

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 final funding available to support the plan outlined here is pending final FY 2015 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



## PRESIDENT'S MALARIA INITIATIVE



# **PRESIDENT'S MALARIA INITIATIVE**

**Senegal**

**Malaria Operational Plan FY 2015**

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## ABBREVIATIONS and ACRONYMS

|             |   |
|-------------|---|
| ACT         | Artemisinin-based combination therapy   |
| ANC         | Antenatal care  |
| ASC         | <i>Agent de santé communautaire</i> (community health worker)                                 |
| BCC         | Behavior change communication   |
| CBO         | Community based organization  |
| CDC         | Centers for Disease Control and Prevention  |
| cDHS        | Continuous Demographic and Health Survey  |
| CFA         | West African Financial Community Franc (USD \$1 = F CFA 500)                                  |
| CHW         | Community Health Worker   |
| CMS         | Central Medical Stores  |
| DHS         | Demographic and Health Survey   |
| DSDOM       | <i>Dispensateur de soins à domicile</i> (village malaria worker)                              |
| FY          | Fiscal year   |
| GHI         | Global Health Initiative  |
| Global Fund | Global Fund to Fight AIDS, Tuberculosis and Malaria   |
| HIV/AIDS    | Human immunodeficiency virus /acquired immunodeficiency syndrome                              |
| IDB         | Islamic Development Bank  |
| IEC         | Information, education, communication   |
| IPTp        | Intermittent preventive treatment in pregnant women   |
| IRD         | <i>Institut de Recherche pour le Développement</i>  |
| IRS         | Indoor residual spraying  |
| ITN         | Insecticide-treated bed net   |
| LLIN        | Long-lasting insecticide-treated bed net  |
| LNCM        | <i>Laboratoire national de contrôle des médicaments</i><br>(National Drug Control Laboratory) |
| M&E         | Monitoring and evaluation   |
| MIP         | Malaria in pregnancy  |
| MIS         | Malaria indicator survey  |
| MoH         | Ministry of Health  |
| MOP         | Malaria Operational Plan  |
| NMCP        | National Malaria Control Program  |
| PECADOM     | <i>Prise en charge à domicile</i> (home-based management of malaria)                          |
| PMI         | President's Malaria Initiative  |
| RDT         | Rapid diagnostic test   |
| SMC         | Seasonal malaria chemoprevention  |
| SNEIPS      | National Health Education and Information Service   |
| SP          | Sulfadoxine-pyrimethamine   |
| SP-AQ       | Sulfadoxine-pyrimethamine/amodiaquine   |
| TA          | Technical assistance  |
| UC          | Universal coverage  |
| UCAD        | <i>Université Cheikh Anta Diop</i>  |
| UNICEF      | United Nations Children's Fund  |
| USAID       | United States Agency for International Development  |
| USG         | United States Government  |
| WHO         | World Health Organization   |

## I. EXECUTIVE SUMMARY

The President's Malaria Initiative (PMI) is a core component of the USG Foreign Assistance Strategy. PMI was launched in June 2005 as a five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, PMI was extended and a US Global Malaria Strategy was developed covering 2009-2014. The goal is now to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by reaching 85% coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS). Development of a new six-year US Global Malaria Strategy 2015 – 2020 is underway.

Senegal was selected as a PMI country in 2006. Large-scale implementation of ACTs and rapid diagnostic tests (RDTs) began in 2007 and progressed rapidly with support from PMI and other partners. ACTs and IPTp are now being used in all public health facilities nationwide, RDTs are used to confirm malaria cases at all levels of the health system (including the community level) and more than 7.3 million long-lasting insecticide-treated bed nets (LLINs) have been distributed using a universal coverage (UC) approach since 2010. Senegal's estimated population in 2016 will be approximately 14 million, with approximately 2.7 million children less than five years of age and 561,000 pregnant women. Malaria is still a major cause of morbidity and mortality and a high priority for the government, even though the number of reported cases of malaria has dropped significantly since 2007-2008. While the decline in the first year can be partially ascribed to a change in the malaria case definition that now requires parasitological confirmation of all cases, the proportion of all outpatient visits due to confirmed malaria continued to fall, from 6% in 2008 to 3% in 2009. However, there has been an uptick of cases in recent years with malaria representing 5.4% of all consultations and 7.5% of all deaths in 2013. Forty-three of 76 health districts saw their incidence decrease or remain stable from 2010-2013, while 30 districts had increases (no data available for three districts). Eight districts in the southeastern part of the country carry the highest disease burden (more than 100 cases per 1,000 population).

The 2012 continuous Demographic and Health Survey (cDHS) showed that under-five mortality continued to fall, from 121 per 1,000 live births in 2005 to 65 in 2012, a 46% drop in seven years. The proportion of households owning at least one insecticide-treated net (ITN) increased from 20% in 2005 to 73% in 2012, and the proportion of children under five sleeping under an ITN the previous night increased from 7% to 46%, with similar trends for pregnant women. The proportion of pregnant women receiving two doses of intermittent preventive treatment with sulfadoxine-pyrimethamine (SP) fell from 52% in 2008 to 39% in 2010, a decline due to many factors including problems in maintaining supplies of the drug. A slight increase was noted in 2012, to 41%.

This FY 2015 Malaria Operational Plan (MOP) presents a detailed implementation plan for Senegal. It was developed in consultation with the NMCP, with participation of national and international malaria partners. Proposed activities build on investments made by PMI and other

partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This document briefly reviews the current status of malaria control policies and interventions in Senegal, describes progress to date, identifies challenges and unmet needs, and describes planned activities for FY 2015 funding. The proposed FY 2015 budget for Senegal is \$21.6 million, of which 38% will be managed directly by local entities. The following paragraphs summarize progress made during the last 12 months and proposed activities for FY 2015 funding:

**Insecticide-treated nets (ITNs):** During FY 2014, PMI supported the distribution of free and subsidized long-lasting insecticide-treated bed nets (LLINs) nationwide via multiple continuous distribution channels. These include free LLINs to pregnant women attending antenatal care (ANC) clinics and to primary school children, and subsidized nets to other health facility clients through community-based organizations, and through social marketing. To promote demand for and correct use of ITNs, PMI has also invested in behavior change communication (BCC) activities using primarily community-based networks. With FY 2015 funding, PMI and the NMCP plan to continue supporting the routine distribution system to bridge the gap for those that do not possess an LLIN and to replace worn out nets. PMI plans to procure one million LLINs to support both routine distribution and a national mass campaign. The total LLIN need for 2016 is estimated at 8.7 million.

**Indoor residual spraying (IRS):** During FY 2014, PMI supported IRS activities in four districts sprayed in previous years. Pyrimiphos-methyl was the insecticide of choice for this year because of the insufficient longevity of bendiocarb. Nevertheless, sufficient supplies of bendiocarb remained from the previous year's stock to cover two districts. In the two districts where pyrimiphos-methyl was used, spray operations began in May. In the other two districts, bendiocarb was used and spray operations began in July to maximize the effective duration of the insecticide. A total of 204,159 structures were sprayed (97% of those targeted) and 708,999 people were protected. With FY 2015 funds, PMI will support the NMCP's plan to spray malaria hot spots in selected districts based on incidence and entomological data. Eligible areas include districts and/or health post zones with an incidence greater than 50/1,000 in the previous year and with indoor resting and biting malaria vectors. The NMCP will assume the majority of the operational responsibilities (except commodity procurement), with technical assistance provided by PMI.

**Malaria in pregnancy (MIP):** The NMCP adopted intermittent preventive therapy in pregnant women in 2003 and the strategy is implemented in all ANC sites nationwide. National policy has recently been revised to include World Health Organization (WHO) recommendations on frequency (at least three doses starting in the second trimester and with at least one month between doses). The NMCP recommends using quinine to treat pregnant women with confirmed malaria in the first trimester and ACTs in the second and third trimesters. During FY 2014, the Government of Senegal continued to procure SP for IPTp while PMI focused its support on training and supervision of health workers in malaria in pregnancy activities. With PMI's assistance, registers have been updated to reflect all three doses of IPTp and these are now being used in health facilities nationwide. PMI's FY 2015 funding will continue to support activities aimed at reinforcing the provision of effective MIP services in health facilities. Support will continue for monitoring and supportive supervision of MIP service delivery, improvement of

data collection including IPTp data, and training of new staff on IPTp, including topics such as the importance of LLIN use in pregnancy, diagnosis and management of MIP, and counseling and interpersonal communication skills.

**Case management:** The NMCP adopted ACTs as first-line treatment in 2006 and introduced RDTs in 2007. Two WHO recommendations recently adopted as policy are pre-referral treatment with rectal artesunate for severe malaria and seasonal malaria chemoprevention (SMC). At the community level, PMI supports both health huts and home-based management of malaria (PECADOM). With FY 2015 resources, PMI plans to support training and supervision for microscopic diagnosis of malaria, quality control for microscopy, and procurement of laboratory consumables and RDTs. The number of RDTs required is expected to remain high as more case investigation and active case detection activities are carried out in the context of pre-elimination. PMI also plans to support training and supportive supervision both in the formal health sector and at the community level. PMI plans to continue its support for SMC in the high transmission regions of Senegal. Finally, PMI plans to support the introduction of single low-dose primaquine for transmission reduction in elimination districts.

**Monitoring and evaluation (M&E):** In 2012-2013, Senegal began implementing a continuous DHS (cDHS) consisting of population-based and service provision assessment components, which provides information to guide programming on a regular basis. During the past 12 months, PMI supported malaria surveillance activities at 20 sites around the country, an upgrade of the NMCP's M&E database, and the introduction of tablet computers to facilitate analysis during supervision visits. Using FY 2015 funds, PMI plans to continue its support for the cDHS and malaria surveillance activities. In addition, PMI will fund the expansion of case investigation in the northern region of St. Louis. Support from PMI will also include an evaluation of malaria control activities for 2011-2015 to inform efforts to achieve the NMCP's goal of pre-elimination by 2018.

**Behavior change communication:** PMI has supported various community mobilization and BCC activities in Senegal. These include both ongoing malaria communications (mass and interpersonal) and communication activities promoting specific events, such as IRS or LLIN distribution 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). With FY 2015 funds, PMI will continue to support a range of communications activities to influence the social and behavior changes needed to improve the adoption of key malaria prevention and care seeking behaviors (e.g., net ownership, proper net use, net repair, IPTp, when and where to seek care).

**Health system strengthening and capacity building:** During FY 2014, PMI continued supporting management at the Central Medical Stores, particularly updating the procedures manual and improving the information management system. Integrated logistics supervision visits were conducted at all regional medical stores and health districts, and PMI also supported the NMCP to supervise case management at hospitals, health centers, and health posts. An organizational assessment of the NMCP was performed with PMI's support and the

recommendations will be implemented to strengthen the leadership and coordination capabilities of the program. With FY 2015 funding, PMI plans to support activities to develop capacity at sub-national and central levels to continue working towards the attainment of the NMCP's pre-elimination objective. This includes supervision, performance-based financing, supply chain management, and drug quality monitoring.

## **II. STRATEGY**

### **1. Introduction**

The President's Malaria Initiative (PMI) is a core component of the USG Foreign Assistance Strategy, along with human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), maternal and child health, reproductive health, and tuberculosis. PMI was launched in June 2005 as a five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, PMI was extended and the position and role of the USG Global Malaria Coordinator was formalized. As required by Lantos-Hyde, a US Global Malaria Strategy was developed covering 2009-2014 and the original goal of the PMI was expanded. The goal is now to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015 (four new countries were added in FY 2011). This will be achieved by reaching 85% coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS). Development of a new six-year US Global Malaria Strategy 2015 – 2020 is underway.

Senegal was selected as a PMI country in 2006. Large-scale implementation of ACTs and rapid diagnostic tests (RDTs) began in 2007 and progressed rapidly with support from PMI and other partners. ACTs and IPTp are now being used in all public health facilities nationwide, RDTs are used to confirm malaria cases at all levels of the health system (including the community level) and more than 7.3 million long-lasting insecticide-treated bed nets (LLINs) have been distributed using a universal coverage (UC) approach since 2010.

This FY 2015 Malaria Operational Plan (MOP) presents a detailed implementation plan for Senegal, based on the PMI Multi-Year Strategy and Plan and the National Malaria Control Program's (NMCP's) 2014-2018 Strategic Framework. It was developed in consultation with the NMCP, with participation of national and international partners involved with malaria prevention and control in the country. Proposed activities build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Senegal, describes progress to date, identifies challenges and unmet needs, and describes planned activities for FY 2015 funding.

## 2. Updates in MOP strategy section

- Availability of routine data on morbidity and mortality (see page 9)
- Switch from blanket to focal spraying (see page 11)
- Scale up of reactive case investigation (see page 12)
- Review and revision of the National Strategic Plan (see page 10)
- Adoption of a National Strategic Plan for Community Health (see page 10)
- Availability of results from the Impact Evaluation (see page 17)
- Revised challenges and opportunities (see page 17)

## 3. Malaria situation in Senegal

Senegal's estimated population in 2016 will be approximately 14 million, based on the most recent census conducted in 2013. Although substantial improvements have been achieved since the 1960s, Senegal's indicators of human development remain low, with the country ranked 154 out of 186 countries worldwide on the Human Development Index<sup>1</sup>. The infant mortality rate is 43 deaths per 1,000 live births and the under-five mortality rate is 65 deaths per 1,000 live births<sup>8</sup>. Maternal mortality is estimated to be 392 deaths per 100,000 live births and the mean life expectancy is 56 years<sup>2</sup>. The adult HIV prevalence rate is estimated at 0.7% for adults 15-49 years of age, with 54,000 adults and 5,000 children estimated to be living with HIV/AIDS<sup>3</sup>.

Malaria is endemic throughout Senegal and 100% of the population is at risk of the disease. The three ecological zones, based on annual rainfall, are the northern Sahelian zone with < 400 mm of rainfall occurring between July and September, the central Sahelian zone with 400 – 1,000 mm of rainfall occurring between July and October, and the southern tropical zone with 1,000 – 1,250 mm of rainfall occurring between June and October. The country can also be divided into two epidemiological zones: the tropical zone, with year-round transmission peaking during the rainy season and lower transmission during the rest of the year; and the Sahelian zone, with high transmission toward the end of and immediately after the rainy season and very low transmission during the rest of the year. Transmission in the Sahelian zone may occur throughout the year, often as small outbreaks, in areas close to rivers or other water sources that persist through the dry season. In peri-urban areas, persistent flooding during and after the rainy season has led to higher peaks in transmission during the rainy season and a longer transmission season.

*Plasmodium falciparum* is the major malaria parasite species, accounting for more than 90% of all infections. The main vector species are *Anopheles gambiae sensu strictu*, *An. arabiensis*, *An. funestus*, and *An. melas*. The species distribution depends on rainfall and the presence of permanent sources of water.

The vulnerable groups in Senegal comprise an estimated 2.7 million children under five and 561,000 pregnant women. According to routine data collected by the NMCP between 2001 and 2006, malaria was responsible for just over one-third of all outpatient consultations. In October 2007, the case definition of malaria changed from a purely clinical definition to one that relies on parasitological confirmation. From that point on, health workers were directed to test all suspected cases of malaria and to treat and report only those cases with positive results.

Suspected cases of malaria are defined as those with fever who do not have signs or symptoms indicative of other illnesses. In 2013, 87% of suspected cases were tested.

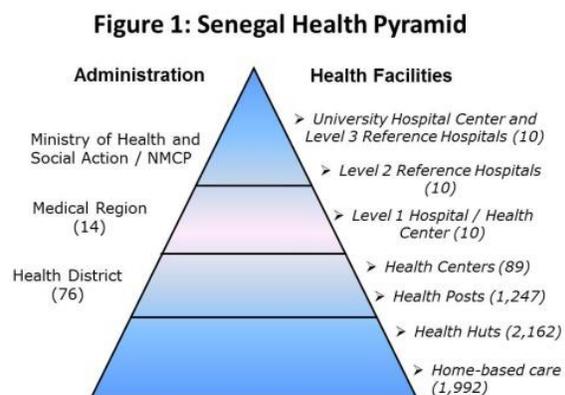
As a result of these changes, the proportion of all outpatient visits due to malaria fell from 36% (clinically diagnosed) in 2001 to 6% (parasitologically confirmed) in 2008. The proportion of all deaths in children under five in health facilities that were attributed to malaria also fell from 30% to 7% over the same timeframe. Although the change in the case definition of malaria obscured assessment of the impact of program activities, this reduction continued between 2008 and 2009, with malaria representing only 3% of all outpatient visits and 4% of all deaths in 2009.

Morbidity and mortality data were not available between 2010 and 2012 because health worker unions were staging a nationwide data retention strike. This data strike was lifted in March 2013, and data have been backfilled, though data quality for 2010-2012 is not optimal. In 2013, the routine data system was functional once again. Incidence of confirmed malaria per thousand increased from 14 in 2009 to 27 in 2013, with malaria representing 5.4% of all consultations and 7.5% of all deaths in 2013. Incidence ranged from 1/1,000 in five northern districts to over 200/1,000 in two south-eastern districts.

#### 4. Country health system delivery structure and Ministry of Health (MoH) organization

Administratively, the country is divided into 14 regions and 46 departments. The health system functions at the level of the regions (each with a Regional Chief Medical Officer) and is further decentralized into 76 health districts that may be all or part of an administrative department. Health districts are led by the District Chief Medical Officer who, together with the District Health Management Team, oversees care and treatment activities at the District Health Center and at peripheral facilities, as well as prevention activities. Health districts have at least one health center and a number of health posts that are staffed by chief nurses and sometimes midwives. There are approximately 1,247 health posts in Senegal.

Although not a formal part of the health system, Senegal's health care pyramid rests on a foundation of approximately 2,162 functional health huts that are established and managed by local communities and cover approximately 50% of the country's population. A functional health hut is defined as one that has a trained community health worker (literacy is preferred but not required), regular supervision by the chief nurse of the health post, and the basic structure and equipment needed to provide services. The community health workers (CHWs) offer an integrated package of preventive and curative services or referral for more advanced medical care. Additional community health staff includes *matrones*, who are trained birth attendants; and *relais*, who are health educators and communicators.

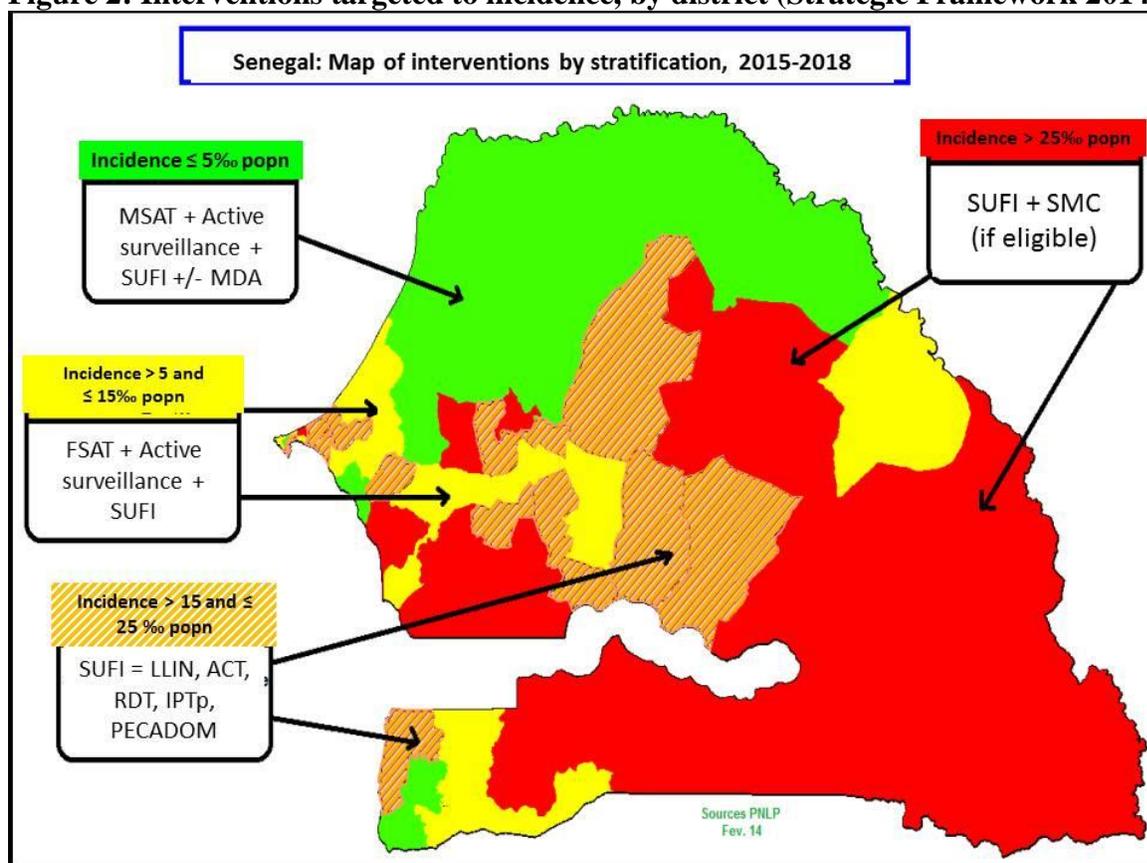


Since 2008, a new type of health worker, the village malaria worker (*dispensateur de soins à domicile - DSDOM*), provides testing with rapid diagnostic tests (RDTs) and treatment with artemisinin-based combination therapy (ACTs) through the home-based management of malaria program (*prise en charge à domicile - PECADOM*), now active in 1,992 villages in 13 regions where health services are difficult to access. In 2012, 88 DSDOMs were trained in management of pneumonia and diarrhea in addition to malaria, an approach called integrated PECADOM that was scaled up to 492 DSDOMs in the Kédougou and Tambacounda regions in 2013. Both health huts and DSDOMs are linked to their supervising health post by the commodity supply chain and the health information system (i.e. they get supplies from and submit data to the health post). In 2014, the Ministry of Health adopted a National Strategic Plan for Community Health to improve linkages between the community level and the formal health system, increase ownership by communities, and improve coordination of activities to make Senegal a model for community health.

## **5. Country malaria control strategy: Achieve pre-elimination by 2018**

In developing the 2011-2015 National Strategic Plan, the NMCP adopted a goal of reaching the threshold for pre-elimination (incidence  $<5/1,000$ ) by 2015, continuing the use of proven interventions already scaled up nationally, adopting new proven interventions in a targeted manner, and piloting new interventions. In 2013, the NMCP conducted a midterm program review. Key findings included the need for closer collaboration with private health care providers (case management and reporting) and private enterprises (coordination and resource mobilization); weaknesses in stock management at all levels, including providing malaria commodities free of charge; and the need to extend weekly surveillance to all low-transmission districts. The National Strategic Plan was subsequently updated. In early 2014, the decision was made to develop a new Strategic Framework that would guide the development of a concept note for the Global Fund, covering activities expected to be implemented from 2015 through 2017 (the Framework goes through 2018 in alignment with the National Health Development Plan). The goal of reaching pre-elimination has been extended to 2018, with interventions targeted to the different transmission zones. In addition to the standard interventions, pre-elimination zones are eligible for case investigation and active case detection, while the highest transmission regions (control zones) receive seasonal malaria chemoprevention (SMC) and are prioritized for home-based management (see Figure 2).

**Figure 2: Interventions targeted to incidence, by district (Strategic Framework 2014-2018)**



MSAT – mass screen and treat; FSAT - focal screen and treat; SUFI – scale up for impact (LLINs, IPTp, RDTs, ACTs, PECADOM); MDA – mass drug administration; SMC – seasonal malaria chemoprevention

### *NMCP strategy by intervention*

Senegal has now adopted all the WHO-recommended interventions and remains a leader in piloting and scaling up new recommendations and innovative strategies to increase the reach and effectiveness of interventions. The 2014-2018 Strategic Framework outlines the following package of activities:

- **LLINs:** Mass distribution for universal coverage transitioning to a nationwide campaign in 2016, with scale-up of multi-channel routine distribution.
- **IRS:** Focal spraying to target hotspots at the level of the health post in districts with incidence greater than 50/1,000.
- **Larval source management:** Bio-larvicides applied in areas where larval sources are few, fixed, and findable, such as the suburbs of Dakar.
- **Seasonal malaria chemoprevention:** One treatment of sulfadoxine-pyrimthamine (SP) and amodiaquine (AQ) monthly during the transmission season, up to four months, for children 3-120 months in regions that meet WHO criteria.
- **Malaria in pregnancy:** IPTp with SP under directly observed therapy, beginning during the second trimester, at every contact with the health facility, at intervals of at least one month. Every pregnant woman is to receive a free LLIN during her first ANC visit. Pregnant women

with confirmed malaria are treated with quinine in the first trimester and with ACTs thereafter, unless signs of severe disease, when IV quinine or artesunate is used.

- **Case management**
  - Uncomplicated malaria: All suspected cases are to be confirmed with RDT, and patients with positive tests treated with an ACT. Artemether-lumefantrine, artesunate-amodiaquine, and dihydroartemisinin-piperaquine are co-first line therapies.
  - Severe disease: Pre-referral treatment with rectal artesunate if identified at community or health post level. Definitive treatment at the health center or hospital level with IV quinine or artesunate, to be followed with a course of oral ACT. Hospitalized patients should have malaria confirmed by blood smear.
  - Community level: All patients with fever are tested with an RDT and patients with positive tests receive an ACT. Both health hut and home-based care programs are integrated with diarrhea and pneumonia.
- **Health promotion:** Evidence-based behavior change campaigns and activities accompanied by M&E to measure impact, increasing role of communities and private sector.
- **Epidemic surveillance and response:** Epidemic surveillance sites report all data weekly and data are analyzed to identify hotspots. Case notification and reactive case investigation in pre-elimination zones.
- **Monitoring and evaluation/research**
  - 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.
  - Reinforce pharmacovigilance.
  - Operational research on the introduction of low-dose primaquine for transmission reduction in elimination settings.
- **Supply chain management:** Improve storage and transport capacity, strengthen coordination between the NMCP and the Central Medical Stores, strengthen capacity for supply chain management at all levels, monitor drug quality and efficacy
- **Program management and coordination:** Improve managerial and operational capacity, increase resource mobilization and coordination efforts, and strengthen partnerships.

## 6. Integration, collaboration, and coordination

A new coordination body was created in 2011, called the *Cadre de Concertation des Partenaires de Lutte contre le Paludisme - CCPLP*, which brings together funding, technical, and non-governmental partners. The president is selected on a rotating basis from among the partners, with the NMCP functioning as the secretariat. This group meets several times each year to exchange information and has been instrumental in helping resolve challenges and coordinate efforts.

### *Funding and technical partnerships*

Senegal currently has one active **Global Fund** malaria grant for approximately \$88 million, awarded to two principal recipients, the NMCP and IntraHealth International.

Phase 1 of the grant has been extended to the end of 2014 and the NMCP submitted a concept note in June 2014 under the new funding model for additional resources to cover the period 2015 to 2017. The NMCP, PMI, and Global Fund Senegal teams enjoy frequent communication and close collaboration.

The **World Bank** continues to provide support for malaria through the Senegal River Basin Development Organization and the Nutrition Enhancement Project. Activities include LLIN distribution and communication/education.

The **World Health Organization** (WHO) continues to provide technical and some financial support for the implementation of treatment and prevention policies, planning, M&E, research, surveillance, and management of the NMCP.

The **United Nations Children's Fund** (UNICEF) provides support for district-level health plans in the regions of Kolda, Sédhiou, Kédougou, Tambacounda, and Matam. UNICEF collaborates with the United States Agency for International Development (USAID) funded Community Health Program Component to support various community health interventions in more than 500 health huts. They also contributed to the scale-up of integrated PECADOM in four regions, and supported operational costs for the 2013 SMC campaign.

The **Islamic Development Bank** (IDB) provided \$8 million in loans in 2009-2010 for the procurement of LLINs and RDTs, health personnel training, and supervision. They are finalizing a new \$10 million loan to be disbursed beginning in 2015.

In addition to multilateral institutions, Senegal benefits from the support of various bilateral donors. The **French Cooperation** contributes significantly to research activities through the *Institut Pasteur* and the *Institut de Recherche pour le Développement* (IRD) and places a technical advisor at the MOH. The **Japan International Cooperation Agency** (JICA) and USAID have developed a joint partnership in Tambacounda and Kédougou regions; JICA donated \$1 million for malaria activities in these regions through UNICEF in 2013. The **Chinese Cooperation** makes periodic donations of drugs for the treatment of uncomplicated and severe malaria, and the **Embassy of Thailand** has supported the participation of health personnel at malaria training courses in Thailand. The **Belgian Technical Cooperation** is supporting the overall development of the health sector primarily in Fatick and Kaolack regions.

Senegal's non-governmental and faith-based partners are also numerous. *Medicos del Mundo* and several Spanish non-governmental organizations are active in Sédhiou and Kolda regions. They have supported outreach activities by health post staff, rehabilitation of health huts, and LLIN distribution campaign operations.

**Speak Up Africa** is a local non-governmental organization dedicated to mobilizing African leadership, resources and individual action against malaria, diarrhea, and pneumonia in several countries. In Senegal, the group has supported various communications/advocacy activities and helps to draw in national celebrities to support the malaria control cause.

The **International Committee of the Red Cross** supports outreach activities and LLIN distribution campaign operations in conflict zones in Ziguinchor and Sédhiou regions, as well as in the mining areas of Kédougou Region.

The **Malaria Control and Evaluation Partnership for Africa** (MACEPA), which began work in Senegal in 2009, has implemented a pre-elimination project in one northern district, including enhanced and integrated surveillance and case investigation, and a mass screen and treat program in hotspots in three additional districts.

Senegal is fortunate to have strong academic and research capacities in epidemiology, parasitology and entomology at the NMCP, *Université Cheikh Anta Diop* (UCAD), the **Parasite Control Service** (*Service de Lutte Anti-Parasitaire - SLAP*), IRD, and the *Institut Pasteur*. These groups have strong collaborative relationships and together have published much of the recent literature on malaria in Senegal.

#### *Private sector*

In recent years the NMCP has been working with an increasing number of private enterprises on outreach and sensitization programs, LLIN distributions, and malaria case management. For example, collaboration with the **Senegalese Sugar Company** in the northern city of Richard Toll led the company to introduce RDTs in their clinic, to screen all seasonal workers for malaria, and to provide them with LLINs. The company continues to be active in pre-elimination activities in the district, which was highlighted during 2014 World Malaria Day events. **BICIS Bank** (BNP/Paribas) has become more active in the past year, supporting the printing of a popular children's comic book on malaria and airing spots/messages on the video screens in their branches. The fuel company **Total** has supported communications activities and will sell socially marketed LLINs in their stations' shops. Nevertheless, meaningful, longer-term partnerships have proven to be challenging due to the time commitment and skills required to develop them.

#### *Within United States Government (USG)*

The **United States Peace Corps** and PMI embarked on a new partnership in 2011. In Senegal, PMI staff and implementing partners continue to regularly participate in pre-service and in-service training sessions and over the past year supported one third-year malaria volunteer to oversee malaria PCV malaria activities and liaise with PMI and one third-year volunteer to support the entomology laboratory at UCAD. Peace Corps volunteers also support PMI and the NMCP through information, education and communication (IEC) activities and by participating in M&E and operational research (OR) activities. Two innovative strategies piloted by Peace Corps, universal coverage distribution of LLINs targeting every sleeping space, and PECADOM Plus, a community-based active fever detection program, have been adopted by the NMCP.

#### **Global Health Initiative**

Malaria prevention and control is a major foreign assistance objective of the U.S. Government (USG). In May 2009, President Barack Obama announced the GHI, a six-year, comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will help partner countries improve health outcomes,

with a particular focus on improving the health of women, newborns and children. The GHI is a global commitment to invest in healthy and productive lives, building upon and expanding the USG's successes in addressing specific diseases and issues.

## **7. PMI goals, targets, and indicators**

The goal of PMI is to reduce malaria-associated mortality by 70% compared to pre-initiative levels in the 15 original PMI countries and to reduce malaria-associated mortality by 50% in new countries added to PMI in FY 2010 or later. By the end of 2015, PMI will assist Senegal to achieve the following targets in populations at risk for malaria:

- >90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been protected by IRS;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected or confirmed malaria will have received treatment with ACTs within 24 hours of onset of their symptoms

## **8. Progress on coverage/impact indicators to date**

The table below shows that steady progress has been made for most malaria indicators in Senegal, as measured by two Demographic and Health Surveys (DHS) (2005 and 2010), the first round of the continuous DHS (2011-2012), two malaria indicator surveys (MISs) (2006 and 2008) and a nationwide post-LLIN distribution campaign survey (post-campaign survey, 2009). Of note, most of the surveys have taken place primarily during the dry season, when ITN use and parasitemia are generally lower, though this should not affect ITN ownership, IRS, and IPTp coverage, or child mortality.

Household ownership of at least one ITN rose from 20% in 2005 to 73% in 2012. Household possession of at least one ITN was greater than 85% in all regions in which universal coverage was conducted prior to the survey. Intra-household access to an ITN increased from 11% in 2005 to 63% in 2012. Utilization of ITNs by children under five rose from 7% in 2006 to 46% in 2012. Similar trends in utilization were observed with pregnant women and in the general population.

The proportion of pregnant women receiving two doses of IPTp with sulfadoxine-pyrimethamine (SP) increased from 12% in 2005 to 52% in 2008, but fell to 39% in 2010 due primarily to stockouts of SP, rising slightly to 41% in 2012. Comparing the proportion of children with fever who received prompt treatment with an ACT across the surveys is difficult given the introduction of RDTs in late 2007 and the falling incidence, with treatment being given only to patients with a

positive test. In addition, the diagnostic algorithm mandates that only those without an obvious alternate cause for fever be tested with an RDT. In 2012, 17% of children had a fever in the last two weeks, 1.3% of which received an ACT, and 0.5% of which received an ACT within 24 hours.

As a result of the scale-up of malaria control interventions, parasitemia in children under five has fallen from 6% nationwide in 2008 to 3% nationwide in 2012. The mortality rate for children under five has fallen from 121 deaths per 1,000 live births in the 2005 DHS to 65 in the 2012 cDHS. These indicators are available at the national level annually through the continuous Demographic and Health Survey (cDHS).

**Table 1: Evolution of Key Malaria Indicators in Senegal from 2005 to 2012**

| Indicator   | 2005<br>DHS <sup>4</sup> | 2006<br>MIS <sup>5</sup> | 2008<br>MIS <sup>6</sup> | 2010<br>DHS <sup>2</sup> | 2012<br>cDHS <sup>8</sup> |
|---|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|
| % Households with an ITN  | 20                       | 36                       | 60                       | 63                       | 73                        |
| % Households with at least one ITN for every two people   | 11                       | 19                       | 36                       | 41                       | 63                        |
| % General population who slept under an ITN the previous night  | 6                        | 12                       | 23                       | 29                       | 41                        |
| % Children under five who slept under an ITN the previous night   | 7                        | 16                       | 29                       | 35                       | 46                        |
| % Pregnant women who slept under an ITN the previous night  | 9                        | 17                       | 29                       | 37                       | 43                        |
| Households in targeted districts protected by IRS   | --                       | --                       | 80                       | 80                       | --                        |
| Households with an ITN or sprayed within previous 12 months   | --                       | --                       | --                       | 66                       | 76                        |
| % Women who received two or more doses of IPTp during their last pregnancy in the last two years                            | 12                       | 49                       | 52                       | 39                       | 41                        |
| % Children under five with fever in the last two weeks who received a diagnostic test                                       | --                       | --                       | 9                        | 10                       | --                        |
| % Children under five with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever | --                       | 3                        | 2                        | 3                        | 0.5                       |
| % Women of childbearing age with anemia (<11 g/dL)  | 59                       | --                       | 64                       | 54                       | --                        |
| % Children 6-59 months with severe anemia (<8 g/dL)   | 20                       | --                       | 17                       | 14                       | 10                        |
| % Children under five with parasitemia ( <i>P. falciparum</i> )   | --                       | --                       | 6                        | 3                        | 3                         |
| Under-five mortality rate per 1,000 live births   | 121                      | --                       | 85                       | 72                       | 65                        |

## 9. Other relevant evidence on progress

The Impact Evaluation, which covered the period from 2006-2010, was completed in late 2013. All-cause under-five child mortality fell 40% during that period, coinciding with dramatic increases in coverage of ITNs and IPTp and a 50% decrease in malaria parasite prevalence. Strikingly, the most dramatic decreases in mortality were seen in the populations in which the increases in intervention coverage and decreases in parasite prevalence were the most pronounced: in the south-eastern regions, in the poorest three quintiles, and in rural populations, suggesting that the decrease in mortality correlated with increase in intervention coverage and decrease in parasite prevalence. Routine data corroborated the picture from nationwide surveys, demonstrating a dramatic decrease in confirmed malaria cases and deaths due to malaria, even as the numbers of total consultations and total hospitalizations increased, suggesting a simultaneous increase in access to health services.

While parasite prevalence remained stable at 3% from 2010 to 2012, routine data available in 2013 show an increase in incidence from 14 per 1,000 in 2009 to 27 per 1,000 in 2013, with the most pronounced increase in the southeast. The many contributing factors include: increased access to care and/or increased data completeness, particularly at the community level (342% increase in consultations reported by the community level from 2010 to 2013), with a 23% increase in total consultations among children under five from 2010 to 2013; increased rainfall; and degradation and attrition of LLINs distributed in 2010 in the four south-eastern regions that were scheduled to have been replaced prior to the rainy season in 2013. In comparison, in the regions in which universal coverage was conducted in early 2013 (Dakar and Thies), incidence dramatically decreased.

## 10. Challenges, opportunities, and threats

Senegal has made great strides against malaria in the last decade, though challenges remain in virtually every domain of malaria prevention and treatment. Recent policy changes and innovative solutions being piloted provide opportunities to advance malaria control.

### *Challenges*

**Pharmaceutical Management:** Management challenges at the Central Medical Stores (CMS), including delays in procuring and distributing essential medications, inadequate quantification, and poor responsiveness to program needs, represent a significant threat to successful program implementation. There are positive signs from the leadership of the CMS, but periodic stockouts continue at community and local levels, and occasionally at regional and district levels. There are concerns that pharmacy managers, from the PNA to the health post level, neglect free commodities (such as ACTs, RDTs, and SP) in favor of those that bring in revenue. In addition, there are very few professional pharmacists or logisticians below the Regional Pharmacy level, meaning that this critical function simply does not get the attention that it requires.

**Data quality and timeliness:** Historically, Senegal has had a very robust routine malaria information system; however, the data retention strike meant that for three years the NMCP had no information on the number of suspected malaria cases, diagnostic tests performed, or

confirmed cases. The data strike was formally lifted in March 2013, although it continues in a handful of districts, and the process of rebuilding the routine health information system is underway. The Ministry of Health is mobilizing to implement the DHIS2 and develop an integrated mHealth strategy, which the NMCP will also adopt. Until then, the NMCP receives data from the districts during the quarterly data reviews. Completeness of reporting, particularly inclusion of community level data, is variable. The NMCP is piloting mobile tools to assist with weekly case reporting, stock management, and community level reporting.

**Insecticide Resistance:** Insecticide resistance threatens both LLIN and IRS programs in Senegal, as it does in many PMI countries. Only three of the 15 surveillance sites showed sensitivity to pyrethroids in 2010 and none were in districts targeted for IRS. While pyrethroid sensitivity has increased in many of the monitored districts, both in those sprayed with carbamates and those not, a return to pyrethroids for IRS is not foreseen given the strategy of universal coverage with LLINs. Carbamates were used in all IRS districts from 2011-2013, though their short life (two months) has necessitated a switch to organophosphates in the higher transmission districts with longer rainy seasons.

### *Opportunities*

**WHO policy adoption:** Senegal has adopted all WHO-recommended interventions pertinent to the Senegalese context. The implementation of the new recommendations for SMC and for severe disease management may have a dramatic impact on morbidity and mortality due to malaria in the upcoming years. The NMCP is committed to leadership in the region, piloting and evaluating new strategies including active case detection, introduction of single low-dose primaquine for transmission reduction in elimination areas, and weekly case reporting.

**Continuous Survey:** Senegal is the first sub-Saharan African country to pilot a continuous survey, implementation of which began in October 2012, during the high transmission season. The continuous survey includes both population-based (DHS) and health facility (service provision assessment (SPA) components. While balancing the needs of malaria and other programs is challenging, the continuous survey presents an opportunity to measure trends that will guide decision-making on a more frequent basis. PMI has worked with the implementing partner to ensure that the sampling strategy takes into account the strongly seasonal transmission and assures the comparability of regions.

**Collaboration with Peace Corps:** The local partnership with Peace Corps continues to be solidified through development of a package of malaria activities that volunteers may choose from. In 2013 a third year volunteer was recruited to provide assistance with data management for entomological monitoring at UCAD. In addition, Peace Corps volunteers in Saraya District collaborated with the NMCP and the district health office to implement an active version of the PECADOM program, called PECADOM Plus. The DSDOMs conducted weekly door-to-door sweeps to identify people with fever, test them with RDTs, and treat positive cases. This strategy is being adopted by the NMCP for further scale-up. The more than 200 Volunteers in-country represent a valuable resource for everything from testing communications materials to conducting household visits to gathering information on specific questions. In return, the PMI Resident Advisors provide technical assistance on specific volunteer projects, facilitate training

sessions, and ensure that Peace Corps leadership has a place at the table when key malaria interventions are being planned and implemented.

**Direct Funding:** USAID’s procurement reforms have given PMI/Senegal the opportunity to directly support its two strongest local partners – the NMCP and UCAD. Previously, PMI channeled funds for these partners through WHO. Starting in FY 2012, PMI negotiated fixed amount reimbursement agreements with both entities to fund specific activities. The principal of payment based on the achievement of milestones has given PMI the opportunity to focus on defining high-level results and to encourage our partners to think strategically about how to accomplish them. These two agreements have been very successful to date, and a new agreement with the National Drug Control Laboratory is in the process of being established.

### III. OPERATIONAL PLAN

#### 1. Insecticide-treated nets

##### NMCP/PMI objectives

The NMCP 2014-2018 Strategic Framework includes one overarching strategy for malaria prevention related to LLINs, which is to strengthen distribution mechanisms. It describes two distinct approaches: 1) mass distribution of LLINs to achieve/maintain UC, defined as one treated net per sleeping space; and 2) routine distribution to allow ongoing access to LLINs. The objective is for 80% of the population to sleep under an LLIN.

##### Progress since PMI was launched

The NMCP and partners have supported various approaches for LLIN distribution:

- 1) **Periodic mass free distribution of LLINs:** In 2007, the NMCP began implementing large-scale mass “catch-up” distributions of LLINs to children under five, culminating in a national campaign in 2009. Universal coverage distributions targeting every sleeping space began in 2010 and were completed in early 2013, with 6.9 million LLINs distributed. In 2013, PMI piloted free distribution to primary school students in two regions, with 75,710 LLINs distributed in classes CI and CE2 (six- and nine-year olds) once during the school year. The distributions were accompanied by educational activities. Two additional regions were added in 2014.
- 2) **Targeted subsidies for vulnerable groups:** From 2004 to 2009, PMI supported the subsidized sale of ITNs and later LLINs to pregnant women and children under five. This system involved agreements between facility health committees and private sector net distributors, with beneficiaries contributing a small copayment. Beginning in July 2012, free nets were made available to pregnant women during their first antenatal consultation.

- 3) **Untargeted sales of subsidized bednets:** From 2006 to 2007, the NMCP supported bednet sales to the general population at health facility pharmacies and through community-based organizations (CBOs) at a subsidized price of 1,000 West African Financial Community Francs (CFA) (about \$2 per net), a portion of which was retained by the health districts and CBOs. Beginning in July 2012, PMI began supporting a system to make subsidized nets available to all clients frequenting health facilities at a price of 500 F CFA (about \$1). PMI expanded the availability of subsidized nets in 2013 by supporting a pilot in two regions using CBOs. Community “relays” distribute coupons during home visits or from a fixed point and individuals then redeem the coupons at distribution sites. As with the health facility channel, the LLINs are sold for 500 F CFA (approximately \$1) and the copay is shared at different levels to cover transport costs and communications activities.

Finally, PMI supports a social marketing program in pharmacies and other retail outlets. These nets are sold at a price of 1,000 F CFA and are branded with a unique logo and promoted through a communications campaign that focuses on being a protective head of household. PMI provides the LLINs to pharmaceutical wholesalers, who then assure distribution through their normal supply chain. Actors at each level of the supply chain retain the profit from the sale of LLINs to cover their operational costs.

- 4) **Commercial sales to the general public:** PMI supported social marketing of full-price LLINs in the private sector from 2007 to 2009. When mass free distributions began, however, the market was significantly weakened. Full-price ITNs can still be found in pharmacies and some shops, primarily in major urban areas, but they are generally not long-lasting varieties. These bednets are sold at 3,000 – 7,500 F CFA (\$6 – \$15) each.

As a result of implementing these different strategies, household ownership of at least one ITN has increased substantially (from 20% in 2005 to 73% in 2012). Utilization of ITNs by children under five rose from 7% in 2005 to 46% in 2012, with similar trends observed among pregnant women and in the general population. However, these data mask significant disparities among regions, reflecting socio-cultural differences as well as the progression of the universal coverage campaign (see Table 2). The West zone, which includes the populous and urbanized regions of Dakar and Thies, had not yet been covered by the campaign at the time of data collection for the 2012 continuous survey. Possession of ITNs is highest among the poorest quintiles (greater than 88%), while use is highest for the middle income quintile (52% - 58% for all households, 60-65% in households with at least one ITN). In households with at least one ITN, use is higher among the higher income quintiles (50-60% for higher income, around 45% for lower income).

**Table 2: ITN possession and use by zone and population**

| Zone   | Proportion of households possessing at least 1 ITN | Average number of ITNs per household | Proportion of population that slept under an ITN the previous night |                  |                | In households with at least 1 ITN, proportion of population that slept under an ITN the previous night |                  |                |
|--------|--|--------------------------------------|---|------------------|----------------|--|------------------|----------------|
|        |  |                                      | General popn  | Children under 5 | Pregnant women | General popn   | Children under 5 | Pregnant women |
| North  | 93   | 3.7                                  | 61  | 64               | 64             | 65   | 67               | 68             |
| West   | 50   | 1.7                                  | 24  | 19               | 24             | 41   | 45               | 34             |
| Center | 88   | 3.9                                  | 48  | 50               | 47             | 54   | 57               | 51             |
| South  | 86   | 3.2                                  | 40  | 43               | 45             | 47   | 50               | 52             |

Data source: 2012 cDHS

### Progress during the last 12 months

Following completion of its national UC campaign in April 2013, the NMCP restarted mass distributions in the regions that were initially covered in 2010. Kédougou and Kolda regions were completed in 2013 and six more regions are being covered in 2014 using Global Fund and JICA/UNICEF resources. Due to delays in procuring Global Fund nets, PMI is contributing approximately 400,000 nets from its existing stock to be reimbursed when Global Fund nets arrive.

PMI continues to focus on the routine distribution system, although this has suffered in FY 2014 due to delays in the transfer of management responsibilities from an implementing partner to the NMCP. The NMCP undertook a situational analysis in February 2014 to consolidate information on the number of LLINs distributed and existing stocks, lessons learned during implementation, and recommendations for expansion of the pilot programs. A “relaunch” plan was validated by the national coordinating committee in April 2014, which will serve as a roadmap for the coming year. Key elements include 1) eliminating coupons for the health facility and community channels to simplify the acquisition process and reduce bottlenecks related to supplying the coupons; 2) increasing the involvement of local authorities in identifying appropriate storage facilities; 3) a plan for introducing the different channels in each region. School-based distributions will continue in the two pilot regions and two additional regions that are not scheduled for another mass campaign until 2016.

The social marketing program received a boost this year from a partnership developed with *City Dia*, which operates grocery stores as well as the shops co-located with Total gas stations. During FY 2014, more than 430,000 LLINs were distributed through the following channels:

**Table 3. ITNs Distributed**

| Channel                                 | FY 2012-13     | FY 2014        |
|---|----------------|----------------|
| Health facility – ANC                   | 202,393        | 233,560        |
| Health facility – general consultations | 295,320        |                |
| Schools                                 | 75,710         | 165,988        |
| CBOs                                    | 42,059         | 39,710         |
| Social marketing (sold to distributors) | 13,604         | 122,106        |
| <b>TOTAL</b>                            | <b>629,086</b> | <b>439,258</b> |

PMI developed a protocol and began implementing durability monitoring for LLINs distributed during the 2014 mass campaigns in six regions.

Commodity gap analysis

Maintaining high LLIN coverage levels after the mass campaigns will require keeping up LLIN distribution via the different routine channels across the country. Approximately 1.5 million nets need to be distributed through the routine channels every year in order to maintain coverage.

Under its new Strategic Framework, the NMCP has decided to stop the phased approach to mass campaigns and to implement a nationwide replacement campaign in 2016. The different routine channels will continue to operate, providing the population with several options for replacing worn out nets in the interim.

**Table 4: LLIN Gap Analysis**

| Calendar Year   | 2014                   | 2015              | 2016 <sup>1</sup>      |
|---|------------------------|-------------------|------------------------|
| <b>Total Population</b>   | <b>13,195,441</b>      | <b>13,525,327</b> | <b>13,863,460</b>      |
| <b>Routine Distribution Needs</b>   |                        |                   |                        |
| Pregnant women during first prenatal care visit (3.9% of the population); assumes 100% attendance for one visit | 514,622                | 527,488           | 270,337                |
| Other health facility clients; assumes 4% of all clients will request an ITN                                    | 296,106                | 303,508           | 155,548                |
| Community-based organizations   | 329,886                | 338,133           | 169,067                |
| Primary school students   | 237,163                | 310,347           | 0                      |
| Social marketing  | 126,500                | 139,150           | 76,533                 |
| <i>Estimated total need for routine channels</i>  | <i>1,504,277</i>       | <i>1,618,626</i>  | <i>671,485</i>         |
| <b>Mass Distribution Needs</b>  |                        |                   |                        |
| 2014 campaign – Tambacounda, Sédhiou, Kaffrine, Kaolack, Diourbel, Fatick                                       | 3,500,000              |                   |                        |
| 2016 national campaign  |                        |                   | 8,000,000              |
| <i>Estimated total need for mass campaigns</i>  | <i>3,500,000</i>       |                   | <i>8,000,000</i>       |
| <b>Total Routine and Mass ITN Needs</b>   | <b>5,004,277</b>       | <b>1,618,626</b>  | <b>8,671,485</b>       |
| <b>Partner Contributions</b>  |                        |                   |                        |
| PMI (primarily routine channels)  | 2,581,450 <sup>2</sup> | 1,000,000         | 1,047,120              |
| Global Fund (mass distribution only)  | 2,414,383              |                   | 3,967,635 <sup>3</sup> |
| Islamic Development Bank  |                        | 1,300,000         |                        |
| <b>Total Partner Contributions</b>  | <b>4,995,833</b>       | <b>2,300,000</b>  | <b>5,014,755</b>       |
| <b>Gap (Surplus)</b>  | <b>8,444</b>           | <b>(681,374)</b>  | <b>3,656,730</b>       |

PMI plans to provide approximately one million of the needed LLINs each year, which will be distributed primarily through the routine channels except in 2016. If Senegal is successful with its Global Fund concept note submission, nearly four million LLINs are expected to be procured through that mechanism.

#### Plans and justification

With FY 2015 funds, PMI and the NMCP plan to focus efforts on maintaining a constant supply of nets and a strong, nationwide routine distribution system for ITNs as described above, while conducting a nationwide replacement campaign in 2016. PMI also plans to support

<sup>1</sup> Routine needs for 2016 estimated to be half of earlier years due to national mass campaign

<sup>2</sup> Includes existing stock from FY12 funding and FY13-funded ITNs expected around September 2014

<sup>3</sup> Quantity requested in concept note

communications activities to inform the population about mechanisms to acquire nets and their proper use and maintenance. These activities are described in the BCC section.

PMI will continue LLIN durability monitoring of nets distributed during the 2014 mass campaigns, as well as conduct baseline and possibly follow-up monitoring for the 2016 campaign, depending on when the campaign is implemented. Please see the Monitoring and Evaluation section for further details.

Proposed activities with FY 2015 funding: (\$4,900,000)

1. *Procurement (\$4,000,000) and operational support (\$800,000) for distribution of LLINs*  
PMI plans to support both the mass campaign and the routine LLIN distribution channels by procuring approximately one million LLINs and supporting operational costs. Operational costs for the routine system are expected to decrease significantly as the different channels will be fully functional nationwide, but will continue to include transportation to regions/districts and supervision. A larger proportion of operational funds will be dedicated to the national replacement campaign.

2. *Operational costs of LLIN social marketing program (\$100,000)*  
PMI will support operational expenses related to the social marketing of LLINs in the private sector, including bar code and logo stickers for packaging, transportation from the warehouse to wholesalers, and medical detailers who visit pharmacies to check on stock levels and placement.

## **2. Indoor residual spraying**

NMCP/PMI objectives

Senegal's 2014-2018 Strategic Framework includes IRS as a key component of malaria prevention along with other vector control interventions, such as LLINs and larval source management. The NMCP has adopted a targeted approach for IRS: a) districts with a yearly incidence of less than 30 per 1,000 will not receive IRS, b) districts with an incidence between 30 and 50 per 1,000 may have targeted IRS in the health post zones where malaria incidence is greater than 50 per 1,000 (hot spots) and c) districts with an incidence greater than 50 per 1,000 will receive IRS over the whole district. Entomological parameters such as indoor biting and resting rates also will be used to assist in determination of where IRS may be appropriate. The goal for IRS is to protect at least 90% of the population in targeted areas.

Progress since PMI was launched

Senegal has benefitted from IRS since PMI began work in the country in 2007. The first three districts sprayed with PMI support - Richard Toll, Nioro, and Vélingara - each represented different ecological zones. One spray round was carried out just before the high transmission season in each district, while in Richard Toll, a district along the Senegal River, another round was done immediately prior to the second seasonal peak in April. After entomological monitoring demonstrated that the insecticidal activity persisted long enough to cover the second

peak, this second round was eliminated in 2010. Also in 2010, IRS operations were expanded to Guinguinéo, Malem Hoddar, and Koumpentoum, districts that were among the 16 health districts prioritized for IRS by the NMCP. In 2011, because malaria rates were low and insecticide resistance was high in Richard Toll, spray operations ceased in this district and Kounghoul was selected as a replacement. In early 2013, the IRS Steering Committee made the decision to cease IRS operations in the districts of Guinguinéo and Nioro because data indicated that malaria rates had become very low. A plan for post-withdrawal action was prepared, including communications at both administrative and community levels and enhanced surveillance.

The population protected during the seven years of IRS ranged from around 650,000 in 2007 to more than 1 million in 2012, with high coverage rates being achieved in most years (see Table 5 for last four years).

**Table 5: IRS Coverage**

| Year  | Number of Districts Sprayed | Insecticide Used (# districts)        | Number of Structures Sprayed | Coverage Rate | Population Protected |
|-------|-----------------------------|---------------------------------------|------------------------------|---------------|----------------------|
| 2011  | 5                           | Bendiocarb (4)<br>Deltamethrin (1)    | 240,770                      | 98%           | 887,315              |
| 2012  | 6                           | Bendiocarb                            | 306,916                      | 98%           | 1,095,093            |
| 2013  | 4                           | Bendiocarb                            | 206,704                      | 98%           | 690,090              |
| 2014  | 4                           | Bendiocarb (2)<br>Organophosphate (2) | 204,159                      | 97%           | 708,999              |
| 2015* | 4 (hot spots)               | Organophosphate                       | 215,000*                     |               | 740,000*             |

*\*Represents projected targets*

Pyrethroids were used during the first four years of spray operations, but a significant drop in insecticide susceptibility of mosquitoes to pyrethroids was observed and the decision was made to switch to a carbamate for the 2011 operations. Insecticide susceptibility to pyrethroids increased after this rotation and remained high in 2012.

Spray operations have been organized by PMI implementing partners under the direction of the NMCP, the Hygiene Service, UCAD, and district health management teams. PMI support includes training and equipping locally-recruited spraying agents with help from the NMCP and its vector-control partners, with supervision by the National Hygiene Service. All spray rounds were followed by post-spray evaluation meetings to identify lessons learned and opportunities for improving the next round.

*Progress during the last 12 months*

**Entomologic Monitoring:** During the eight months following the end of the 2013 spray round, entomologists from UCAD, the Parasite Control Service, *Institut Pasteur*, and IRD conducted entomologic monitoring in five villages in each of the four IRS districts and three villages in two neighboring districts, Kolda and Kaffrine. The monitoring included cone bioassays on walls to

test for insecticidal activity (not in the non-IRS districts), knockdown spray catches, and human landing catches. Because susceptibility to carbamate was still high at the end of the 2012 spray round, this class of insecticide was selected for the 2013 spray season. On average the results of cone bioassays on bendiocarb-sprayed walls were similar in all districts with the mortality between 90% -100% in the first month and between 75 and 80% in the second month. By the third month the results were variable but all except Koumpentoum were well below 70%. Thus, as in previous years, the insecticidal activity of bendiocarb appeared to endure at most two months. In three districts, cone bioassays were also done with mosquitoes raised from locally collected larvae. Mortality rates were generally even lower, although *Anopheles gambiae s.l* from these districts were 99% to 100% susceptible to bendiocarb in resistance assays. As was observed in 2011 and 2012, an apparent increase of insecticidal activity was noted in cone bioassays in all the districts in the five to eight months after spraying, a phenomenon that may be related to decreases in ambient temperature. For the two months following spraying in 2013, parity rates of mosquitoes collected in the IRS district of Vélingara were lower (4% in September and 30% in October) than those collected in the neighboring non-IRS district of Kolda (18% and 83%, respectively) suggesting that insecticide was still reducing vector longevity. Mosquitoes continue to bite indoors as well as outdoors but at lower rates both indoors and outdoors in the IRS districts than in the comparison districts.

Insecticide resistance assays were conducted in 16 geographically dispersed districts of Senegal. Assays were performed with insecticides of all four classes but not all insecticides were tested in all districts. The data showed that vector susceptibility to bendiocarb remained high in most of the country (99%-100% in the IRS districts) but was fairly low in the three districts without IRS (Kaffrine, 83%; Ndoffane, 78%; and Richard Toll, 86%). Pyrethroid resistance varied greatly but improved in both IRS and non-IRS districts whereas DDT resistance was evident in almost all sites.

**Spray Operations:** The IRS steering committee, composed of representatives from the NMCP, entomologists from UCAD, the National Hygiene Service, the National Directorate of Environment and Agriculture, the IRS implementing partner, and PMI, decided to change the insecticide to a long-lasting organophosphate in the districts of Vélingara and Koumpentoum due to the inadequate longevity of bendiocarb. Nevertheless, because the stock of bendiocarb remaining after the 2013 campaign was almost sufficient to cover Malem Hoddar and Koungheul districts, and because these districts had a lower malaria incidence than the other two IRS districts, the committee decided to maintain bendiocarb for these two districts. Preparations for operations in the four districts began in March 2014, including reviewing training tools, preparing pits, recruiting seasonal spray operators, and training. Spraying activities began in May in the two districts treated with pyrimiphos-methyl (Vélingara and Koumpentoum), whereas in Malem Hoddar and Koungheul spraying began in July to ensure optimal coverage of the transmission season given the short duration of bendiocarb action. A total of 204,159 structures were sprayed (97% of those targeted) and 708,999 people were protected. Despite the many challenges involved in IRS implementation, routine monitoring of spray operations suggests that high rates of acceptance have been consistently achieved in all spray rounds.

With each spray round, PMI places increasing emphasis on building national and local capacity for IRS. To date, agents of the National Hygiene Service and MoH personnel at many levels of

the health system have been engaged in IRS activities. During the 2013 and 2014 spray rounds, the NMCP assumed responsibility for implementing IEC operations in all districts. In 2014, NMCP personnel also took a much more active role in all of the steps of the process and thus gained intense hands-on experience. As a result, the NMCP is now better prepared to assume responsibility for IRS operations. In 2015, the NCMP will assume a lead role in IRS implementation in one district with the technical support of a PMI implementing partner. The national IRS Steering Committee will be intimately involved in this transition.

### Plans and justification

With FY 2015 funds, PMI plans to transition spray operations and entomological monitoring to hot spots in selected districts based on the malaria incidence and entomological data. During the 2015 spray season, the NMCP will have assumed the majority of the operational responsibilities in one district (except commodity procurement), including planning, IEC, training, and implementation of IRS activities with technical assistance provided by PMI's implementing partner. PMI will closely monitor implementation and ensure the NMCP's proper handling of technical and financial responsibilities. The insecticide chosen for FY 2015 will be a long-acting organophosphate.

### Proposed activities with FY 2015 funding (\$4,539,000)

#### 1. *IRS operations (\$4,000,000)*

With FY 2015 funds, PMI plans to support one round of spray operations in malaria hot spots in selected districts based on malaria incidence and entomological data. Eligible areas include districts and/or health post zones with an incidence greater than 50/1,000 in the previous year and with indoor resting and biting malaria vectors and are generally located in the four southeastern regions. Number of structures sprayed and people protected will be estimated after districts or health zones have been chosen but will be similar to those covered in 2014 (215,000 and 740,000, respectively).

#### 2. *Entomologic monitoring (\$539,000)*

PMI plans to continue to support entomologists from UCAD and *Institut Pasteur* to conduct entomologic M&E for IRS as well as insecticide resistance monitoring. Entomologists will conduct cone bioassays at monthly intervals after spraying in selected areas to assess spray quality. Vector behavior will be assessed by monitoring indoor and outdoor biting rates and indoor resting densities. Parity rates will aid in determining female longevity and transmission potential. Finally, mosquito strains will be identified and checked for malaria sporozoites. Baseline entomological data will be collected in malaria hot spots where future IRS activities may take place. Entomologists will continue to conduct insecticide susceptibility assays in the spray districts, the districts where IRS operations have ceased, as well as in additional sites throughout the country where entomologists have been following the evolution of insecticide resistance during the past several years. An entomologist from the Centers for Disease Control and Prevention (CDC) will provide TA for the planning and implementation of all PMI-funded entomologic monitoring activities as well as some supplies that have been difficult to obtain through other channels.

### **3. Malaria in pregnancy**

#### NMCP/PMI objectives

Intermittent preventive treatment in pregnant women with SP given free-of-charge as directly observed therapy during focused ANC visits was adopted as national policy by the NMCP in 2003 and is implemented in all ANC sites nationwide, regardless of epidemiologic strata. The NMCP's new Strategic Framework for 2014-2018 articulates that all pregnant women should receive at least three SP doses during their ANC visits, starting in the second trimester and with at least one month between doses. The NMCP's malaria in pregnancy (MIP) objectives are to protect at least 80% of pregnant women with IPTp and for 80% of pregnant women to be protected with an ITN. In addition, the NMCP aims to treat 100% of pregnant women with confirmed malaria according to national guidelines, using quinine in the first trimester and ACTs in the second and third trimesters. The NMCP's strategy for increasing IPTp uptake includes advocacy for health workers and the population at large, training and supportive supervision of health workers, and outreach activities by health post staff to provide ANC services at the community level at health huts, all of which are supported by PMI.

#### Progress since PMI was launched

Attendance for ANC is high in Senegal and 93% of pregnant women make at least one visit. However, IPTp coverage remains low with only 41% of pregnant women receiving two doses of SP. PMI has supported the production, dissemination, and use by health care workers of new ANC registers and ANC cards that allow for accurate recording of IPTp treatments; job aids to promote the correct management of malaria in pregnancy and improve the counseling skills of health care providers; water filters/dispensers and re-usable cups for SP administration; and refresher training and supportive supervision. The PMI-supported MIP training is part of integrated malaria training and covers data collection and record-keeping, prevention via IPTp and use of LLINs, and diagnosis and treatment of malaria in pregnant women. PMI supports a routine LLIN distribution system that offers free LLINs to women attending ANC.

#### Progress during the last 12 months

During the period October 2013-September 2014, 509 facility-based health workers were trained in the prevention, diagnosis, and treatment of malaria in pregnancy. More than 1,000 community-level workers were also sensitized about IPTp, which was integrated with training on vaccination. In addition, 20 midwives received training on focused antenatal care (FANC), with an emphasis on IPTp. For the period October 2013-August 2014, 73,796 women received IPTp2 with PMI's support.

With PMI's support during FY 2014, promising approaches to increasing the uptake of SP have been implemented in 13 districts in the regions of Dakar, Diourbel, and Thiès. In Mbao District, for example, IPTp2 coverage increased from 32% to 83% between June 2013 and December 2013, following implementation of an evidence-based approach. Interviews and focus groups

with health care providers, pregnant women, and community members indicated that there was confusion about the policy to provide SP for free, as well as a need to reinforce the IPTp guidelines. This formative research was used to develop key messages that were disseminated through road shows/caravans in the area. In addition, health facility staff were re-trained, cups and water filters were provided to encourage directly-observed administration of SP in facilities, and community members (particularly female leaders who provide health advice to other women in the community) were sensitized on the importance of preventing malaria in pregnant women. Given the observed increase in IPTp in this district, the NMCP plans to use a similar approach to improve IPTp2 coverage in other districts during the coming year.

Following the WHO recommendation, the NMCP changed its case management policy to allow the treatment of pregnant women diagnosed with uncomplicated malaria during the second and third trimesters with ACTs and maintained the use of quinine during the first trimester. The NMCP has also updated its policy, guidelines, and training manuals to incorporate the WHO recommendation to simplify IPTp guidelines and include the three-dose regimen for IPTp. With PMI's support, updated registers are now being used in health facilities nationwide and include fields to record all three doses of IPTp as well as whether an ITN was provided.

#### Commodity gap analysis

The CMS is expected to procure SP for an anticipated 540,674 pregnant women in 2016, which will cover all SP needs for the country (see Table 6).

**Table 6: SP Gap Analysis**

| <b>SP Needs and Contributions</b>          | <b>2014</b> | <b>2015</b> | <b>2016</b> |
|--|-------------|-------------|-------------|
| <b>Estimated population<sup>1</sup></b>    | 13,195,441  | 13,525,327  | 13,863,460  |
| <b>Estimated pregnancies<sup>2</sup></b>   | 514,622     | 527,488     | 540,674     |
| <b>Total SP needs in doses<sup>3</sup></b> | 1,235,093   | 1,265,971   | 1,297,618   |
| <b>SP to be procured by the CMS</b>        | 1,235,093   | 1,265,971   | 1,297,618   |
| <b>Gap in SP</b>                           | 0           | 0           | 0           |

1. Source: Senegal 2013 population census, assuming 2.5% growth per year.
2. Assuming 3.9% of the population becomes pregnant each year.
3. SP needs calculated assuming that 80% of pregnant women will receive three doses.

Fewer than 7,000 cases of malaria are reported among pregnant women annually and the ACTs needed to treat them are included in the overall ACT gap analysis in the case management section. The CMS also procures quinine for use in severe malaria cases and maintains adequate stocks. Iron/folate supplements (combination pill: 60 mg ferrous sulfate, 250 micrograms folic acid) are provided to pregnant women at ANC visits and are also procured by the CMS.

#### Plans and justification

With FY 2015 funding, PMI will continue to support activities aimed at reinforcing the provision of effective MIP services in health facilities nationwide. Support will continue for monitoring and supportive supervision of MIP service delivery, improving data collection including IPTp data, and training new staff on MIP. PMI will also continue to encourage collaboration between

the NMCP and the Division of Reproductive Health and Child Survival to strengthen and streamline MIP activities.

Proposed activities with FY 2015 funding (\$600,000)

1. *Reinforce provision of effective malaria in pregnancy services in health facilities and through outreach strategies*

PMI will support Senegal's efforts to reposition the prevention of malaria in pregnancy. Building on the successful evidence-based methodology in the districts cited above, PMI will support the ongoing scale-up of this approach to additional districts. Continued support is planned to update, print, and disseminate training materials and job aids as needed to reflect the new treatment recommendations and the simplification of IPTp administration guidelines. Support will include training for new health-facility level providers as needed on prevention and treatment of malaria during pregnancy, which includes topics such as the importance of LLIN use in pregnancy, diagnosis and management of MIP, and counseling and interpersonal communication skills. PMI also plans to continue to provide cups and water filters as needed for directly-observed treatment with SP. Support will continue for ANC outreach activities at health huts. Activities related to LLIN use and behavior change communication are covered in those sections.

**4. Case management**

NMCP/PMI objectives

PMI's objectives are:

- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with confirmed malaria will have received treatment with ACTs within 24 hours of onset of their symptoms

The NMCP's objectives also include:

- $\geq 99\%$  of health facilities have RDTs and ACTs available
- 100% of suspected cases tested in pre-elimination zones
- $\geq 95\%$  of suspected cases tested with an RDT in control zones
- 100% of confirmed cases of malaria treated according to national policy
- 100% of children under 10 years with signs of severe malaria receive pre-referral treatment

The NMCP has adopted WHO recommendations regarding case investigation and active case detection in districts in which annual incidence is less than 5/1,000.

Progress since PMI was launched

The NMCP adopted ACTs as first-line treatment in 2006 and introduced RDTs in 2007. Both AL and AS-AQ were adopted simultaneously as first-line drugs, with AS-AQ being procured from the beginning, and AL procured starting in 2010. In addition, dihydroartemisinin-piperaquine donated by the Chinese government is also used in the public health sector and is considered a

third first-line drug. Quinine is used for treatment of severe malaria in all age groups and in pregnant women in the first trimester (with ACTs in the second and third trimesters), but intravenous artesunate is now included along with quinine as first-line therapy for severe malaria.

Rapid diagnostic tests were introduced in formal health facilities in late 2007, along with a diagnostic algorithm specifying that if another obvious cause of fever was present, a patient would not be tested with an RDT nor be reported as a suspected malaria case, but be treated for that illness and be eligible to return for re-evaluation, including an RDT, if symptoms persisted. At the community level, RDTs were introduced in 2008, and all fevers are eligible for testing. Positive cases showing no signs of severity are treated with ACTs, while negative and severe cases are referred to the nearest health post.

Senegal recently introduced three WHO recommendations: (1) pre-referral treatment with rectal artesunate for severe malaria, both at the health post level and at the community level; (2) intravenous artesunate as a co-first line for treatment of severe malaria; and (3) SMC with one treatment of SP-AQ monthly during the rainy season. Much of the research on SMC was conducted in Senegal, first in children under five, and subsequently in children up to ten years of age. In Senegal, four southern regions (Sédhiou, Kolda, Tambacounda, and Kédougou) meet all the WHO criteria for SMC (at least 60% of cases within four months, at least 10% annual incidence among children).

PMI has supported both diagnosis and treatment of malaria through integrated training of health care providers at all levels, supportive supervision, and commodity procurement. In addition, PMI has provided microscopes, trained laboratory technicians, and supported quality assurance/quality control systems for microscopy.

At the community level, PMI supports two levels: health huts and home-based management of malaria (PECADOM). Health huts, staffed by community health workers (*agents de santé communautaire* or ASC), offer an integrated package of maternal and child health interventions, which has included malaria case management with RDTs and ACTs since 2008. PECADOM was piloted in 2008, and scaled up to nearly 1,000 villages by 2010. Under this model, a home-based care provider (*dispensateur de soins à domicile* or DSDOM) is chosen by a community at least 5km from the nearest health post, and trained in management of malaria with RDTs and ACTs. Diagnosis and treatment are provided to patients of all ages. In 2012, an integrated home-based package including treatment of diarrhea and pneumonia for children under five years was piloted among 88 DSDOM in five districts.

#### Progress during the last 12 months

**Diagnosis:** PMI supported the training of 88 laboratory technicians on malaria microscopy and supervision/quality control visits to 110 facility laboratories, including 343 technicians, covering all public sector laboratories with microscopy capacity. During the quality control visits, the supervisors complete a supervision checklist, verify five negative and five positive slides that the microscopists have read, and have the microscopists read a panel of pre-selected slides. In addition, 10 positive and 10 negative slides are sent to Dakar for concurrence by the UCAD

reference lab. Only 10 laboratories did not receive satisfactory composite scores; these were targeted for remedial training and increased supervision.

Data collection was completed for a PMI-funded operations research project to evaluate the diagnostic algorithm, specifically to determine the proportion of patients not tested with an RDT according to the NMCP's diagnostic algorithm who actually have parasitemia. While the sensitivity of the algorithm to identify malaria parasitemia (compared to RDT) is greater than 80% in most of the country and in patients greater than five years, sensitivity is 75% in the southeast and only 68% among children under five years. The NMCP is beginning the process of policy change based on these results.

**Treatment:** PMI procured 800,950 ACT treatments (371,750 AL targeted primarily to SMC regions and 429,200 AS-AQ). Case management activities in the formal health sector included training and supportive supervision, using a strategy of peer supervision and mentoring termed *TutoratPlus*. During the 2014 fiscal year, PMI supported the training of 509 health workers at the facility level and 206 at the community level on malaria case management including RDTs and ACTs.

Implementation of SMC in 2013 covered four south-eastern districts during the months of November and December, later than planned due to late arrival of drugs, but within transmission season. In November 56,127 children were treated, and in December, 58,540 children were treated, with coverage of the target population of 92% and 95%, respectively. PMI procured the drugs while UNICEF covered operations using resources allocated by JICA for malaria programming. PMI worked closely with the NMCP to develop the implementation and monitoring plan. This new intervention is being rigorously monitored and evaluated using routine morbidity and mortality data, pharmacovigilance, monitoring of molecular markers, and process indicators, as recommended by WHO. Currently no other donors have agreed to support the campaign for FY 2015.

For treatment of severe disease, the NMCP introduced pre-referral treatment with rectal artesunate in preparation for the 2014 transmission season. Following official adoption of the policy, national guidelines and manuals were updated. Health post nurses nationwide were trained on drug administration and procedures for referring patients to higher level facilities for the correct treatment of severe disease and stocks were put in place. A community-level pilot is underway in the high transmission districts of Saraya and Salemata. Intravenous artesunate was introduced at selected hospitals and health centers.

The community-level program now includes a total of 2,162 health huts and 1,992 DSDOMs. At the community level, integrated PECADOM was scaled up to 492 DSDOMs in Tambacounda and Kédougou regions. PECADOM Plus, an active version of PECADOM, was piloted in 15 villages in Saraya District (Kédougou Region), in partnership with Peace Corps and the NMCP. This strategy uses DSDOMs to visit every household in their communities once per week during 21 weeks of the high transmission season to identify and test fever cases and treat the positives. An additional 15 villages with DSDOMs served as comparison, and household visits were conducted at baseline, midline, and endline in these villages. The point prevalence of symptomatic malaria was 1.1% in both comparison and intervention villages at baseline, but by

the final week (three weeks after the first round of SMC), intervention villages had a point prevalence of symptomatic malaria of 0.2%, compared to 2.9% in comparison villages. Based on these favorable results, the NMCP is planning to expand PECADOM Plus as an additional strategy to increase access to care in the high-prevalence region of Kédougou in 2014, integrated with case detection of pneumonia and diarrhea.

#### Commodity gap analysis

While ACT needs for treatment are expected to decrease with the introduction of SMC, RDT needs may not significantly change, and increased use of both through active case detection strategies and expansion of PECADOM may lead to stationary needs. The ACT needs presented here are based on consumption data from recent years, while the RDT analysis takes into account the various case detection and case investigation activities that are planned. The Islamic Development Bank (IDB) has recently announced that it will provide funding for RDTs. Of note, case management policy change in response to operational research results is likely to significantly increase RDT needs, though it is unclear to what degree, and RDT needs have not yet been re-calculated. PMI plans to assure sufficient RDTs to account for the increase in testing.

**Table 7: ACT and RDT Gap Analysis**

| <b>ACTs</b>                   | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> |
|-------------------------------|-------------|-------------|-------------|-------------|
| ACT needs                     | 746,163     | 706,525     | 668,992     | 633,454     |
| Partner contributions - stock | 318,820     |             |             |             |
| PMI                           | 479,700     | 600,000     | 600,000     |             |
| IDB                           |             |             | 700,000     |             |
| Total contributions           | 798,520     | 600,000     | 1,300,000   |             |
| Gap (Surplus)                 | (52,357)    | 106,525     | (631,008)   | 633,454     |
| <b>RDTs</b>                   | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> |
| RDT needs                     | 1,683,379   | 1,683,379   | 1,683,379   | 1,683,379   |
| Partner contributions – stock | 1,584,725   |             |             |             |
| PMI                           |             | 1,900,000   | 1,500,000   | 1,500,000   |
| IDB                           |             |             | 1,000,000   |             |
| Total contributions           | 1,584,725   | 1,900,000   | 2,500,000   | 1,500,000   |
| Gap (Surplus)                 | 98,654*     | (216,621)   | (816,621)   | 183,379     |

\*RDT gap in 2014 is fictitious as needs are for full year while stock is as of April.

#### Plans and justification

PMI will maintain its support for the diagnosis and treatment activities described above (training, supervision, procurement), for both uncomplicated and severe disease. With the expected increase in the number of districts with very low annual incidence (nearing or less than 5/1,000 – 14 districts in 2013), the NMCP plans to begin the process of policy change to introduce a single low dose of primaquine in association with ACT treatment for confirmed malaria cases, in accordance with WHO guidelines. Introduction of this approach is planned for selected districts with annual incidence < 5/1,000. Research on safety and G6PD prevalence is currently ongoing

to support the introduction in 2016. Finally, PMI will continue to support therapeutic efficacy monitoring in two sites annually, rotating sites.

*Proposed activities with FY 2015 funding (\$5,479,000)*

**Diagnosis**

1. *Strengthening microscopic diagnosis of malaria (\$200,000)*

PMI plans to continue to provide training in microscopic diagnosis of malaria for new microscopists, as well as remedial training for those found not proficient during supervision. PMI plans to provide supportive supervision of malaria diagnosis by microscopy for laboratory and health facility staff and assist the NMCP and its partners to implement the quality assurance and control standards for malaria diagnostic testing. Sites showing poor performance will be targeted for additional on-site training and quality control visits.

2. *Procurement of microscopes and laboratory consumables (\$10,000)*

PMI plans to provide laboratory consumables and to replace aging microscopes if needed.

3. *Procurement of RDTs (\$931,000)*

The NMCP has requested that PMI procure approximately 1.5 million RDTs to contribute to nationwide needs, including diagnosis of symptomatic patients at health facilities, and active case detection where indicated.

**Treatment**

1. *Improve case management at health facilities (\$550,000)*

As part of the effort to improve the management of malaria, PMI plans to support training for health care workers in case management with RDTs and ACTs (initial and refresher training, as indicated) as well as management of severe disease. Implementing partners will work with the MoH to provide supportive supervision in the correct management of malaria at health posts, health centers, and hospitals.

2. *Strengthen community case management (\$500,000)*

With FY 2015 funding, PMI plans to continue to provide technical support on correct diagnosis, treatment, stock management, and referral practices for CHWs at health huts. Attention will also be given to timely data collection and integration of community case management data into the MoH reporting system. The PMI funding will complement other USAID/MCH funding to support the training, supervision, and monitoring of community-based staff.

3. *Supervision for integrated home-based management of malaria (PECADOM) (\$350,000) and operational costs for PECADOM Plus (\$200,000)*

PMI plans to continue to support supervision of village malaria workers in malaria diagnosis with RDTs and treatment with ACTs as part of an integrated case management package that includes acute respiratory infections and diarrhea. PMI plans to also support health post nurses in their supervision of DSDOMs. PMI plans to support operational costs to extend integrated

PECADOM Plus in the Kédougou and Kolda regions, including existing DSDOM and CHWs at health huts. Results will be collected, analyzed, and shared by the NMCP.

4. *Procure ACTs (\$514,000)*

PMI plans to procure approximately 600,000 ACT treatments, which will meet the majority of the country's needs for the year. Artemether-lumefantrine will be procured and distributed in the four regions where SMC is implemented to avoid treating confirmed malaria cases with the same drug that is used for chemoprevention (amodiaquine). In previous years, approximately half of the country's malaria cases have occurred in these regions. Artesunate-amodiaquine will be procured and targeted to the remaining regions.

5. *Operational costs (\$1,200,000) and procurement of drugs (\$542,000) for implementation of SMC*

PMI plans to continue to fund SMC with three doses of SP-AQ for children from three months to ten years in the four highest transmission regions. The age groups and geographic zones may be re-evaluated based on experience. The operational funds are slated to support training, supplies, and supervision. Funds for communications activities are included in the BCC section. The intervention should cover approximately 600,000 children for three months, with the Kédougou Region adding a fourth month to cover a longer transmission season. UNICEF supported operational costs during the first year of the campaign, but it is not yet known whether that support will continue or if other partners will join the effort. PMI plans to support the NMCP to get maximum participation and support from other malaria partners.

6. *Operational costs of expanding pre-referral treatment to the community level nationwide (\$250,000), procurement of rectal artesunate suppositories (\$25,000), and procurement of injectable artesunate for treatment of severe malaria (\$57,000)*

PMI plans to continue to procure rectal artesunate for pre-referral treatment for severe malaria, currently estimated at approximately 15,000 treatments for the year. Pre-referral treatment with rectal artesunate at the community level will be scaled up nationwide. The budget/quantity for procurement of rectal artesunate will be revised as necessary depending on use in pilot implementation. PMI plans to procure injectable artesunate sufficient to treat cases of severe malaria referred to the hospital or health center level. While the hope is that the number of severe cases will decrease, this amount is sufficient to meet approximately 30% of the need, if the incidence of severe malaria does not decrease from 2013 levels.

7. *Procurement of primaquine (\$10,000) and implementation of single low-dose primaquine in elimination districts (\$40,000)*

PMI plans to procure primaquine, and if necessary and available, G6PD tests for single low-dose treatment in elimination districts with incidence approximately 1/1,000. PMI will target the region of St. Louis, which has 5 health districts, a population of approximately 980,000, and a malaria incidence of 1.6/1,000. PMI will also support a detailed M&E plan which will likely include regular supervision, data analysis, case investigation, and pharmacovigilance. Operational funds will cover training, job aids, and supervision.

8. *Therapeutic efficacy monitoring (\$100,000)*

PMI plans to support therapeutic efficacy studies at two sites to monitor the susceptibility of *P. falciparum* to the first-line ACTs (artesunate-amodiaquine and artemether-lumefantrine) and monitoring of resistance markers for SP and amodiaquine in areas of SMC implementation. Sites for therapeutic efficacy studies will be rotated to provide data from western, central, and southeastern Senegal.

## **5. Monitoring and evaluation**

### NMCP/PMI objectives

The NMCP objective for M&E is to ensure prompt and complete reporting and use of data for M&E of the 2014-2018 Strategic Framework. The approach also includes strengthening surveillance and intensifying case investigation targeted to reaching pre-elimination in 2018.

### Progress since PMI was launched

Senegal was known for its robust routine malaria information system during the first few years of PMI implementation, providing data to guide and measure scale-up of malaria control activities. The NMCP collected routine malaria mortality and morbidity data by health post from health districts monthly through a database developed in collaboration with RBM, based on EpiInfo™ (DOS), known as RBMME. In this system, all relevant malaria data flowed up from the community level (health huts and DSDOM) through health posts and districts, which then sent them simultaneously to the regional and central levels. The NMCP also organized quarterly review meetings with health districts to share malaria burden data as well as policy/technical information. This system was adversely impacted by a nationwide data retention strike in public health facilities from June 2010 to March 2013. The quarterly review meetings resumed in July 2013. While efforts have been made to include private facilities, and some send their data to the districts, participation is limited.

Multiple national-level household surveys have been conducted to provide information on key malaria indicators, including MISs in 2006, 2008 and 2014, and DHSs in 2005 and 2010, and a post-campaign survey in 2009 to assess the ownership and use of ITNs after a campaign targeting children under five years of age. In 2012-2013, Senegal began implementing a Continuous Survey consisting of population-based (cDHS) and service provision assessment components, which provides information to guide programming on a regular basis. The cDHS provides annual estimates of all standard household-level malaria indicators (including anemia and parasitemia) as well as information on the availability and quality of services in the health sector (including private providers). Results are available nationally and by urban/rural and epidemiologic strata annually, and by region every two years. This activity is supported by USAID, using malaria and other funds, as well as other partners including the MoH and the World Bank.

A system of epidemic surveillance sites has been operational since 2008, starting in the Senegal River Valley. Ten districts are now enrolled in the program, each with two sites reporting morbidity, mortality, and stock information on a weekly basis. Beginning in 2012, in the northern district of Richard Toll, where the prevalence of parasitemia is less than 1%, MACEPA initiated a project in which all positive patients identified through health facilities are

investigated and reactive case detection is conducted in the household and the five closest households of the index case. Based on analysis of data collected during the first two years, MACEPA recommended testing all household members of the index case, and among the five closest households within a 100 meter radius, only individuals who are symptomatic, have traveled recently, or do not sleep under an ITN.

In high transmission districts where SMC is implemented, standard M&E protocols and tools as outlined by the WHO SMC Field Manual are used to monitor SMC indicators, molecular markers of resistance to SP and AQ, estimate coverage rates, and assess adherence, and track pharmacovigilance. Entomological monitoring of IRS districts and select non-IRS sites has guided IRS implementation, and PMI continues to support therapeutic efficacy testing and drug quality monitoring. Table 8 below summarizes the different M&E activities that have been supported by PMI and other partners.

### *Progress during the last 12 months*

The NMCP, with assistance from PMI developed the M&E section for the 2014-2018 Strategic Framework. Support for malaria surveillance continued, as well as the scale-up of using tablet computers during supervision visits to facilitate analysis. The twenty epidemic surveillance sites continued to send data with near 100% completeness and promptness. Since March 2013, the NMCP has continued to send out weekly surveillance bulletins to a large and varied group of stakeholders that presents user-friendly data describing trends in malaria burden and commodity availability at each site. The data strike affecting routine data was lifted in March 2013 and backfilling the databases is complete. The process of rebuilding the health information system is ongoing, with the MoH planning to introduce the District Health Information System 2 (DHIS2) nationwide by the end of 2015. PMI supported a data review of the epidemic surveillance sites. At the request of the NMCP, PMI supported the update of the malaria health information system (RBMME) from the DOS-based version of EpiInfo™ (which was no longer supported by computers and hence unusable), to the new module of EpiInfo™ 7, with greatly increased functionality.

The cDHS is in Phase 2 of data collection. Two hundred clusters for the DHS, and a random sample of approximately 20% of health facilities for the SPA, were included. Key findings from Phase 1 of data collection were disseminated in September 2013 (reported in Table 2). Senegal is the first PMI country to implement a cDHS which has helped strengthen the capacity of data collection and use to help inform malaria-specific programs. Some lessons learned from Phase 1 included the importance of ensuring close partner collaborations to ensure a robust sampling strategy to account for seasonality of malaria indicators. Since health posts and health huts are the first sites where the population seeks medical attention, data from health posts and their associated health huts were collected. Additionally, an SMC question was added to the survey to monitor implementation in high burden areas. The cDHS is expected to be a permanent part of the MoH's data stream and the expectation is that fewer household surveys will be needed.

**Table 8: Monitoring and Evaluation Activities**

| Data Source                                     | Activities  | Calendar Year (2006-2016) |     |     |     |     |     |     |     |     |     |     |
|---|---|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|   |   | '06                       | '07 | '08 | '09 | '10 | '11 | '12 | '13 | '14 | '15 | '16 |
| Household Surveys                               | Demographic and Health Survey                         |                           |     |     |     | X   |     |     |     |     |     |     |
|   | Continuous Demographic and Health Survey              |                           |     |     |     |     |     | X   | X   | X   | X   | X   |
|   | Malaria Indicator Survey                              | X                         |     | X   |     |     |     |     |     | X*  |     |     |
|   | Nationwide post-LLIN distribution campaign survey     |                           |     |     | X   |     |     |     |     |     |     |     |
|   | Universal coverage evaluation                         |                           |     |     |     |     | X   |     |     |     |     |     |
| Entomological monitoring                        | Entomologic monitoring                                |                           | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   |
|   | LLIN durability monitoring                            |                           |     |     |     |     |     |     |     |     | X   | X   |
| Malaria Surveillance and Routine System support | Malaria epidemic surveillance                         |                           |     | X*  | X*  | X*  | X*  | X   | X   | X   | X   | X   |
|   | Case investigation                                    |                           |     |     |     |     |     | X*  | X*  | X   | X   | X   |
|   | SMC M&E   |                           |     |     |     |     |     |     |     | X   | X   | X   |
|   | Impact Evaluation                                     |                           |     |     |     |     |     |     | X   |     |     | X   |
|   | Evaluation of NMCP strategic plan                     |                           |     |     |     | X   |     |     | X   |     |     |     |
|   | M&E course  |                           |     |     |     | X   | X   | X   | X   | X   |     |     |
|   | Demographic Surveillance System*                      |                           | X   | X   |     |     |     |     |     |     |     |     |
|   | Therapeutic efficacy testing                          |                           | X   | X   |     | X   |     | X   | X   | X   | X   | X   |
|   | Drug quality monitoring                               |                           | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   |
|   | Routine data from health system through RBM database* | X                         | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   |

\*Not PMI-funded

The evaluation of the impact of the malaria control and prevention interventions from 2005 – 2010 was finalized in November 2013. The evaluation and final report, which was Senegalese-led and managed, was endorsed by the Minister of Health and disseminated in country; it is currently being translated from French to English.

### Plans and justification

Using FY 2015 funds, PMI plans to support the expansion of case investigation to districts that are classified as low transmission by the NMCP, with less than five cases per 1,000 population, as determined by the routine information system that includes the number of confirmed cases of malaria identified in the community and in health facilities. Information on positive malaria cases will be sent to the district health supervisor and within three days of notification, a team will be deployed to the community level to conduct a detailed investigation of the index case and screening of the five neighboring households. Findings and critical issues identified from case investigations conducted in Saint Louis regions will guide implementation strategies in the expanded districts. Districts will be selected based on incidence reported in 2015.

At the time FY 2015 funds become available, the Senegal NMCP will be in the third year of its current Strategic Framework. This is optimal timing to evaluate progress and to identify and plan for the challenges ahead. Support from PMI will contribute to key data collection and analysis activities, as well as enhancing activities to support pre-elimination objectives.

In accordance with WHOPES guidelines and recommendations, PMI will continue durability monitoring of LLINs distributed during the 2014 mass campaigns to estimate survivorship/attrition and physical integrity. In addition, PMI will continue to support measuring bioefficacy and insecticide content of the LLINs using cone bioassays. PMI plans to conduct baseline and six-month follow-up laboratory testing on a sample of nets from the 2016 campaign to ensure they adhere to WHOPES specifications for insecticide content.

### Proposed activities with FY 2015 funding (\$1,700,000)

#### 1. *Technical assistance (\$100,00) and implementation of the continuous DHS (\$350,000)*

With FY 2015 funding, PMI plans to maintain its support for the continuous DHS, including technical assistance to the National Statistics and Demography Agency to strengthen their capacity to analyze and present the data collected.

#### 2. *Strengthening epidemiologic surveillance of malaria (\$400,000)*

In response to the growing surveillance needs as Senegal moves toward pre-elimination, PMI will continue to support the national malaria surveillance system, including weekly case notification, in both the formal public health sector (hospitals, centers, and posts) and at the community level (health huts and home-based management). This system includes electronic transmission of data by short message service (SMS) and will be integrated with the DHIS2, recently adopted by the MOH. Districts where IRS has been withdrawn will be prioritized with weekly notification by SMS. While the system currently includes 20 sites, this may evolve as Senegal transitions to weekly notification nationally.

#### 3. *Case investigation in districts with incidence <5/1,000 (\$400,000)*

PMI will support the expansion of case detection in the low transmission districts. PMI will provide assistance to the NMCP to identify, investigate and treat all positive malaria cases and reactive case detection in the household of the index case and the five neighboring households. Training will be provided for CHWs, health post nurses, district health supervisors for

investigation and weekly electronic data transmission with DHIS2 integration. Results will be collected, analyzed, and shared by the NMCP.

4. *Monitoring and evaluation of seasonal malaria chemoprevention (\$250,000)*

In accordance with the WHO field manual for SMC M&E, PMI will support the existing routine health information system to monitor indicators relevant to SMC and all malaria interventions. Molecular markers will be monitored and an end of season survey to assess coverage will be implemented.

5. *Evaluation of impact of malaria control activities (\$100,000)*

PMI will support activities for a second round evaluation of the impact of malaria control interventions over the period 2010 - 2015. Evaluation of these activities will provide insight towards the 2018 goal of pre-elimination and help explore issues that hamper progress and provide solutions. The proposed funding from PMI (\$100,000) will support planning and organizational activities and supplemental funding from other partners is expected.

6. *LLIN durability monitoring (\$100,000)*

With FY 2015 funding, PMI will support training and field data collection to monitor durability of the LLINs distributed during the 2014 mass campaign. These funds will also be used to purchase supplies and equipment to conduct cone bioassays and to conduct baseline and 6 month follow-up laboratory analyses to monitor insecticide content of LLINs procured for the 2016 campaign.

## 6. Operational research

PMI does not plan to support operational research with FY 2015 funds. Table 9 presents completed and ongoing operational studies supported by PMI with previous years' funding.

**Table 9. PMI-funded Operational Research Studies**

| <b>Completed OR Studies</b>   |                   |                 |               |
|---|-------------------|-----------------|---------------|
| <b>Title</b>  | <b>Start date</b> | <b>End date</b> | <b>Budget</b> |
| Assessment of diagnostic and treatment algorithm  | 04/2012           | 06/2014         | \$125,000     |
| PECADOM Plus: An active version of the PECADOM model in the context of seasonal malaria chemoprevention   | 07/2013           | 12/2013         | \$8,000       |
| <b>Ongoing OR Studies</b>   |                   |                 |               |
| <b>Title</b>  | <b>Start date</b> | <b>End date</b> | <b>Budget</b> |
| Phase III evaluation of long-lasting insecticide treated nets (multi-country study with Malawi and Kenya) | 12/2009           | 12/2015         | \$92,000      |
| Longevity of insecticides used for indoor residual spraying (multi-country study with Kenya)              | 07/2011           | 12/2014         | \$200,000     |

## **7. Behavior change communication**

### NMCP/PMI objectives

In November 2012, Senegal updated its 2008 national strategy for malaria communication, which outlines a series of challenges, objectives, and targets for the communication activities underpinning the National Strategic Plan. This communications strategy includes the following objectives:

- Increase the proportion of people sleeping under ITNs to > 80%
- Increase the proportion of pregnant women who take two 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 (Note: This objective has been achieved in all spray rounds supported by PMI)
- Strengthen partnerships with the private sector, media, local government, Parliament, and other government departments
- Monitor and evaluate the NMCP communication plan

The plan also outlines key messages, target groups, and channels through which communication activities are to be carried out. These activities fall into the categories of prevention, case management, epidemic response, and communication through partnerships.

While originally developed to support the goals and objectives of the 2011-2015 National Strategic Plan, the communications strategy remains consistent with the NMCP's new 2014-2018 Strategic Framework. The new framework emphasizes that IEC/BCC approaches in Senegal should be evidence-based and tailored to specific populations. The NMCP 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 campaigns are expected to take into account local specificities. For example, the NMCP anticipates conducting small-scale communications campaigns specifically in those areas receiving IRS, SMC or MSAT interventions. The 2014-2018 Strategic Framework also articulates the NMCP's desire to revitalize the partnership around BCC and broaden it to include the private sector, community-based organizations, and other sectors of the government. In particular, the NMCP foresees working more closely with primary and elementary schools by providing training for teachers as well as educational tools about malaria prevention and control.

### Progress since PMI was launched

PMI has supported various community mobilization and BCC activities in Senegal. These include both ongoing malaria communications (mass and interpersonal) and communication activities promoting specific events, such as IRS or LLIN distribution 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 IEC/BCC at community level include the importance of owning and using ITNs, prompt care-seeking in the case of fever, recognition of danger signs, the importance of attending ANC visits, and the importance of receiving the recommended IPTp. Through Peace Corps Volunteers and bilateral implementing partners, PMI has been able to engage in malaria education and prevention throughout the country.

To date, there has been little if any effort to evaluate the impact of the different communications activities on health/malaria indicators, such as LLIN use or care seeking behavior. This weakness was voiced often as USAID/Senegal was developing its 2011-2016 health strategy and directly led to the creation of a new program to concentrate on streamlining and “upgrading” communications interventions. Going forward, the focus will be on strategic activities with specific objectives, the results of which can and will be evaluated.

In 2012, the NMCP and National Health Education and Information Service (SNEIPS) created a national Malaria IEC/BCC Coordination Committee to promote harmonization of approaches and activities among the numerous partners. This was followed by a workshop to share actual materials and work plans, and to revise the 2011 malaria BCC plan. PMI supported both of these activities and has taken a lead on ensuring rigor in the development of BCC interventions. A team from Senegal, composed of the NMCP, SNEIPS, PMI, and two implementing partners, attended the PMI Malaria BCC workshop in September, 2013. This provided a good opportunity to share perspectives and experience and develop a common plan for moving forward with more evidence-based communications activities.

### Progress during the last 12 months

The NMCP, with the assistance of PMI, has introduced a more strategic approach to developing and implementing communications campaigns. This is reflected in the NMCP’s new 2014-2018 Strategic Framework. The NMCP’s approach includes identifying the determinants of behaviors related to malaria and using the findings to develop communication campaigns with an appropriate mix of messages and channels. Developed with the technical assistance of professional media/marketing firms and based on the determinants of the behaviors PMI seeks to influence, the new messages speak more directly to the targeted populations. This evidence-based approach is measurable and will allow PMI to more rigorously gauge the impact of the supported BCC campaigns.

**BCC for LLINs** During the past year, PMI supported the implementation of a communications campaign to accompany the introduction of subsidized LLINs in the private sector in large urban areas nationwide. The campaign focused on increasing brand recognition and demand through television and radio spots as well as printed media. Building on the results of market research showing that, for many people, nuisance avoidance is a more important factor for net use than malaria prevention, the campaign focused on getting a



good night's sleep, the protective qualities of the nets ("MILDA: The mosquito net that kills mosquitoes"), their affordability ("1,000 FCFA for 1,000 nights"), and where to obtain them (pharmacies, grocery stores, gas stations). For this campaign, three TV and four radio spots were produced and broadcast more than 500 times, focusing on major urban areas. Newspaper insertions and internet banners were also used to reach a wide audience. As a result, a total of 122,106 MILDA-branded ITNs were sold during the 2014 fiscal year.

PMI also provided support for a broader communications campaign to increase use of ITNs in general, which utilized a combination of mass media and inter personal communication strategies. From October 2013 to September 2014, two TV spots were produced and broadcast 226 times on multiple national networks, four radio spots were developed and broadcast 1,066 times, and 130 billboards were erected on roads around five major cities. In addition, 17,040 people participated in road shows that passed through 10 of 14 regions. An evaluation of this generic campaign began in July 2014.

In July 2014, a nationwide population-based survey was conducted to gather more information on the determinants of behavior related to ITN acquisition and use, as well as preferred and most effective communications channels.

**BCC for IRS** In the past year, PMI also continued to support communication activities in areas targeted for IRS to inform potential beneficiaries about the timing of spray activities, what they can expect, the precautions they need to take, and the health benefits of IRS. Finally, tools to collect data on communications activities were revised and materials to support BCC activities (posters, training guides, and manuals) were produced.

**BCC for SMC** Similarly, PMI funded the development of informational materials for the first SMC campaign in four districts in November/December 2013, and UNICEF supported dissemination costs. Materials were reviewed and revised based on that initial experience for the 2014 campaign in four regions. Acceptance of both the IRS and SMC campaigns has been high, indicating that the population understands the utility of the interventions.

**General Malaria BCC** Peace Corps Volunteers continued to play a significant role in disseminating net transformation techniques to communities and training people on care and repair. Volunteers also hosted local language radio programs, helped test new communications materials, and organized home visits that touch on various malaria themes.

Similar interpersonal communications activities were implemented through the outreach workers at health huts and sites under USAID's community health program. During the period October 2013 to September 2014, IEC/BCC activities were carried out in 2,214 health huts and 1,649 community-level sites on a variety of topics such as ITN use and maintenance, signs and symptoms of malaria, early care-seeking, and IPTp. A total of 1,618,087 people were reached with malaria IEC/BCC messages during this period.

### Plans and justification

With FY 2015 funds, PMI will support a range of communications activities to influence the social and behavior changes needed to improve the adoption of key malaria prevention and care seeking behaviors (e.g., net ownership, proper net use, net repair, IPTp, when and where to seek care). Communications activities in recent years have tended to focus on LLINs due to the intensive efforts dedicated to achieving universal coverage. More attention can now be given to other key behaviors, such as prompt care seeking, which becomes more important as transmission and acquired immunity decrease. Communications campaigns going forward will also put greater emphasis on the need for pregnant women to obtain at least three doses of SP during their pregnancy.

PMI plans to continue to work in close partnership with the SNEIPS, NMCP, the MoH and other ministries (the Ministry of Education, Ministry of the Family, etc.), private sector entities and various other local partners. Approaches will maximize the use of effective materials/tools and media products already developed and used successfully in Senegal while also seeking to develop innovative methods. Focused on evidence-based social marketing principles, PMI plans to use a mix of channels to deliver messages that promote malaria-related products and behaviors to targeted populations. Social mobilization and mass media activities will be conducted to reach large numbers of people, while interpersonal communications will be used at the community and health facility levels to reinforce messages and tailor them to individual situations.

Through participation in the national Malaria IEC/BCC Coordination Committee, PMI plans to continue to promote coordination across ministries, donors, implementing partners, and the private sector to harmonize the implementation of BCC programming. PMI also plans to support qualitative and quantitative studies to identify determinants of malaria-related prevention and care-seeking behaviors. All planned BCC activities will be monitored in order to improve their outcomes and impact.

*Proposed activities with FY 2015 funding (\$1,775,000)*

1. *Development, implementation, and evaluation of BCC activities (\$800,000)*

PMI plans to continue to support the NMCP's strategy to promote appropriate malaria prevention and care-seeking behaviors. One implementing partner is charged with ensuring harmonization amongst the PMI-funded partners who work at different levels of the system, from community to ministry. These funds will be used for formative research on determinants of behavior (quantitative and qualitative, as indicated), to contract with marketing firms to design materials and campaigns, to fund actual implementation (printing, mass media, national and regional events), and to evaluate results. Some of the campaigns will be relatively general and used nationwide (such as promoting IPTp) while others will be designed for specific situations, such as in the northern pre-elimination zones. PMI will also continue working with the NMCP to engage the private sector in malaria prevention efforts.

2. *Capacity building for BCC (\$100,000)*

PMI will also support USAID/Senegal's general efforts to improve health BCC in the country. These funds will contribute to capacity building activities for the MoH/NMCP and SNEIPS, including technical skills and management/organizational capacity. PMI will

continue to support the Malaria IEC/BCC Committee in its efforts to ensure high-quality, high-impact interventions (this committee is jointly coordinated by the NMCP and SNEIPS).

3. *Sustaining community mobilization activities (\$500,000)*

PMI plans to continue to support a wide variety of malaria communication and education activities nationwide on LLIN use, case management, MIP, and other preventive behaviors through localized community mobilization and interpersonal BCC activities. The first activity focuses primarily on strategy development and harmonization of materials, while this activity supports actual implementation at the community level by health outreach workers. Specific examples include home visits, group discussions, activities with schools, and World Malaria Day local events.

4. *Support to Peace Corps malaria-related activities (\$25,000)*

Active linkages with Peace Corps Volunteers are planned to continue, allowing volunteers and their communities to benefit from the technical resources that partners provide. In this partnership, PMI benefits from the committed community presence of about 280 volunteers. 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.

5. *Community sensitization and mobilization for IRS (\$250,000)*

PMI plans to ensure that populations in areas targeted for IRS are appropriately informed before each spray round through radio spots, community meetings, and house-to-house visits. Information pamphlets and other materials for the household visits and social mobilization activities are slated to be updated, printed, and distributed. Revising these materials is particularly important in light of Senegal's switch from district-wide IRS to targeted spraying of malaria hot spots within districts.

6. *Community sensitization and mobilization for SMC (\$100,000)*

As with IRS, PMI plans to promote the acceptance of SMC campaigns through radio spots, community meetings, and house-to-house visits. The experience of the 2014 campaign will be reviewed and communications materials updated/revised as needed. Given the potential for rumors and resistance related to giving medicine to well children, the focus will be on interpersonal communication methods.

## **8. Health system strengthening and capacity building**

### NMCP/PMI objectives

The 2011 – 2015 National Strategic Plan identifies three key objectives for health system strengthening:

1. Ensure the availability of antimalarial drugs and products in at least 95 percent of all public and community facilities.
2. Strengthen the managerial and operational capabilities of health personnel at all levels of the health system.

3. Ensure the timeliness, completeness and use of data for M&E of the 2011-2015 National Strategic Plan.

These objectives have been carried over into the new 2014-2018 Strategic Framework.

#### *Progress since PMI was launched*

Since beginning work in Senegal, PMI has supported health system strengthening and capacity building of the MoH to implement its malaria control program. Specific interventions include pharmaceutical management activities, training, supervision, drug quality monitoring, and policy reform. In 2013, the NMCP conducted a mid-term review to assess the program's performance. Many recommendations were made to improve the program's performance to ensure the achievement of the malaria pre-elimination objective by 2018.

In line with GHI principles, PMI has reinforced its efforts to build capacity and integrate across programs. PMI has supported training for pharmacy managers on supply chain management as part of an integrated activity covering principles that apply to all essential drugs. Similarly, malaria drug quality monitoring was integrated with medicines for the treatment of tuberculosis and HIV/AIDS, as well as oral contraceptives, with different programs contributing to support the overall budget.

**Pharmaceutical management:** The ultimate goal of PMI supporting the supply chain is to ensure that SP, ACTs, and RDTs are procured and made available in sufficient quantities at all service delivery points. Responding to recurrent stockouts of several commodities, in 2011 PMI supported an assessment of the CMS aimed at identifying root problems and potential solutions. Challenges included the lack of a procedures manual, inadequate utilization of the commodity management information system, and insufficient capacity among various personnel. PMI then provided assistance to update the procedures manual, which was disseminated throughout the health system to chief pharmacists, accountants, and other players. Also, a new drug management software (SAGE) was developed and installed at the CMS. Technical assistance from PMI has also supported efforts to improve stock management at the lowest levels of the system, with an emphasis on ensuring good ACT prescribing and dispensing practices at health posts and health huts.

**Capacity building:** For the past several years, PMI has supported the NMCP to supervise case management at hospitals, health centers, and health posts. PMI helps build national capacity in malaria control by supporting an annual malariology course and in M&E through funding the attendance of health system staff at the annual data management and M&E course at the African Center for Advanced Management Studies (*Centre Africain des Etudes Supérieures en Gestion*). In 2012, PMI was closely involved in developing and shepherding through policy changes related to case management and prevention.

**Drug quality monitoring:** Since its inception, PMI has supported antimalarial drug quality monitoring by the National Drug Control Laboratory (LNCM). The nationwide network now includes nine surveillance sites and samples are collected and analyzed on an annual basis. PMI

provides training, Minilab kits and supplies, and specialized TA. In particular, PMI is supporting the LNCM as it works towards International Organization for Standardization accreditation.

### Progress during the last 12 months

**Pharmaceutical management:** PMI continued its support to the CMS by providing technical assistance to develop a strategic plan that will guide it towards meeting the challenges it is facing, with all stakeholders sharing the same vision. Some specific improvements have been made and new initiatives are being piloted, including a mobile pharmacy for the three regions that do not have a pharmacy structure, and the Informed Push Model for some essential products (includes malaria in one region). Preliminary results of the first end-use verification survey revealed that ACT availability is still weak in health facilities while RDTs and injectable quinine are available in large quantity. Efforts will continue to increase supervision to make ACTs available on a permanent basis at all health facilities.

**Capacity building:** Integrated logistics supervision visits were conducted at all regional medical stores and health districts, and PMI also supported the NMCP to supervise case management at hospitals, health centers, and health posts. At the NMCP's request, PMI supported an organizational assessment and the recommendations will be implemented to strengthen the leadership and coordination capabilities of the program, allowing it to face the multi-dimensional challenges posed by the pre-elimination objective. Also, PMI provided technical assistance to the NMCP for the preparation and submission of four abstracts for the American Society for Tropical Medicine and Hygiene annual conference that were accepted for presentation.

In FY 2014 PMI continued its support to activities aimed at improving governance of the health system for increased access and quality service delivery. Following the evaluation of the first year of the MoH-led Performance-Based Financing (PBF) pilot, PMI activities including training and supervision in three districts contributed to improving malaria prevention and case management services for which compensation is paid. Because IPTp coverage is an indicator included in the PBF management plan and compensated, the uptake of IPTp has significantly increased in the target districts. In the District of Kaffrine for example, IPTp coverage has improved from 29.8% to 48.3% over a one-year period and from 31.9% to 69.5% in the District of Birkelane. Moreover, SP stockouts have been reduced considerably due to appropriate steps taken by service providers to ensure SP availability on a permanent basis during ANC services. Discussions are underway between USAID, the MoH, and the World Bank to expand the number of districts covered by PBF, which will contribute to the Government of Senegal's vision of Universal Health Coverage.

**Drug quality monitoring:** The 2013 round of sampling covered four zones across the country. Teams collected 247 antimalarials at the same time as ARVs, tuberculosis drugs, and oral contraceptives. Ninety-six percent of the antimalarial samples were found to conform based on the minilab testing. The 10 doubtful samples (8 of which were AS-AQ) were sent on for full testing along with 23% of those that passed the first level. All of these samples passed the confirmatory testing stage.

### Plans and justification

The NMCP requires ongoing skills development to respond to changes in malaria trends. Increased supervision is also necessary at all levels of the health system to ensure that policies and guidelines are implemented as appropriate. Besides concentrating on improving data collection to monitor drug availability and distribution, drug quality control activities will continue to receive more attention. With FY 2015 funding, PMI plans to support activities to develop capacity at sub-national and central levels to continue working towards the attainment of the NMCP's pre-elimination objective.

### Proposed activities with FY 2015 funding (\$1,095,000)

With FY 2015 funding, PMI plans to support the following activities to strengthen the health system and develop capacity at sub-national and central levels.

#### *1. Support to NMCP to enable program supervision (\$200,000)*

With FY 2015 funds, PMI plans to contribute to the NMCP's supportive supervision visits to regional and health district levels. Supervision at health posts, health centers, and hospitals will continue to receive increased attention.

#### *2. State of the art capacity building opportunities (\$20,000)*

With the objective of achieving malaria pre-elimination by 2018, NMCP personnel and the country program will greatly benefit from participating in international technical, scientific, and professional meetings that present opportunities to learn best practices, share experiences, and develop networks. Potential meetings include the American Society for Tropical Medicine and Hygiene and the Pan-African Malaria Conference. PMI would encourage the NMCP to seek funding from the MoH and conference organizers before supporting participation at such events.

#### *3. Support for Performance-Based Financing for malaria indicators (\$150,000)*

A few malaria indicators were selected as part of the PBF performance management plan. PMI plans on providing continued support for the PBF program in participating districts, including training, supervision, data collection and verification, and payment of performance bonuses.

#### *4. Support supply chain management at the central level (\$300,000)*

With FY 2015 funds, PMI plans to continue to support the implementation of key reforms instituted during prior years and provide technical assistance. Activities will potentially include expanding the "push model" to deliver commodities directly to health facilities, which has been piloted in some areas, and increasing the logistical capacity of the CMS.

#### *5. Support supply chain management and the strengthening of drug management at the peripheral level (\$200,000)*

This activity will include supporting training and supervision specifically at the district and health post levels, as well as end-use verification surveys.

#### *6. Drug quality monitoring and advocacy (\$225,000)*

In collaboration with the NMCP, the Directorate of Pharmacies and Medicines and the LNCM, PMI plans to continue its support to drug quality monitoring activities in nine sites. In addition, PMI plans to support advocacy for policy enforcement of drug quality standards. Proposed activities will also include technical assistance to the LNCM as it seeks to meet the requirements to be a regional reference laboratory.

## **9. Staffing and administration**

Two health professionals serve as Resident Advisors to oversee the PMI in Senegal, one representing CDC and one representing USAID. In addition, one or more Foreign Service Nationals (FSNs) work as part of the PMI team. All PMI staff members are part of a single inter-agency team led by the USAID Mission Director or his/her designee in country. The PMI team shares responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day activities. Candidates for resident advisor positions (whether initial hires or replacements) will be evaluated and/or interviewed jointly by USAID and CDC, and both agencies will be involved in hiring decisions, with the final decision made by the individual agency.

The PMI professional staff work together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance to PMI partners.

The PMI lead in country is the USAID Mission Director. The two PMI resident advisors, one from USAID and one from CDC, report to the Senior USAID Health Officer for day-to-day leadership, and work together as a part of a single interagency team. The technical expertise housed in Atlanta and Washington guides PMI programmatic efforts and thus overall technical guidance for both resident advisors falls to the PMI staff in Atlanta and Washington. Since CDC resident advisors are CDC employees (CDC USDD—38), responsibility for completing official performance reviews lies with the CDC Country Director who is expected to rely upon input from PMI staff across the two agencies that work closely day in and day out with the CDC resident advisor and thus best positioned to comment on the resident advisor's performance.

The two PMI resident advisors are based within the USAID health office and are expected to spend approximately half their time sitting with and providing technical assistance to the national malaria control programs and partners.

Locally-hired staff to support PMI activities either in Ministries or in USAID will be approved by the USAID Mission Director. Because of the need to adhere to specific country policies and USAID accounting regulations, any transfer of PMI funds directly to Ministries or host governments will need to be approved by the USAID Mission Director and Controller, in addition to the USG Global Malaria Coordinator.

*Proposed activities with FY 2015 funding (\$1,512,000)*

These funds are slated to be used for coordination and management of all in-country PMI activities including support for salaries and benefits for two resident advisors and local staff, office equipment and supplies, and routine administration and coordination expenses.

**Table 1****President's Malaria Initiative - Senegal****Planned Malaria Obligations for FY 2015: Budget Breakdown by Partner**

| <b>Partner</b>   | <b>Geographic Area</b> | <b>Activity</b>   | <b>Budget (\$)</b> | <b>%</b> |
|--|------------------------|---|--------------------|----------|
| CDC IAA  | Targeted districts     | TA for entomological monitoring and operations research   | 39,000             | 0.2 %    |
| Community Health Program Component & TBD                   | Nationwide             | Community case management of malaria at health huts and by home-based volunteers; community mobilization for malaria prevention and treatment                                     | 1,000,000          | 4.6 %    |
| Health Communication and Promotion Program Component & TBD | Nationwide             | Strategy development and implementation of BCC activities   | 1,000,000          | 4.6 %    |
| Health Services Improvement Program Component              | Nationwide             | Strengthen MIP services; training and supervision of health service providers for malaria case management   | 1,350,000          | 6.3 %    |
| Health System Strengthening Program Component              | Nationwide             | Strengthening supply chain management; performance-based financing  | 450,000            | 2.1 %    |
| IRS TO6  | Targeted districts     | IRS operations  | 2,500,000          | 11.6 %   |
| Measure DHS  | Nationwide             | Continuous DHS  | 450,000            | 2.1 %    |
| National Drug Control Laboratory                           | 9 sites                | Drug quality monitoring and advocacy  | 200,000            | 0.9 %    |
| National Malaria Control Program                           | Nationwide             | IRS; routine ITN distribution system & mass campaign; SMC; malaria epidemic surveillance; case investigation; program supervision; PECADOM Plus; introduce primaquine; microscopy | 6,260,000          | 29.0 %   |

| <b>Partner</b>    | <b>Geographic Area</b> | <b>Activity</b>  | <b>Budget (\$)</b>  | <b>%</b>    |
|-------------------|------------------------|--|---------------------|-------------|
| TBD               | Nationwide             | LLIN durability monitoring, procurement of LLINs, ACTs, RDTs, SP-AQ, lab consumables | 6,189,000           | 28.7 %      |
| UCAD-Entomology   | Targeted districts     | Entomological monitoring   | 500,000             | 2.8 %       |
| UCAD-Parasitology | Nationwide             | Therapeutic efficacy testing   | 100,000             | 0.5 %       |
| US Peace Corps    | Nationwide             | Support to Peace Corps malaria activities  | 25,000              | 0.1 %       |
| US Pharmacopeia   | Nationwide             | TA for accreditation and drug quality monitoring                                     | 25,000              | 0.1 %       |
| USAID             | Nationwide             | In-country staff & administration  | 928,035             | 4.3 %       |
| CDC               | Nationwide             | In-country staff & administration  | 583,965             | 2.7 %       |
| <b>Total</b>      |                        |  | <b>\$21,600,000</b> | <b>100%</b> |

**Table 2**

**President's Malaria Initiative – Senegal**

**Planned Malaria Obligations for FY 2015: Budget Breakdown by Activity**

| Proposed Activity  | Mechanism  | Budget           |                  | Geographic Area                 | Description   |
|--|--|------------------|------------------|---------------------------------|---|
|  |  | Total \$         | Commodity \$     |                                 |   |
| <b>PREVENTIVE ACTIVITIES</b>                                 |  |                  |                  |                                 |   |
| <b>Insecticide-Treated Nets</b>                              |  |                  |                  |                                 |   |
| Procurement of LLINs   | TBD  | 4,000,000        | 4,000,000        | Nationwide                      | 1,000,000 LLINs to support routine channels and national universal coverage campaign.                   |
| Operational costs of maintaining routine distribution system | NMCP   | 100,000          |                  | Nationwide                      | Transport, support materials, supervision.  |
| Operational costs for mass distribution                      | NMCP   | 700,000          |                  | Nationwide                      | Transport, training, support materials, supervision.  |
| Operational costs for social marketing of LLINs              | Health Communication and Promotion Program Component & TBD | 100,000          |                  | Nationwide                      | Social marketing of LLINs in the private sector, including packaging and transportation to wholesalers. |
| <b>SUBTOTAL ITNs</b>   |  | <b>4,900,000</b> | <b>4,000,000</b> |                                 |   |
| <b>Indoor Residual Spraying</b>                              |  |                  |                  |                                 |   |
| Indoor residual spraying operations                          | IRS 2 TO6  | 2,500,000        | 2,000,000        | Hot spots in eligible districts | Technical assistance and purchase of insecticides.  |

| Proposed Activity   | Mechanism                                     | Budget           |                  | Geographic Area                 | Description   |
|---|---|------------------|------------------|---------------------------------|---|
|   |   | Total \$         | Commodity \$     |                                 |   |
|   | NMCP  | 1,500,000        |                  | Hot spots in eligible districts | Spraying of hot spots in districts determined to be eligible. Assumes transfer of majority of operational cost to NMCP. Exact funding breakdown to be determined                        |
| Strengthen entomologic capabilities and entomologic monitoring  | UCAD - Ento                                   | 500,000          |                  | Nationwide                      | Entomological monitoring.   |
|   | CDC IAA                                       | 39,000           |                  | N/A                             | \$24,000 TA, \$15,000 supplies.   |
| <b>SUBTOTAL IRS</b>   |   | <b>4,539,000</b> | <b>2,000,000</b> |                                 |   |
| <b>Malaria in Pregnancy</b>   |   |                  |                  |                                 |   |
| Reinforce provision of effective malaria in pregnancy services in health facilities and through outreach strategies | Health Services Improvement Program Component | 600,000          |                  | Nationwide                      | Monitoring and supportive supervision, update materials to reflect revised guidelines, training of new staff. Cups and water filters as needed for directly-observed treatment with SP. |
| <b>SUBTOTAL MIP</b>   |   | <b>600,000</b>   | <b>0</b>         |                                 |   |
| <b>SUBTOTAL PREVENTIVE</b>  |   | <b>9,939,000</b> | <b>6,000,000</b> |                                 |   |
| <b>CASE MANAGEMENT</b>  |   |                  |                  |                                 |   |
| <b>Diagnosis</b>  |   |                  |                  |                                 |   |
| Strengthen microscopic diagnosis of malaria   | NMCP  | 200,000          |                  | Nationwide                      | Training, supervision, quality assurance, and quality control for microscopy.   |
| Procurement of microscopes and laboratory consumables   | TBD   | 10,000           | 10,000           | Nationwide                      | Laboratory consumables and replacement of aging   |

| Proposed Activity  | Mechanism                                     | Budget           |                | Geographic Area    | Description  |
|--|---|------------------|----------------|--------------------|--|
|  |   | Total \$         | Commodity \$   |                    |  |
|  |   |                  |                |                    | microscopes, as needed.  |
| Procurement of RDTs  | TBD   | 931,000          | 931,000        | Nationwide         | 1,500,000 RDTs   |
| <b>SUBTOTAL DIAGNOSIS</b>  |   | <b>1,141,000</b> | <b>941,000</b> |                    |  |
| <b>Treatment</b>   |   |                  |                |                    |  |
| Improve case management at health facilities   | Health Services Improvement Program Component | 550,000          |                |                    | Support for training and supervision of malaria case management at all levels of the health system, including the private sector.  |
| Strengthen community case management   | Community Health Program Component & TBD      | 500,000          |                | Nationwide         | Support for community case management of malaria by CHWs in 1,620 functional health huts. Includes training, supervision, and monitoring of staff.   |
| Supervision for integrated home-based management of malaria (PECADOM) and operational costs for PECADOM Plus | NMCP  | 550,000          |                | Selected districts | Support for the supervision of DSDOMs recently trained to provide malaria diagnosis and treatment as part of an integrated package of services. Extension and continuation of previous DSDOM and inclusion of health huts. |
| Procurement of ACTs  | TBD   | 514,000          | 514,000        | Nationwide         | Approximately 600,000 ACTs.  |

| Proposed Activity  | Mechanism | Budget    |              | Geographic Area                       | Description  |
|--|-----------|-----------|--------------|---------------------------------------|--|
|  |           | Total \$  | Commodity \$ |                                       |  |
| Operational costs for SMC implementation                                     | NMCP      | 1,200,000 |              | Kédougou, Sédhiou, Kolda, Tambacounda | Support for training, supplies, and supervision for the SMC activities.  |
| Procurement of drugs for SMC implementation                                  | TBD       | 542,000   | 542,000      | Kédougou, Sédhiou, Kolda, Tambacounda | Monthly doses of SP-AQ for approximately 600,000 children (ages 3 months to 10 years), administered by community volunteers for 3-4 months during the high transmission season.          |
| Operational costs of expanding pre-referral treatment to the community level | NMCP      | 250,000   |              | Nationwide                            | Support for nationwide scale-up of community-level pre-referral treatment.   |
| Procurement of rectal artesunate for pre-referral treatment                  | TBD       | 25,000    | 25,000       | Nationwide                            | Approximately 15,000 suppositories.  |
| Procurement of injectable artesunate for treatment of severe malaria         | TBD       | 57,000    | 57,000       | Nationwide                            | Injectable artesunate to treat severe malaria cases referred to the hospital or health center level (estimate is for approx. 30% of need based on 2013 severe malaria incidence levels). |
| Procurement of primaquine  | TBD       | 10,000    | 10,000       | Pre-elimination districts             | Procurement costs include primaquine and G6PD tests (if commercially available) for single low-dose treatment.   |

| Proposed Activity   | Mechanism     | Budget           |                  | Geographic Area           | Description   |
|---|---------------|------------------|------------------|---------------------------|---|
|   |               | Total \$         | Commodity \$     |                           |   |
| Implementation of low-dose primaquine administration in elimination districts | NMCP          | 40,000           |                  | Pre-elimination districts | Support for introduction of single low-dose treatment in one pre-elimination region.  |
| Therapeutic efficacy monitoring   | UCAD-Parasito | 100,000          |                  | 2 sites                   | Therapeutic efficacy studies in 4 sites (2 sites per year on a rotating basis).   |
| <b>SUBTOTAL TREATMENT</b>   |               | <b>4,338,000</b> | <b>1,148,000</b> |                           |   |
| <b>SUBTOTAL CASE MANAGEMENT</b>   |               | <b>5,479,000</b> | <b>2,089,000</b> |                           |   |
| <b>MONITORING AND EVALUATION</b>  |               |                  |                  |                           |   |
| Support to the malaria module in cDHS   | Measure DHS   | 450,000          |                  | Nationwide                | Technical assistance for sampling and analysis (\$100,000). Operational support (\$350,000) to a full malaria module as part of cDHS, including biomarkers. Co-funding from other donors. |
| Strengthening malaria surveillance and response                               | NMCP          | 400,000          |                  | Nationwide                | Strengthening notification, particularly using mobile communication. (\$75,000 of funds reserved for potential response to epidemics).  |
| Case investigation in districts with incidence <5/1,000                       | NMCP          | 400,000          |                  | Pre-elimination districts | Support training for the investigation of index cases and neighboring households and weekly electronic data transmission with DHIS2 integration.  |

| Proposed Activity   | Mechanism  | Budget           |              | Geographic Area                       | Description   |
|---|--|------------------|--------------|---------------------------------------|---|
|   |  | Total \$         | Commodity \$ |                                       |   |
| Monitoring and evaluation of seasonal malaria chemoprevention | NMCP   | 250,000          |              | Kédougou, Sédhiou, Kolda, Tambacounda | Support process monitoring, end of season coverage survey and molecular markers.  |
| Evaluation of impact of malaria control activities 2011-2015  | NMCP   | 100,000          |              | Nationwide                            | Funding for Round 2 impact evaluation of 2011-2015 malaria control activities.  |
| LLIN durability monitoring                                    | TBD  | 100,000          |              | Nationwide                            | Support for training and field data collection, supplies and equipment for cone bioassays   |
| <b>SUBTOTAL M&amp;E</b>                                       |  | <b>1,700,000</b> | <b>0</b>     |                                       |   |
| <b>BEHAVIOR CHANGE COMMUNICATION</b>                          |  |                  |              |                                       |   |
| Development, implementation, and evaluation of BCC activities | Health Communication and Promotion Program Component & TBD | 800,000          |              | Nationwide                            | Overall support for the development, production, and dissemination of IEC/BCC materials, including support for the national IEC/BCC Committee to ensure harmonization of messages among partners. |
| Capacity building for BCC                                     | Health Communication and Promotion Program Component & TBD | 100,000          |              | Nationwide                            | Support for BCC capacity building of the MoH/NMCP and SNEIPS, including technical skills and managerial capacity.   |

| Proposed Activity                                      | Mechanism                                | Budget           |              | Geographic Area                       | Description   |
|--|--|------------------|--------------|---------------------------------------|---|
|  |  | Total \$         | Commodity \$ |                                       |   |
| Sustaining community mobilization activities           | Community Health Program Component & TBD | 500,000          |              | Nationwide                            | Comprehensive malaria community mobilization activities including IEC/BCC, support for MIP, case management, ITNs.  |
| Support to Peace Corps malaria related activities      | Small Projects Assistance Peace Corps    | 25,000           |              | Peace Corps Volunteer communities     | Support for specific malaria-related Peace Corps volunteer projects.  |
| Community sensitization and mobilization for IRS       | NMCP                                     | 250,000          |              | Hot spots in eligible districts       | Implementation of radio spots, community meetings, and house-to-house visits to ensure high community acceptance of IRS in spray areas.                                     |
| Community sensitization and mobilization for SMC       | NMCP                                     | 100,000          |              | Kédougou, Sédhiou, Kolda, Tambacounda | Promotion of SMC through radio spots, community meetings, and house-to-house visits in regions targeted for this intervention.  |
| <b>SUBTOTAL BCC</b>                                    |  | <b>1,775,000</b> | <b>0</b>     |                                       |   |
| <b>HEALTH SYSTEM STRENGTHENING / CAPACITY BUILDING</b> |  |                  |              |                                       |   |
| Support to NMCP to enable program supervision          | NMCP                                     | 200,000          |              | Nationwide                            | Support visits by national staff to regional and district levels.   |
| State of the art capacity building opportunities       | NMCP                                     | 20,000           |              | N/A                                   | Support participation in international technical scientific and professional meetings that present NMCP staff opportunities to learn best practices, share experiences, and |

| Proposed Activity  | Mechanism                                     | Budget           |              | Geographic Area    | Description  |
|--|---|------------------|--------------|--------------------|--|
|  |   | Total \$         | Commodity \$ |                    |  |
|  |   |                  |              |                    | develop networks. Potential meetings will include the American Society for Tropical Medicine and Hygiene and Pan-African Malaria Conference. ASTMH, MIM. 2 trips, 2 people each. |
| Support for Performance-Based Financing for malaria indicators                 | Health System Strengthening Program Component | 150,000          |              | Targeted districts | Continued support for the collection of malaria indicators under the Performance-Based Financing model.  |
| Supply chain management and drug management strengthening at the central level | Health System Strengthening Program Component | 300,000          |              | Nationwide         | Support for the NMCP to improve quantification through regular consumption data collection from the peripheral level.  |
| Support to supply chain management at the peripheral level                     | Health Services Improvement Program Component | 200,000          |              | Nationwide         | Support for training and supervision at all levels of the supply chain.  |
| Drug quality monitoring and advocacy   | National Drug Control Laboratory              | 200,000          |              | Nationwide         | Sampling and testing antimalarials from 9 sites nationwide.  |
|  | USP   | 25,000           |              | 9 sites            | TA for accreditation and drug quality monitoring.  |
| <b>SUBTOTAL HSS &amp; CAPACITY BUILDING</b>                                    |   | <b>1,095,000</b> | <b>0</b>     |                    |  |

| Proposed Activity                             | Mechanism | Budget              |                    | Geographic Area | Description   |
|---|-----------|---------------------|--------------------|-----------------|---|
|   |           | Total \$            | Commodity \$       |                 |   |
| <b>IN-COUNTRY STAFFING AND ADMINISTRATION</b> |           |                     |                    |                 |   |
| USAID Technical Staff                         | USAID     | 928,035             |                    |                 | Support the salaries and expenses for one USAID resident advisor and local staff. |
| CDC Technical Staff                           | CDC       | 583,965             |                    |                 | Support the salary and expenses for one CDC resident advisor.                     |
| <b>SUBTOTAL IN-COUNTRY STAFFING</b>           |           | <b>1,512,000</b>    | <b>0</b>           |                 |   |
| <b>GRAND TOTAL</b>                            |           | <b>\$21,600,000</b> | <b>\$8,089,000</b> |                 |   |

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