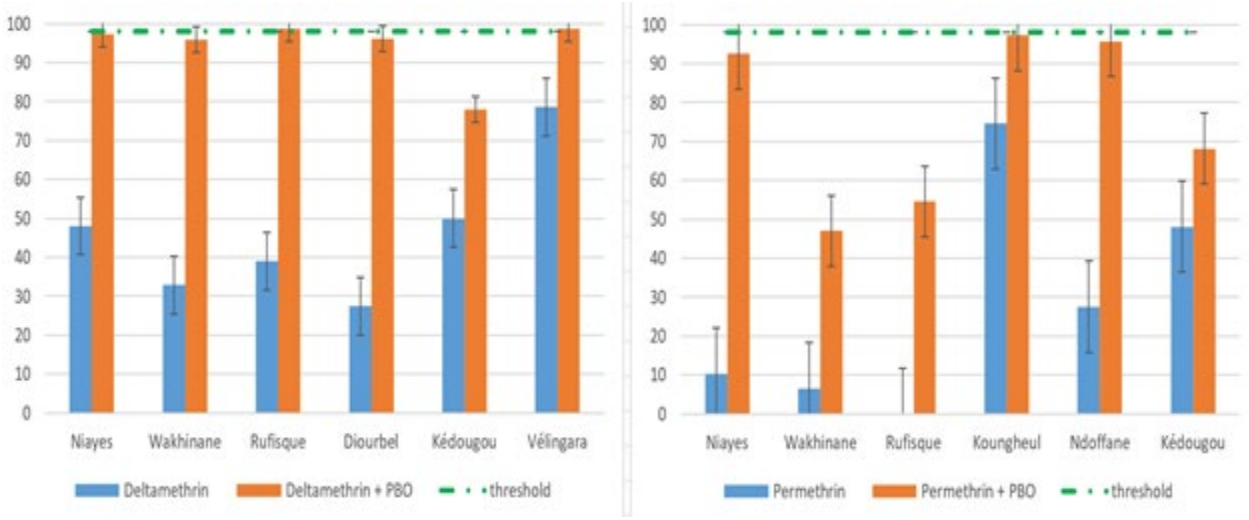


Figure A9. Susceptibility of *An. gambiae* s.l. Exposed to Chlorfenapyr

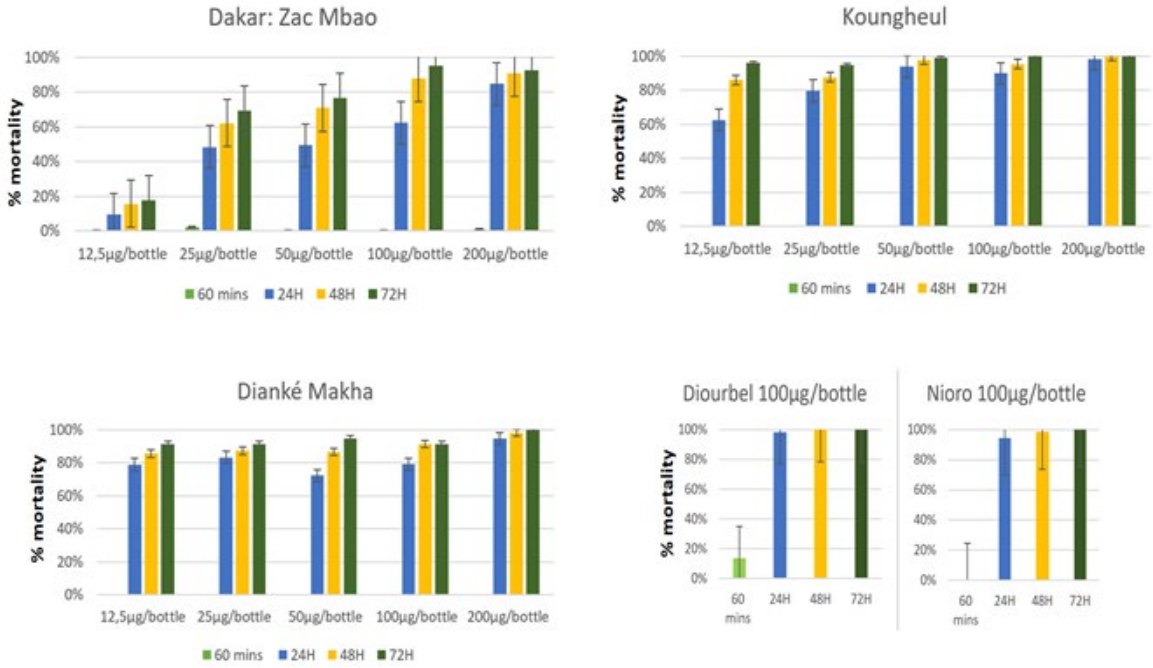
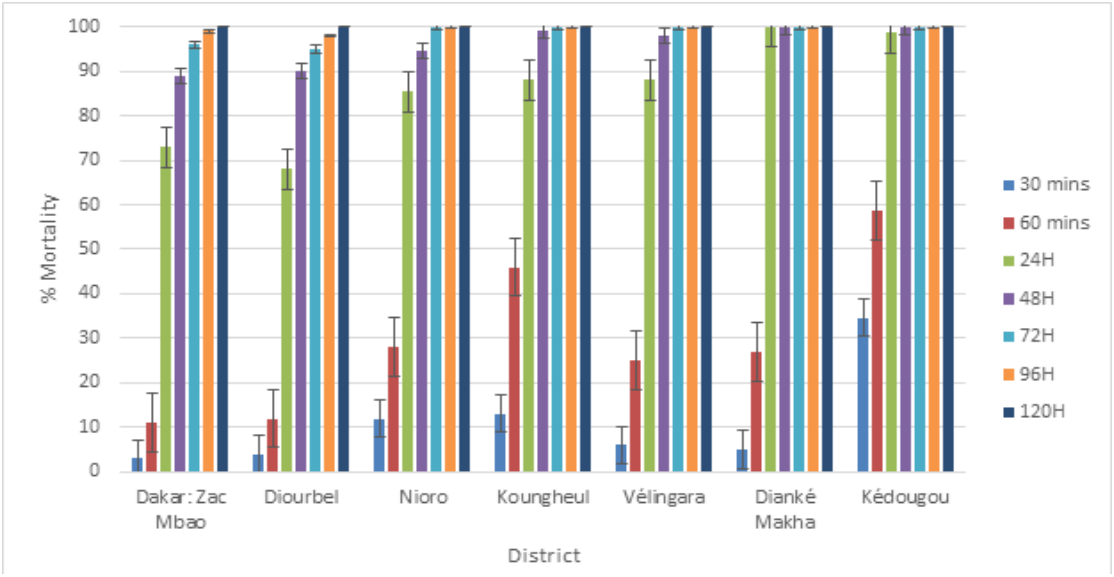


Figure A10. Mortality of *An. gambiae* s.l. exposed to clothianidin



Conclusion

- Pyrethroid resistance is widespread. It was detected in mosquitoes at all 15 sites where mosquitoes were tested (Figure A6). Bendiocarb resistance is limited to the areas of Dakar and the Niayes where market farms are common and in areas such as Kédougou and Tambacounda where cotton farming is a major industry. Reduced susceptibility to Pirimiphos methyl was mostly limited to the Niayes and the suburbs of Dakar.

- Intensity assays with the pyrethroids deltamethrin, permethrin and alpha-cypermethrin showed that mosquitoes were able to survive the 5x or 10x concentrations of these insecticides in 11-13 sites depending on the insecticide tested (Figure A7).
- Fortunately, pre-exposure of mosquitoes to PBO restored susceptibility to deltamethrin and permethrin in most sites where tested. These data suggest that esterases are involved in resistance. For deltamethrin, PBO pre-exposure increased the percentage of susceptible mosquitoes to greater than 95 percent in five of six sites. In the sixth site, the increase was 25 percent. For permethrin, pre-exposure increased the susceptibility to greater than 90 percent in three sites and by at least 20 percent in the other three sites (Figure A8). These data suggest PBO nets may be more protective than standard ITNs s in Senegal.
- Susceptibility of mosquitoes to the pyrrole chlorfenapyr, a new insecticide within a new class of public health insecticide to be used on bed nets, was tested at multiple doses over multiple exposure times. Some sites show 100 percent susceptibility at the 100 ug/bottle after an exposure of 72 hours. The 72 hour exposure at 200 ug/bottle showed 100 percent susceptibility at all sites (Figure A9).
- Clothianidin, a neonicotinoid insecticide, is used in conjunction with pyrethroids in new formulations of insecticides for indoor residual spraying (IRS). In all seven sites tested a 120 hour-exposure to papers prepared with an IRS formulation was sufficient to kill 100 percent of the mosquitoes indicating that the mosquitoes are susceptible at all sites (Figure A10).
- Molecular analyses of the sodium channel gene showed that both common mutations associated with pyrethroid resistance, *L1014S (kdr-east)* and *L1014F (kdr-west)* were detected in mosquitoes in all sentinel sites. The *Ace-1R (G119S)* mutation in the acetylcholinesterase gene, the target of organophosphate and carbamate insecticides was found as the heterozygous allele in all study sites.

Insecticide resistance is widespread in Senegal but combinations with PBOs and other new insecticides are effective against these mosquitoes. Continued entomological surveillance will permit the detection of resistance problems and allow for the rotation of vector control interventions as needed.

Key Question 3

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

Supporting Data

Koalack, Diourbel and Touba districts have higher numbers of malaria cases than the districts surrounding them. Senegal is currently conducting a study to gain a better understanding of malaria transmission in these areas. Preliminary mapping of larval sites in Diourbel suggests that a permanent larval site contributes significantly to mosquito production during the dry season and larval source management in such sites may help to reduce transmission.

Conclusion

If the conclusion of the study suggests that larval sources are few, fixed, and findable, funding of larval source management may be warranted in the future.

1.B. INSECTICIDE-TREATED NETS (ITNs)

PMI Goal
Achieve high ITN coverage and usage of effective nets in endemic PMI-supported areas (in the context of the current insecticide resistance); and maintain high coverage and use with consistent ITN distribution (via campaigns and/or continuous channels in a combination that is most effective given country context). Determine the geographic distributions, bionomics, and insecticide resistance profiles of the main malaria vectors in the country to inform vector control decision-making.

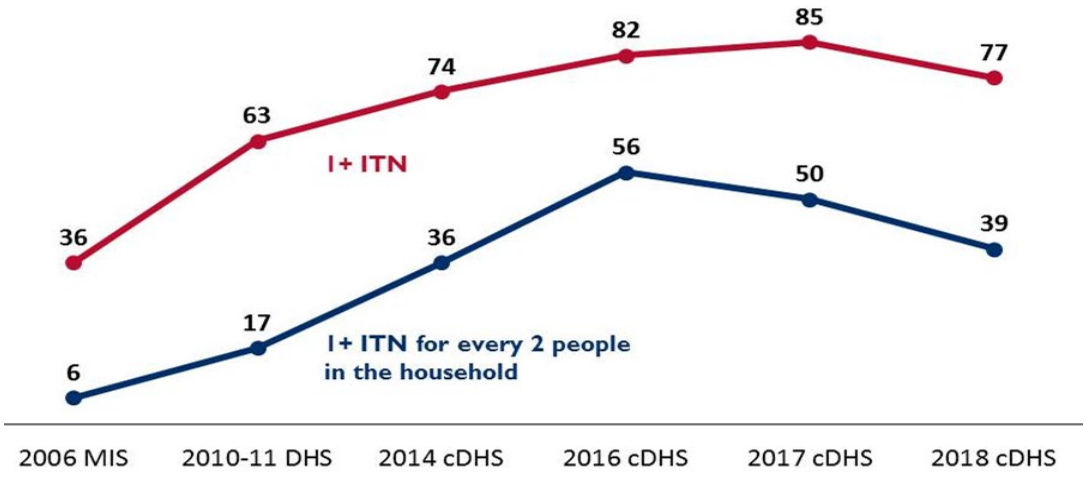
Do you propose expanding, contracting, or changing any ITN activities? If so, why and what data did you use to arrive at that conclusion?
PMI/Senegal's approach to ITN distribution will remain largely the same, with most support going to the different parts of the routine distribution system - health facilities, including antenatal care and general consultations, schools and community-based organizations. Social marketing activities through the private sector targeting urban areas will be discontinued once the nets procured with FY 2019 funds have been distributed. There was a national mass campaign in 2019 and the next one is planned for 2022. PMI is budgeting for about 688,000 ITNs in the FY 2020 MOP to ensure that they will be in-country in time for the campaign, which should normally be implemented between January and April (dry season). Additional ITNs will be procured using reprogrammed funds. Given the high level of pyrethroid resistance throughout the country and the fact that PBO exposure restores some susceptibility, nets with PBO or with chlorfenapyr will be purchased for the campaign. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

How has net ownership evolved since the start of PMI in the country? Are households fully covered?

Supporting Data

Figure A11. Trends in ITN ownership, *Percent of Households*



Conclusion

ITN ownership at the household level increased steadily from 2006 through 2016. The proportion of households that had enough ITNs to meet the definition of universal coverage also increased, but remained significantly below the household indicator. The drop in the universal coverage indicator after 2016 can be explained by the fact that Senegal changed from rolling campaigns (2008-2015) to nationwide mass campaigns starting in 2016. In other words, some regions were receiving mass campaigns every year for the first timeframe, helping to maintain the higher levels of ownership, while no regions received mass campaigns in 2017 and 2018. Nevertheless, household possession remained relatively stable after the 2016 campaign. These data reinforce the importance of having strong routine distribution systems to meet ITN needs between mass campaigns.

Key Question 2

What proportion of the population has access to an ITN? In contrast, what proportion of the population reports using an ITN? What is the ratio between access and use? Does it vary geographically?

Supporting Data

Figure A12. Trends in ITN Access and Use, *Percent of Household Population with Access to an ITN and Who Slept Under an ITN the Night Before the Survey*

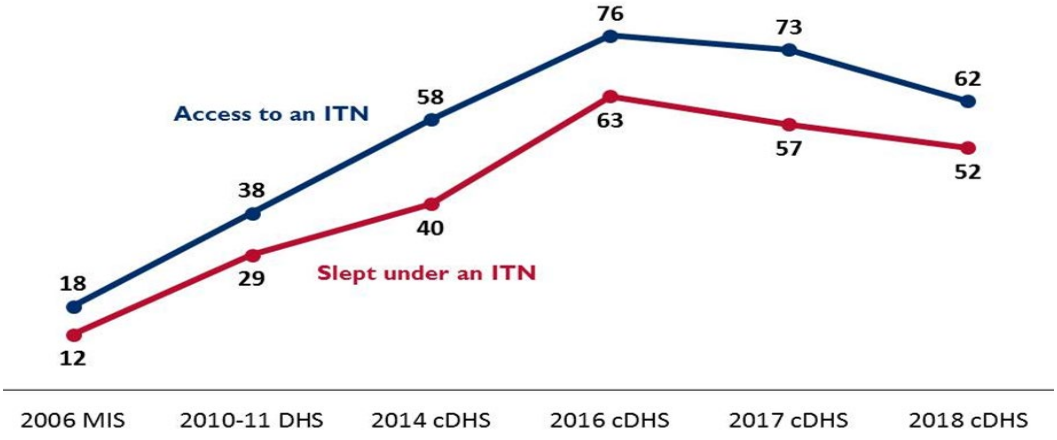
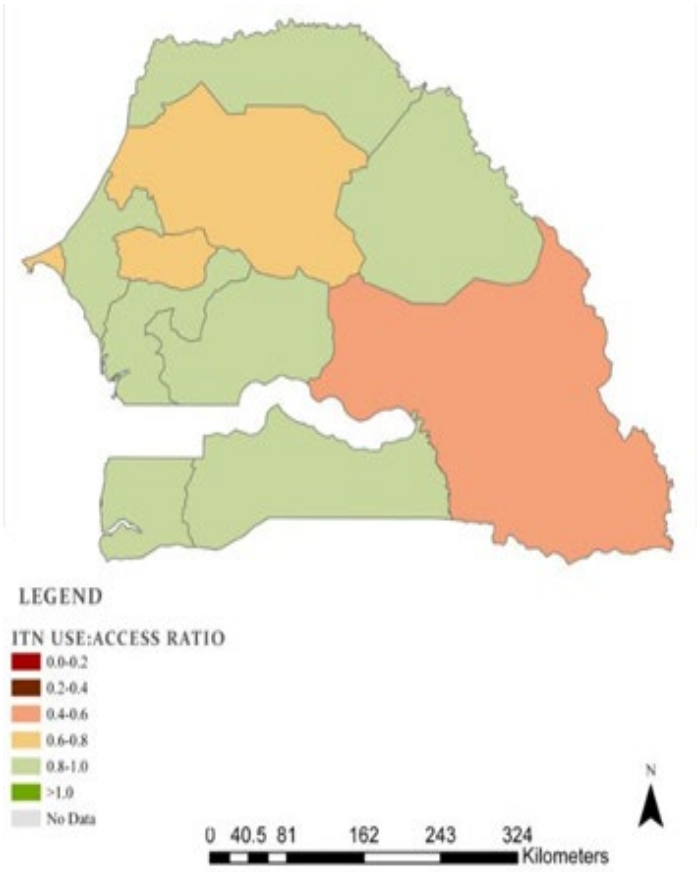


Figure A13. ITN Use: Access Ratio



Source: cDHS 2017

Figure A14. ITN Use and Access by Season

2017			
Region	**Use/Access**		
	Dry Season	**Early Rains**	**Late Rains**
Dakar	0.57	0.90	0.60
Zuguinchor	0.50	0.96	0.93
Diourbel	0.46	0.78	0.91
Saint-Louis	0.71	0.76	0.92
Tambacounda	0.34	0.51	0.79
Kaolack	0.89	0.90	0.90
Thies	0.79	0.85	0.83
Louga	0.55	0.70	0.86
Fatick	0.86	0.94	0.93
Kolda	0.78	0.83	0.93
Matam	0.63	0.88	0.99
Kaffrine	0.52	0.59	0.71
Kedougou	0.14	0.75	0.80
Sedhiou	0.73	0.89	0.94

Source: cDHS 2017

Note: green= 80-100%; yellow= 60-79%; red= <60%

Conclusion

Trends in ITN access and use have progressed in parallel, and the surveys showed that the majority of people who had access to an ITN slept under one the previous night. The continuous DHS, implemented since 2012, sheds additional light on the use: access ratio across surveys. Analysis by season shows a pattern of net use that increases during the early rains and peaks during the late rains (September/October), indicating that net use is likely driven by perceived nuisance biting, and diminishes when mosquitoes are less present. It is worth noting that the ITN access: use ratio during the dry season is lowest in the southeast regions of the country, where malaria prevalence and incidents are the highest overall, but it is on par with other regions during peak transmission season. This implies a need for increased behavior change interventions focusing on the risk of getting malaria throughout the year. Finally, ownership and access seem to be higher on the whole in the lower wealth quintiles than in the wealthier ones. As in many other countries, rural residents have higher access and use rates than urban residents.

Key Question 3

In areas where ITN access is high but use is low, what is known about the key barriers and facilitators to use?

Supporting Data

Figure A15. Key Facilitators and Barriers to ITN Use

Facilitator	Type of Factor	Data Source	Evidence
Perceptions of malaria risk (Dakar)	Internal	VectorWorks Assessment of ITN Social Marketing in Dakar (2017)	80% of respondents think that many children in their community contract malaria.
Economic (Dakar)	Environmental		96% of respondents think that malaria can prevent them from working and earning money, as well as prevent their children from going to school. 65 percent agree that their families spend a lot of money on medical care related to malaria.
Attitude (Dakar)	Internal		88%of respondents agree that they sleep better under a net and that the net should be treated with insecticide in order to be effective.
Self-efficacy (Dakar)	Internal		89% of respondents agree that it is possible to maintain a net so that it lasts several years.
Attitude	Internal	NMCP Formative Research Report (2016)	Understanding their vulnerability and the possible severity of the disease, pregnant women see ITNs as an effective way to protect themselves and their newborns from malaria.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Perceptions of risk of net use	Internal	VectorWorks Assessment of ITN Social Marketing in Dakar (2017)	58% of respondents think that the insecticide on ITNs is harmful to children
Perceptions of risk of malaria	Internal		62% of respondents think that people in their community only contract malaria during the rainy season, and 86% think that only people who live in areas where there are a lot of mosquitoes, contract malaria.
Attitude	Internal	NMCP Formative Research Report (2016)	Some people feel uncomfortable using nets (too hot, feeling claustrophobic) or have experienced side effects, and are therefore less inclined to use ITNs or to use them consistently.
Attitude	Internal		Some heads of household are disappointed that the “promise” that ITNs will kill mosquitoes is not always fulfilled.

Conclusion

The barriers and facilitators presented above come from an evaluation of the Senegal social marketing program conducted in Dakar in 2017. There are several factors that facilitate the use of ITNs, primarily related to the risk of children contracting malaria and the negative effects of

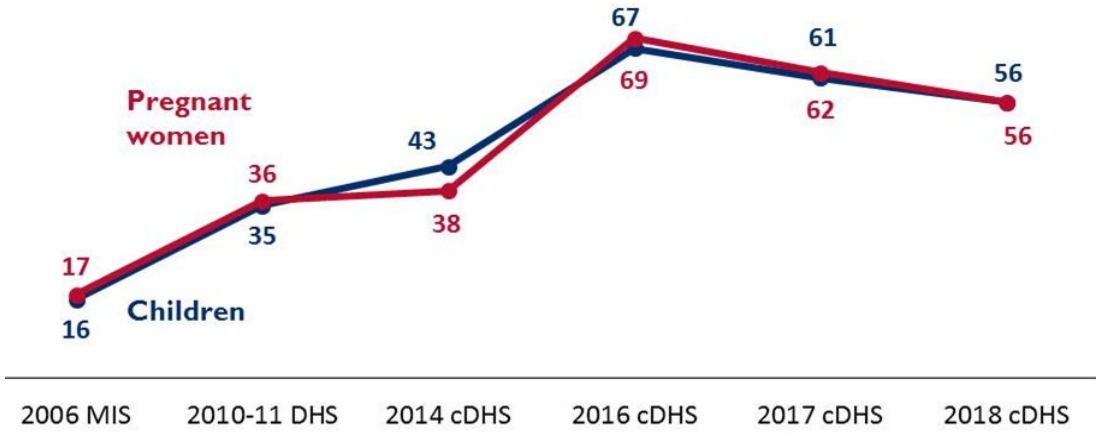
having malaria on the ability to go to work or to school. Personal comfort is also an important factor. Nevertheless, a significant proportion of respondents have concerns about the safety of the insecticide, and do not understand that malaria can be transmitted year round in Dakar, even when there are only a few mosquitoes present.

Key Question 4

What percent of pregnant women and children under 5 report sleeping under an ITN?

Supporting Data

Figure A16. Trends in ITN Use Among Children and Pregnant Women, *Percent of Children Under 5 and Pregnant Women Age 15-49 Who Slept Under an ITN the Night Before the Survey*



Conclusion

Similar to the ownership and universal coverage indicators presented above, ITN use among pregnant women and young children have advanced in parallel. Both indicators improved over the years of rolling mass campaigns, but decreased in the years following the first nationwide universal coverage campaign. PMI expects to see an increase following the 2019 mass campaign.

Key Question 5

What channels are used to distribute ITNs?

Supporting Data

Figure A17. Channels for ITN Distribution

Channel	FY 2016	FY 2017	FY 2018
ANC	291,192	299,029	162,464
Schools	0	0	0
Community	0	44,273	16,761
Social marketing	147,675	0	211,115
Mass Campaign	2,149,000	0	0

Source: Senegal annual performance plan and reports

Conclusion

The number of ITNs distributed through routine channels has remained relatively consistent over the past few years. The decrease in the number of nets distributed through ANC in 2018 can be largely explained by a general health sector strike that lasted several months and resulted in reduced services. The community channel is also dependent on health services for its supply of ITNs.

Key Question 6

What was the estimated need for ITNs during calendar year? What are the estimated ITN needs over calendar years 2020 and 2021? What volume of ITNs are available from partners and the public sector for the next three calendar years?

Supporting Data

See Excel sheet for commodity gap analysis for details.

Conclusion

The total ITNs needed for 2019 was 10.6 million ITNs, and 9.2 million of those nets were distributed through the national mass campaign conducted jointly with the Gambia. PMI provided 3 million of the nets and the remainder were provided by the Global Fund. No mass campaigns are planned for 2020 or 2021; PMI will support all of the ITNs for distribution through routine channels. The ITN need is projected to be higher in 2021 based on expected loss of ITNs distributed through the 2019 campaign. The NMCP plans to re-introduce school-based distribution in 2020 and 2021 in order to cover the greater needs from net loss and the end of social marketing activities.

Key Question 7

What is the current status of durability monitoring?

Supporting Data

Figure A18. Current status of durability monitoring

Campaign Date	Sites	Brands	Baseline	12-month	24-month	36-month
November 2014	Diourbel (Grand Diourbel), Fatick (Ndiongolor), Kaffrine (Nganda), Kaolack (Léona), Thies (Thiénéba, Malicounda)	PermaNet (rectangular), PermaNet (circular), NetProtect, Interceptor, Olyset, Magnet, Yorkool, Bayer	x	x	x	x

Figure A19. Key Results of Durability Monitoring

Brand	Survey and time since distribution (months)	Cohort nets in serviceable condition (%)	Cohort nets used the previous night (%)	Insecticidal effectiveness in bioassay: Knock down/mortality (%)
PermaNet (rectangular)	6m:	95.4	82.3	n/a
	12m:	61.8	57.2	79.7
	24m:	23.3	18	79.2
	36m:	3.5	3.2	30.4
PermaNet (circular)	6m:	98.9	85.7	n/a
	12m:	69.3	65.5	72.7
	24m:	35.2	30.6	80.3
	36m:	9.4	9	32.2
NetProtect	6m:	96.2	75.6	n/a
	12m:	61.7	52.3	90.3
	24m:	21.2	12.9	80.5
	36m:	0.7	0.7	48.6
Interceptor	6m:	98.9	90.7	n/a
	12m:	66	65.6	77.1
	24m:	33.6	29.1	74.7
	36m:	6.3	6	29.9
Olyset	6m:	96.5	79.4	n/a
	12m:	59.8	50.5	58.4
	24m:	21.6	10.3	62.5
	36m:	0.7	0.7	27.1
MAGNet	6m:	96.5	66.8	n/a
	12m:	58.1	48.9	98.4
	24m:	15.7	10.5	98
	36m:	0	0	n/a
Yorkool	6m:	96.1	96.1	n/a
	12m:	56.9	57.4	44.4
	24m:	52.7	9.7	77.2

Brand	Survey and time since distribution (months)	Cohort nets in serviceable condition (%)	Cohort nets used the previous night (%)	Insecticidal effectiveness in bioassay: Knock down/mortality (%)
	36m:	6	1.2	71.1
Bayer	6m:	93.7	93.8	n/a
	12m:	58.9	n/a*	95.1
	24m:	20.1	n/a*	95.1
	36m:	2.6	3.1	80.7

*n/a - the data in the report are not clear, original data set not available

Conclusion

The durability monitoring study in Senegal was conducted from 2015 to 2018, using nets that were distributed during mass campaigns in November 2014. Eight different types of ITNs were distributed across six sites, half urban and half rural. For the majority of types, the proportion of nets surviving in serviceable condition was around 95-98 percent after six months, and 60-69 percent after 12 months. By the 24 month time point, only around 20 percent of ITNs survived. By 36 months, most brands were below 5 percent with the exception of PermaNet circular (9.4 percent) and Yorkool (6 percent). MAGNet fared the worst, with 0 percent survivorship by 36 months, followed by Olyset and NetProtect. The use of cohort nets the previous night follows similar patterns, with PermaNet at 9 percent, and Olyset and NetProtect at 0.7 percent.

For insecticidal effectiveness, 24 hour mortality at 36 months was highest for Bayer and Yorkool at 80.7 percent and 71.1 percent, respectively. The lowest insecticidal effectiveness was seen with Olyset (27.1 percent) and Interceptor (29.9 percent).

Although these data provide insight into durability of nets used in Senegal, information gained from insecticide resistance monitoring demonstrates that PBO or other new types of nets will be more effective for Senegal in the future.

Key Question 8

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

Supporting Data

None

Conclusion

None

1.C. INDOOR RESIDUAL SPRAYING (IRS)

Key Goal
Ensure high spray coverage, with an appropriate insecticide, in targeted endemic PMI-supported areas

Do you propose expanding, contracting, or changing any IRS activities? If so, why and what data did you use to arrive at that conclusion?
With FY 2019 funds, PMI plans to reintroduce IRS in Senegal to target high burden areas. Those districts selected are Kédougou, Koumpetoum, Koungheul and Maka Coulibanta. With FY 2020 funds, PMI will continue to support IRS in the same areas that were selected in 2019. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

What areas are targeted for IRS and why?

Supporting Data

- In CY 2020, with FY 2019 funds, PMI will support IRS in four high burden districts in Senegal, covering the whole district (See Figure 9. PMI intervention support map). In addition, FY 2018 funds were provided to start the planning activities for the 2020 IRS campaign including selecting sites, conducting a census, mapping of houses and estimating insecticides needed. Insecticides with a clothianidin formulations will be sprayed in all four districts.
- The Islamic Development Bank provided funds to support IRS in the areas of pre-elimination, mostly northern Senegal. The NMCP is targeting “hot spots” (health zones with malaria incidence of greater than 5 per 1000) and will use bendiocarb as the insecticide. In 2019, the NMCP only targeted the health zone in Ranerou and Kanel districts. This spray program will end in three years.

Conclusion

Only two organizations currently support IRS in Senegal and each are using different approaches: PMI supports blanketing the whole high burden districts with IRS while the IDB supports spraying in targeted areas in pre-elimination zones.

Key Question 2

In PMI-supported areas, what spray coverage rates have been achieved in the past 5 years?

Supporting Data

Figure A20. Spray Coverage Rates

Calendar Year	Number of Districts Sprayed	District Names**	Number of Structures Sprayed	Coverage Rate	Population Protected
2016	4 (hotspots)[1]	Koungheul, Koumpentoum, Malam Hodar, and Nioro	124,757	97%	496,728
2017	4 (hotspots)[2]	Koungheul, Koumpentoum, Malam Hodar, and Nioro	156,362	96%	619,578
2018	n/a	n/a	n/a	n/a	n/a
2019	n/a	n/a	n/a	n/a	n/a
2020[3]	4	Kédougou, Koungheul, Koumpentoum, Maka Coulibantan	150,170	not yet done	540,611 estimated pop to be protected

[1.] For the 2016 campaign, the hotspots sprayed were the same as the 2015 campaign and were based on the 2013 data for selection of hotspots

[2.] For the 2017 campaign, the hotspots sprayed were the same as the 2015 campaign. In addition, 10 additional zones were sprayed due to higher malaria rates recorded in 2016.

[3.] Sites were selected by a committee composed of the NMCP and in country entomologists. Kedougou is an extremely high burden district. The other three districts are relatively high burden and separate the pre-elimination area in the north from the higher burden area in the south.

Conclusion

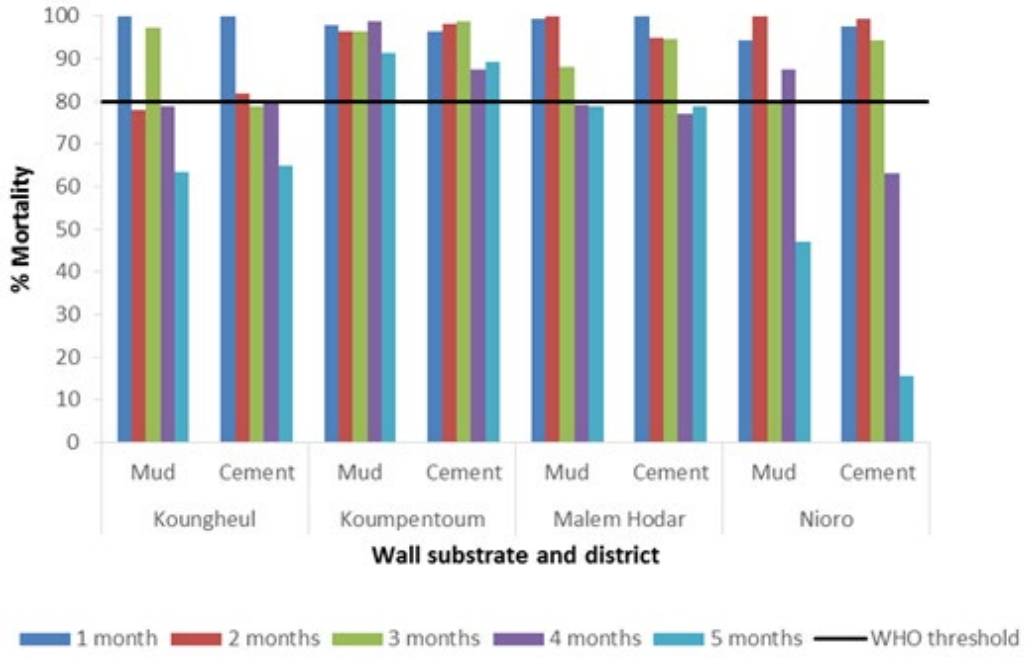
The target coverage rate for IRS is greater than 85 percent. In all previous campaigns in Senegal, the achieved coverage was 96 percent or higher, demonstrating good planning and implementation and high acceptance rates.

Key Question 3

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

Supporting Data

Figure A21. Cone Bioassay Data from Walls Sprayed with Pirimiphos Methyl from the Last Spray Campaign in 2017.



Note: Mosquitoes used in the assay were colony reared susceptible strain of *An. gambiae* s.s.

Conclusion

The residual efficacy of Pirimiphos methyl in experimental settings had been around nine months, which should be sufficient to cover the five-six months when peak malaria transmission occurs in southern Senegal. However, the insecticidal activity decreased to less than 80% as early as two months in some sites and substrates and up to five months in others.

Key Question 4

What is the plan for insecticide rotation? What insecticide will be used next in PMI-supported areas?

Supporting Data

Figure A22. Insecticide Rotation Plan

Year	Koumpentoum	Koungheul	Malem Hodar	Nioro	Kédougou	Maka Coulibantan
2017	organophosphate	organophosphate	organophosphate	organophosphate	--	--
2018	--	--	--	--	--	--
2019	--	--	--	--	--	--
2020*	neonicotinoid with pyrethroid	neonicotinoid with pyrethroid	--	--	neonicotinoid with pyrethroid	neonicotinoid with pyrethroid

*Denotes planned insecticide classes

Conclusion

Given the variable durability of Pirimiphos methyl during the 2017 spray campaign, the insecticides selected for 2020 were the new neonicotinoid insecticides.

Key Question 5

Are the NMCP and PMI considering withdrawing IRS from any PMI-supported area? If so, what programs are in place to cover anticipated increases in malaria cases and promote consistent net use and care-seeking behaviors?

Supporting Data

N/A

Conclusion

N/A

Key Question 5

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

Supporting Data

N/A

Conclusion

N/A

2. HUMAN HEALTH

2.A CASE MANAGEMENT in health facilities and communities

NMCP objective
The objectives outlined in the 2016-2020 National Strategic Plan are: ● Introduce molecular biology in low transmission areas ● Diagnose 100 percent of suspected cases of malaria by RDT and/or microscopy in accordance with the national case management guidelines by 2020 ● Treat 100 percent of confirmed malaria cases with safe and effective medications for malaria in accordance with the national case management guidelines by 2020
NMCP approach
Facilities ● The NMCP 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, though artesunate-amodiaquine is only used in zones in which SMC is not implemented. In pre-elimination zones where incidence is <5/1,000 any confirmed case of malaria is given a single low-dose of primaquine along with the ACT treatment. Universal testing for fevers became policy in 2017. RDTs are used at the health post and community level, and microscopy at higher levels. Senegal monitors antimalarial efficacy by implementing therapeutic efficacy studies in four sentinel sites each year. ● 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. Rectal artesunate as pre-referral treatment has been adopted at health posts and at the community level for children aged up to five years old. ● 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; however, this has not been extended to the community level. There are two types of services available for malaria case management at the community level: ● **Health huts:** Health huts, staffed by community health workers (*agents de santé communautaire*), 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)**: PECADOM *(prise en charge à domicile)* was piloted in 2008, and has now been scaled up to 2,111 villages nationwide. Under this model, selected communities with remote or difficult access to health care choose a

home-based care provider (*dispensateur de soins à domicile* or DSDOM), who is trained in management of malaria with RDTs and ACTs. Diagnosis and treatment are provided to patients of all ages. The PECADOM program is offered for both passive and active case detection and treatment:

  - **PECADOM**: An integrated home-based package (integrated PECADOM), including treatment of malaria, diarrhea and acute respiratory illness for children under five years of age was piloted in 2012 and subsequently expanded to 14 regions of Senegal.
  - **PECADOM+**: Despite the progress made by integrated PECADOM, there were still some limitations with this passive detection of malaria cases at the community level. In 2013, a variation named PECADOM+ was piloted by Peace Corps volunteers and the Saraya District (Kédougou Region). In this approach, DSDOMs visited each household in their communities weekly during the malaria high transmission season (July-December) to identify and test any fever cases, and treat or refer any cases of malaria among all age groups, and diarrhea or acute respiratory illness among children under five years of age. The PECADOM+ strategy was adopted by the NMCP in 2014 and scaled up to Kédougou, Kolda, Sédhiou, and Tambacounda regions (708 villages in 16 districts) by 2016, and has now expanded to a total of 35 districts with PMI support. The package has been further extended and now includes deworming, vitamin A supplementation and identification of children who are late for immunizations. Currently PECADOM+ is being implemented by 1,944 DSDOMs monitored by 560 community supervisors.
  - **PECA *Daara***: A situational analysis identified that students of Koranic residential schools, or *Daaras*, suffered a disproportionate proportion of severe malaria cases. In 2016, DSDOMs were trained to offer malaria case management at 73 *Daaras* in the district of Diourbel. To date there are 204 DS Daaras trained in the districts of Vélingara, Saint Louis, and Touba.
  - **PECA *École***: In 34 schools in the region of Kédougou, the district health management teams and Peace Corps volunteers are piloting a strategy to reach students who are in school while weekly sweeps are being carried out in the communities under the PECADOM+ program.

- The NMCP has adopted WHO recommendations regarding case investigation and active case detection in districts in which annual incidence is less than 5 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 concession and a focal mass drug administration approach is implemented with Dihydroartemisinin-piperaquine and low-dose primaquine targeting all eligible members in the index case's concession and sensitization in the five neighboring households in regards to malaria preventive measures.

- These are countrywide objectives and therefore should take into account both the private and public sector and all levels of the health system.

PMI objective, in support of NMCP

PMI contributes to the NMCP's case management strategy nationwide, with more support going to the higher-transmission areas. Other financial partners, including IDB and BMGF are supporting molecular surveillance and reactive case detection in the pre-elimination zones. PMI provides partial funding for operational cost of case investigations in the pre-elimination zones

PMI-supported recent progress (past ~12-18 months)

- Number of ACTs procured: 670,437 (treatments)
- Number of RDTs procured: 1,640,000

Facility level in 2018:

- Healthcare workers trained:
    - Annual implementation of External Competency Assessment of Malaria Microscopists (ECAM) course, implemented by UCAD in partnership with the NMCP, WHO, WHO AFRO and AMREF Health Africa. In 2018, 23/24 microscopists achieved accreditation (course held December 2018-January 2019)
    - 574 healthcare workers trained on prevention and case management guidelines
    - 14 new mentors were trained on an integrated healthcare module, including malaria
- Supervision & case investigation
    - NMCP and UCAD ensured the supervision of 142 different health structures (public and military hospitals) for quality control of their microscopy diagnostic capacities. In 137/142 of these laboratories the quality of slide reading of lab technicians was assessed. For the remaining 5 laboratories, a documentary review could be performed due to the lab technicians being on strike on the day of the supervision.
    - 5102/5437 (94%) of eligible index cases in the northern regions had an investigation performed

Community level in 2018:

- 23 DSDOMs and 35 traditional healers trained in malaria case management and referral guidelines
- All 1,944 DSDOMs, 560 community supervisors and 400 health post chief nurses implicated in PECADOM+ benefited from training/refresher training on the active detection of malaria cases. PECADOM+ was implemented in 35 districts, completing 34,499 of 35,491 (97%) of

targeted weekly sweeps, performing 166,331 RDTs, diagnosing 87,406 cases of malaria (TPR 53%), and referring 1,007 cases of severe malaria.

- In 2018, there was a nationwide strike in the healthcare sector from April to December. Healthcare workers were providing services during limited hours and did not engage in activities such as participation in the SMC campaign and data submission. This affected the timeline of PMI-supported case management and drug-based prevention activities, as well as supervision of case management activities.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- Support for the decentralization of malaria activities by the development and implementation of regional and district level malaria action plans that partners along with the NMCP will then use to direct their funding. Malaria control and elimination activities will then be included in an integrated annual work plan both at the regional and district level.
- Continued support for implementation of quality control programs for both microscopy and RDTs at all levels of the health system, including private sector.
- Continued support in 2020 for training of laboratory technicians from health facilities at district level, Military Medical Center and hospitals for microscopy diagnosis and annual supportive supervision of laboratories from health facilities at district level, Military Medical Center and Hospitals for microscopy.
- Continued implementation of the PECADOM+ strategy, including an expansion of DSDOM in targeted areas and expansion of active sweeps over time
- Therapeutic efficacy study to be conducted in 2 PMI-supported sentinel sites in 2020. Funding for this activity was increased so as to be able to use next generation sequencing for the molecular analysis of the samples.

PMI Goal

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

Do you propose expanding, contracting, or changing any Case Management activities? If so, why and what data did you use to arrive at that conclusion?

As part of close coordination and synergy between partners and a concern from Global Fund that Senegal was not spending down their malaria allocation in a timely manner, it was decided during MOP planning that Global Fund would purchase half of all RDTs and all of the AL for 2020. PMI

will purchase all the ASAQ with FY19 funds, which is used in non-SMC zones. This decrease in commodity purchases with PMI funds allows for an expansion of PMI support for other activities.

Related to case management, PMI will support a comprehensive SMC exit strategy for the region of Sédhiou, which will include enhanced community case management, including PECADOM+, and strengthening the management of severe cases, including a reinforcement of pre-referral treatment with rectal artesunate. In some high burden areas such as the three districts of Kédougou and two districts in Tambacounda, pending availability of funds PECADOM+ activities will expand to year-round implementation of weekly sweeps with PMI support. Due to delays in government procurement procedures, the procurement of the equipment needed by DSDOMs will be handed over to a local implementing partner. As PECADOM+ is a seasonal but high priority activity, PMI/Senegal is trying to address some of the most critical bottlenecks to the timely implementation of the activities.

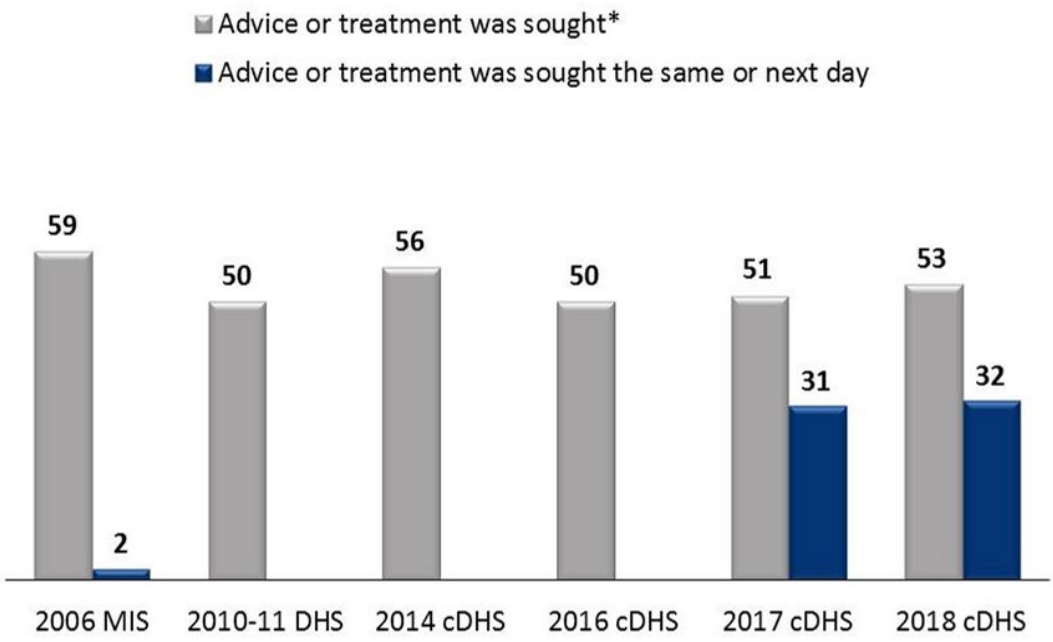
Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

What is the status of care-seeking?

Supporting Data

Figure A23. Trends in Care-Seeking for Fever, *Among Children Under 5 With Fever in the 2 Weeks Before the Survey for Whom:*



Conclusion

Prompt care seeking for fever in Senegal is low. As the country shifts their strategy to focusing on elimination, it will become even more critical to ensure that every fever is tested and treated if positive for malaria. Understanding the drivers and barriers to care seeking will help the program to target these behaviors.

Key Question 2

What is known about the major barriers and facilitators to care-seeking?

Supporting Data

Figure A24. Key barriers and facilitators to care seeking

Facilitator	Type of Factor	Data Source	Evidence
Maternal Knowledge	Social	*NMCP Formative Research on determinants of Behaviors (2016)*	Qualitative study targeting caretakers and heads of household showed that majority of mothers know that fever is a sign of malaria
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Lack of support from head of household or other key decision makers in the family (mother in law and father)	Social	*NMCP Formative Research on determinants of Behaviors (2016)* *ADEMAS. Etude formative sur les déterminants d'Opportunité, de Capacité et de Motivation (OCM) sur les moyens de prévention et de prise en charge du paludisme. 2016*	While mothers consider fever to be a sign of malaria that needs to be taken seriously, men, including fathers consider fever as a benign and temporary condition. Symptomatic treatment of fever by caregivers' delays prompt care seeking and timely diagnosis & treatment of malaria
Use of fever medications and other alternative treatments	Internal		
Low risk perception among heads of household	Social		

Conclusion

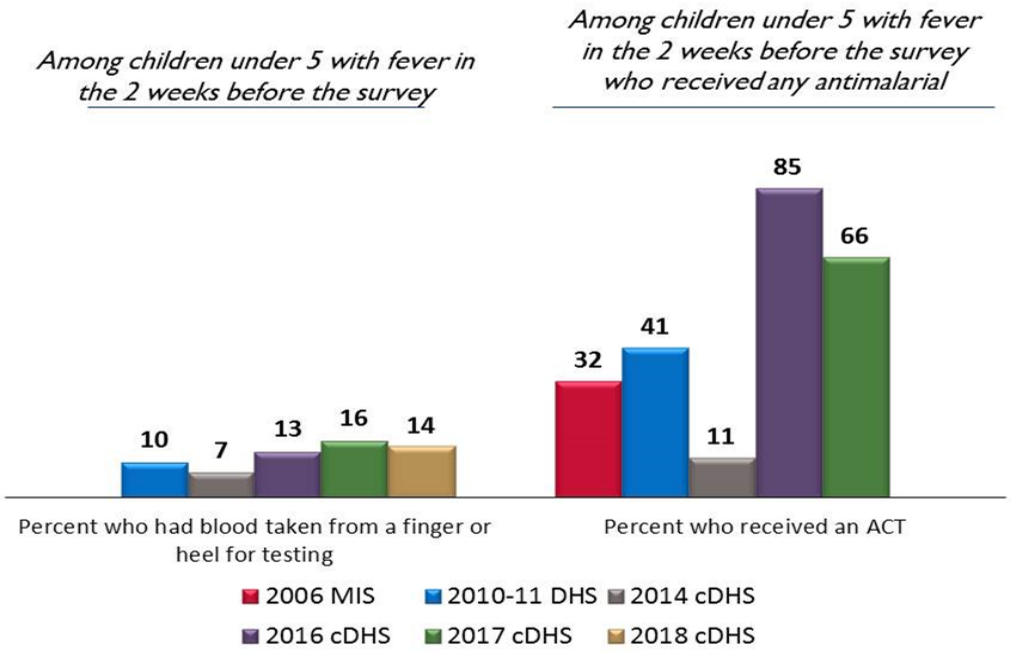
The NMCP SBC communication strategy is targeting heads of households and other family decision makers. A new formative research survey is planned for 2020 with funding from Global Fund to further assess various determinants of care seeking behaviors in addition to a PMI-funded operational research study that focuses on care seeking and provider behavior. Data generated from these studies will allow for more targeted and informed interventions to increase care seeking in all epidemiologic zones in Senegal.

Key Question 3

How have malaria testing and treatment practices evolved over time?

Supporting Data

Figure A25. Trends in Diagnosis and Treatment of Children with Fever



Since 2012, Senegal has implemented a continuous Demographic and Health Survey (cDHS), which is composed of an annual household survey and a service provision assessment (SPA). These data provide trends on care seeking and malaria case management. Data provided by the SPA for 2018 demonstrate that availability of RDTs and artemisinin-based combination therapy (ACT) remained high in public structures; unexpired RDTs were available in 97 percent of structures and unexpired ACTs were present in 61 percent of structures (93% of public structures and 10% of private structures). The 2018 cDHS found that while care had been sought for 53 percent of children under five years of age with fever in the two weeks before the survey, the vast majority in the public sector, only 14 percent of these febrile children had received an RDT.

Conclusion

Despite improved access to and quality of malaria services in the public health sector, the rate of care seeking for febrile illness is low among children under five years of age. Although Senegal has a comparative wealth of information on children under five years of age, as the country shifts from a control phase to a context of malaria elimination, a better understanding of care-seeking and case management is needed for the entire population. There is very limited data on care-seeking for and management of febrile illness in all age groups and how this may impact malaria case management. In conclusion, there is a need to better understand and target determinants of health seeking behavior in addition to provider behavior in both the public and private health sector and for the whole population.

Key Question 4

What is known about provider behavior in relation to testing and treatment practices?

Supporting Data

Figure A26. Key barriers and facilitators to appropriate testing and treatment practices

Facilitator	Type of Factor	Data Source	Evidence
Positive attitude towards RDTs and ACTs	Internal	*NMCP Formative Research on determinants of Behaviors (2016)* *ADEMAS. Etude formative sur les déterminants d'Opportunité, de Capacité et de Motivation (OCM) sur les moyens de prévention et de prise en charge du paludisme. 2016*	Qualitative study shows that providers trust ACTs and RDTs and would follow testing and treatment guidelines.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Providers report frequent stockouts of RDTs and ACTs, particularly during the high-transmission season	Environmental	*ADEMAS. Etude formative sur les déterminants d'Opportunité, de Capacité et de Motivation (OCM) sur les moyens de prévention et de prise en charge du paludisme. 2016*	Qualitative study demonstrated that most providers reported frequent stockouts of malaria diagnosis and treatment tools, limiting their ability to follow case management guidelines.

Conclusion

In 2016, evidence indicated that providers were not able to adhere to case management guidelines due to frequent stockouts. However, since the time of the cited study, SPA data show that the availability of commodities has increased, and this is unlikely to be a meaningful barrier today. The planned PMI-supported study for next year will generate more evidence about healthcare worker facilitators and barriers.

Key Question 5

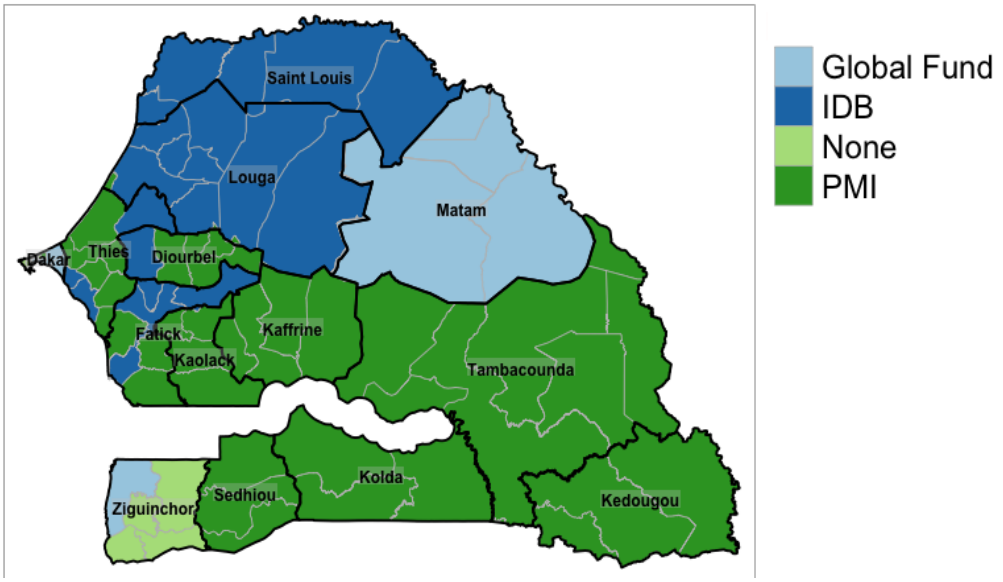
What is the current and planned support for case management at health facilities and in the communities by CHWs?

Supporting Data

Figure A27. Donor Support for Facility-Based Case Management, by Major Donor and by Category of Intervention Supported for 2020

	GF	PMI	IDB	Chinese Cooperation
Training on Case Management	X	X		
Diagnostic training	X	X		
Provision of Commodities for Case Management	AL RDT	ASAQ RAS Inj. Artesunate RDT	Primaquine DHA-PQ (for pre-elimination zones)	DHA-PQ (for pre-elimination zones)
QA of Case management (Formative supervision)	X	X		
TES	X	X		
QA of diagnostic capacity		X		
Death audits	X			
Pharmacovigilance	X			

Figure A28. Donor Support of the PECADOM-Community Case Management Program in Senegal as of October 2019[1,2]



[1]In addition to support for implementation, Global Fund supports equipment for 1,500 DSDOM and GIZ is providing bicycles

[2]In the Matam region, PECADOM+ implementation is targeted to certain health zones, additionally IDB finances activities related to SM&E of PECADOM activities in the region

Conclusion

Senegal benefits from the support of several partners to strengthen its case management both at the health facility and community level. PMI and Global Fund provide most support for training and supervision, as well as quality assurance activities. There is wide coverage of DSDOMs providing passive and active case management in Senegal, contributing to an increased access to care for malaria across the country in addition to stronger surveillance of malaria at the community level.

Key Question 6

What was the estimated need for RDTs during calendar year 2019? What are the estimated RDT needs over calendar years 2020 and 2021?

Supporting Data

See Excel sheet for commodity gap analysis for details.

Conclusion

In 2019, it is estimated that 12,000,000 all-cause consultations will take place at health facilities nationwide (source: PNLP Annual Bulletin). It is estimated that 35 percent of those will be fever cases and all will be tested by RDT. Thus 4,400,000 RDTs will be needed in 2019. Maintaining the same proportion of projected fever cases (35 percent) and assuming 12,200,000 all cause consultations in 2020 and 12,500,000 all cause consultation in 2021, it is estimated that 4,270,000 and 4,375,000 RDTs will be needed in 2020 and 2021 respectively. For 2020, the NMCP anticipates a surplus of 787,000 RDTs. For 2020, Global Fund will procure 50 percent of the remaining RDT needs (1,750,000) and PMI will procure the other 50 percent. It is anticipated that for 2021, PMI will procure 100 percent of the country's RDT needs, currently estimated at a total of 4,358,000 RDTs to be purchased and taking into account any surplus from 2020.

Key Question 7

What was the estimated need for ACTs during calendar year 2019? What is the estimated need for ACTs over calendar years 2020 and 2021?

Supporting Data

See Excel sheet for commodity gap analysis for details.

Conclusion

In 2018, the nationwide test positivity rate was 25 percent, which was applied to the quantification of the ACT need in 2021, plus a yearly 25 percent increase. AL is procured for the districts in which SMC is implemented and which account for about 80 percent of malaria cases in the country. For the remaining 20 percent, ASAQ is used. PMI plans to procure all AL and ASAQ needs for 2021 in Senegal. In the pre-elimination zones (incidence <5/1,000), Dihydroartemisinin-piperaquine is used along with low-dose primaquine and both are procured by IDB. Historically DHA-PQ has been provided by the Chinese Cooperation. IDB will

purchase DHA-PQ for the first time in 2019. As indicated in the gap analysis footnote, while a gap is identified, the NMCP is negotiating with the Chinese Cooperation on ACT procurements. At the time of this MOP development the amount of planned procurement from the Chinese Cooperation is not available.

Key Question 8

What was the estimated need for severe malaria treatment and any other treatments as applicable during calendar year 2019? What is the estimated need for calendar years 2020 and 2021?

Supporting Data

See Excel sheet for commodity gap analysis for details.

Conclusion

In 2018, there were 13,350 cases of severe malaria registered nationwide. For the out years, an assumption of a decrease of 100 each year every year was made. This is based on the fact that the 2018 data was used as a baseline and 2018 was a year where the health system was on strike and therefore there was discontinuity in access to health services nationwide. Hence the assumption is that 2018 was the 'worst case scenario' and it is assumed that the situation will improve in 2019 and beyond. This assumption was used for both injectable and rectal artesunate estimates.

For injectable artesunate, the 2018 data was used as a baseline to quantify the need for injectable artesunate. The estimate includes a 6 month buffer stock plus a 10 percent loss rate. PMI plans to procure all needed injectable artesunate for Senegal in 2021.

For rectal artesunate: 6,000 sites are targeted for the implementation of pre-referral treatment of malaria: 2,000 health huts, 2,000 PECADOM villages, and 2,000 health posts. PMI plans to procure all needed rectal artesunate for Senegal in 2021.

Key Question 9

Are the first-line ACTs effective and monitored regularly?

Supporting Data

Figure A29. Recently Completed and Ongoing Antimalarial Therapeutic Efficacy Studies

Year	Sites	Treatment arms	PCR-corrected ACPR>90%?	Where molecular resistance work was completed or the plan, if any, for molecular resistance work
2018	Tomboronkoto, Kounkane, Keur Serigne Mbaye Satt, Sessene	AL, ASAQ, DP	Yes	CDC Atlanta and UCAD
2019	Kanel, Bakel	AL, ASAQ, DP	TBD	UCAD

Conclusion

There is evidence that the first-line ACTs used in Senegal continue to be effective as of 2018. Additionally, there is advanced in-country capacity to perform the laboratory testing for antimalarial resistance markers.

Key Question 10

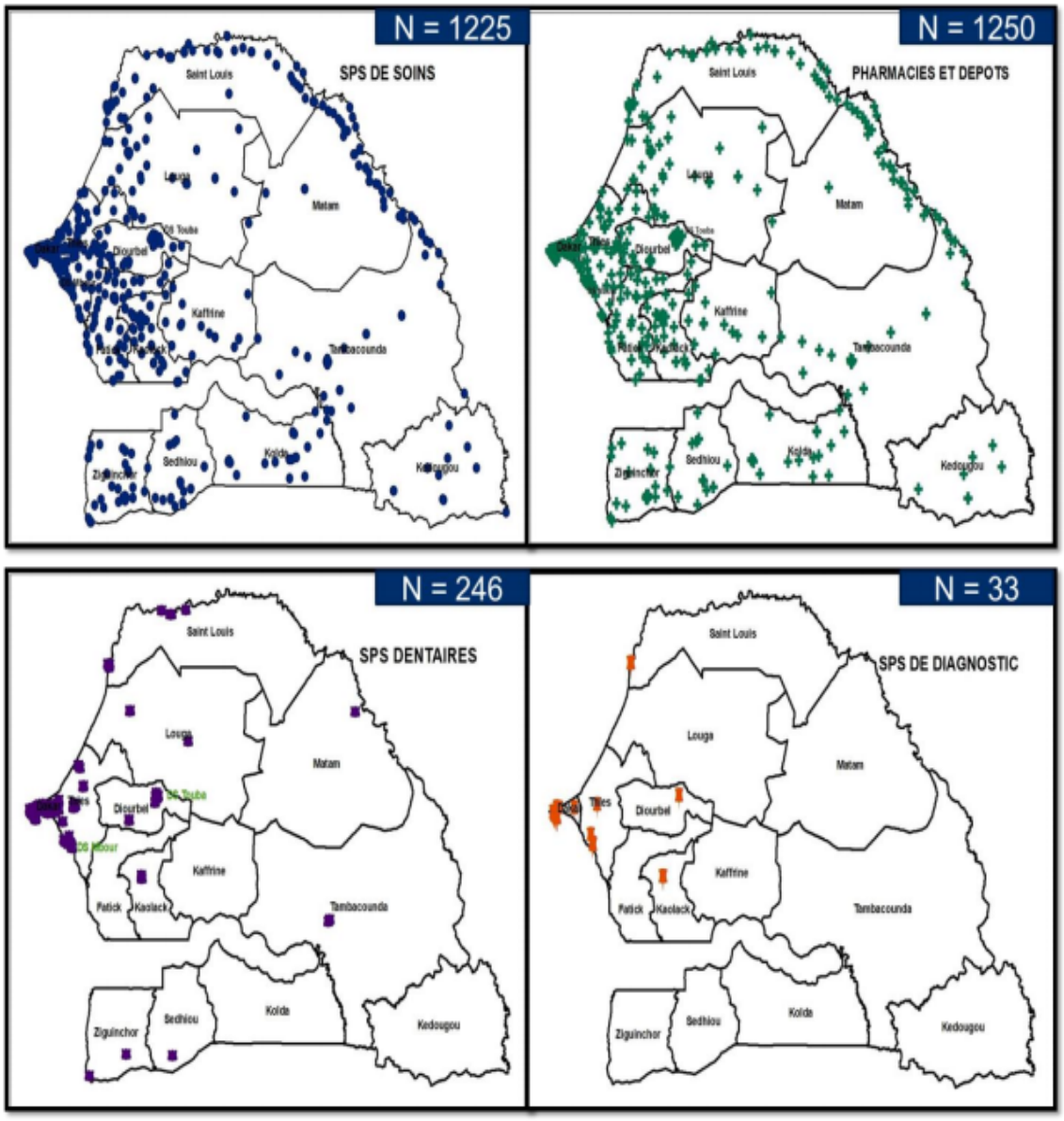
Are there other key items, such as lab strengthening, private sector support, etc. that should be considered?

Supporting Data

- 150 laboratories supervised in 2018 for quality of microscopy diagnosis. The quality of microscopy diagnostic capacity is mixed, with 34 percent of laboratories presenting a very good level (>90% concordance) and 35.3 percent of structures presenting a weak level of microscopy diagnosis capacity.
- No laboratory was supervised in 2019 due to funds flow issue within the GoS resulting in delays in arrival of PMI funds and the prioritization of the 2019 ITN mass distribution campaign.
- In 2020 the NMCP will be introducing molecular biology diagnostics in low transmission areas with the deployment of LAMP assays in health facilities (with funding from the IDB)

Private Sector support:
The mapping of private health structures was performed in 2017 by the MSAS and ASPS with technical support from SHOPS+ and USAID funding. There were 2,754 private health structures identified within the country. The majority are located in urban areas (86.8%) with more than half in Dakar region (51.8%). Almost half (45.4%) are pharmacies, while 36.6% are medical or paramedical facilities (see figure below).

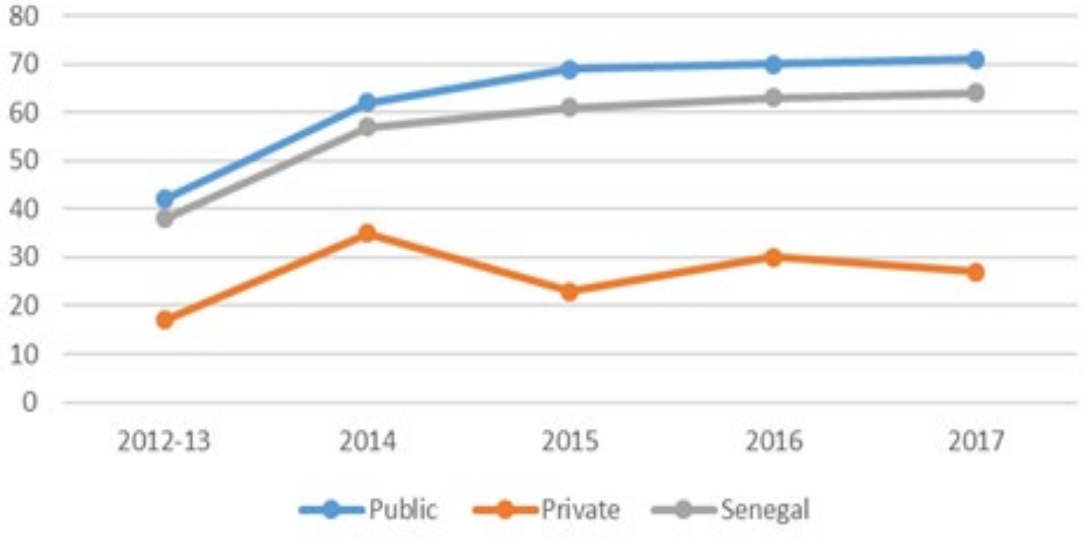
Figure A30. Geographical Distribution of Private Health Structures, by Type of Structure



(Source: SHOPS +)

- 68 percent of medical or paramedical private health structures provided malaria services (diagnosis and/or treatment). However, most of them do not benefit from the training and supportive supervision from the NMCP. Many of them are unaware of the national case management guidelines and they do not benefit from subsidized (or free) RDTs and ACTs.
- Recent analysis of the continuous SPA data (figure below) indicates that the availability of quality malaria services in the private sector is much lower than in the public sector. The malaria service readiness index (SRI) captures availability of diagnostic capacity, treatment, trained personnel, and guidelines at health facilities.

Figure A31. Malaria Service Readiness Index 2012-2017, per Health Sector and Nationwide



Private Sector engagement in 2018: The NMCP implemented several foundational activities such as:

- Use the private sector mapping to identify private health structures providing malaria services
- Establishing a partnership between the case management office and some of these structures and working on harmonization of malaria services with national guidelines
- Organizing trainings of obstetricians on national case management guidelines for pregnant women (funded by the GF)
- Making some courtesy visits to large private enterprises
- Establishing a partnership with the Alliance of Private Sector of Senegal (ASPS) and participating in the development of their action plan for 2018-19.
- Initial brainstorming with pharmacies on how to effectively engage them in malaria prevention activities and discuss the possibility and implications of providing malaria diagnosis (RDTs) in their structures.

Conclusion

Laboratory capacity strengthening to ensure quality diagnostic capacity remains a priority. Maintaining microscopy diagnosis capacity in low transmission areas where few positive slides are processed by health facilities is a real operational challenge. The introduction of molecular biology diagnostics at health facilities may change the diagnostic landscape but it remains to be seen what the operational implications will be with this introduction of new technology. PMI will continue to support training, supervision, certification and quality control activities for RDTs and microscopy.

There has been some important foundational activities related to private sector engagement that the NMCP undertook in 2018. However, more has to be done to fully engage the private sector, as many of the private health facilities do not yet benefit from training on national guidelines and do not have access to subsidized malaria commodities. There was $307,800 allocated in FY18 for the acceleration of the improvement of case management in the private sector and this activity will be implemented in 2020 by the NMCP.

Key Question 11

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

Supporting Data

N/A

Conclusion

N/A

2.B. DRUG-BASED PREVENTION

NMCP objectives
Malaria in Pregnancy ● Protect at least 80 percent of pregnant women with IPTp with three doses of SP in accordance with the national guidelines by 2020 ● All malaria cases in pregnant women will be seen at health facilities and treated according to national guidelines by 2020 **Seasonal Malaria Chemoprevention** ● Ensure 95 percent yearly coverage of children 3-120 months old in areas targeted for SMC by 2020
NMCP approach
MIP In 2003, Senegal adopted intermittent preventive treatment in pregnant women with SP given free of charge as directly observed therapy during focused ANC visits in all ANC sites nationwide. In 2014, the NMCP updated its policy and training materials to reflect WHO recommendations. One key recommendation supported by the NMCP is that SP is given as early as possible in the second trimester with one month interval between two doses of SP. The NMCP's Strategic Plan highlights four key IPTp interventions: 1. Ensuring availability of commodities and materials for the provision of directly observed IPTp;

2. Implementing IPTp, with the introduction of IPTp3 as the indicator to be tracked;
3. Monitoring of IPTp implementation
4. Engaging the private sector

SMC

The Senegal NMCP has been implementing SMC since it was recommended by WHO in 2012, including children up to ten years of age. Much of the existing research on SMC was conducted in Senegal, first in children under five and subsequently in children under ten[2].

In 2018, SMC was interrupted due to a strike in the healthcare sector. In 2019, the SMC campaign strategy was readjusted based on the evolving malaria epidemiology in Senegal to cover a total of 15 districts, phasing out the region of Sédiou, which has seen a significant reduction in incidence, and adding the Touba and Diourbel districts in the Diourbel region.

Monthly sweeps for three months are implemented in the Diourbel, Kolda, and Tambacounda regions, and four months in Kédougou, based on the respective length of the malaria transmission season in these regions. In 2019, a directly observed therapy (DOT) strategy for all three days was implemented for the first time to ensure compliance with the SMC guidelines.

PMI objective, in support of NMCP

PMI supports the national strategy for MIP and SMC. The support for MIP includes the provision of ITNs at first ANC visit. PMI has also supported SMC in Senegal since 2013 in all targeted areas which includes three or four rounds (depending on region), for children aged 3-120 months.

PMI-supported recent progress (past ~12-18 months)

MIP

- Evaluation and update of IPTp bolstering plans in 11 districts in concentration regions
- 45 IPTp buckets distributed as additional supplies in support of the DOT strategy in the Saint-Louis and Matam regions
- Orientation of 101 providers in four health districts (Vélingara, Kolda, Sédhiou and Bounkiling) on IPTp
- Training of 54 Bajenu Gokh (women's groups) on the importance of IPTp and malaria prevention

SMC

PMI is the only financial partner that supports SMC in Senegal, and PMI funds supported implementation of the following activities during the last 12 months:

- Training / refresher training of nurses and community relays

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

- Planning activities
- Transportation including delivery of commodities at the district and health post levels
- Social and behavior change
- Drug administration costs
- Monitoring and evaluation including supervision and process review meetings

During the 2019 SMC campaign, the NMCP distributed 5,707,000 blisters to 1,065,227 children aged 3 – 120 months. The number of SP-AQ doses procured, which is 5,910,092, covered the total need for the campaign.

The NMCP trained 361 nurses and doctors as well as 14,764 community relays before the operations began. Even though the NMCP has not yet held the evaluation meeting, a few challenges and bottlenecks were identified during supervision, including the following:

- Delay in delivering commodities at the district level including SMC cards and T-shirts
- Refusals in some districts due to past experience with drug side effects
- Delay in transferring financial resources from the central level to district level due to fund flow issue between the Ministry of Finance and the NMCP

To address these challenges, PMI and the NMCP have agreed to hand over the implementation of the intervention to another implementing partner while resolving issue of flow of USAID funds to the government-to-government agreement.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

FY 2019 funds will be used to train new health facility-level providers on MiP. This includes topics such as the importance of ITN use in pregnancy, diagnosis and management of MIP, and counseling and interpersonal communication skills. Support will continue for ANC outreach activities at health huts. Based on identified district priorities, PMI will also support the development and financing of IPT action plans.

FY 2019 funds will be used to support operational costs for SMC implementation in 2020 , including planning, training, implementation, supervision, monitoring, direct observation of treatment doses on all 3 days, transportation, materials and equipment and campaign evaluation. Moreover, PMI will be purchasing all SMC commodities.

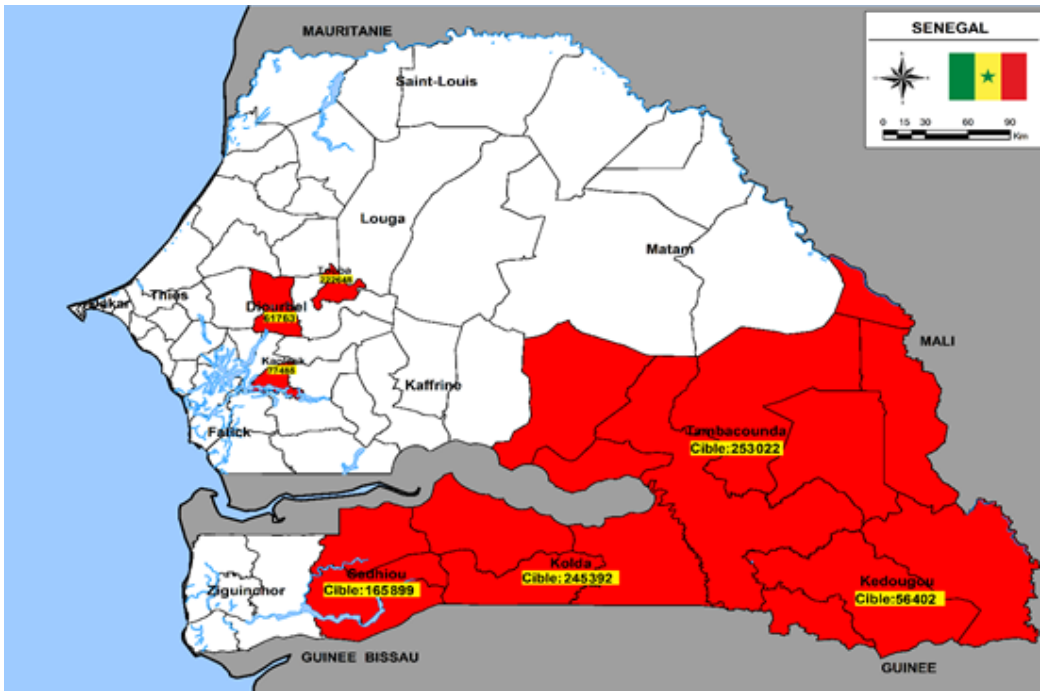
2.B.i SEASONAL MALARIA CHEMOPREVENTION (SMC)

PMI Goal
Support the national strategy for SMC addressing relevant geographic areas and age groups, which includes 3 or 4 rounds (depending on the region), for children aged 3-120 months.

Do you propose expanding, contracting, or changing any SMC activities? If so, why and what data did you use to arrive at that conclusion?

The target areas for SMC will remain the same compared to the geographic scope covered with FY 2019 except Sédhiou Region. Therefore, all districts in Kédougou, Tambacounda and Kolda regions will benefit from the intervention as well as Touba, Diourbel and Kaolack district. In addition, the DOT approach that has already been expanded across all of the target areas using FY 2019 funds will continue. The map in Figure A32 indicates the target areas for SMC during the 2019 year campaign.

Figure A32. Target areas for SMC in 2019



Sédhiou region, which had previously been included in SMC campaign, will not be a target region as of 2020 because of the decrease in malaria incidence in the region (2018 incidence rate of 23/1,000 pop and a total of 12,386 confirmed cases). The five highest burden regions (Kédougou, Kolda, Tambacounda, Kaolack and Diourbel) will be targeted for the SMC campaign. There will be monthly sweeps for three months in the regions of Diourbel, Kaolack, Kolda and Tambacounda and four months in Kédougou, based on length of malaria transmission season in these regions.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

What was the estimated need for SMC commodities during calendar year 2019?What is the estimated need for SMC commodities over calendar years 2020 and 2021?

Supporting Data

See Excel sheet for commodity gap analysis for details.

Conclusion

The estimated need for SMC commodities during calendar year 2019 was as follows:

- Coblister 1 (COB 1) for children aged 3 – 11 months = 2,050,000
- Coblister 2 (COB 2) for children aged 12 – 120 months = 3,657,000

The 5,910,092 treatment doses procured for the 2018 calendar campaign, which did not take place due to the health worker strike, were sufficient to cover the needs for the 2019 calendar year campaign (5,707,000 treatments).

The NMCP has estimated its needs for 2020 and 2021 calendar year campaigns respectively as 4,230,000 and 4,344,000 doses of co-blister SP-AQ.

Since the 2018 SMC campaign was not implemented due to the health worker strike, the NMCP did not need to order SP – AQ drugs for the 2019 campaign. In addition, need is decreased because of the removal of Sédhiou Region in calendar year 2020.

Key Question 2

What are the estimated non-commodity resource needs to properly deliver SMC over the next 3 years?

Supporting Data

PMI is the only donor that supports SMC in Senegal and that includes both commodity and non-commodity costs. The non-commodity cost refers to operational costs and includes a range of activities such as planning, training, implementation, supervision, monitoring, DOT on all 3 days, transportation, materials, equipment, and campaign evaluation. The operational cost for SMC for the next 3 years is estimated at $6,600,000.

Conclusion

The estimated cost is based on the current epidemiological profile that may change over time. We expect that interventions will have substantial impact on malaria morbidity as long as they are being scaled up.

Key Question 3

What does the data show about SMC refusal rates? How do refusal rates change from round to round? What barriers are contributing to SMC refusal rates?

Supporting Data

Figure A33. Key Barriers and Facilitators to SMC Acceptance and Uptake

Facilitator	Type of Factor	Data Source	Evidence
Caretaker belief that SMC contributes to the reduction of malaria in children	Internal	*ADEMAS. Etude formative sur les déterminants d'Opportunité, de Capacité et de Motivation (OCM) sur les moyens de prévention et de prise en charge du paludisme. 2016*	Most caretakers interviewed in this qualitative study expressed that the SMC drug reduced malaria in children
Strong support from community leaders	Social	*Field visit Supervision*	Strong support from community leaders, especially in religious cities such as Touba is critical. In some cases, the supervision data have shown that people will refuse to participate until the leader gives his approval.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Caretaker concern about the side effects of SPAQ	Internal	*ADEMAS. Etude formative sur les déterminants d'Opportunité, de Capacité et de Motivation (OCM) sur les moyens de prévention et de prise en charge du paludisme. 2016*	Many caretakers interviewed noted that the drugs used for SMC have side effects, including vomiting, right after the administration of the drug and expressed concerns that the drug was making their children sick.
Belief that the SMC campaign targets children in order to reduce fertility later in life	Internal	*Supervision*	This is mainly seen in areas where heads of household are abroad and give clear instructions not to accept the intervention.
Lack of access to relevant information	Environmental factors	*Supervision*	Some people said they were not aware of the activity.
Lack of social support because others in the community have already refused or the leader of the community does not support the activity.	Social	*Supervision*	Lack of buy-in from community or religious leaders is associated with higher refusal rates .

Data about refusals are mostly gathered from the supervision activities during the administration phase. Data have shown that districts that have benefited from SMC since the beginning are less likely to present high refusal rates and coverage is higher than in other districts. However, in Tambacounda district the refusal rate was quite high during the 2019 campaign. The PMI team noticed that 175 out of the 269 refusals (65%) reported for the whole region on day 1 of the second sweep were located in the commune of Tambacounda. The main cause of this high rate of refusal in a very localized area was the death of a 3 year old child at this location after administration of SMC drugs during the previous sweep (first month). The investigation by the NMCP and the MOH Toxicology Service showed that the child had an illness and was erroneously given the SMC drugs despite meeting exclusion criteria. Instead, the child should have been referred to the health post without administration of the SMC drugs. The Toxicology Service determined that the child had received a high dose of paracetamol outside of the SMC campaign activities, that may have led to liver damage. Despite the death being caused by other factors, the community perception was that the SMC treatment caused the death of the child. In the absence of a reinforced SBC campaign, the refusal rate in that locality during the second sweep was very high. The Regional Health Management Team paid particular focus to that district and sent a team to strengthen the communication activities, particularly the community and authority outreach to secure community buy-in.

Conclusion

The refusal rate was 175 out of the 269 refusals (65 percent) reported for the whole region of Tambacounda on day 1 in Tambacounda which is quite high. The same trend has been noted in three new districts (Touba, Diourbel and Kaolack) during the 2019 campaign. Insufficient SBC and IEC messaging before the launch of the campaign was cited as a reason for higher than usual refusals.

Emphasis should be put on advocacy to ensure support from community leaders, and extensive communication for a wide reach of target communities.

Key Question 4

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

Supporting Data

Figure A34. Administrative Dots Coverage in 2019 SMC Campaign by District and Age Group

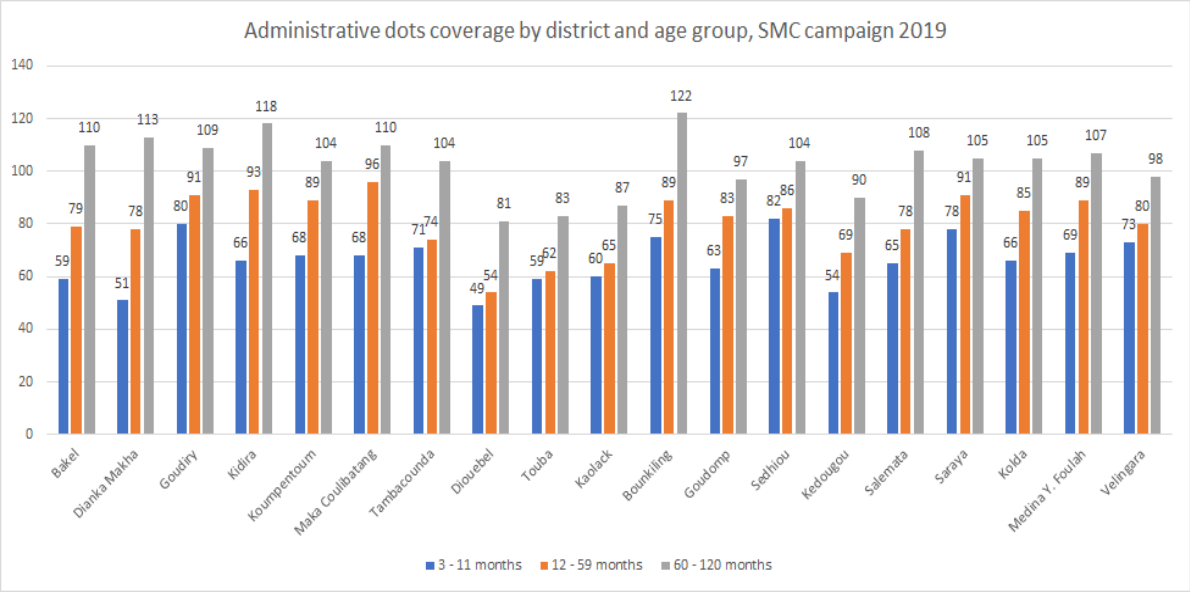
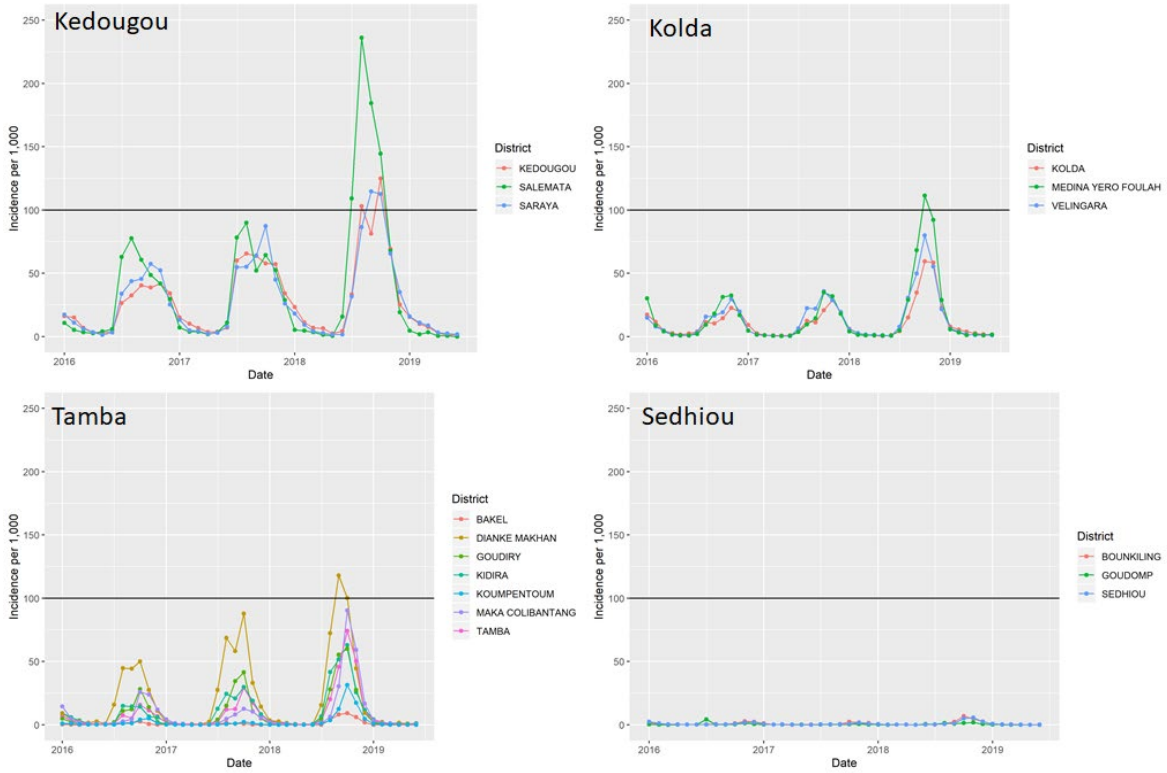


Figure A35. Under-Five Malaria Incidence per 1,000 in Southern Regions of Senegal



Conclusion

DOTS Administrative Coverage (Figure A34)

Reaching children aged 3 - 11 months old is a challenge in some districts such as Dianke Makha, Diourbel, Kédougou and Bakel. Necessary efforts should be done to identify any barriers that could limit the coverage of that specific target. The evaluation meeting that will identify lessons learned from the campaign could be an opportunity to start reflecting and proposing approaches to address the issue.

SMC geographic coverage (Figure A35)

In 2018 when SMC was not implemented due to the health sector strike, incidence among children under five years of age in the high-transmission regions of Kédougou, Kolda, and Tambacounda rose (data for children under ten not available). In Sédhiou, where the NCMP had planned to discontinue SMC in 2019, cases did not increase significantly, but because the 2018 strike did not allow for implementation of an exit strategy, SMC was implemented in Sédhiou in 2019. PMI does not plan to support SMC in Sédhiou moving forward because the incidence is far below the WHO criteria (shown with the black horizontal line) and will instead support a comprehensive exit strategy. In Kaolack and Diourbel, SMC is targeted at the level of health post catchment areas, targeting hot spots within districts with overall low transmission.

2.B.ii MALARIA PREVENTION IN PREGNANCY (MIP)

PMI Goal
Support the national strategy for MIP, which includes provision of ITNs at first antenatal care (ANC) visit, intermittent preventive treatment for pregnant women (IPTp) to all pregnant women in malaria endemic area starting at 13 weeks gestational age, for a minimum of 3 doses, and effective case management of malaria, in accordance with WHO recommendations.

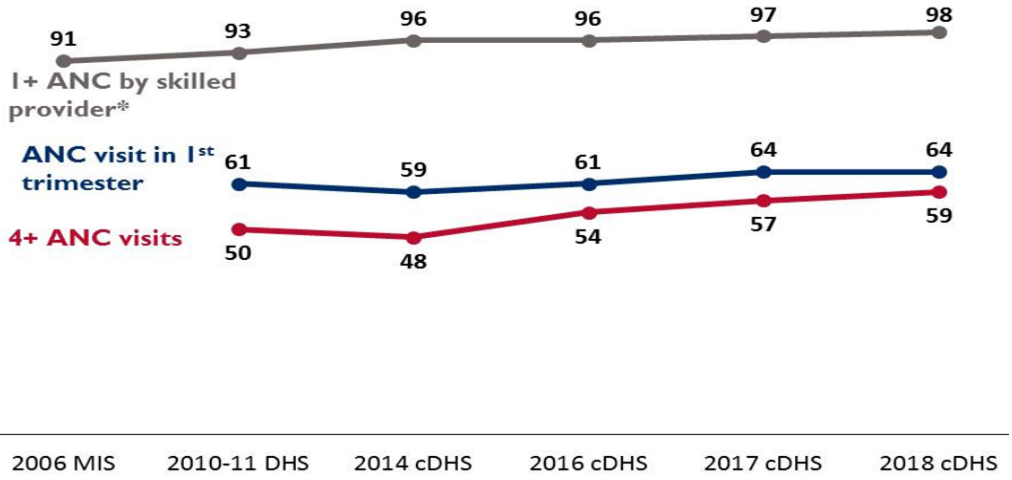
Do you propose expanding, contracting, or changing any MIP activities? If so, why and what data did you use to arrive at that conclusion?
PMI will maintain funding for MIP activities in 2020. SP procurement is planned to be covered by Global Fund in 2020 and 2021. The NMCP will reinforce capacity building for midwives with a six-day training on malaria prevention in pregnancy management. The NMCP will also sensitize skilled providers on the importance of providing the minimum of three doses. Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

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

Supporting Data

Figure A36. Trends in ANC Coverage, *Percent of Women Age 15-49 with a Live Birth in the 5 Years Before the Survey for Most Recent Birth*



*Skilled provider includes doctor, nurse, or midwife.

Figure A37. Key barriers and facilitators to ANC attendance

Facilitator	Type of Factor	Data Source	Evidence
Residence (urban vs. rural)	Environmental	NMCP Situational Analysis on Intermittent Preventive Treatment	Pregnant women in urban areas are more likely to seek prenatal care and receive at least three doses of SP than their peers in rural areas.
Involvement of female community health workers to identify and sensitize pregnant women in the community	Social		Paternal aunts are key decision makers in the family and greatly influence what a woman does during pregnancy. A current nationwide strategy - the impact of which has not been evaluated - utilizes neighborhood paternal aunts (*Badienou gokh)* for: for home visits and promote positive malaria in pregnancy behaviors such as uptake of IPtp through early and complete ANC visits.
Good knowledge of IPTp among service providers	Internal	NMCP formative research on determinants of behaviors (2016	Trained providers are more likely to implement the IPTp policy, which includes prompting women to return to ANC for subsequent doses
Pregnant women have good knowledge of malaria	Social		Good knowledge of malaria severity and consequences malaria can have on both the pregnant woman and the baby.

Barrier	Type of Factor	Data Source	Evidence
Hiding pregnancy until later in second trimester	Social	NMCP formative research on determinants of behaviors (2016)	It is taboo for women in Senegal to disclose a pregnancy early.
Lack of midwives	Environmental	NMCP Situational Analysis on Intermittent Preventive Treatment	Non availability and/or and re-assignment of qualified service providers particularly in rural areas make ANC difficult to attend.
Wait time at clinic			Long wait time prevent some pregnant women from achieving the three recommended doses of SP.

Conclusion

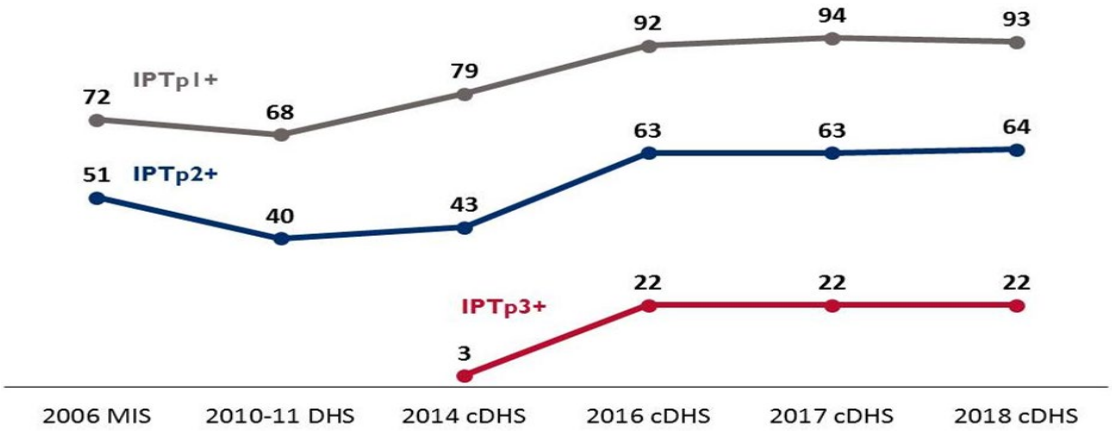
In 2018, 98 percent of pregnant women attended at least one ANC visit by a skilled provider. However, only 64 percent of pregnant women attended their first ANC during the first trimester and 59 percent four ANC visits or more. Regular ANC compliance remains a challenge in Senegal, particularly in rural areas as described above. The sociocultural context surrounding pregnancy status has a great impact on ANC attendance and delays the first ANC visit.

Key Question 2

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

Supporting Data

Figure A38. Trends in IPTp, ***Percent of Women Age 15-49 with a Live Birth in the Two Years Before the Survey who Received the Specified Number of Doses of SP/Fansidar During Their Last Pregnancy***



Note: This indicator has been recalculated according to the newest definition, the specified number of doses of SP/Fansidar from any source.

Conclusion

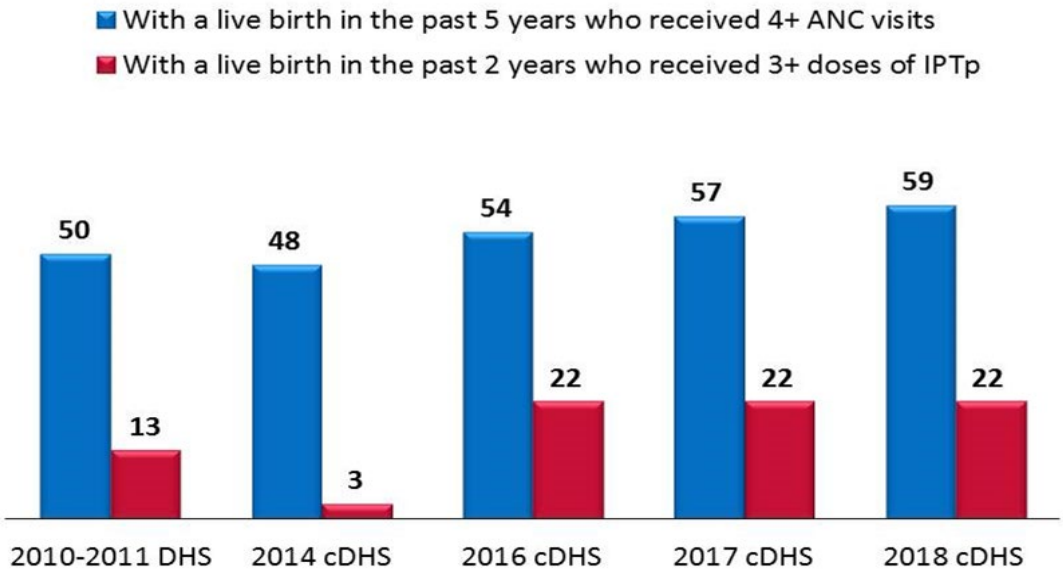
Based on the 2018 NMCP annual report, ANC attendance remains relatively high. Survey data show that the proportion of pregnant women receiving at least one dose of SP by a skilled provider is above 90 percent since 2016. However, the proportion of pregnant women who received at least three doses of SP did not increase. This could be attributed to several factors, including frequent stockouts of SP, the health worker and data strike that impacted the health system during eight months in 2018, and other sociocultural and financial barriers.

Key Question 3

What is the gap between ANC attendance and IPTp uptake? What barriers and facilitators exist, especially among providers?

Supporting Data

Figure A39. Trends in Missed Opportunities for IPTp, *Percent of Women Age 15-49*



According to the 2018 cDHS survey, 59 percent of pregnant women attended at least four ANC visits but only 22 percent received at least three doses of SP. There was a dramatic increase in 2016 but this trend has not evolved since then.

Figure A40. Key Barriers and Facilitators to IPTp Administration at ANC Visits

Facilitator	Type of Factor	Data Source	Evidence
Maternal Knowledge	Internal	NMCP Situational Analysis on Intermittent Preventive Treatment	Majority of women in this study stated that SP, referred to as "the three pills" prevent malaria in pregnancy and protect the unborn child
Health care providers trained on new NMCP directives	Environmental		Overall knowledge of IPTp among service providers contributes to increasing access to SP by pregnant women.
Barrier	**Type of Factor**	**Data Source**	**Evidence**
Distance to health facility	Environmental	Neema Report	A pilot program of outreach activities undertaken by healthcare providers to provide IPTp services to pregnant women lost to follow up increased coverage with SP in target districts. In the Goudomp district for instance coverage with SP3 went from 43% in 2016 to 79% in 2017
Lack of qualified service providers	Environmental		The number of midwives remains too low, particularly in rural areas
Availability of SP	Environmental	NMCP Situational Analysis on Intermittent Preventive Treatment	Many providers attribute the discrepancy between high ANC visits and low SP coverage to frequent stockouts.

Conclusion

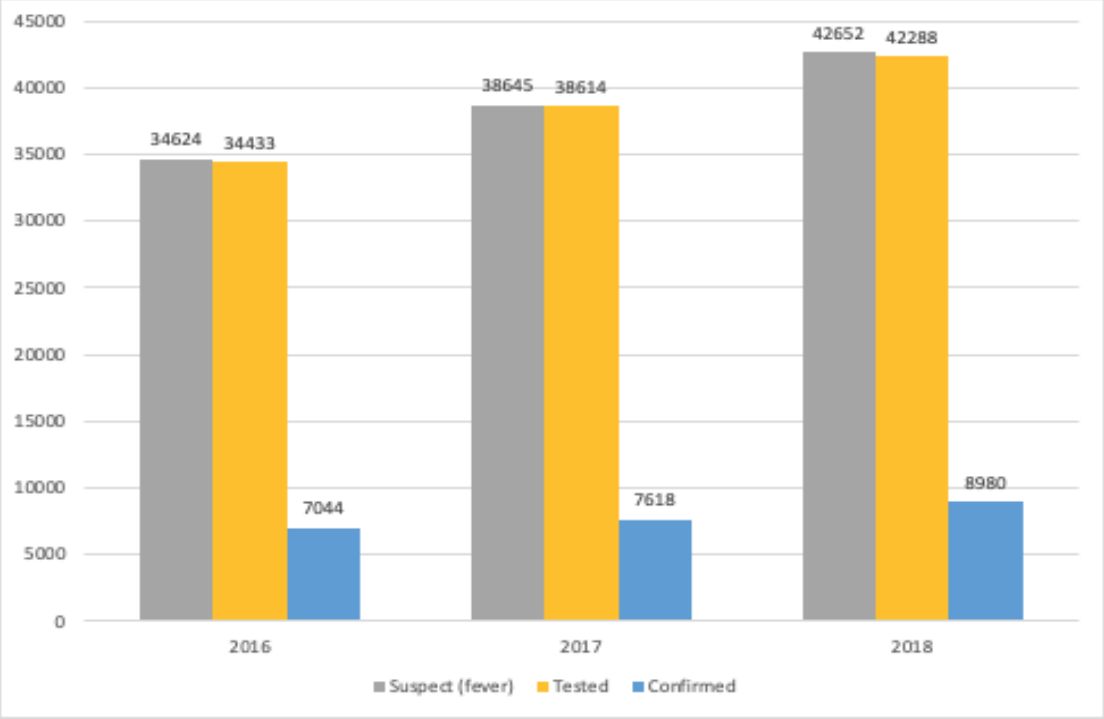
There are many missed opportunities to providing the required SP doses during ANC visits. PMI purchased 475 water buckets in FY 18 to increase compliance with directly observed therapy in the seven regions of concentration. Still, the connection to provider behavior needs to be further investigated to determine the extent of the problem and include provider behavior change in the SBC strategy. PMI will discuss this gap in knowledge and the need to conduct a health facility survey with NMCP using MOP 2021 funding

Key Question 4

What proportion of pregnant women with fever and malaria infection are getting diagnosed and treated?

Supporting Data

Figure A41. Proportion of Pregnant Women with Fever in Senegal Who were Tested and Confirmed for Malaria 2016-2018



(Source: malaria surveillance system data)

Conclusion

Most pregnant women in Senegal who present at a public health facility with a fever are reported as being given a diagnostic test. The average nationwide test positivity rate among pregnant women in Senegal between 2016-2018 is 20%.

Key Question 5

What was the estimated need for IPTp commodities during calendar year 2019 ? What is the estimated need for IPTp commodities over calendar years 2020 and 2021?

Supporting Data

See Excel sheet for commodity gap analysis for details.

Conclusion

The estimated need during CY 2019 for IPTp commodities was 1,710,228 doses of SP. The country received an order of 1,327,016 SP in November 2018 from the IDB. The commodities were delivered directly to the health districts. PMI funded an emergency SP supply that will be delivered in December 2019. In 2020 and 2021, SP will be procured by Global Fund.

Key Question 6

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

Supporting Data

SP stockouts were reported in many service delivery points between 2017 and 2018.

Conclusion

SP stockouts had a big impact on IPTp coverage. PMI funded an emergency procurement of SP that is expected to be delivered in December 2019. Global Fund will procure the SP needed according to the NMCP's supply plan in 2020 and 2021.

For FY 2020, PMI and the NMCP will prioritize capacity building for qualified service providers and will continue ANC outreach activities. Another priority will be to address the concerning gap related to missed opportunities in IPTp uptake.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.A. SUPPLY CHAIN

NMCP objective
Under the NMCP's National Strategic Plan 2015-2020, the program aims to ensure permanent availability of medicines and anti-malaria products for at least 99 percent of structures by 2020.
NMCP approach
According to the Senegal 2015-2020 National Strategic Plan, continuous improvement of supply chain management and quality of medicines will be made possible through the implementation of the following interventions: ● Capacity building ● LMIS (Logistics Management Information System) monitoring ● Commodity quantification ● Commodity procurement ● Coordination with the *Pharmacie Nationale d'Approvisionnement* and other partners ● Improving the storage and transport of commodities ● Planning and regular transfer of commodities from the central level to the regional level ● Planning and regular deliveries of commodities to districts, health facilities and community sites ● Monitoring the quality, efficacy and safety of antimalarial drugs and products

- Quality control of antimalarial drugs
- Development of supply chain management policies and documentation
- Coordination with the private sector for distribution

PMI objective, in support of NMCP

PMI fully aligns with the NMCP supply chain strategy to ensure continual availability of quality products needed for malaria control and elimination at health facilities and at the community level.

PMI-supported recent progress (past ~12-18 months)

- PMI, in collaboration with the NMCP is conducting an assessment of the ITN continuous distribution system.
- Working with the *Laboratoire National du Contrôle du Médicament* (LNCM) and *Direction de la Pharmacie et du Médicament* (DPM), PMI facilitated the obtention of importation waivers for malaria tracer products such ACTs, RDTs and rectal artesunate.
- PMI supported the LNCM and DPM to organize the final national campaign on medicine quality. The campaign to combat the illegal sale of medicines in Senegal attracted 41 participants drawn from different agencies in the country including medical doctors, veterinary doctors, pharmacists, scientists, researchers, market controllers, and customs service and law enforcement agents.
- PMI, as the main donor, supported the procurement, shipment and reception processes for malaria commodities.
- PMI assisted the NMCP staff to conduct the annual quantification to update the malaria commodity forecast for the 2019-2021 supply plan.
- PMI provided support to the Central Medical Stores to conduct an evaluation of its 2014-2018 strategic plan.
- In collaboration with the MOH, PMI is improving warehouse operations at three regional warehouses (Diourbel, Fatick and St. Louis).
- PMI supported the DPM in the development of a reference document that integrates a compilation of best practices applicable to pharmaceutical management in the country with
- specific recommendations for malaria commodities.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- Support the NMCP to ensure smooth procurement of malaria products
- Development of annual malaria commodity quantification and review of malaria supply plan

- Performance of an annual inventory at regional warehouses
- Finalize regional warehouse renovations
- Strengthen data visibility and stock monitoring at the operational level by identifying and addressing interoperability needs between existing management information systems
- Support regional medical stores to improve the accuracy of recordkeeping and strengthen the effectiveness of inventory controls
- Assist the NMCP and CMS to improve the quality and logistics data for decision making
- Continue supporting LNCM in building its capacities towards ISO 17025 accreditation
- Support NMCP to conduct an inventory of their respective stocks at central and regional medical stores prior to quantification exercises, which will help improve data quality and will also help to mitigate stock-outs and over-stocks

PMI Goal

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

Do you propose expanding, contracting, or changing any supply chain activities? If so, why and what data did you use to arrive at that conclusion?

We propose an increase in FY 2020 funding allocations for this activity to strengthen quality-assurance systems for malaria commodities and to improve the availability of information on product quality for decision making in collaboration between LNCM and DPM.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

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

Supporting Data

Figure A42. Central Stock Levels for AL

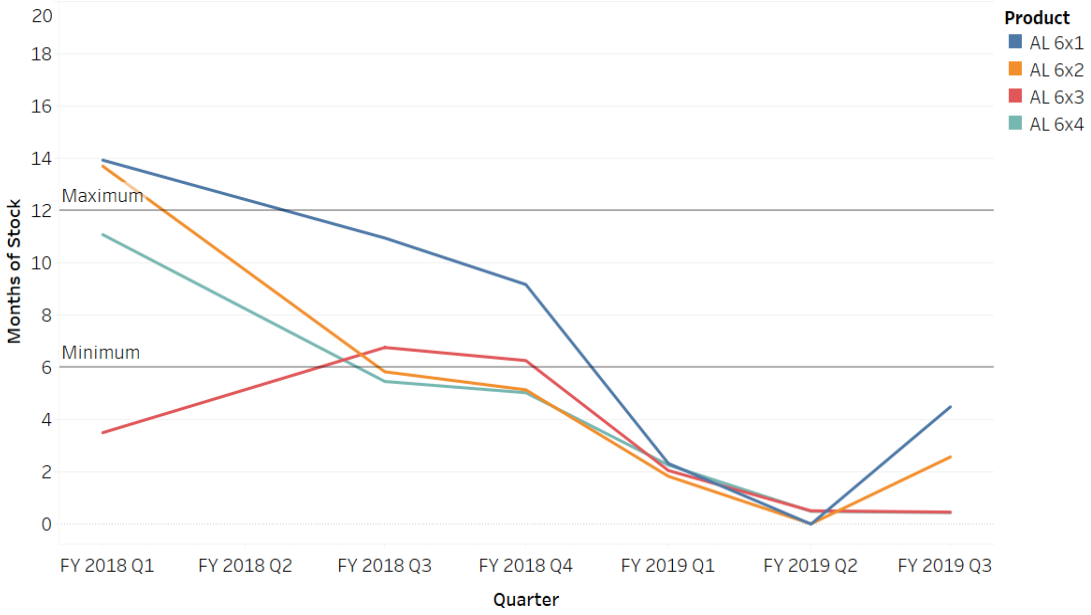


Figure A43. Central Stock Levels for AS/AQ

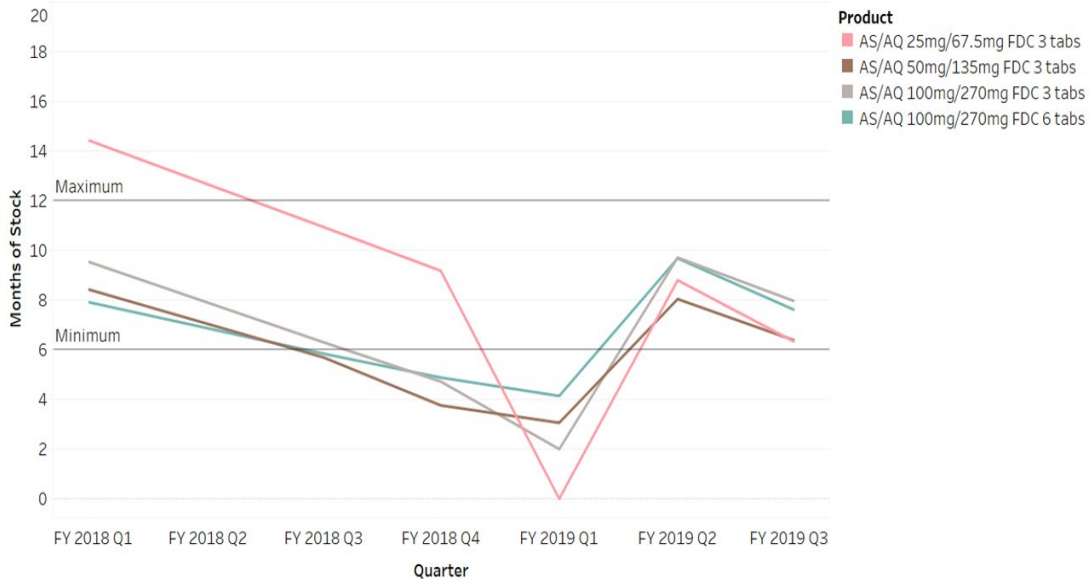
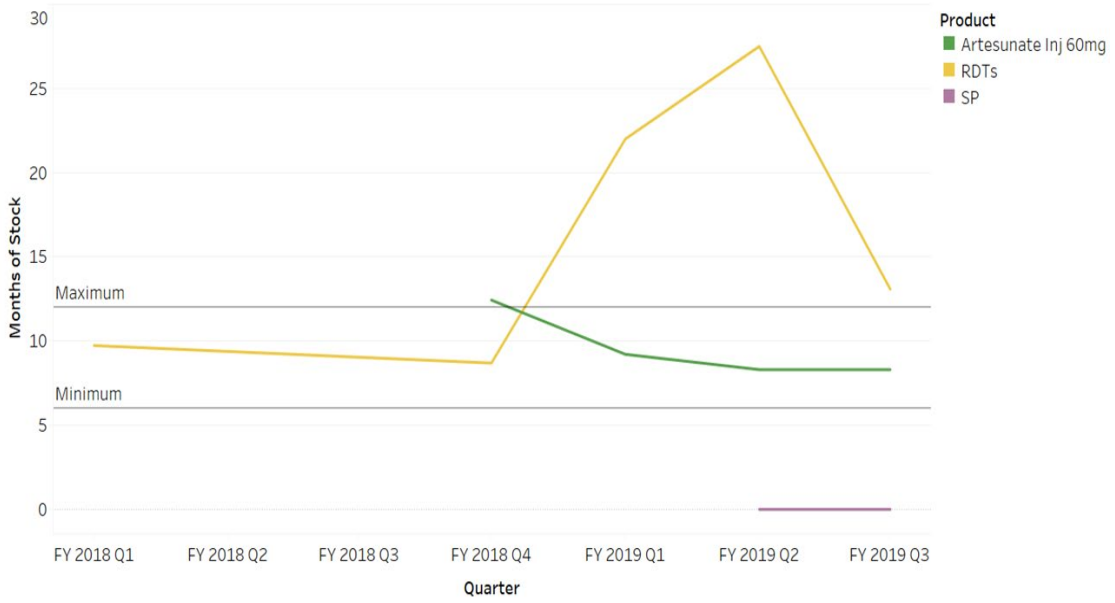


Figure A44. Central Stock Levels for RDTs, SP and Injectable Artesunate, 60mg



Conclusion

Stock levels for AL were low at the central medical store but not at the operational level during the low transmission season. Low central level trends show that products have been pushed out to the peripheral level to prevent stockouts at the last mile. The NMCP did not report critical stock outs at the health district level. These stocks will be brought back to an acceptable level by monitoring closely the central level stocks with the technical assistance of Francophone TA. It is planned to conduct semesterly quantifications with the central medical store and submit better quality data in the Procurement Planning and Monitoring Report for malaria (PPMRm).

The increased stock level of RDTs was due to an additional donation made by the IDB. Stock levels of RDTs decreased significantly at the end of quarter 2 due to the increased monthly consumption during the period of high transmission season.

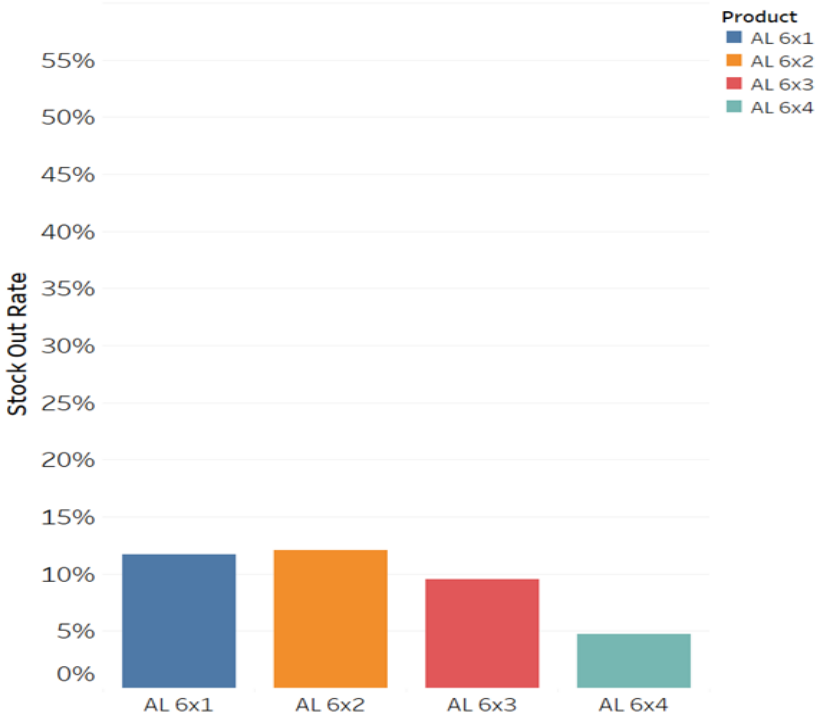
SP is out of stock at the central level but available in some service delivery points. There were few health districts that consumed all their SP supply. PMI funded an emergency supply of SP which is expected to be delivered in December 2019. The Global Fund will purchase SP to fill the needs for 2020 and 2021.

Key Question 2

What are the trends in facility- and community health worker-level stock out rates for ACTs, RDTs, and SP over the last year? Is there a seasonal or geographic difference in stock out rates?

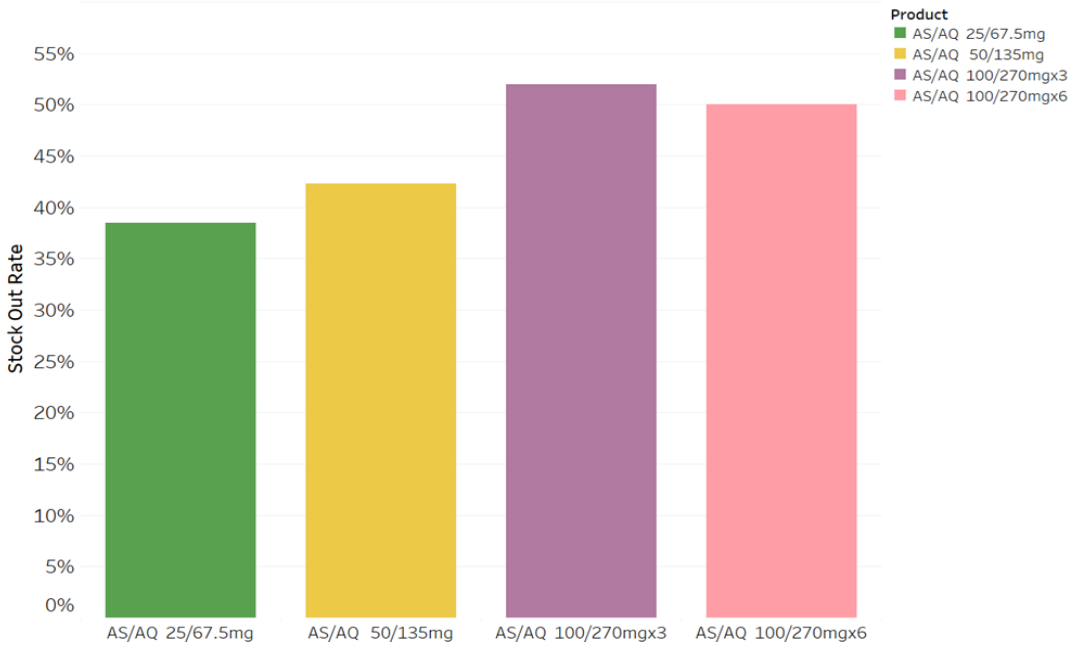
Supporting Data

Figure A45. Stockout Rates for AL, December 2018



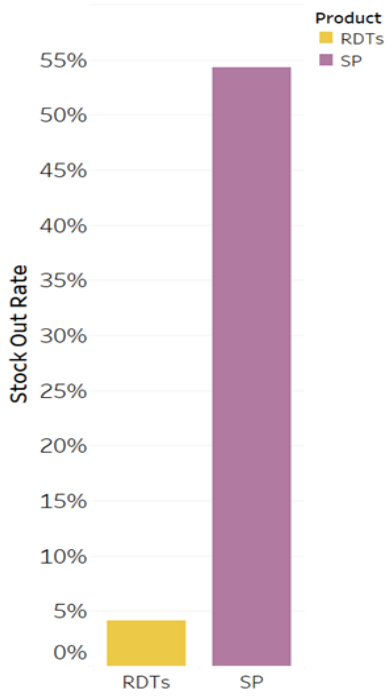
Source: EUV Data

Figure A46. Stockout rates for AS/AQ, December 2018



Source: EUV Data

Figure A47. Stockout rates for SP and RDTs, December 2018



Source: EUV Data

Conclusion

There was an eight-month health worker and data strike in 2018 that impacted timely decision-making at the peripheral level. According to the December 2018 EUV conducted in 74 health facilities in the three regions with the highest malaria prevalence, 88 percent of health facilities had at least one AL presentation on the day of visit, and 95 percent had a WHO pre-qualified ACT. Stockouts of individual AL presentations ranged from 5-12 percent, and AS/AQ stockouts ranged from 39-52 percent. SP and RDTs were stocked out in 54 percent and 4 percent of health facilities, respectively. For 2020, and 2021, the NMCP has negotiated with the Global Fund to purchase SP, which should ensure central level stock. The EUV applies PMI stockout guidelines while Senegal defines stockout as non-availability of a product for 7 consecutive days instead of 3 consecutive days. For example, non-availability of AS/AQ 25/67.5mg and 50/135mg in SMC regions should not be reported as a stockout, as this formulation of ACT is not recommended for use in areas where SMC is implemented. Yet this geographical restriction is not taken into account in the EUV data collection tools.

According to routine data collected by the NMCP, in the first trimester of 2019, 96 percent of functional health facilities did not report ACT stockouts (all formulations included) and 99 percent of these facilities did not report RDT stockouts.

The two tables below (Figures A48 and A49) are from the 2017 Service Provision Assessment (SPA) survey (data available at dhsprogram.com). The SPA is performed annually in Senegal and the sample size is robust enough to be representative of all 14 administrative regions, different types of health facilities and of the public and private sectors.

Figure A48 shows that 82-83 percent of health posts surveyed had first line ACTs. They disaggregated the data by formulations.

Figure A48. Availability of ACTs in Health Facilities (in %)

	Antipaludiques							
Caractéristiques de base	ACT[1] de première intention – préparation pédiatrique	ACT[1] de première intention – préparation adulte	ACT[1] de première intention – préparation adolescente	Autres anti-paludiques	Artésunate[2] injectable	Artésunate par voie rectale	Quinine par voie orale	Quinine Injectable
Type de structure								
Hôpital	42	48	46	0	12	3	0	61
Centre de santé	76	79	75	1	10	25	0	90
Poste de santé	83	83	82	1	1	38	1	75
Secteur								
Public	95	95	95	0	3	44	1	88
Privé	30	30	24	2	1	2	0	31
Région								
Dakar	44	50	47	0	6	0	3	45
Diourbel	83	93	83	2	11	45	0	79
Fatick	96	90	90	0	0	67	0	90
Kaffrine	100	100	100	0	4	56	0	91
Kaolack	86	88	86	0	5	5	0	70
Kédougou	100	95	95	0	0	54	0	97
Kolda	76	78	76	0	0	51	0	77
Louga	85	73	78	0	3	56	0	75
Matam	100	100	100	0	0	24	0	85
Saint Louis	94	85	94	0	0	51	4	81
Sédhiou	100	100	100	0	0	78	0	89
Tambacounda	90	94	92	4	0	13	0	96
Thiès	82	83	79	3	0	42	0	82
Ziguinchor	95	96	87	0	0	38	0	84
Ensemble	81	81	80	1	3	35	1	76

Figure A49 below shows that 92 percent of health posts had RDTs available on the day of the visit.

Figure A49. Availability of RDTs in health facilities (in %)

Caractéristiques de base	Pourcentage de toutes les structures offrant des services de diagnostic et/ou de traitement du paludisme[1]	**Effectif des structures**	Directives		Personnel formé		Diagnostics			Effectif des structures offrant des services de diagnostic et/ou de traitement du paludisme
			Directives sur le diagnostic et/ou le traitement du paludisme	Directives sur le TPI[2]	Personnel formé en diagnostic et/ou traitement du paludisme	Personnel formé en TPI[4]	TDR du paludisme[5]	Microscopie du paludisme[6]	N'importe quel diagnostic du paludisme[7]	
Type de structure										
Hôpital	93	15	62	31	77	35	88	67	88	14
Centre de santé	100	35	85	59	89	53	95	72	95	35
Poste de santé	97	347	90	74	93	65	92	3	92	337
Secteur										
Public	100	304	98	81	98	71	100	11	100	304
Privé	88	92	52	35	70	30	63	16	65	81
Région										
Dakar	86	82	64	49	70	41	78	22	78	71
Diourbel	100	25	83	70	96	62	95	8	95	25
Fatick	100	26	95	82	95	66	96	11	96	26
Kaffrine	100	16	100	61	100	77	100	7	100	16
Kaolack	100	24	86	59	100	68	92	7	92	24
Kédougou	100	7	100	53	95	75	100	15	100	7
Kolda	100	20	87	74	93	56	90	6	90	20
Louga	100	34	99	86	99	66	94	9	94	34
Matam	100	19	95	85	90	67	95	5	95	19
Saint Louis	100	28	98	98	100	78	100	6	100	28
Sédhiou	100	11	95	100	100	84	100	10	100	11
Tambacounda	100	23	92	73	94	47	98	9	98	23
Thiès	100	47	95	64	98	68	88	14	91	47
Ziguinchor	100	33	97	79	100	74	100	9	100	33
Total	97	396	88	71	92	63	92	12	92	385

The data collection tools and questionnaires for the SPA are adapted to the Senegal context and follow availability of ACTs by formulation, as does the NMCP and the operational level, it is recommended when assessing the country context that this data source be considered as well. Senegal is in a unique position with SPA data available on a yearly basis.

Key Question 3

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

Supporting Data

Table currently not available. This information will be available in January 2020 when the LMIS module is expected to be integrated into the DHIS2 platform.

Conclusion

According to the 2018 NMCP annual epidemiological bulletin report, 98 percent of confirmed cases were treated with ACT. There were 520,898 ACTs consumed and 530,944 malaria cases and 2,090,323 RDTs consumed. Ninety-eight percent of suspected malaria cases were confirmed with an RDT and/or microscope.

Large numbers of RDTs are utilized due to the algorithm requiring that all febrile patients, regardless of age, season or other symptoms possible be tested with RDTs. It is important to note

that in 2020, the NMCP will integrate the LMIS module into the DHIS2. This will allow the comparison of LMIS and HMIS reported data.

Key Question 4

What are the trends in LMIS reporting rates?

Supporting Data

N/A This data is currently not available.

Conclusion

The supply chain and pharmaceutical system faces a major challenge related to the lack of consumption data to forecast, procure and distribute commodities. The technical and financial partners along with the government are working together to find better sustainable solutions. The Bill and Melinda Gates Foundation is conducting an evaluation on the Informed Push Model to make better informed decisions. PMI will surely address these challenges once recommendations will be identified. From 2013 to 2017, the MOH and the CMS implemented the Informed Push Model with third-party logistics providers (IPM-3PL) called *"Yeksi naa"* ("I have arrived"). This model aims to strengthen contraceptive commodity availability, data availability and financial transactions. Given the positive results of the IPM-3PL approach, in 2015 it was extended to include not only 25 contraceptive products, but an additional 93 essential medicines including malaria commodities, as part of the supply chain transformation.

The *Yeksi naa* model is facing challenges including lack of interoperability between different information systems, lack of financial resources to sustain it, limited number of tablets to collect logistics data at facilities level, and the level of access to data for implementing partners at lower levels of the supply chain remains restricted. The model is no longer functional since July 2019 due to lack of funding. PMI and most of the financial and technical partners lack access to logistics data at service delivery points, despite continuous requests.

The NMCP conducts quarterly data collection and validation reviews of HMIS and LMIS data at the regional level. The 2018 data retention strike that ended in December greatly impacted these routine reviews and data have been backfilled, delaying the submission of their annual report.

Key Question 5

What are the main supply chain functions supported by PMI? For areas that are not as strong is there additional investment that PMI should make? In areas performing well, is it dependent on PMI/donor funding and so should be maintained?

Supporting Data

Figure A50. PMI Supply Chain Investments in FY 18 in Senegal, *Field Expenses by TA Category*

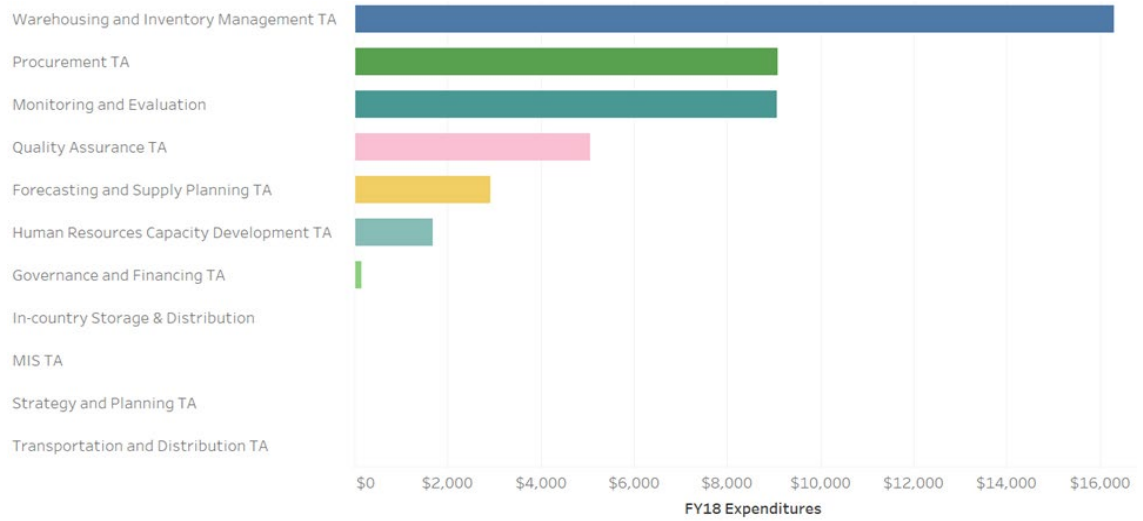
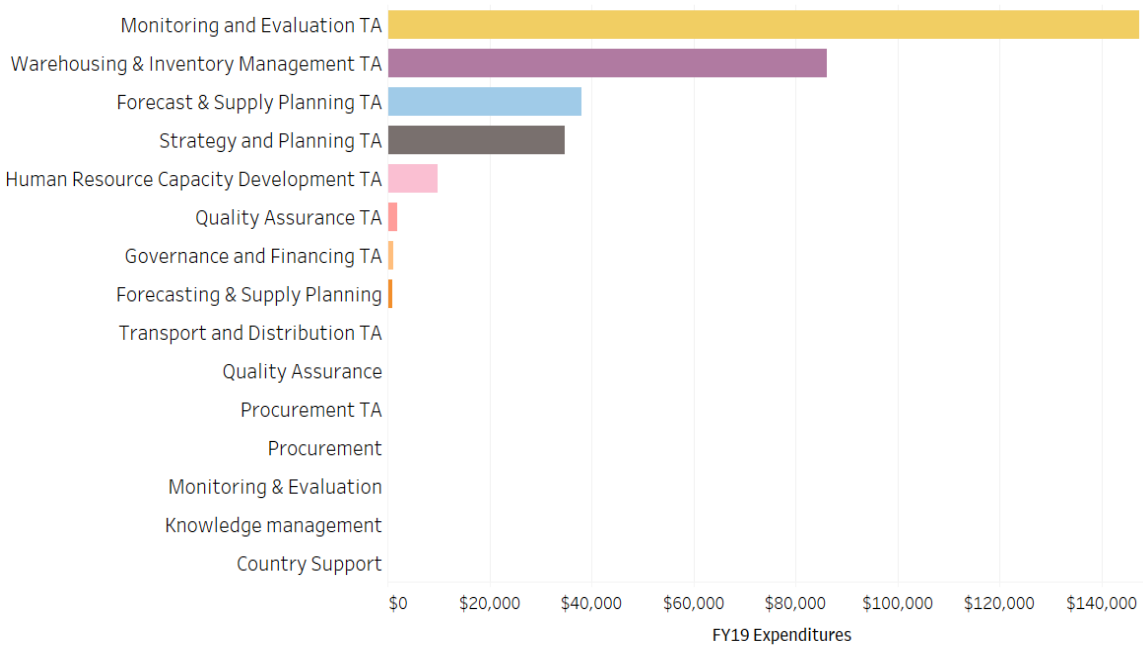


Figure A51. PMI Supply Chain Investments in FY19 in Senegal, *Field Expenses by TA Category*



Conclusion

The main supply chain interventions supported by PMI are warehousing and inventory management, procurement, and monitoring and evaluation technical assistance. The largest proportion of the technical assistance is warehousing and inventory. PMI technical assistance also supports the Central Medical Store to improve stock management and an annual inventory.

PMI technical assistance investment will be directed towards improving annual inventory and semesterly quantifications with the supply chain management stakeholders. Also, PMI funding through the G2G mechanism with the NCMP will support the training of a supply chain committee specific to malaria commodities. The platform will ensure data sharing and transparency among donors with regard to commodity orders. The multi-sectorial committee will help reduce stock outs and avoid overstocks. PMI will increase its funding to enhance the Informed Push model once an action plan will be finalized.

FY 18 was the first full fiscal year of the GHSC-FTO field office in Senegal. During FY18 all field staff, including technical staff, were attributing their time to operations and program management. This includes their travel costs, subcontractor salaries, and ODCs. The costs allocated for operations and program management were based on the funding splits approved in the FY 18 workplan giving PMI the majority of the costs. PMI is currently working with GHSC-PSM to address the costs associated with program management and operations as the graph above does not accurately reflect the use of technical staff's time in providing assistance to Senegal's Supply Chain program.

In FY 19, technical staff started to properly allocate their time across the technical areas providing a more accurate picture of the assistance being provided. While the expenses are more appropriately allocated, some technical programs did not incur large costs during FY19 continuing the trend of operations and program management taking a large portion of the budget. One program in particular is the refurbishment of the regional warehouses (PRA - *Pharmacie Régionale d'Approvisionnement*) which will account for $1M in warehousing TA, but did not incur expenses by the end of FY 19.

The PMI/Senegal team and headquarters supply chain team are continuing to address the issues of operations and program management costs through the review of funding splits in Senegal's FY 20 workplans to ensure equitable distribution of costs across health elements.

Key Question 6

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

Supporting Data

In 2018, health post nurses went on strike for eight months, during which time health service delivery was affected at the facility level. More precisely, at times some nurses refused deliveries of essential medicines from the private logistics operator. Moreover, they refused to share programmatic and logistics data with higher levels of the healthcare system. Fortunately, malaria commodities were still distributed during this time, thanks in part to the involvement of the Minister of Health and Regional/District Chief Medical Officers.

Conclusion

PMI, in collaboration with the NMCP should find sustainable contingency measures to avoid tension when strikes or other disruptions in the health sector occur. The technical and financial

partners with the MOH will also work together to ensure sustainability of the Informed Push Model. These could have implications on malaria activities programming, particularly supply chain activities.

3.B. SURVEILLANCE, MONITORING & EVALUATION (SM&E)

NMCP objective
The NMCP objective for M&E is to ensure 100 percent prompt and complete routine reporting at all levels and use of data for M&E of the 2016-2020 Strategic Plan. To achieve this objective, the NMCP will focus on building capacity in surveillance, monitoring and evaluation and continue to focus on strengthening the routine information system at all levels: national, regional, district, and facility. The NMCP will continue to work closely with the Division of Social and Health Information Systems (DSISS) to fully integrate the NMCP malaria system into the national HMIS that uses the District Health Information System (DHIS2) platform and work with the MoH to improve the quality of the malaria data.
NMCP approach
● Epidemic surveillance sites report all data weekly and data are analyzed to identify hotspots. ● Integration of NMCP data into DHIS2 adopted by the MoH, with quarterly data reviews. ● Introduction of mobile health (mHealth) system to facilitate reporting of data at community level and reporting of weekly case counts. ● Health facility supervision using tablet computers to streamline analysis and feedback.
PMI objective, in support of NMCP
Support from PMI will continue to contribute to key data collection and analysis activities including continued collaboration with the DSISS and the NMCP in increased use of the HMIS in DHIS2 and use of the malaria module in the system. The NMCP will continue to evaluate the completeness and timeliness of data and perform data quality checks through quarterly reviews at the district level and on-site verification through supervision with the DSISS and the MoH. PMI will continue to support technical assistance to the cDHS for data analysis and dissemination as the ANSD is now fully able to manage and implement the survey on their own. PMI will also provide some technical assistance to a MIS in 2020 that will be funded by the Global Fund and focused in the Southeast, higher burden regions with the aim to collect more granular data.
PMI-supported recent progress (past ~12-18 months)
PMI provided the following support in the previous 12-18 months: ● Data analysis, report formatting and dissemination of the 2018 cDHS.

- Supported fifth SM&E course and trained an additional 40 health workers for a total of 115 health workers trained.
- Support for case investigations and training of health staff in investigation procedures in pre-elimination zones with incidence <5/1000
- Continued partial support for the annual cDHS and cSPA
- Continued support for weekly reporting from sentinel sites, routine HMIS data collection with the production of the annual bulletin.
- Assessing the Performance of Malaria SM&E Systems in the Context of Malaria Elimination
- Supervision visits to health posts in Kolda, Kaffrine and Kédougou.

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

- Support for weekly reporting from sentinel sites and dissemination of progress reports.
- Malaria specific supportive supervision at all levels of the health pyramid (community, district and regional). These regular supervisions take into account case management, prevention and promotion of protective behaviors as well as on-site data verification.
- Continued support for case investigations in pre-elimination zones with incidence <5/1000
- Pilot use of PECADOM+ platform as community-based surveillance in the context of an OR study and pilot the use of digital data collection tools for CHW
- Implement health information system readiness assessment to assess if systems are ready for elimination activities and identify areas of need and priorities.
- Implementing recommendations from SM&E systems assessment
- Support for DHIS2 implementation with a specific emphasis on data quality.
- Technical assistance to Global Fund funded MIS in 2020 for focus in southeast regions.

PMI Goal

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

Do you propose expanding, contracting, or changing any SM&E activities? If so, why and what data did you use to arrive at that conclusion?

PMI Senegal proposes maintaining similar funding levels for surveillance activities with a couple of increases in training of case investigations and support to the HMIS. There is an increase in support to training for investigation of index cases and surrounding households due to the success of the

program and increase in the number of districts with incidence of <5 per 1000. Also, in collaboration with the Global Fund, to encourage the transition away from parallel Excel-based malaria information system to the web-based DHIS-2 HMIS system, there is planned support to the DSISS for increased visualization and use of the system for malaria in addition to plans for support to districts for data quality reviews and feedback back to facilities.

Within the context of a HQ-funded OR study on Mass Drug Administration, the PECADOM+ platform will be expanded to being year-round in the study area within the district of Tambacounda. The DSDOMs performing weekly fever sweeps in households will be trained and supervised to collect fever and malaria data in addition to identifying and testing any fever cases, and treating or referring any cases of malaria among all age groups.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

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

Supporting Data

Figure A52. Sources of data available in Senegal

Data Source	*Data Collection Activities*	*Year*								
		2015	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*
Household Surveys	Continuous Demographic Health Survey (cDHS) - National Scale	X	X	X	X#	X#	(X)#	(X)#		
	Malaria Indicator Survey (MIS) - Southeast Regions		X*!				(X)			
	Multiple Indicator Cluster Survey (MICS)									
	EPI survey									
Health Facility Surveys	Service Provision Assessment (SPA)	X	X	X	X#	X#	(X)#	(X)#		
	Service Availability Readiness Assessment (SARA) survey									
	Other Health Facility Survey									
Other Surveys	EUV				X	X	(X)	(X)		

Data Source	*Data Collection Activities*	*Year*								
		2015	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*
	School-based Malaria Survey									
	Other (Knowledge, Attitudes and Practices Survey, Malaria Behavior Survey)									
	Other (Malaria Impact Evaluation)			X*						
Malaria Surveillance and Routine System Support	Malaria Epidemic Surveillance System	X	X	X	X	X	(X)	(X)	(X)	(X)
	Support to HMIS	X	X	X	X	X	(X)	(X)	(X)	(X)
	Support Case Investigation	X	X	X	X	X	(X)	(X)	(X)	(X)
	Other (Electronic Logistics Management Information System (eLMIS)									
	Other (Malaria Rapid Reporting System)									

*Asterisk denotes non-PMI funded activities; x denotes completed activities and (x) denotes planned activities.

! 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.

PMI co-funds the cDHS and SPA on an annual basis. The ANSD is now capable of managing and implementing all survey fieldwork needs. PMI supports technical assistance for analysis and dissemination.

Conclusion

Available data support maintaining SM&E funding levels with an increase in funds to the DSISS for HMIS support. Close collaboration with Global Fund identified the need for increased funding to HMIS support for better use of the DHIS2 platform and a MIS in 2020 that will be predominantly funded by the Global Fund with minimal TA costs from PMI.

Key Question 2

What HMIS activities have been supported in your country? What current priorities will be supported with this MOP funding?

Supporting Data

Figure A53. HMIS-Supported Activities in Senegal

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
	FY 18	FY 19	FY 20		
Central Level					
Register, tools (e.g. checklists, indicator glossary), job aids (design, indicators, definition of data elements, data dictionary, system support)				X	
Data quality assessments (separate from supervision – funding for travel to lower levels)				X	
Program monitoring and technical assistance (funding for travel to lower levels)	X	X	X		
Training (funding for central level to conduct training at lower levels, capacity building, i.e. on the job training for central level staff)	X	X	X	X	
Human Resources (secondment of person in NMCP for SM&E, office/team for SM&E)					
Data Use (analysis, interpretation, visualization (dashboards, bulletins, dissemination/feedback to lower levels, decision-making)	X	X	X	X	
Policy guidelines and coordination (updating policies, guidelines, supporting sub-committee meetings, supporting participation in sub-committee meetings)			X	X	
External relations/Communications/Outreach (support travel to international meetings and publications)	X	X	X	X	
Desk review to catch “logic errors system” (provide TA to catch logic errors)				X	
Admin 1 Level (Region/Province/State).					
Registers (warehousing, printing, distribution)					
Data quality assessments (separate from supervision – funding for travel to lower levels)	X	X	X	X	
Program monitoring and technical assistance (funding for travel to lower levels)	X	X	X		
Training (funding for Admin 1 staff to conduct training at lower levels, capacity building (i.e. on the job training for Admin 2 level staff)	X	X	X		

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
	FY 18	FY 19	FY 20		
Human Resources (secondment of person for malaria SM&E, office/team for SM&E)					
Data Use (analysis, interpretation, visualization (dashboards, bulletins), dissemination/feedback to lower levels, decision-making)				X	
Adaptation of national policy guidelines and coordination (adapting policies, guidelines, supporting sub-committee meetings, supporting participation in sub-committee meetings)					
Adaptation of checklists and job-aides					
Participation in national meetings (support for travel costs)	X	X	X		
Support to Annual Operational Plans for Admin 1 Malaria Program			X	X	
Admin 2 Level (District)					
Data entry, summary, and transmission (training, re-training, computers, internet, tools)					
Supervision (training, traveling, supervision tools/checklists, create/design system for organized/methodical supervision)	X	X	X	X	
Data validation (data validation activities before monthly data submission - organize health facilities)					
Monthly/Quarterly data quality review meetings (venue, meeting support)	X	X	X	X	
Data Use (analysis, interpretation, visualization (i.e. dashboards), dissemination/feedback to facilities, decision-making)	X	X	X	X	
Human Resources (secondment of person for malaria SM&E, office/team for SM&E)					
Annual planning with Admin 1 (support travel)				X	
Facility Level					
Data collection/entry, summary, and transmission (training, re-training, computers, internet, tools)				X	
Supervision of CHWs (training, traveling, administering supervision tools/checklists of community health workers)	X	X	X		

Intervention	PMI-Funded? (X)			Does Global Fund plan to fund this? (X)	Does another donor plan to fund this? (X)
	FY 18	FY 19	FY 20		
Data use (analysis, interpretation, visualization (dashboards), dissemination/feedback to CHWs, decision-making)					
Monthly/Quarterly data quality review meetings(support for travel)	X	X	X		
Community Level					
Data collection/entry and transmission (training, re-training, tools	X	X	X		
Data use (analysis, interpretation, decision-making)					
Monthly/quarterly data quality review meetings (support for travel)	X	X	X	X	

Conclusion

PMI and the Global Fund are increasing support to the HMIS through the DSISS to support the NMCP's transition from the Excel-based malaria information system to the DHIS-2 based HMIS. In addition to support at the central level with the DSISS, there are plans to provide support at the district level with FY20 funds for data reviews down to the facilities.

Key Question 3

What are the outcomes of HMIS strengthening efforts?

Supporting Data

Figure A54. Outcomes of HMIS strengthening efforts in Senegal

		2017	2018
Timeliness	% of reports received on time	100%	30%
Completeness	"Confirmed malaria cases for children under 5 years of age" was reported in X% of facility-months	100%	98%
Accuracy	Populate with most recent DQA data	97%	n/a

Conclusion

There was a health services and data strike for the majority of 2018. The timeliness of reporting was affected by the strike. All 2018 data has now been reported, although most was retroactively transmitted to the central level.

Key Question 4

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

Supporting Data

N/A

Conclusion

There are no other considerations that impact funding allocation for SM&E in Senegal. PMI will continue to support SM&E activities to achieve the NMCP's goal of improved and sustained data timeliness, quality, completeness and use.

3.C. SOCIAL AND BEHAVIORAL CHANGE (SBC)

NMCP Objective

NMCP/PMI objectives

The overarching goal of Senegal's current national malaria communication strategy is to bring 80 percent of the population to adopt healthy behaviors with regards to malaria prevention measures and case management by 2020. More specifically, the communication strategy is designed to:

- Increase the proportion of people sleeping under ITNs to > 80%
- Increase the proportion of pregnant women who take at least three doses of SP under directly observed treatment at ANC to > 80%
- Increase the proportion of people who seek care at health facilities within 24 hours of the onset of fever to > 80%
- Increase compliance in the treatment of uncomplicated malaria
- Increase acceptance of IRS to > 90% of households in targeted districts
- At least 95 percent of children aged between 3 to 120 months in target zones receive all three doses of seasonal malaria chemoprevention care during transmission season
- 100 percent of suspected malaria cases are diagnosed with RDTs or blood smear according to national guidelines
- 100 percent of confirmed cases are treated according to national guidelines and with effective drugs
- 100 percent of complicated malaria cases among children under 10 years of age have access to pre-reference treatment
- Strengthen partnerships with the private sector, media, local government, Parliament, and other government departments

NMCP Approach

- The objectives of the current integrated malaria communication strategy are consistent with the NMCP's 2016-2020 National Malaria Strategic Plan. The latter emphasizes that IEC/BCC approaches in Senegal should be evidence-based and tailored to specific populations and geographic areas. The NCMP is keen to ensure that approaches are grounded in formative research that identifies key determinants of behavior for specific audiences, appropriate communication channels, and suitable printed materials.
- Communications about malaria are expected to take into account local specificities such as differences in net use culture. Since the NMCP implements various malaria control interventions depending on the malaria burden of specific areas, communications efforts are also tailored accordingly.
- The current communication strategy adopts three main strategic approaches: a) advocacy, b) social mobilization, and c) behavior change communication.

Advocacy: Using a multi-sectoral approach, advocacy efforts particularly target the private sector and other sectors associated with the malaria pre-elimination objective in Senegal. The NMCP plans to reinforce advocacy for resource mobilization in order to scale up interventions proven effective and reduce mortality and morbidity. Advocacy efforts will select specific themes included in the national malaria strategic plan and will target stakeholders with specific strategies and activities geared towards increasing resources to achieve specific objectives. The national strategic plan aims at broadening the partnerships between the NMCP and the private sector as the country works towards pre-elimination.

High-level institutions such as the Parliament are also to be targeted for advocacy efforts. The NMCP is to raise awareness of deputies on the importance of increasing budgetary support to the health sector and specifically for malaria as the country moves towards pre-elimination.

Social mobilization: This communication approach aims to reinforce community participation in malaria control through enhanced collaboration with local NGOs and community-based organizations. The strategies of *Malaria Jambars* (Malaria Champions) increase commitment from communities for malaria control activities through local events covered by the media. The NMCP strengthens the IEC/BCC capacities of civil society's groups to contribute to malaria prevention and control. Social mobilization activities involve individual citizens as well as specific groups such as artists, local leaders, local elected officials, etc.).

Social Behavior Change Communication: In order to increase utilization of malaria services by different segments of the population, SBC efforts focus on targeted communication using interpersonal communication, mass media(TV channels, radios shows at national and community levels, non-traditional media, billboards, etc.).

PMI Objective in Support of NMCP

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, and IRS. The NMCP is keen to ensure that approaches are grounded in formative research that identifies key determinants of behavior, are evidence-based and tailored to specific populations and geographic areas.

PMI-Supported Recent Progress *(Past 12-18 Months)*

- 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 events, 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 (setting aside a day to focus on a specific theme or topic and bringing the whole community together around that topic – for speeches, music, skits, with banners and t-shirts with messages, etc.). 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 attending ANC visits, and the importance of receiving the recommended doses of IPTp. Through Peace Corps volunteers and civil society organizations, PMI has supported malaria education and prevention throughout the country.
- PMI supported l61 TV spots and 160 national radio spots at the central level.
- PMI also supported the broadcast of 39,956 radio public service announcements in the seven regions on bed net use, IPTp, and early care seeking, and 100 radio broadcasts on malaria where 3,180 messages were inserted in the largest broadcasts.
- Large posters displaying malaria messaging were also funded by PMI on 35 billboards on major roads for six months, and in the biggest cities of the countries (Dakar, Mbour, St-Louis and Kaolack) for one month.
- PMI supported SBC activities at the community level, including 379 health talks reaching 9,475 participants and home visits targeting 19,074 people.

PMI-Supported Planned Activities *(Next 12-18 Months Supported by Currently Available Funds)*

With the reduction in malaria burden observed in Senegal and the rollout of interventions specific to the epidemiologic profile of different parts of the country, SBC activities are tailored to local contexts as well to reflect the interventions being implemented.

- PMI's focus intervention areas are the high incidence south-eastern regions of Kolda, Kédougou, Sédhiou, and Tambacounda. However, support for SBC activities is two pronged with a nationwide focus through mass media implemented by the National Health Communication Office, and target regional communication activities through the integrated

bilateral health project. PMI funding supports both the national and regional communication activities.

- Various channels including community meetings on a specific topic, home visits, theater, community radio (radio spots as well as interviews and programming), and social mobilization (setting aside a day to focus on a specific theme or topic and bringing the whole community together around that topic – for speeches, music, skits, with banners and t-shirts with messages, etc.).

PMI Goal

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

Do you propose expanding, contracting, or changing any SBC activities? If so, why and what data did you use to arrive at that conclusion?

The NMCP is planning to conduct formative research in 2020 to identify key drivers and determinants to uptake of services. No changes are planned to the current strategy and activities until after the review of the results of the study, which PMI negotiated with Global Fund to fully fund.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

Key Question 1

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

Supporting Data

Figure A55. Prioritized Behaviors with FY2020 Funds

Behavior	Target Population	Geographic Focus	Justification
Acceptance of SMC	Caregivers of children <10 years old	Kolda, Kédougou, Tambacounda, Kaolack	Insufficient communication around SMC, especially in new target areas, led to higher refusal rates to participate in the 2019 campaign. The reasons for refusals are varied - intervention fatigue, concern about side effects, scheduling conflicts, etc. - and these need to be addressed in all locations for every passage. Given the impact of this intervention in Senegal's highest burden regions, acceptance of SMC is prioritized and will be addressed in FY19 activities with an increase of resources for SMC communication activities. The outcomes of the 2020 campaign will influence the priorities for 2021
Uptake of IPTp3	Pregnant women and heads of households	Kolda, Kédougou, Tambacounda, Sédhiou	Strategic decision to target high burden regions with SBC combined with mobile outreach to increase coverage with SP3

Conclusion

Malaria in Senegal is unequally distributed among the regions, with three out of the four PMI focus regions (Kolda, Tambacounda and Kédougou) carrying the bulk of the malaria burden. While the three regions account for only 11 percent of the Senegalese population, they recorded 82 percent of confirmed malaria cases in 2018, 91 percent of cases among children under 5 years, and 84 percent of cases in pregnant women. Thus, PMI support for SBC will continue to focus mainly on these high burden regions with an integrated package of activities aiming at increasing uptake and utilization of core malaria prevention (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 IPC through CBOs working with community health workers. At the national level, PMI will support the NMCP for SBC messaging and advocacy during special events such as SMC campaigns, ITN distribution campaigns, World Malaria Day, etc. Findings from the formative research planned for 2020 will be used to inform the design of activities as necessary.

Key Question 2

Given the priority behaviors identified, what data are available to better understand the factors influencing low uptake? What are the behavioral determinants of the prioritized behaviors? Are there gaps in understanding the barriers to uptake?

Supporting Data

Figure A56. Summary of Determinants and Gaps for FY2020 Prioritized Behaviors

Behavior	Key Facilitators	Key Barriers	Knowledge Gaps
Acceptance of SMC	-Support of activity from community and religious leaders	Insufficient communication about SMC prior and during the campaign-	To what extent the death of a child during the 2019 campaign will affect acceptance of SMC in future campaigns
Uptake of IPTp3	Early disclosure of pregnancy and access to ANC services	-Distance to health facilities -SP Stockouts- Provider Behavior	Weight of various known barriers to optimal IPTp coverage, including access to SP, late disclosure of pregnancy, and provider behaviors

Conclusion

While several studies have been conducted on the determinants of behaviors, the NMCP assessment is that they are not comprehensive enough, either because of their scope or design. Thus, the plan is to conduct a more in depth formative research study in 2020 and use the findings to revise the current strategy.

Key Question 3

What activities are needed to bolster the country's capacity for SBC? Are these activities needed at the national or sub-national level?

Supporting Data

In addition to the assessment of the current SBC capacity provided on the Program Inventory, the following strengths and weaknesses were identified:

Strengths

- Existence of a National Communication Strategy in support of the NSP.
- Existence of guidance documents for community actors on different interventions (training guides and briefs).
- Production of communication media for all interventions.
- Sustained mass media activities.
- Implementation of SBC (IPC) at community level through civil society organizations.

Weaknesses

- No capacity building plan for NPCP communication office to support elimination objectives.
- Insufficient communication plans at the operational level.
- Lack of monitoring of community level SBC activities by the districts.

- Insufficient social mobilization.
- Insufficient support for the implementation of community plans.
- Advocacy plan for domestic resource mobilization not well implemented.

Conclusion

Senegal has relatively a very strong SBC and long standing communication strategy which combines both IPC and mass media, and involves community based organizations in the implementation of activities. The weaknesses outlined by the head of the SBC/Communication office are due to a combination of budget constraints and low prioritization of SBC by decision makers who tend to favor other intervention areas during budget planning, which is not unique to Senegal.

PMI advocated an increase of the SBC budget and will provide technical assistance for the implementation of the comprehensive formative research on determinants of behaviors(to be funded by Global Fund), and an update of the national SBC strategic plan.

Key Question 4

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

Supporting Data

N/A

Conclusion

N/A

3.D. PROGRAM EVALUATION AND OPERATIONAL RESEARCH

NMCP objective
There is one OR-related specific objective in the updated Senegal National Malaria Strategic Plan 2016-2020, which is listed below: ● Ensure strengthening 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. Two interventions are related to this specific objective: ● Strengthening coordination and promotion of operational research ● Development of operational research topics of national interest

NMCP approach

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 consultation of partners in the fight against malaria (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 the implementation of decision. For better coordination, a framework for sharing malaria research results will be implemented. 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).

The NMCP actively engages as research partner in malaria-related OR/PE activities that have direct implication on programmatic activities, or which are implemented through the public health system.

The standard procedures of engagement in OR by the NMCP is described briefly below:

- The NMCP has an office/unit that manages PE/OR activities.
- The NMCP regularly facilitates IRB approval for studies undertaken in collaboration with international research partners.
- A national Steering Committee is nominated by the NMCP for advising and monitoring the study implementation. The steering committee will include NMCP staff, the local study coordinator, partners and other researchers. The steering committee will review and approve the proposed research protocol. The steering committee will meet regularly for the duration of the study. Steering committee will review draft study progress reports and will validate them. In case of challenges with study implementation, the Steering committee may be called upon for ad-hoc meetings.
- The NMCP is responsible for the introduction of the research team to the actors at the operational level of the health system (regional medical officer, district medical officer, health facility nurses, etc.) and facilitates and accompanies the research team in its engagement with the health sector at the operational level.

PMI objective, in support of NMCP

- In Senegal, PMI financially supports program- and policy-relevant PE/OR activities proposed by the NMCP.
- In-country or headquarters-based PMI staff participate as co-investigators in specific PE/OR activities (usually the ones funded by PMI).
- The PMI in-country team participates actively in the CCPLP.

- PMI in-country team members are regularly requested to participate as members of PE/OR Steering Committees, based on their technical expertise.
- The PMI CDC Resident Advisor will chair the CCPLP committee for research and training (Oct 2019- Oct 2022).
- Through the Peace Corps' Small Program Award (SPA), innovative approaches are developed and piloted at a small scale. Several of these innovative approaches have been then brought to scale by the NMCP (such as PECADOM+).

PMI-supported recent progress (past ~12-18 months)

N/A

PMI-supported planned activities (next ~12-18 months, supported by currently available funds)

In 2020, two PMI funded studies will be implemented in Senegal:

- Framework to assess and remediate barriers to care seeking for febrile illness in Senegal (formative research)- MOP funded
- Mass drug administration with Dihydroartemisinin-piperaquine and primaquine to reduce malaria in a moderate-low transmission setting in Senegal (cluster randomized controlled trial)- Core funded

Both activities are in the process of securing OR-committee approval for the protocols and local research partners are being identified/selected who will implement the two studies.

PMI Goal

PMI will support program- and policy-relevant OR and program evaluation that will:

- Improve effectiveness of existing interventions and increase scale-up and quality, including assessing combined interventions (e.g., LLINs and IRS);
- Evaluate ways to mitigate insecticide and drug resistance;
- Identify and assess improved and cost-effective approaches to monitoring changes in malaria epidemiology, particularly for documenting impact of malaria control efforts;
- Identify and assess approaches to improve the capacity of health systems to optimize delivery and quality of malaria interventions;
- Assess new interventions that offer the potential for use by PMI-supported programs in the near future; and
- Assist in optimizing program efficiency by addressing bottlenecks in malaria prevention and control.

Do you propose expanding, contracting, or changing any program evaluation and operational research activities? If so, why and what data did you use to arrive at that conclusion?

We are proposing an increase in resources towards the approved MOP-funded formative research to assess and remediate barriers to care seeking for febrile illness in Senegal. This project was proposed in last year's FY18 reprogramming ($200,000) The study protocol has been approved by the OR committee and the study will be implemented in 2020 by a local research partner (TBD). However, after discussion with the NMCP during the FY20 MOP, we are proposing to increase the resources by $50,000 with FY19 funds, which will allow the expansion of the study to another site in a fourth priority region and better inclusion of hospital facilities. As the epidemiology of malaria is highly stratified in Senegal, the inclusion of one more site would allow the data collection to occur in all three transmission zones and in the urban region of Dakar. Once the FY19 reprogramming is approved, we will submit the revised scope and budget of the previously approved protocol.

Please see Table 2 for a detailed list of proposed activities with FY 2020 funding.

No new OR/PE activity proposed for FY2020.

Key Question 1

Have technical challenges or operational bottlenecks that require operations research or program evaluation been identified in consultation with the NMCP? How have they been prioritized?

Supporting Data

Last year (July 2018) the NMCP went through the Mid-term review of its NSP. This was the opportunity to review the program performance and identify specific areas that could benefit from research projects. The following (not exhaustive) list was developed at the start of the NSP and revisited in 2018:

- Introduction of molecular biology diagnostic in pre-elimination zones.
- Better characterization of circulating parasites in the country (genotyping).
- Monitoring of primaquine tolerance.
- Impact evaluation of SMC in high transmission areas.
- Study of the introduction of rapid diagnostic tests in the private sector.
- Study on the different forms of motivation for the DSDOMs.
- Study on climate and malaria (predictive risk maps including climate data).

Figure A57. PE/OR Currently Conducted in Country with USG, GF, Multilaterals or Other Major Donors

Source of Funding	Implementing institution	Research Question/Topic	Current status/ timeline
BMGF	• UCAD • Harvard University • Broad Institute • MSAS/PNLP	Integrating genomic data into real world malaria surveillance and decision-making strategy	initiated in November 2019. Three year project so will continue until the end of 2022
BMGF	• PATH/MACEPA • UCSF • MSAS/PNLP • UCAD	Identification of high risk population for malaria and characterization of their movement and exposure profiles to develop specific intervention strategies (formative research)	to start in winter 2019
FIND	• MSAS/PNLP • PATH	Demonstrate the added value of using highly sensitive RDTs in case detection in the Northern pre-elimination zone (4 health posts total in the districts of Dagana and Kanel)	initiated in Sep 2019
GF	• TBD local research partner • MSAS/PNLP	Formative research to identify key drivers and determinants linked to the uptake of malaria services (to include risk perception, religious and traditional beliefs, etc.)	Delayed due to lack of funds. GF just approved to increase funding for this study with reprogramming of savings on current allocation. Proposed implementation is 2020
GF	MSAS/PNLP with a consultant	Malaria Program Review (MPR) at the end of the period of performance of the current National Strategic Plan 2016-2020	Q4 2020

Conclusion

No new PE/OR topics are being proposed. Between the two PMI-funded projects (MOP and core-funded) and the five PE/OR activities listed above being currently conducted, the NMCP and its partners are addressing most of the highest priority topics in the coming 12-36 months.

Key Question 2

In the technical areas covered above, are there specific issues in any of the intervention areas that merit further exploration, in anticipation of establishing intervention strategies that are or could become available in the future that could be applied?

Supporting Data

There is a need to develop and implement novel vector control strategies better adapted to urban settings. VectorLink is currently undertaking a landscape analysis to identify the ecological and vectorial determinants of malaria transmission in urban area of Diourbel, Touba and Kaolack

districts. Once these determinants are identified and characterized, it will be of interest to analyze any innovative vector-control strategies that would become available in the near future (i.e., outdoor baits, upgrading of residential structures, models for urban IRS campaigns, etc.) and consider some OR project around their implementation in these specific urban areas.

Conclusion

No immediate implications on programming.

Key Question 3

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

Supporting Data

N/A

Conclusion

N/A

3.E. OTHER HEALTH SYSTEMS STRENGTHENING

NMCP objective
The 2016 –2020 National Strategic Plan identifies the following key objective for health system strengthening: Promote universal access to a package of interventions to protect vulnerable groups and under-served populations, with a special focus on highly endemic zones to achieve the objectives set forth in a short time period.
NMCP approach
● Decentralize some of NMCP's responsibilities to the regional and operational levels ● Promote community-based approaches to increase demand for services and strengthen the provision of healthcare by the communities themselves. ● Improve management and coordination capacities of the health system in the framework of malaria control, with decentralization and local governance as major pillars to increase ownership by local governments and communities ● Reinforce partnership with the private sector in order to optimize opportunities for financing and coordination. ● Promote multi-sectoral approaches ● Improve the supply chain system, scale up community-based interventions, and strengthen the information system through innovative tools and research.

PMI objective, in support of NMCP Infrastructure
PMI supports a broad array of health system strengthening activities, including training of health workers, supply chain management, health information systems strengthening, drug quality monitoring, and NCMP capacity building.
PMI-supported recent progress (past ~12-18 months)
● Provided technical assistance to NMCP for the implementation of G2G activities. ● Support for peer supervision at the regional and district levels. Supervision will be performed by malariologists (graduates from the NMCP run malariology course) identified in the neighboring districts. ● Support for the local government to include malaria and other health priorities in their development plans and increase participation of communities in decision making regarding health issues. ● Funded the decentralized training in malariology for 235 Health Posts Chief Nurses in five regions (Kédougou, Kolda, Louga, Sédhiou and Tambacounda) using a Training of Trainers model. ● Supported Peace Corps for malaria control related activities, including SBC, SM&E, and OR. ● Supported capacity building in leadership and management for the NMCP managers, Built on existing modules developed in 2018 by USAID with the Government of Senegal and included a focus on strategic planning, facilitating change, and time management.
PMI-supported planned activities (next ~12-18 months, supported by currently available funds)
● Continue funding for Malariology and SM&E courses. ● Support Peace Corps for SBC and other malaria control activities. ● Support NMCP staff for their participation in international scientific and professional meetings such as ASTMH to learn best practices, share experiences, and develop networks. ● Continue support for peer supervision at the regional and district levels. Supervision will be performed by malariologists (graduates from the NMCP run malariology course) identified in the neighboring districts. ● Continue support for local authorities to include malaria and other health priorities in their Community Development Plans, and for an increased participation of communities in decision-making regarding health issues.

- Support for drafting and monitoring of the G2G agreement between PMI and the NMCP (fixed amount reimbursement agreement, FARA); and TA for management and data reporting.
- Support for capacity building in leadership and management for the NMCP managers, Training will build on existing modules developed in 2018 by USAID with the Government of Senegal and will include a focus on strategic planning, facilitating change, and time management.
- Support to the CCPLP (Malaria Partners Coordination Committee) to bring together NMCP staff and all its in-country partners as well as the Global Fund, Islamic Development Bank, PMI to provide guidance to the NMCP, facilitate information sharing and ensure better coordination of malaria-related activities across the country.

PMI Goal

The goal of PMI for health system strengthening is the ability of a country to possess appropriately-skilled human resources and the necessary infrastructure to plan, implement, and monitor the progress of their malaria control activities. PMI strengthens the host government system by reinforcing the six internationally HSS functions: human resources for health, health finance, health governance, health information, medical products and service delivery.

Key Question 1

N.B, As there is not a specific pre-defined goal and objective for this section on other health systems strengthening, this can be an open question that is included by the MOP team. One possible example is to consider support that would address emergencies (Ebola outbreak; cyclone events; etc.) or support that engages FETP or Peace Corps programs.

Supporting Data

PMI has always supported health system strengthening and capacity building of the Ministry of Health, though the budget allocated to this activity has been decreasing. The NMCP requires ongoing skills development to implement its malaria control program and respond to changes in epidemiologic trends.

With FY2020 funds, PMI will:

- Complement other USAID/Mission efforts to promote local governance by strengthening the capacity of local elected officials to address malaria as a priority in local development plans, and increasing participation of communities in decision-making and financing.
- Support supervision visits at all levels of the health system to ensure that policies and guidelines are implemented as appropriate. The supervision will be conducted by

graduates from the NMCP-run malariology course, with central-level NMCP staff joining only in some of the supervisory visits, but not routinely in all visits.

- Support quarterly malaria partners coordination meetings to review planned activities, facilitate information sharing and ensure better coordination of malaria-related activities across the country.
- Continue 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
- Provide Technical assistance for the management of Fixed Amount Reimbursement Agreement (FARA) under the G2G mechanism to support the preparation and monitoring of the G2G agreement between PMI and the NMCP
- Support Peace Corps small project assistance (SPA) grants: Specific projects that require funding will be submitted to the Small Project Assistance committee for approval. Projects that have been funded in the past include net care and repair activities, piloting the active detection of fever cases, training women's groups/community care groups, and organizing malaria fairs.

Conclusion

PMI supports a broad array of health system strengthening activities which cut across intervention areas and covers all WHO HSS building blocks. The combined interventions have strengthened the health system in general, and greatly contributed to the progress made in reducing the malaria burden in Senegal

Key Question 2

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

Supporting Data

There are no considerations impacting this funding allocation at this time.

Conclusion

n/a

ANNEX B: COUNTRY PROGRAM INVENTORY

The MOP seeks to facilitate a consultative, collaborative process between PMI, the NMCP, and other partners, where relevant. This section outlines a high-level program inventory along key intervention areas, and is intended to structure discussions around the relative strengths and challenges facing a program, as well as prioritization and opportunities to drive catalytic impact with specific investments.

Key:

Example score

Figure B1. Category: Vector Control

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Entomological Monitoring	Insecticide Resistance monitoring	No insecticide resistance monitoring conducted	Limited insecticide resistance monitoring conducted on an ad-hoc basis	Insecticide Resistance monitoring conducted on an annual basis in a limited number of sites, not covering all administrative units. Occasional monitoring of molecular mechanisms	Insecticide resistance monitoring conducted in a greater number of sites on an annual basis with some collaboration with other partners, routine monitoring of some resistance mechanisms	Regular high quality insecticide resistance monitoring done in multiple sites per administrative division, consideration of molecular mechanisms and bioassay data, collaboration with other partners and NMCP
	Insectary	No functioning insectaries in country	Insectary present, but frequent ruptures in rearing and contamination of strains, frequent challenges in meeting needs	Insectary present, full-time staff present, some capacity for strain verification, sometimes challenges to get enough mosquitoes, occasional contamination	One or more insectary present, regular verification, rare challenges in getting sufficient mosquitoes, some capacity for strain verification	Highly functioning insectaries with verification of strains, capacity for rearing wild strains, quality controls in place
	Data-based vector control decision making	No consideration of entomological data when making decisions	Limited review of data, reliance on outdated data, uncoordinated analysis of data with limited collaboration with partners	Irregular and incomplete review of data from multiple partners, sometimes in collaboration with research and funding partners	Collaborative but irregular review of entomological data, sometimes providing timely evidence for decisions	Collaborative regular review of entomological data from multiple sources when making decisions about vector control
	Vector bionomics monitoring or research	No research or longitudinal monitoring done in country	Limited longitudinal monitoring and research done in country	Regular vector bionomics monitoring, and vector control research done in country, but generally not having an important role in decision making	Regular vector bionomics and vector control research conducted in country but not sufficient to respond to all major needs of the national program	Regular monitoring driven by program priorities conducted alongside research done in country to provide timely data on the best malaria vector control

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Institutionalization of funding	No resources	Only supported by external partners, no host government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government
ITNs	Consistent distribution channels, in accordance with national strategy	Infrequent campaigns with no continuous distribution	Regular (e.g., every 3 years) campaigns, no continuous distribution	Regular campaigns, inconsistent continuous distribution	Regular campaigns, plus at least 1 well- managed continuous distribution channel	Regular, well- executed campaigns and well-managed continuous distribution channels
	Regular supervision of routine ITN distribution (e.g. HFs)	No HFs regularly supervised in ITN distribution	0-25% of HFs regularly supervised in ITN distribution	25-50% of HFs regularly supervised in ITN distribution	50-75% of HFs regularly supervised in ITN distribution	75-100% of HFs regularly supervised in ITN distribution
	ITN distribution reporting capabilities	Quantities of ITNs distributed not reported at all into LMIS (or other system)	Some quantities of ITNs distributed reported routinely	Some quantities of ITNs distributed reported routinely but cannot be disaggregated by channel	Quantities of ITNs distributed reported routinely and disaggregated by channel	All ITNs distributed captured routinely, disaggregated, and reported electronically
	Capacity to use data to appropriately target and rotate new types of nets	N/A	No capacity	Limited capacity	Some capacity	Good capacity
IRS	Host country government's IRS implementation capacity	N/A, no host country government implemented spray campaign	Host country government has very limited capacity to implement minor aspects of spray campaign	Host country government has capacity to implement some aspects of spray campaign	Host country government has capacity to implement most aspects of spray campaign	Host country government implements independent spray campaign
	Institutionalization of funding	N/A, no IRS conducted in country	No host country government funding, only supported by external sources (e.g. PMI, GF, mining companies)	Limited host country government funding in addition to external sources	>50% funded by host country government in addition to external sources	Fully funded by host country government, no external sources

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Coverage of Government-Implemented Spray Campaign	N/A, no government-implemented spray campaign	Spray coverage not reported	85+% coverage in some government-sprayed areas	85+% coverage in most government-sprayed areas	85+% coverage in all government-sprayed areas

Figure B2. Category: Vector Control

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Community-based CM, if in national strategy	Coverage of CHWs trained in and providing CM (geographic or numerical target)	No CHWs conducting CM	0-25% of national target met	25-50% of national target met	50-75% of national target met	75-100% of national target met
	Regular supervision of CHWs in CM (regular defined as per national QA/QC guidelines)	No CHWs regularly supervised in CM	0-25% of CHWs regularly supervised in CM	25-50% of CHWs regularly supervised in CM	50-75% of CHWs regularly supervised in CM	75-100% of CHWs regularly supervised in CM
	CHW reporting capabilities	CHW-managed cases not reported into HMIS	Some CHW-managed cases routinely reported into HMIS	Cases routinely reported into HMIS but cannot be disaggregated from HF-reported cases	Cases routinely reported into HMIS and can be disaggregated from HF-reported cases	All CHW case data routinely captured and reported electronically
	Institutionalization of funding (salaries and/or other support)	No resources	Only supported by external partners, no host government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government
Facility based CM	Access to HF-based care (within 5 km of a health facility or as per national definition)	0-20% of population has access to HF	20-40% of population has access to HF	40-60% of population has access to HF	60-80% of population has access to HF	>80% of population has access to HF

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Regular* supervision of public HFs in CM	No HFs regularly supervised in CM	0-25% of HFs regularly supervised in CM	25-50% of HFs regularly supervised in CM	50-75% of HFs regularly supervised in CM	75-100% of HFs regularly supervised in CM
	Drug resistance monitoring	No TES performed in last 3 years	TES performed in last 3 years but results not available	Recent TES results available (within last 3 years) but no training in molecular testing	Recent TES results available (within last 3 years) and in-country staff trained in molecular testing	Recent TES results available (within last 3 years) and in-country capability for molecular testing

Figure B3. Category: Drug-Based Prevention

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
SMC (where applicable)	Geographic scope	No eligible districts receiving SMC		50% eligible districts receiving SMC		All eligible districts receiving SMC
	Coverage in targeted areas (% of eligible children 3-59 months who received complete SMC courses for all 3-4 rounds)	<60%	60-69%	70-79%	80-89%	90%+
	Institutionalization of funding	No resources	Only supported by external partners, no host government funding	Some host country government funding	>50% funded by host country government	Fully funded by host country government
MIP	National policy exists for malaria prevention in pregnancy	No policy	Policy exists but is not comprehensive (does not cover all aspects of MIP: ITN, IPTp and case management)	Comprehensive policy exists for prevention (ITNs, IPTp) and case management but not all WHO recommendations are included	Policy meets current WHO recommended MIP prevention	Comprehensive, WHO-aligned policy is actively implemented

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Country policy adoption/adaptation of ANC guidelines with at least 4 recommended contacts	No policy	Country has started discussions and consultations for adopting the new ANC guidelines and recommendations	Country has policy specifying ANC contacts but no provision for early delivery of IPTp and is not able to systematically track ANC visits in HMIS	Country policy specifies ANC contacts and has provision for delivery of IPTp at 13-16 weeks but cannot track all ANC visits in HMIS	Country policy specifies the number of contacts be delivered during pregnancy and has a provision for delivery of IPTp at 13-16 weeks and is able to track ANC visits in HMIS.
	National MIP working group established and coordinating effectively	No working group established	Working group formed and meets on an ad hoc basis, TORs are established	Working group engages in regular coordination but does not have mechanisms to ensure programmatic integration across technical areas	Working group coordinates at the national level only with Malaria and Maternal Health and has limited mechanisms for ensuring programmatic integration across technical areas	Working group engages in regular coordination at national and sub-national level with Malaria and Maternal Health and has mechanisms to ensure programmatic integration across technical areas.
	Supportive MIP supervision conducted	No HFs regularly supervised in MIP	0-25% of HFs regularly supervised in MIP	25-50% of HFs regularly supervised in MIP	50-75% of HFs regularly supervised in MIP	75-100% of HFs regularly supervised in MIP
	Routine SP resistance monitoring via biomarkers conducted	No SP resistance monitoring conducted	SP resistance monitoring conducted in the last 6-10 years	SP resistance monitoring conducted in the last year 4-5 years	SP resistance monitoring conducted in the last year 3 years	SP resistance monitoring conducted in the last 3 years and results published or being published.

Figure B4. Category: Supply Chain

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Supply Chain	Forecasting and Procurement Planning	Ad hoc forecasting based on poor, inadequate, or inaccessible data Insufficient skills for selecting and implementing	Annual forecasting and supply planning done but is based on poor, inadequate, or inaccessible data Locally based skills in quantification are	Annual forecasts incorporate service and/or/consumption data Supply plans updated semi-annually and incorporate review/revisions of available funding	Semi-annual forecasts incorporate service and/or/consumption data, account for seasonality Supply plans updated quarterly and incorporate review/revisions of	Near real-time demand/consumption, enhanced with additional programmatic contributions, drives monthly forecasting Forecasting and supply planning-specific software

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
		appropriate forecasting methodologies. Procurement plans are not developed from forecasts No coordination among procurers	developing Review of procurement plans is irregular. Coordination among procurers is limited	Coordinated procurement planning done at the national level (and regional level, if the health system is decentralized) and among procurers	available funding Coordinated procurement planning done at the national level (and regional level, if the health system is decentralized). Identified commodity gaps effectively communicated to stakeholders for purposes of resource mobilization	used and outputs visible across networks. Supply plans updated monthly and incorporate review/revisions of available funding Coordinated procurement planning done at the national level (and regional level, if the health system is decentralized). Identified commodity gaps effectively communicated to stakeholders for purposes of resource mobilization. Outputs shared through global platforms
	Warehousing/ Storage	Quality of infrastructure and operations at all stock holding levels (Central, Sub-central/facility) compromises ability to ensure commodities are adequately protected from damage, deterioration and loss. Unable to locate stock by batch in central/mid-level stores/warehouses.	Quality of infrastructure and operations in at least one stock holding level (Central, Sub-central/facility) ensures that commodities are adequately protected from damage, deterioration and loss. Paper-based inventory management system.	Quality of infrastructure and operations in at least two stock holding levels (Central, Sub-central/SDP) ensures that commodities are adequately protected from damage, deterioration and loss. Warehousing SOPs exist. Able to track inventory level with central level WMS but information is not routinely shared across warehouses. Some maintenance occurring	Quality of infrastructure and operations at all stock holding levels (Central, Sub-central/SDP) ensures that commodities are adequately protected from damage, deterioration and loss Stock data is digitized in at least two stock holding levels Some routine maintenance occurring Storage capacity scaled through contracting of	Quality of infrastructure and operations at all stock holding levels (Central, Sub-central/SDP) ensures that commodities are adequately protected from damage, deterioration and loss. Storage infrastructure and operations adhere to Good Warehousing Practices and/ or meet in-country compliance standards Stock data is digitized at all stock holding levels and near real-time stock visibility available across networks

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
			No SOPs.	Limited ability to scale storage capacity	third party logistics providers (3PLs)	Routine and predictive maintenance budgeted for and institutionalized Storage capacity is logically located and can be effectively scaled with 3PLs
	Routine distribution/ resupply between stock holding levels	No routine requisition and resupply schedule between stock holding levels No resources routinely available and allocated for transportation from higher to lower stock holding levels	Routine requisition and resupply between at least two stock holding levels according to a schedule Resources for transportation from higher to lower stock holding levels provided on ad hoc basis	Routine resupply between all stock holding levels according to a schedule Allocated resources for transportation from higher to lower stock holding levels provided on an irregular basis and resupply often achieved through unplanned means Resupply performance monitored post-activity	Routine resupply between all stock holding levels according to a schedule shared with all levels and informed by accurate demand signals Allocated resources for transportation provided on a regular basis and augmented with 3PLs Resupply performance monitored real-time	Routine resupply between all stock holding levels according to a schedule shared with all levels and informed by accurate, timely, demand signals Robust emergency and inter-facility resupply mechanisms are in place Allocated resources for transportation available internally or outsourced with 3PLs. Resupply transaction data is digitized for all stock transfers Near real-time visibility into upstream and downstream activities Resupply operations adhere to GDP and or meet in-country compliance standards for maintaining quality during distribution

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Logistics Management Information System	System to aggregate, analyze, validate and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage the supply chain not institutionalized or followed No facility level records or not maintained. Low reporting rates. No visibility into CHW supplies. No visibility by central level on facilities and none by facility level on central level.	Stand-alone, program specific LMIS processes and structures defined but no formal or ongoing monitoring or measurement protocol exists. Some visibility of facility level inventory and consumption, low reporting rates, mostly paper-based	The country has documented LMIS processes and structures. The structures are functional. Metrics for performance monitoring, quality improvement, and evaluation are systematically used. Migration of data collection and reporting from a paper system to an electronic system at the district level and above. A documented mechanism is in place for maintaining data quality throughout the data supply chain.	Government and stakeholders use the national LMIS systems for key performance monitoring and follow standard practices. Facility inventory and consumption data is digital at facility level, upstream data available to facilities, System alerts for low stock/expiry, use of master product list and master facility list Interoperability with other information systems (e.g., warehouse management, medical records, laboratory management, enterprise resource planning systems, and health information management systems)	Near real time visibility into inventory and consumption data at all levels, data from multiple systems feed into common platform/control tower (automated process), predictive analytics. The government and stakeholders routinely review interoperability activities and modify them to adapt to changing conditions. Compliance with standards for data exchange, messaging, and security is regularly reviewed. The regulatory framework is reviewed and updated to reflect best practices for data exchange, messaging, and systems security.
	Regulatory, Policy and Governance	Legal basis to enable a medicines (and related health commodities - e.g., devices, vaccines, etc.) regulatory agency to function is absent or inappropriate Formal organizational structure regarding in-	Medicines framework exists and is sufficient to support basic regulatory functions including clinical dossier review (licensing) and marketing authorization with	All SDP levels have in place policies that address STG, quality assurance and HR. Management policies for the supply chain system are in place at the MOH level. Policy and strategic leadership is not always	Strong policy and strategic leadership by government, with firm grasp of budgets and financial sustainability Robust implementation plans, and supportive supervision, capacity building and guidance to managers within the	The MOH leads strategic functions such as, policy formulation, quality assurance and overseeing the funds required for policy implementation. Ability to ensure product quality, automated drug registration process,

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
		country stakeholders and relevant agencies to whom authority is delegated, is absent or inadequate (e.g., up-to-date organogram of MOH). Human and financial capacity to enable regulatory functionality, weak or absent No approved supply chain strategic plan	registration. Documented domestic financial support to enable regulatory activities - including human resources Approved supply chain strategic plan but not updated recently. Poorly implemented strategic plan	translated into robust implementation plans, and supportive supervision, capacity building and guidance to managers within the system. No consistent approach to pharmacovigilance or a standard reporting structure for pharmacovigilance events Overall quality management system in place to support interface of product licensing, registration, manufacturing, post-marketing surveillance. Approved (and up to date) supply chain strategic plan. Partially implemented	system. Regulatory and policy bodies in alignment to support quality product availability National and standardized Pharmacovigilance or a standard reporting structure for pharmacovigilance events in place, not fully functional. Approved (and up to date) supply chain strategic plan (contains clear roles and responsibilities, stakeholder mapping, costs).	clear/transparent importation process, robust post-market surveillance system and, track and trace regulations developed and/or in the process of implementation. Approved (and up to date) supply chain strategic plan (contains clear roles and responsibilities, stakeholder mapping, costs). Includes risk mitigation plan.

Figure B5. Category: Strategic Information

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
Data, Surveillance, Monitoring & Evaluation	Overall HMIS reporting rate (CY 2018)	<60%	60-69%	70-79%	80-89%	90%+
	Element specific reporting rate: "Confirmed malaria cases among children under 5" (CY 2018)	<60%	60-69%	70-79%	80-89%	90%+

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	HMIS data quality assurance and quality control	Few standards exist for data collection, assembly, & analysis. Data quality reviews and audits are ad hoc for specific data needs. No data-quality assurance plan and national coordinating body exist.	Standards used for data collection, assembly & analysis in limited settings. Some electronic tools used for data quality review and audit. Data-quality assurance plan is available.	Standards defined and implemented for data collection, assembly, analysis, and used nationally. Data quality reviews and audits scheduled and include a remediation process to address identified issues. SM&E staff are seconded to NMCP	Data reviews and audits are integrated in strategic plans, conducted on a regular schedule. Regular meetings held by national data-quality governing body; issues identified are addressed through an established remediation process.	Continuous review and auditing through automated and manual processes, to ensure defined levels of data quality. Data quality metrics are used for continuous improvement. The data-quality assurance plan is reviewed periodically by a national coordinating body and appropriate stakeholders.
	Reporting Systems	Data collection tools are not standard, and procedures are not consistently followed; data are collected and stored in an unstructured format. NMCP does not have access to malaria data from HMIS.	Data systems support longitudinal health data (clinical, surveillance, M&E) in limited settings. The data are available for centrally mandated reporting. A parallel malaria reporting system may exist.	Most data platforms/applications ensure data availability at all levels for decision support and M&E for authorized users. No parallel malaria reporting system exists. NMCP has access to malaria data from HMIS.	The data systems in use ensure reliable and appropriate access to data at all levels for authorized users. Changes in reporting requirements are accommodated with minimal disruption to data availability. Data systems support secondary use of data and NMCP has access.	Data availability is monitored for continuous improvements and to meet emerging health sector needs. Reporting is available from private facilities and community-level providers and can be disaggregated.
	Data collection	Data collection is not done at the most peripheral level (CHWs) and is irregular and inaccurate at rural and more central health facilities. System is entirely paper based, but	Data collection is well managed at HF level, but incomplete at community level (CHWs); most collection is paper based and aggregation is paper based; registers	Data collection is well managed at HF level and at community level (CHWs); most collection is paper based, aggregation is electronic; registers available; timeliness and completeness >80%, feedback to collectors limited	Data collection at all levels); collection is electronic and sometimes paper based, aggregation is electronic; registers include all program-critical data; timeliness and completeness >80%, feedback to	Data collection occurs at all levels, is transmitted in real time with timely feedback to those collecting and those using the data; data checks exist at point of collection; electronic transmission

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
		registers may be absent	generally available; timeliness and completeness remain challenges		collectors is standardized	is the norm, including to data collectors
	Data use	Activities (analysis, interpretation, visualization) to ensure data use are rarely implemented	Limited data use activities are implemented (bulletin has been developed but analysis and interpretation for decision- making needs to be strengthened)	Country conducts regular data use activities (review meetings, bulletin at least quarterly, at least at the central level).	Country conducts regular data use activities at all levels (review meetings, bulletins, dashboard at least quarterly).	Country has developed their own high- quality dashboard to facilitate data use, and data-informed decision making is evident at all levels, on a frequent basis.
OR/PE	PMI in-country OR experience	No previous PMI OR experience in country	PMI team has prepared concept notes (CNs) but has not completed protocols or conducted OR	PMI team has completed protocols and received approval for OR; studies in planning, underway, or recently completed	PMI team and/or other country partners have completed a OR study and prepared and shared reports	Multiple OR studies completed in country that address malaria program implementation bottlenecks with publication and sharing of results, with involvement from MOH co-investigators
	Country mechanisms for OR/PE review	No in-country process for research review, determination or IRB processes	Limited in-country processes for research review, determination and IRB oversight	Processes in place for research and IRB review with federal-wide assurance approval; no previous PMI in-country OR experience	Processes in place for research and IRB review with federal-wide assurance approval; previous PMI in-country OR experience	Full complement of research review, approval, oversight processes including data safety and monitoring boards and systems for results sharing

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	In-country partnerships for OR	No in-country partners (academic, NGO, or other) with OR experience	1-2 in-country partners with OR experience, but no malaria specific experience	3+ in-country partners with OR experience; 1+ with some malaria expertise; no current PMI-linked OR work	3+ in-country partners with OR experience; 1+ with malaria expertise; current or recent work with PMI OR	Multiple in-country partners with specific malaria experience in PMI OR, including completed past work and reporting on malaria OR
	Conceptualization of problems needing scientific evaluation	No experience	Some but limited experience in identifying programmatic problems and prioritization	Experience with identifying program problems and prioritizing PE and OR	Experience with identifying problems needing PE or OR and developing study approaches with partners	Extensive experience with problem identification, prioritization, proposal development and conducting PE or OR

Figure B6. Category: Support Systems

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
SBC	National Malaria SBCC Strategy used to guide design and implementation of malaria SBC activities	No strategy exists.	Strategy exists but there is no evidence that it has been used to guide design or implementation.	Strategy exists and is used from time-to-time to guide design and implementation, but is of poor quality and does not include any of the key elements identified in the RBM SBCC Working Group National Malaria SBCC Strategy Template.	Strategy is used from time-to-time to guide design and implementation, but lacks alignment with the broader National Malaria Strategy and only incorporates a couple of the key elements identified in the RBM SBCC Working Group National Malaria SBCC Strategy Template.	Strategy is well aligned with the broader National Malaria Strategy, includes the key elements identified in the RBM SBCC Working Group National Malaria SBCC Strategy Template, and is used to guide design and implementation.

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	SBC Technical Working Group coordinates effectively	No technical working group exists.	The SBC Technical Working Group exists on paper, but has not been operationalized.	The SBC Technical Working Group has significant resource and staffing gaps and does not have clear pathways for coordination.	The SBC Technical Working Group lacks some needed resources/staff and generally only coordinates at the national level only.	The SBC Technical Working Group is well resourced and staffed and engages in regular coordination at both the national and sub-national level.
	High-quality formative assessments used to inform intervention design	No high-quality, formative assessment conducted in the last five years.	Formative assessment conducted, but significant quality issues in the design and no evidence that data was used to inform intervention design.	High-quality, formative assessment conducted, but no evidence that data was used to inform intervention design.	Data from prior projects used exclusively to guide intervention design; no new data collected.	High-quality, formative assessment conducted, and data used to inform intervention design.
Elim (relevant only for countries actively pursuing elimination	Elimination planning to implementation	No elimination or pre-elimination targets in the national strategic plan	Risk stratification conducted using latest incidence data and interventions targeted	Readiness assessment/ capacity inventory conducted	Capacity built and systems in place to initiate elimination activities	Elimination activities implemented fully in targeted areas
	Surveillance system readiness to track all cases	Monthly, aggregate data from public sector only	At least monthly, aggregate data from public, private, and community levels	Case-based reporting initiated	Real-time, case-based surveillance inclusive of all sectors and levels in targeted areas	Real-time, case-based reporting and response activities implemented
Additional Health Systems Strengthening	Staffing	No staff	Manager and a few technical staff; not all intervention areas are covered	Manager and technical staff for each intervention area; many staff have limited training and experience ; limited program support staff	Full staffing of program areas and support systems but some staff need further training to optimize their effectiveness; limited plans and opportunities for such training	Fully staffed with personnel with relevant training and experience; complete plan for professional development

Activity	Metrics/ Criteria	Relative Continuum, for discussion purposes				
		1	2	3	4	5
	Office space, transport	No office space or transport	Office space exists but is insufficient for staff; Transport available at intervals but limited for program needs	Office space adequate for current staff but no growth possible; office not well positioned for access to MOH leadership. Transport available but not covering all needs and not well managed/maintained	Office space adequate for current staff and some technical areas (e.g., lab) but not fully adequate for growth and all technical services. Transport covers most needs.	Office space is fully adequate for current staff and technical needs (lab, insectary, meeting space, etc.) and some growth and well positioned in the MOH; Transport is fully available for needed purposes -- trucks and 4-wheel drive vehicles where needed - all maintained and managed.
	Internet connectivity	No Internet connectivity	Intermittent connectivity; poor bandwidth; challenging maintenance; very little budget	Mostly connected with some outages; ok but not ideal bandwidth; irregular maintenance; modest budget	Generally stable connections, adequate bandwidth for most work, fair to good maintenance and sufficient budget	Fully connected, maintained, good bandwidth for all needs, and sufficient budget including all needed hardware and software
	NMCP placement within Ministry of Health	NMCP exists but is barely visible in the MOH structure	NMCP is visible in the MOH structure but NMCP manager reports to supervisor who is still low in the MOH system	NMCP is visible and manager reports to high level leader in MOH (e.g., Director of Public Health or Permanent Secretary for Health)	NMCP (or NMEP) is highly visible and reports at a high level in MOH and has some access to other ministry leadership (e.g., education, agriculture, community development)	NMCP (or NMEP) is highly visible within MOH and with all other relevant ministries and has ready access to country leadership (e.g., the president/prime minister; and parliament)