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 2013 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.

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PRESIDENT'S MALARIA INITIATIVE

PRESIDENT'S MALARIA INITIATIVE

Senegal

Malaria Operational Plan FY 2013

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ABBREVIATIONS and ACRONYMS

ACT	artemisinin-based combination therapy
AL	artemether-lumefantrine
ANC	antenatal care
AS/AQ	artesunate-amodiaquine
BCC	behavior change communication
CDC	Centers for Disease Control and Prevention
CDHS	Continuous Demographic and Health Survey
CFA	West African Financial Community Franc (USD $1 = F CFA 500)
CMS	Central Medical Stores
DHA-PQ	dihydroartemisinin-piperaquine
DHS	Demographic and Health Survey
DSDOM	*dispensateur de soins à domicile* (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
IEC	information, education, communication
IFRC	International Federation of Red Cross and Red Crescent Societies
IP	*Institut Pasteur*
IPTp	intermittent preventive treatment in pregnant women
IRD	*Institut pour le Recherche et Développement*
IRS	indoor residual spraying
ITN	insecticide-treated bed net
LLIN	long-lasting insecticide-treated bed net
M&E	monitoring and evaluation
MACEPA	Malaria Control and Evaluation Partnership for Africa
MIP	malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
NGO	non-governmental organization
NMCP	National Malaria Control Program
PCS	post-campaign survey
PECADOM	*prise en charge à domicile* (home-based management of malaria)
PMI	President's Malaria Initiative
RDT	rapid diagnostic test
SLAP	*Service de Lutte Antiparasitaire* (Parasite Control Service)
SMC	seasonal malaria chemoprevention
SNEIPS	National Health Education and Information Service
SP	sulfadoxine-pyrimethamine
SP-AQ	sulfadoxine-pyrimethamine/amodiaquine
UCAD	*Université Cheikh Anta Diop*
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

I. EXECUTIVE SUMMARY

Malaria prevention and control is a major foreign assistance objective of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a multi-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 partner with countries to improve health outcomes, with a particular focus on improving the health of women, newborns, and children.

The President's Malaria Initiative (PMI) is a core component of the GHI, along with HIV/AIDS, 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, funding for PMI has now been extended through FY 2014 and, as part of the GHI, the goal of PMI has been adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015.

Senegal was selected as a PMI country in 2006. Large-scale implementation malaria control activities began in FY 2007 and progressed rapidly with significant progress demonstrated to date.

This FY 2013 Malaria Operational Plan for Senegal was developed in close consultation with the National Malaria Control Program (NMCP) and with the participation of all national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support with FY 2013 funding fit well with the 2011-2015 National Malaria Control Strategic Plan and build on investments made by PMI and other partners to improve and expand malaria-related services over the last five years. This FY 2013 MOP is designed to support the consensus of the Government of Senegal and all the stakeholders to engage in the pre-elimination phase of malaria control, as data have demonstrated a significant reduction in malaria prevalence in many regions of the country. In line with GHI principles, PMI has reinforced its efforts to build capacity and integrate across programs. The proposed FY 2013 PMI budget for Senegal is $21.6 million, of which 18.6% will be managed directly by local entities/institutions.

Senegal has a population estimated at 13.2 million, with approximately 2.2 million children less than five years of age and 528,000 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 has continued to fall, from 6% in 2008 to 3% in 2009. Since July 2010, routine morbidity and mortality data are not available due to a health worker union data retention strike.

The 2010-2011 Demographic and Health Survey showed that under-five mortality continued to fall, from 121 per 1000 live births in 2005 to 72 in 2010, a 40% drop in five years. The proportion of households owning at least one insecticide treated net (ITN) increased from 45% in 2005 to 63% in 2010, and the proportion of children under five sleeping under an ITN the previous night had increased from 21% to 35%, 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 recent problems in maintaining supplies of the drug.

The following paragraphs summarize progress made during the last 12 months and proposed FY 2013 activities.

Insecticide-Treated Nets (ITNs): During FY 2012, PMI supported the free distribution of 1.5 million long-lasting insecticide-treated bed nets (LLINs) in four regions, with more than four million distributed in 12 regions during the past two years, using a universal coverage approach. To promote demand for and correct use of ITNs, PMI has also invested in behavior change communication (BCC) using primarily community-based networks. Routine LLIN distribution also began in the health system in June, providing free LLINs to pregnant women attending antenatal care and subsidized nets to other clients. An assessment of other possible distribution channels was carried out in August.

With FY 2013 funding, PMI and the NMCP will continue supporting the routine distribution system to bridge the gap for those that do not possess an LLIN and to replace nets no longer appropriate to be used. PMI will procure 1.25 million LLINs to support both the routine and mass distribution strategies. The total LLIN need for FY 2014 is estimated at 4,756,876. PMI LLINs will complement those expected to be procured by the NMCP via the Global Fund but there will likely still be a gap to be filled by other funding partners.

Indoor Residual Spraying (IRS): During FY 2012, PMI supported IRS activities in five districts sprayed in previous years (Guinguinéo, Koumpentoum, Malem Hoddar, Nioro and Velingara), and the new district of Koungheul. Bendiocarb was the selected insecticide, as little resistance has been shown to this insecticide after last year's spray operations. A total of 306,916 structures were sprayed during the June-August 2012 campaign and 1,095,093 people were protected. With FY 2013 funding, PMI will support spray operations and entomological monitoring in the same six districts. An estimated 320,000 structures will be sprayed, protecting more than 1.1 million people.

Malaria in Pregnancy: The significant drop in coverage for intermittent preventative treatment in pregnant women (IPTp) can be attributed largely to recurrent stock-outs of SP. Nevertheless, in FY 2012 PMI continued support for training and supervision to assure that quality services were offered to the extent possible. As the country is expected to procure the stock of SP needed for 2014, PMI FY 2013 funding will focus on monitoring and supportive supervision of malaria in pregnancy service delivery, improvement of data collection regarding IPTp, and training of new staff on IPTp, the importance of LLIN use in pregnancy, diagnosis and management of malaria in pregnancy, and counseling and interpersonal communication skills. PMI anticipates that at least 100 service providers will receive initial training and 900 will receive refresher training on the same subjects.

Case Management: During the past year, PMI procured 700,000 rapid diagnostic tests (RDTs) and 360,000 doses of artemisinin-based combination therapies (ACTs). PMI has also supported the training and supervision of health care providers at the health facility level, including a strategy of peer supervision and mentoring known as *TutoratPlus*. At the community level, PMI continued to support both health huts offering an integrated package of services, including

malaria case management with rapid diagnostic tests (RDTs) and ACTs, and the malaria-specific home-based management of fever (PECADOM) program. With FY 2013 funding, PMI will continue its support to improving case management of malaria by procuring 1.2 million RDTs and 354,000 ACT treatments to cover the transition period to the Global Fund Round 10, Phase 2 grant. PMI will continue to support the NMCP's efforts to implement new case management policies such as the treatment of malaria cases in pregnant women using ACTs, pre-referral treatment with rectal artesunate, and the scale up of the seasonal malaria chemoprevention for children in high transmission zones in Senegal.

Monitoring and Evaluation (M&E)/Operations Research: PMI's M&E activities are carried out jointly with the NMCP and other partners, and PMI supports implementation of the new NMCP M&E plan. Activities supported by PMI during the past year have included the development of the Continuous Demographic and Health Survey (CDHS) to enable data collection, processing, and analysis on a yearly basis to enable reporting, monitoring, evaluation, and decision-making, not only for malaria programming, but also for other health interventions. FY 2013 funds will be used to continue support for the epidemic surveillance system and the CDHS, as well as an operations research project focusing on the quality of case management of severe malaria

Behavior Change Communication: During FY 2012 PMI continued to support community-based communications activities to increase LLIN use, promote prompt care seeking, and encourage acceptance of IRS. Home visits and discussion groups were complemented by mass media approaches, particularly using local language radio stations. Work also began with the National Health Information and Education Service to implement a national BCC framework. The first two phases of the "Culture of Net Use" study were conducted and provided valuable information that will be used to inform the future design and focus of BCC activities. These activities will continue with FY 2013 funds, with specific focus on monitoring and evaluating the impact of communications activities.

Capacity Building and Health Systems Strengthening: Since beginning work in Senegal, PMI has supported the strengthening the health system and the building the capacity of the Ministry of Health to operate its malaria control program. In early FY 2012, activities began to assist the NMCP and the Ministry of Health (MOH) implement recommendations from the supply chain management assessment. PMI also supported the NMCP to supervise case management at hospitals, health centers, and health posts, and worked to build national capacity for M&E through funding the attendance of health system staff at the annual data management and monitoring and evaluation course.

With FY 2013 funds, PMI will continue supporting the reforms instituted in prior years and provide technical assistance to improve the performance of the supply chain and ensure that essential drugs are continuously available to service delivery points nationwide. In keeping with USAID/Forward reforms, PMI FY 2013 funds will be transferred to the NMCP and four other Government of Senegal entities as a means of increasing their capacity to directly manage donor funds and to address institutional needs. The support to the NMCP will be used to: a) enable program supervision, b) support a staff entomologist, c) organize a malariology course, d) operate the routine ITN distribution system, e) extend seasonal malaria chemoprevention into new regions, and f) strengthen malaria epidemic surveillance. Work will also continue through other implementing partners to strengthen the supply chain.

II. STRATEGY

1. Introduction

The President's Malaria Initiative (PMI) is a core component of the Global Health Initiative (GHI), along with HIV/AIDS and tuberculosis. PMI was launched in June 2005 as a 5-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, funding for PMI has now been extended through FY 2014 and, as part of the GHI, the goal of PMI has been adjusted 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, insecticide-treated nets, intermittent preventive treatment of pregnant women, and indoor residual spraying.

Senegal was selected as a PMI country in 2006. Large-scale implementation of artemisinin-based combination therapies (ACTs) and intermittent preventive treatment in pregnancy (IPTp) began in Senegal in mid-2007 and progressed rapidly with support from PMI and other partners. Artemisinin-based combination therapies and IPTp are now being used in all public health facilities nationwide and more than four million long-lasting insecticide-treated bed nets (ITNs) have been distributed to the general population since 2010.

This Fiscal Year (FY) 2013 Malaria Operational Plan 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) five-year strategy. It was developed in consultation with the NMCP, with participation of national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing 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 if the targets of the NMCP and PMI are to be achieved, and describes planned activities for FY 2013 funding.

2. Malaria Situation in Senegal

Senegal's estimated population in 2013 will be approximately 13.4 million with 42% living in urban areas[1]. Although substantial improvements have been achieved since the 1960s, Senegal's indicators of human development remain low, with the country ranked 155 out of 187 countries worldwide on the Human Development Index[2]. The infant mortality rate is 47 and the under-five mortality rate is 72 per 1,000 live births[3]. Maternal mortality is estimated to be 392 per 100,000 live births and the mean life expectancy is 56 years[3]. 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[4].

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 < 300 mm

of rainfall occurring between July and September, a central Sahelian zone with 400 – 1,000 mm of rainfall occurring between July and October, and a 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 Sahelian, with high transmission toward the end of and immediately after the rainy season and little transmission during the rest of the year, and the tropical, with year-round transmission peaking during the rainy season. 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 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 2.2 million children less than five years of age and 528,000 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, clinicians were directed to test all suspected cases of malaria and to treat and report only those cases with positive results. The proportion of suspected cases tested rose from 15% in January 2008 to 89% in December 2008, and in 2009, 86% 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 obscures assessment of the impact of program activities, between 2008 and 2009 this reduction continued, with malaria representing only 3% of all outpatient visits and 4% of all deaths in 2009. Since July 2010, morbidity and mortality data are not available because health worker unions began a nationwide data retention strike. Although clinical activities continue, health workers no longer report any routinely collected data, including those related to malaria.

3. Country Health System Delivery Structure and 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 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 at the District Health Center and at peripheral facilities throughout the district, as well as overseeing prevention activities.

Senegal currently is divided into 76 health districts, each with at least one health center and a number of health posts that are staffed by chief nurses and sometimes midwives. There were 1,095 health posts in Senegal in 2010.[3] Although not a formal part of the health system, Senegal's health care pyramid rests on a foundation of approximately 2,000 "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 equipment and space needed to provide services. The community health workers who staff the huts offer 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 (*dispensateurs de soins à domicile, DSDOM*), provides testing with rapid diagnostic tests (RDTs) and treatment with ACTs through the home-based management of malaria program (*prise en charge à domicile, PECADOM*), now active in approximately 1,000 villages.

4. Country Malaria Control Strategy: Achieve Pre-Elimination by 2015

The NMCP's evaluation of the 2006-2010 National Strategic Plan for Malaria Control concluded that currently applicable interventions had been maximally scaled up given the resources available, with dramatic decreases in morbidity and mortality, but without achieving interruption of transmission. In developing the 2011-2015 National Strategic Plan, the NMCP has adopted a goal of reaching the threshold for pre-elimination (less than one case per 1,000 population) by 2015, continuing the use of proven interventions already scaled up nationally, adopting new proven interventions in a targeted manner, and piloting new interventions. Focus will be placed on zones with high population and endemicity. The plan also establishes the target of reducing malaria mortality by 75% from a 2010 baseline, using the following strategies and objectives:

Strategies	**Objectives**
Integrated vector management	• ≥ 80% of people sleep under an LLIN • ≥ 90% of people in targeted zones protected by indoor residual spraying (IRS) • ≥ 95% of productive larval sources treated in targeted zones
Malaria in pregnancy	• ≥80% of pregnant women receive two doses of IPTp • 100% of pregnant women with malaria treated with recommended antimalarials
Case management	• ≥ 95% of suspected cases of malaria tested with an RDT • Treat 100% of confirmed cases of malaria according to national policy
Epidemic preparedness	• Detect 80% of epidemics in a timely fashion • Bring every epidemic under control within two weeks of its detection
Management of procurement and stocks	• Ensure that ≥95% of health structures have RDTs and ACTs in stock
Communication for health promotion	• Reinforce health promotion in order to improve use of malaria control interventions
Monitoring and evaluation	• Insure prompt and complete reporting and use of data for monitoring and evaluation of the 2011-2015 Strategic Plan
Program management	• Improve the management of the program at all levels

The 2011-2015 National Strategic Plan for Malaria Control outlines an integrated package of activities, which includes major efforts in integrated vector management, malaria in pregnancy,

case management, epidemic prevention and control, pharmaceutical supply chain management, health promotion, program management, and monitoring and evaluation. Supporting interventions include human resource management, management and mobilization of financial resources, supply chain management, coordination of partnerships, and community mobilization. While the plan was written based on currently scaled up interventions, the NMCP is moving rapidly to adopt additional interventions (such as seasonal malaria chemoprevention (SMC) and pre-referral treatment) that are expected to help the program to reach its goals.

5. Integration, Collaboration and Coordination

Funding and Technical Partnerships

Senegal currently has one active **Global Fund** malaria grant, Round 10, an $88 million grant for 2012 to 2016, awarded to two principal recipients, the NMCP and IntraHealth International. Disbursement of the second phase of the previous round (Round 7) was significantly delayed, resulting in the cancellation of funds and disruption to the successful implementation of the malaria control plan during the past two years. Disbursement of Round 10 funds required the return of cost recovery funds to the Global Fund, but started in October 2012.

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, monitoring and evaluation, 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 USAID-funded Community Health Program Component to support various community health interventions in more than 500 health huts.

The Islamic Development Bank has provided $8 million in loans for the procurement of LLINs and RDTs, health personnel training, and support for supervision. One million LLINs and RDTs were procured through UNICEF with this funding with 600,000 of these LLINs used to carry out the first phase of universal coverage activities in four regions in 2010.

In addition to multilateral institutions, Senegal benefits from the support of various bilateral donors. **The French Cooperation** contributes significantly to research activities through the Pasteur Institute and the Institute for Research and Development (IRD) and places a technical advisor at the MOH. **The Japan International Cooperation Agency** and USAID have developed a joint partnership in Tambacounda and Kedougou regions where PMI supports health facility and community-based malaria services provision. **The Chinese Cooperation** makes an annual donation 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 (NGOs) 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. Non-governmental and faith based organizations such as the **ChildFund Consortium** implement PMI's community level malaria activities. Members of the consortium include World Vision, Plan International, Catholic Relief Services and Africare, as well as local NGOs Enda Graf and Enda Santé. From 2008 to early 2012, **Caritas** also implemented similar activities in communities surrounding private Catholic health posts through its Malaria Communities Program grant. PMI's IRS, LLIN distribution and clinical, communication and drug management activities are managed by several US-based organizations, including **IntraHealth International, Abt Associates, US Pharmacopeia and Johns Hopkins University Center for Communications Programs.** A new communications and health promotion program managed by the local social marketing organization **ADEMAS** began in early 2012.

The **Senegalese Red Cross Society** has received funds from PMI via the International Federation of Red Cross and Red Crescent Societies (IFRC), and contributed its own funds, to support volunteers and supervisors during the under-five and universal coverage mass distribution campaigns and to implement follow-up activities encouraging net hanging and use. The **Spanish Red Cross Society** has distributed several thousand LLINs in peri-urban Dakar and the Senegal River valley. The **International Committee of the Red Cross** supports outreach activities and LLIN distribution campaign operations in conflict zones in Ziguinchor and Sédhiou regions. **MACEPA**, which began work in Senegal in 2009, supported the development of the 2011-2015 National Strategic Plan and continues to support the NMCP through a pre-elimination project in one northern district, including enhanced and integrated surveillance and case investigation.

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 (SLAP), IRD** and **the Pasteur Institute**. These groups have strong collaborative relationships and together have published much of the recent literature on malaria in Senegal.

Private Sector

In the private sector, the **Pfizer** pharmaceutical company implemented a malaria control program in three health districts in the Tambacounda Region from 2008 to 2011, which focused on behavior change communication (BCC) for improved care-seeking behavior, as well as increasing access to care by making additional community health huts functional through staff training and provision of basic equipment.

Malaria No More supports the dissemination of a variety of messages promoting malaria prevention and treatment through the "Senegal Surround Sound" campaign in collaboration with the **Youssou Ndour Foundation**. In addition, **Total**, a French oil and gas group, has worked with the NMCP to implement outreach and sensitization programs.

Within USG

The United States Peace Corps and PMI embarked on a new partnership in 2011, called "Stomping Out Malaria in Africa." 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 further enhance collaboration on LLIN universal coverage activities.

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 Global Health Initiative (GHI), a multi-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.

The GHI aims to maximize the impact the United States achieves for every health dollar it invests, in a sustainable way. The GHI's business model is based on: implementing a woman- and girl-centered approach; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; encouraging country ownership and investing in country-led plans and health systems; improving metrics, monitoring and evaluation; and promoting research and innovation. The GHI will build on the USG's accomplishments in global health, accelerating progress in health delivery and investing in a more lasting and shared approach through the strengthening of health systems. Framed within the larger context of the GHI and consistent with the GHI's overall principles and planning processes, BEST (Best Practices at Scale in the Home, Community and Facilities) is a USAID planning and review process that draws on our experiences in family planning, maternal and child health, and nutrition to base our programs on the best practices to achieve the best impact.

6. 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 by 2015. By the end of calendar year 2014, 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 sprayed with IRS in the last six months;

- 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; and
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria.

7. 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), two Malaria Indicator Surveys (MIS, 2006 and 2008) and a nationwide post-LLIN distribution campaign survey (PCS, 2009). Of note, all 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 insecticide-treated net rose from 20% in 2005 to 82% in 2009 but fell back to 63% in 2010. The survey in 2009 was conducted six months after a campaign targeting children under five. Three of the five regions in which universal coverage campaigns had been conducted prior to the 2010 DHS had 94% household ITN ownership, but in Dakar, the most populous region, ownership was only 37%. Utilization of ITNs by children under five rose from 7% in 2006 to 35% in 2010. 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 SP increased from 12% in 2005 to 52% in 2008, but fell to 39% in 2010 due primarily to stockouts of SP. Comparing the proportion of children with fever who received prompt treatment with an ACT among the 2006, 2008, and 2010 surveys is difficult given the introduction of RDTs in late 2007, 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. According to the 2010 DHS, 10% of children with fever in the last two weeks were reported to have received a diagnostic test, and 3% received an ACT within 24 hours.

As a result of the scale-up of malaria control interventions, parasitemia in children less than five years has fallen from 6% nationwide in 2008 to 3% nationwide in 2010, and the mortality rate for children less than five years of age has fallen from 121 deaths per 1,000 live births in the 2005 DHS to 72 in the 2010 DHS.

Evolution of Key Malaria Indicators in Senegal from 2005 to 2010

Indicator	2005 DHS[5]	2006 MIS[6]	2008 MIS[7]	2009 PCS[8]	2010 DHS[3]
% Households with an ITN	20	36	60	82	63
% General population who slept under an ITN the previous night	6	12	23	34	29
% Children under five who slept under an ITN the previous night	7	16	29	45	35
% Pregnant women who slept under an ITN the previous night	9	17	29	49	37
Households in targeted districts protected by IRS	--	--	80	--	80
Households with an ITN or sprayed within previous 12 months	--	--	--	--	66
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	12	49	52	--	39
% Children under five years old with fever in the last two weeks who received a diagnostic test	--	--	9	--	10
% Children under five years old with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever	--	3	2	--	3
% 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
% Children under five with parasitemia (*P. falciparum*)	--	--	6	--	3
Under five mortality rate per 1,000 live births	121	--	85	--	72

8. Challenges, Opportunities, and Threats

Senegal has made great strides against malaria in the last decade, though there are challenges in virtually every domain of malaria prevention and treatment. In spite of this, there are a number of potential policy changes and innovative solutions that provide an opportunity to advance malaria control.

Challenges

Pharmaceutical Management: One of the greatest threats to the success of program implementation has been the poor management at the Central Medical Stores (CMS), including delays in procuring and distributing essential medications, inadequate quantification, and poor responsiveness to program needs. Sulfadoxine-pyrimethamine for IPTp has historically been procured and distributed through the CMS, however delays in procurement led to nationwide stock outs during the last two years and a fall in IPTp coverage. Poor supply chain management affects the availability of RDTs and ACTs at all levels, from hospitals to community health huts. In 2011 PMI funded an evaluation of the CMS, and has engaged an implementing partner to provide technical assistance to implement the recommendations.

Data Availability: Historically, Senegal has had a very robust routine malaria information system; however, the ongoing data retention strike means that the NMCP has no information on the number of suspected malaria cases, diagnostic tests performed, or confirmed cases. This has compromised epidemic surveillance and planning for RDT and ACT procurement and has prevented monitoring of program efficacy. In Richard Toll district, it is compromising the implementation of a pilot of intensive surveillance and active case detection. While there is optimism that the new Minister of Health may be able to resolve the strike, measures will be needed for collection of data from peripheral facilities to provide information on morbidity and mortality from 2010 through 2012.

Insecticide Resistance: Insecticide resistance threatens both LLIN and IRS programs in Senegal, as it does in many PMI countries. Senegal currently conducts IRS in six high transmission districts and the NMCP would like to expand the program. However, costs have increased because of the need to move to more expensive insecticides to combat resistance. Only three of the 15 surveillance sites still showed sensitivity to pyrethroids in 2010 and none were in districts targeted for IRS. All IRS districts are now sprayed with a carbamate, which has a shorter half-life than the pyrethroids formerly used. One non-IRS district shows resistance to bendiocarb (a carbamate), and three districts show intermediate sensitivity. Only fenitrothion, an organophosphate, shows complete sensitivity.

Global Fund Delays: Senegal signed its Global Fund Round 10 grant agreement in December 2011, more than one year after its proposal was approved for funding, and the first disbursement was only made in early October 2012. For the past two years, problems with disbursement of Global Fund grants have compromised the malaria control program in Senegal, and PMI has stepped in to procure needed commodities. While these challenges have been an opportunity for PMI to provide greatly valued assistance, smoother disbursement and implementation of Global Fund programming will benefit malaria control in Senegal.

Opportunities

New Policies: Senegal is taking steps to adopt a number of case management policy changes, including treatment of pregnant women in their second and third trimesters with ACTs rather than quinine, pre-referral treatment of severe malaria with rectal artesunate, and implementation of SMC with sulfadoxine-pyramethamine/amodiaquine (SP-AQ). Seasonal malaria chemoprevention for children, involving a monthly treatment of SP-AQ during rainy season (up to four months), was recently recommended by WHO for regions that correspond to conditions

in southeast Senegal (malaria transmission season < 5 months, annual incidence of at least 10%). Pre-referral treatment of severe malaria and SMC are interventions well-documented in scientific studies to decrease morbidity and mortality, although they should be implemented with concomitant carefully planned evaluations to ensure successful implementation and impact in a programmatic context.

Continuous DHS: Senegal is the first sub-Saharan African country to pilot a continuous DHS, implementation of which began in August 2012, during the high transmission season. The CDHS includes both population-based and health facility components. While balancing the needs of malaria and other sectors is challenging, it is an opportunity to collect information to measure trends and to guide decision-making on a more frequent basis.

Direct Funding: USAID's procurement reforms have given PMI/Senegal the opportunity to directly support our two strongest local partners – the NMCP and the University of Dakar. For the past several years PMI has channeled funding through WHO, at a cost of both time and money. Starting in FY 2012, PMI negotiated fixed amount reimbursement agreements with both entities to fund specific activities, including supervision, epidemic surveillance sites, and a malariology course (NMCP) as well as entomologic monitoring (UCAD). With FY 2013 funds PMI will transfer a large portion of funds for LLIN distribution to the NMCP, as well as for implementing SMC. The NMCP has proven itself to be very capable in managing large amounts of funding and complex programs, as evidenced by successful implementation of more than $80 million in Global Fund grants since 2005.

9. PMI Support Strategy

The support strategy for PMI in Senegal focuses on integration, complementarity, and flexibility. A large proportion of PMI-supported activities are implemented through projects that also include other health domains (health system strengthening, community health, health service improvement, and health communication and promotion). This helps promote a rational use of USG resources, avoids having numerous vertical programs, and fosters synergy with other MOH entities. While some other technical and financial partners have strict geographic or programmatic restrictions on how their funds are used, PMI activities are implemented nationwide to the extent that this is indicated and we have been able to demonstrate great flexibility in reprogramming our funds in response to changing needs. This has occurred on numerous occasions, particularly related to blockages in disbursement of Global Fund resources. PMI did not procure any ACTs or RDTs for its first three years of implementation, but was able to promptly pick up this critical element of the national strategy when problems arose in 2010. Finally, PMI supports and follows the country's strategy of testing new interventions on a relatively small scale and then expanding as soon as feasible based on the results of evaluations.

III. OPERATIONAL PLAN

1. Insecticide-Treated Nets

NMCP/PMI Objectives

The NMCP 2011-2015 Strategic Plan includes two key strategies for malaria prevention related to LLINs: 1) distribution of LLINs to achieve and maintain universal coverage, defined as one

treated net per sleeping space; and 2) reinforcement of behavior change communication (BCC) messages on the use of LLINs. The objective is for 80% of the population to sleep under an LLIN every night by 2015.

Progress in the past 12 months

PMI has been supporting the NMCP's strategy to increase household ownership of LLINs to achieve universal coverage. Equally important have been the efforts to boost LLIN use. Free mass distributions aimed at achieving universal coverage continued in FY 2012, with 1.5 million LLINs distributed in four regions (bringing the total for the strategy to four million LLINs in 12 regions). This strategy, started by Peace Corps in Senegal, includes a door-to-door census of sleeping spaces and available bed nets, with each family given a coupon that is later redeemed during community distribution ceremonies. During a validation step, the local coordinating committee uses standardized guidelines to determine the number of nets each household will receive.

In FY 2012, PMI provided all of the 1.5 million LLINs distributed and the majority of funding for operational costs, with the IFRC/Senegalese Red Cross, UNICEF, MACEPA, and local health and government authorities also making significant contributions. Numerous partners are supporting post-distribution BCC activities to ensure that LLINs are correctly hung and properly used.

PMI has also worked with the NMCP and partners to develop a strategy for routine, subsidized LLIN distribution that will reach the general population on national scale. This year the decision was made to develop a two-track strategy:

1) Health system: Free LLINs will be given to pregnant women during their first antenatal care visit and subsidized LLINs (approximately USD 1) will be available to all other clients utilizing health services. The methodological guide for this track was finalized and health system personnel in 12 regions were oriented to the procedures in April 2012. LLINs and coupons were put in place and the system started operating in June. The remaining two regions (Louga and Ziguinchor), which were implementing their mass distribution campaigns at the time of the orientation, will join the program later in the year.

2) Community: Subsidized LLINs will be made available to the general public via different channels such as community-based organizations, schools, and gas station shops. PMI supported an assessment of different options using the NetCalc tool, focus group discussions and interviews with key stakeholders to determine which options would be most effective for maintaining high levels of coverage. The different channels will be tested in two regions for a few months and those that prove to be most promising will be scaled up by the end of 2013.

Opportunities

Community engagement in the universal coverage campaigns has been strong, manifested by the leadership of local authorities on coordination committees, support for operations (vehicles to transport nets, meals for volunteers, and even cash donations), and creative communications initiatives.

Challenges

As noted in the Indicator section above, the 2010-11 DHS showed that ITN coverage and use had fallen compared to the 2009 post-campaign survey. During this time, only 4 of 14 regions were reached by the universal coverage campaign, with a fifth region partially covered prior to the passage of survey teams. The DHS showed significantly higher levels of coverage and use for these regions. The remaining regions, representing 85% of the population, had no access to LLINs other than in private pharmacies. Since that time, PMI and other partners have supported the roll-out of universal coverage campaigns to a total of 12 regions. This highlights the need to have a strong routine system in place to at least partially maintain coverage levels.

As time has passed since the mass distributions began, fewer usable nets have been found in households and needs estimates have had to be adjusted upward to cover the gap.

The extremely long delays in negotiating, signing, and disbursing Senegal's Global Fund Round 10 malaria grant has slowed the roll-out of mass distributions because PMI's resources were insufficient to cover additional regions. The first Global Fund disbursement was made in early October, but it will be several months before the LLINs procured under the voluntary pooled procurement program will arrive in country (estimated late January).

Commodity Gap Analysis

The NMCP expects to complete universal coverage mass distributions in the remaining two regions around February 2013, dependent on the timely arrival of LLINs. Subsequently maintaining universal coverage with LLINs will require keeping up the routine system across the country, while restarting mass distributions in the regions that were initially covered in 2010. Total LLIN needs for 2014 are estimated to be approximately 4.7 million. These calculations are based on actual distribution results from recent years, and the assumption that 8% of LLINs are lost by the end of the first year, 20% in the second year, and 50% in the third year. In addition, results from the household census conducted prior to the universal coverage campaigns have shown that only 65% of expected nets are being found in homes.

PMI will provide approximately 1.25 million of the needed LLINs. If Senegal successfully passes to the second phase of funding of its Global Fund Round 10 grant, a significant quantity of LLINs will also be procured through that mechanism, though it is difficult to estimate the quantity at this point. Given past levels of funding, however, it is unlikely that the Global Fund will be able to cover the current estimated gap of 3.5 million LLINs. Therefore the country should begin seeking alternate sources of funding. This analysis is summarized in the table below and was presented to partners at the recent Roll Back Malaria gap analysis workshop

	2011	2012	2013	2014	2015
Population	12,471,673	12,770,993	13,077,497	13,391,357	13,712,749
LLIN needs	7,368,468	7,545,311	7,726,399	7,911,832	8,101,716
LLINs available in households	6,312,466	5,958,289	6,549,220	4,853,779	4,016,982
LLINs available (UC census results) - 65% of estimate		3,872,888	4,256,993	3,154,956	2,611,038
LLINs needed to maintain coverage	1,056,002	3,672,423	3,469,405	4,756,876	5,490,678
Partner contributions					
PMI		490,000	1,500,000	1,250,000	
Global Fund		2,430,518	1,184,748		
TOTAL		2,920,518	2,684,748	1,250,000	
Gap		**751,905**	**784,657**	**3,506,876**	**5,490,678**

Plans and Justification

With FY 2013 funds, PMI and the NMCP will focus efforts on maintaining a constant supply of nets and a strong, nationwide routine distribution system for ITNs as described above, while restarting mass distributions in the initial universal coverage regions. PMI will also support communications activities to inform the population about how to acquire nets and their proper use and maintenance. These activities are described in the Behavior Change Communication section.

Proposed activities with FY 2013 funding: ($6,250,000)

1. *Procurement ($5,000,000) and operational support ($1,250,000) for distribution of LLINs*

PMI will support both the routine and mass LLIN distribution strategies by procuring approximately 1.25 million LLINs and supporting operational costs. Operational costs of $1.00 per LLIN include transportation to regions/districts, training, supervision, and reporting. These funds will be provided primarily to the NMCP, with a small amount reserved for the current implementing partner to provide technical assistance during the transition of the program to government management.

2. Indoor Residual Spraying

NMCP/PMI Objectives

The current (2011-2015) Strategic Plan for Malaria Control includes IRS as a key strategy for malaria prevention in Senegal along with other vector control interventions such as LLINs and larval source management. The goal for IRS is to protect at least 90% of the population in targeted districts by 2015.

Progress in the last 12 months

Entomologic Monitoring: During the ten months following the end of the 2011 spray round, entomologists from UCAD, SLAP, the NMCP, IP, and IRD conducted entomologic monitoring in five villages in each of the five IRS districts. The monitoring included cone bioassays on walls to test for insecticidal activity, knockdown spray catches and human landing catches. Bendiocarb was the insecticide used during the 2011 spray round, except in Guinguinéo, where susceptibility to pyrethroids had been higher and the surplus stock of deltamethrin water-dispersible granules remaining from 2010 was used. Results of cone bioassays on bendiocarb- sprayed walls were variable. Within one month of spraying, most walls tested showed 95 to 100% mortality except for one village in Koumpentoum suggesting the spray quality may not have been as high in this village. Three to four months after spraying the efficacy on the walls had decreased. The decrease was slight in the villages of Koumpentoum and Nioro but drastic in Velingara and Malem Hoddar, to as low as 10% in some villages. Surprisingly, after six to ten months the efficacy had returned to 90 - 100% in most villages. One hypothesis is that cooler temperatures may decrease the bioavailability of the insecticide. In Guinguinéo, the efficacy of deltamethrin appears to have declined slightly from between 80 and 90% in October and November 2011 to around 70-80% 10 months after spraying.

One of the potentially exciting results from the insecticide resistance assays of 2011 was that in the districts where bendiocarb had been used, the percentage of mosquitoes susceptible to pyrethroids increased, dramatically in some cases. For example, in Velingara the percentage of mosquitoes susceptible to deltamethrin increased from 58% in 2010 to 97% in 2011, lambda cyhalothrin from 88% to 95%, permethrin from 50% to 94%. The susceptibility to bendiocarb remained high, 98%-99% in the populations tested.

Spray Operations: Preparations for spraying began in February, including reviewing training tools, selecting offices, preparing pits, recruiting seasonal spray operators, and training them. Actual spraying activities began in June in all six targeted districts. Because little resistance to bendiocarb was detected after the 2011 spray round, bendiocarb was the insecticide chosen for this year. Five districts (Guinguinéo, Koumpentoum, Malem Hoddar, Nioro and Velingara) had benefited from previous spray rounds but this was the first year for Koungheul. A total of 306,916 structures were sprayed (98% of those visited and eligible for spraying) and 1,095,093 people were protected (see table below). 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. Results from the 2010 DHS suggest that coverage ranged from 73% to 91% in targeted districts.

Year (no. districts)	2007 (3)	2008 (3)	2009 (3)	2010 (6)	2011 (5)	2012 (6)
Structures targeted	*	162,439	200,761	259,967	244,855	312,938
Structures sprayed	*	153,942	176,279	254,559	240,770	306,916
Percent acceptance	*	95%	88%	98%	98%	98%
Population protected	678,971	645,346	661,814	959,727	887,315	1,095,093

** In 2007 data were collected on number of households, not number of structures*

Spray operations are 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 Hygiene Service. Each spray round is followed by post-spray evaluation meetings of stakeholders in order to identify lessons learned and opportunities for improving the next round.

Opportunities

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 2012 spray round, district health management teams played a significant role in training, supervision, community mobilization, and micro-planning.

Challenges

Since IRS started in Senegal, the consortium of NGOs that implements USAID's community health program has been tasked with managing communications activities for the IRS component. To date this has proven to be a problematic arrangement, with poor coordination between the NGOs within the consortium and between the consortium and the spray operations partner. In addition, the 2012 spray season, the first in Senegal for a new spray operations implementing partner, was impacted by a variety of management and logistical challenges. For these reasons, PMI Senegal and IRS stakeholders have agreed that the NMCP should preside over a committee to oversee all aspects of the IRS program, and that the communications activities will be funded by the spray operations partners and coordinated by the NMCP.

Plans and Justification

With FY 2013 funds, PMI will support spray operations and entomological monitoring in six districts. Anecdotal data from Guinguinéo suggest that malaria rates may have become so low that IRS in this district may no longer be cost-effective. Nevertheless, no decision to stop spraying in a district will be made until the data strike is terminated and the data are released from the health facilities. A decision to discontinue spraying in a district would be made by the IRS Steering Committee, composed of representatives from NMCP, entomologists from UCAD, the National Hygiene Service, the National Directorate of Environment and Agriculture, the IRS implementing partner, and PMI. If a district is dropped, this committee would also select a new district, based on its malaria burden, population estimates, and managerial capacity. Furthermore, if IRS is discontinued in a given area, malaria cases will be closely monitored and rapid diagnosis and treatment will be made available. The insecticide choice for 2013 will be based on the results of resistance assays conducted after the 2012 spray round.

Proposed activities with FY 2013 funding ($6,152,000)

1. *IRS Operations ($5,740,000)*

With FY 2013 funds, PMI will support one round of spray operations in six districts covering a population of approximately 1.1 million people and 320,000 structures. With the increasing

problems related to insecticide resistance and rising costs, PMI does not plan to expand its support to IRS beyond six districts.

2. *Entomologic monitoring ($412,000)*

PMI will continue to support entomologists from UCAD and IP to conduct entomologic monitoring and evaluation for IRS as well as insecticide resistance monitoring. Entomologists will conduct cone bioassays immediately after spraying and at bi-monthly intervals in all six spray districts. Entomologic tests, including vector behavior, will also 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. Entomologists will continue to conduct insecticide susceptibility assays in the six spray districts as well as in nine additional sites throughout the country where entomologists have been following the evolution of insecticide resistance during the past several years. An entomologist from CDC will provide technical assistance for the planning and implementation of all IRS monitoring activities.

3. Malaria in Pregnancy

NMCP/PMI Objectives

The NMCP objective is for 85% of women who have completed a pregnancy in the last two years to have received two or more doses of IPTp during that pregnancy. In addition, the NMCP aims to treat 100% of pregnant women with confirmed malaria according to national guidelines. 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 antenatal care (ANC) services at the community level, all of which are supported by PMI.

Progress during the last 12 months

Since October 2011, 672 facility-based health workers have been trained in the prevention, diagnosis and treatment of malaria, including malaria in pregnancy. In addition, 2,700 community-based health workers have been trained to raise awareness about the importance of IPTp. A new guide for outreach visits was created with the Primary Health Care Division of the MOH and disseminated to all 14 regions. Since being introduced, PMI has supported more than 500 outreach visits to communities, in which 4,600 women were seen for pre-natal care in nine regions and 1,905 received IPTp.

Opportunities

Provision of free ITNs during the first ANC visit through the routine distribution system is expected to improve access to ITNs and coverage of IPTp.

The incidence of clinical malaria among pregnant women in 2009 was 14/1000. Senegal has historically defined malaria during pregnancy as severe malaria and has recommended treatment with quinine. However, given data on safety of ACTs during the second and third trimesters of pregnancy presented both in Senegal and elsewhere on the African continent, the NMCP is in the process of changing the treatment policy to ACTs.

Challenges

While Senegal has high ANC attendance, with 93% of women reporting at least one ANC visit, and 90% reporting at least two visits (2010 DHS), challenges with availability of SP in the past two years have compromised the delivery of IPTp. Coverage of two doses of SP during the last pregnancy had fallen to 39% according to the 2010-2011 DHS. SP is procured by the CMS, and management problems in recent years prompted a PMI-funded assessment in effort to resolve these problems, which were affecting other crucial products (such as antibiotics) in addition to SP. PMI is reinforcing stock management in order to improve availability of SP, and USAID/Senegal has launched a major initiative to improve management at the CMS under the rubric of health system strengthening. We anticipate that these challenges will be largely solved by the time of implementation of the FY 2013 MOP.

Commodity Gap Analysis

SP for an anticipated 528,000 pregnant women is expected to be procured by the CMS.

Plans and Justification

PMI will continue to support activities aimed at reinforcing the provision of effective malaria in pregnancy (MIP) services in health facilities in all regions in Senegal. 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, the importance of LLIN use in pregnancy, diagnosis and management of malaria in pregnancy, and counseling and interpersonal communication skills.

Proposed activities with FY 2013 funding ($587,000)

1. *Reinforce provision of effective MIP services in health facilities and in outreach strategies*

At least 200 health facility level providers and 450 community workers will receive training on prevention and treatment of malaria during pregnancy. PMI will also continue to provide cups and water filters as needed for directly-observed treatment with SP. Support for ANC outreach activities at health huts will allow for a total of 2,000 visits annually. Activities covered in other sections include the provision of free LLINs during the first ANC visit and BCC to reinforce ANC attendance, the importance of IPTp and sleeping under an LLIN.

4. Case Management

NMCP/PMI Objectives

The PMI objectives are:

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

The NMCP objectives also include:

- 95% of suspected malaria cases tested with an RDT
- 100% of confirmed cases treated according to national guidelines

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. While dihydroartemisinin-piperaquine (DHA-PQ) was not formally adopted as a first-line therapy, annual donations of DuoCotecxin from the Chinese government are also used in the public health sector.

Rapid diagnostic tests were introduced in late 2007 along with a diagnostic algorithm specifying that if another obvious cause of fever was present, a patient would not receive 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 RDT, if symptoms persisted.

Quinine is used for treatment of severe malaria in all age groups. Malaria in pregnancy has been defined as severe and treated with quinine; the NMCP is in the process of rolling out a policy change to treat pregnant women in their second and third trimesters with ACTs.

Two other policy changes currently in the process of adoption are: (1) pre-referral treatment with rectal artesunate, to be introduced first at the health post level and subsequently at the community level (health huts and PECADOM); and (2) seasonal malaria chemoprevention, with one treatment of SP-AQ monthly during the rainy season. Much of the research on SMC was conducted in Senegal, first in children less than five years of age, and subsequently in children up to ten years of age. Senegalese researchers have conducted multi-district trials involving 175,000 children, implemented campaign-style, at the community level by *relais* (Badara Cisse, in press). Other research conducted in Senegal has had excellent results introducing both SMC and pre-referral treatment with rectal artesunate at the community level (Tine Malaria Journal 2011). A one-year pilot test is scheduled to start in 2012 in the southern region of Kedougou, mainly in the Saraya health district, prior to the implementation of the policy. USAID is currently the only partner providing financial support for this effort, but other local partners, such as mining companies, may finance this activity. The NMCP plans to develop a budgeted plan and will advocate for more resources to scale-up this activity.

Progress during the last 12 months

PMI procured 700,000 RDTs and 360,000 doses of ACT for use in the public health sector, both in the formal health sector and the community level.

Both of the bilateral projects primarily responsible for case management activities ended in September 2011 and new projects were awarded. They began this fiscal year with start-up activities and revision of manuals and tools. PMI supported the training of 43 laboratory technicians on malaria microscopy and supervision/quality control visits to 24 health facility laboratories. The 43 lab technicians are new technicians and those the NMCP identified during supervision as requiring refresher training. During the quality control visits, the supervisors verify five negative and five positive slides that the microscopists have read, then 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.

Activities in the formal health sector include training and supportive supervision, using in some districts a strategy of peer supervision and mentoring termed *TutoratPlus.* Overall, 672 health

facility personnel and 958 community health workers at health huts and PECADOM sites were trained on malaria case management.

At the community level, both health huts administering an integrated package of activities including malaria case management with RDTs and ACTs, and the home based management of fever (PECADOM) program are included. The community level program now includes a total of 1,876 health huts and 1,230 sites, as well as 988 DSDOM. During FY 2012 PMI supported the NMCP to introduce integrated services in the home-based program, with 87 new DSDOM trained to manage malaria, respiratory infections and diarrheal disease.

A PMI-funded operations research project also got underway this year, with an investigation team contracted and protocol developed. The study will seek to determine the proportion of patients who do not receive an RDT according to the NMCP's diagnostic algorithm that actually has parasitemia. While the algorithm, which directs that a patient with another obvious cause for fever does not get an RDT, was implemented in a context of scarcity of resources and a desire to conserve RDTs, this policy may not serve Senegal well in the context of pre-elimination.

In 2012, the NMCP began the process of adopting new case management policies, including treatment of pregnant women in their second and third trimester with ACTs, seasonal malaria chemoprevention, and pre-referral treatment with rectal artesunate. PMI supported the process of developing these policies and will support their introduction once officially adopted by the Ministry of Health.

Opportunities

In 2012 funding has been available from PMI, the Islamic Development Bank and the Global Fund to procure ACTs and RDTs, so there is little risk of large-scale stock problems for the next one to two years. Also aiding in avoiding ACT stock-outs is a donation from the Chinese government of a large quantity of DHA-PQ in the form of DuoCotecxin, which is now widely used in the public health sector throughout Senegal.

Challenges

The lack of data from the districts caused by the data retention strike has made needs estimation difficult. Due to delays in disbursement of funding from the Global Fund, PMI has procured RDTs and ACTs to avoid country-wide stockouts of these essential commodities.

As malaria transmission decreases, the NMCP and PMI are concerned that an increasing proportion of malaria cases will be severe. Implementation of pre-referral treatment with rectal artesunate may alleviate the severity of illness and improve survival for those coming from remote regions, but case management of severe malaria is problematic and many deficiencies remain at the health center and hospital levels.

Commodity Gap Analysis

The NMCP has carried out the following gap analysis for ACTs and RDTs through 2015:

ACTs	**2012**	**2013**	**2014**	**2015**
Population	12,770,993	13,077,497	13,391,357	13,712,749
Incidence	0.012	0.010	0.007	0.004
Expected number of cases	153,252	130,775	93,739	54,851
Partner contributions	153,252	130,775		
Gap			93,739	54,851
RDTs	**2012**	**2013**	**2014**	**2015**
Population	12,770,993	13,077,497	13,391,357	13,712,749
Expected fevers	795,330	715,797	636,264	556,731
Proportion of fevers tested by RDT	98%	98%	98%	98%
Total number of RDTs required	779,423	701,481	623,539	545,596
Partner contributions	779,423	701,481		
Gap			623,539	545,596

There has been no incidence data upon which to base estimates since 2009, and according to consumption data based on orders by districts, 723,131 ACTs were used during 2011. The needs are also based on the assumption that incidence will decline dramatically, and that RDT needs will decline commensurately. However, with the goal of pre-elimination, RDT needs for more intensive surveillance may increase, and cases may not decline as rapidly as anticipated. As the estimate varies from the consumption data by a multiple of approximately five, we have selected a median figure of 354,000 ACTs. Previous routine data demonstrated that approximately one-third of tests, over the course of a year, are positive, thus approximately 1.2 million RDTs would be needed for diagnosis of 400,000 infections.

Plans and Justification

Diagnosis: PMI will support training and supervision for RDTs and microscopic diagnosis of malaria, as well as costs for RDTs when there are expected to be challenges with Global Fund disbursement. During the period covered by this plan, Senegal will transition to Phase 2 of the Round 10 grant, and anticipates a possible gap in funding. If RDTs expected to be procured by Global Fund are not delayed, these funds will be reprogrammed.

Treatment: PMI will also support training and supportive supervision to maintain quality of case management with RDTs and ACTs both in the formal health sector and at the community level (both health huts and home-based management). PMI will continue its support for SMC with three doses of SP-AQ for children 3-120 months, one dose monthly for three months, in the high transmission regions of Senegal. This will be implemented in monthly campaigns by community health workers, based on a research pilot conducted in three regions that estimated total costs at $0.50 per treatment course. Finally, PMI will continue to support pre-referral treatment for severe malaria, which will be introduced in 2012, in an effort to significantly reduce malaria mortality.

Proposed activities with FY 2013 funding ($3,750,000)

Diagnosis

1. *Provide technical assistance for training and supervision of health care providers on RDTs as part of overall training and supervision of case management of malaria ($100,000)*
2. *Support for training, supervision, and quality control for microscopy, and quality control for RDTs ($200,000)*
3. *Procurement of 1.2 million RDTs ($825,000)*

Treatment

1. *Support for training and supervision of case management at health centers and health posts ($300,000) as part of overall training and supervision of case management of malaria*
2. *Training and supervision of case management with RDTs and ACTs at health huts ($500,000)*
3. *Training and supervision of case management with RDTs and ACTs for home-based care under the PECADOM program ($500,000)*
4. *Procurement of 354,000 doses of ACT ($400,000)*
5. *Implementation costs for SMC, including training and community mobilization ($700,000)*
6. *Procurement of SP and AQ in co-blister for SMC, estimated for 1.3 million doses ($200,000)*
7. *Procurement of rectal artesunate suppositories for pre-referral treatment of severe disease ($25,000)*

5. Monitoring and Evaluation/Operations Research

NMCP/PMI Objectives
The overall objective is to ensure prompt and complete reporting and use of data for monitoring and evaluation of the 2011-2015 Strategic Plan.

Though routine data is not available due to the ongoing data retention strike, removing a major pillar of the M&E program, other monitoring and evaluation continues:

- The continuous DHS will provide estimates twice annually of key community malaria indicators and services available in the health sector
- Epidemic surveillance sites currently report data weekly (eight sites total in four districts: one district in Dakar and three in the Senegal River Valley), which is compiled at the NMCP and sent out weekly to all stakeholders
- The NMCP conducts annual supervision of health facilities with a few key indicators tabulated
- MACEPA leads an enhanced surveillance program with case investigation and screening of close neighbors in the district of Richard Toll

- Entomological monitoring is conducted as described in the IRS section
- Therapeutic efficacy testing is conducted in two sites, with molecular markers of resistance to SP and aminoquinolines followed.

Progress during the last 12 months

During the past twelve months, PMI supported the NMCP in strengthening its M&E system and use of data for decision making and better malaria control programming. M&E supported activities included:

- Finalization and dissemination of the 2010 DHS results and preparations for the CDHS. Data collection began in August 2012 for the rainy season round of collection, including both community and health facility surveys.
- Support to the NMCP to analyze data collected during the implementation of the home-based management of fever program and the investigation of a cluster of malaria deaths. The results were presented at the American Society for Tropical Medicine and Hygiene and have been submitted for publication.
- Assistance to the NMCP and MACEPA on data analysis to support the malaria elimination project in the district of Richard Toll.
- A local research institution has been selected for the implementation of the operational research to evaluate the sensitivity of the diagnostic algorithm and the protocol has been written; data collection will start towards the end of the year. While the algorithm was implemented to conserve RDTs by limiting them to patients who did not have an obvious alternate cause of fever, in a context of pre-elimination, the identification of all parasitemic individuals becomes increasingly important, and the capacity of the algorithm to do this will be assessed.

Opportunities

With the appointment of a new Minister of Health, there is an opportunity for a sustainable resolution to the data retention strike to be adopted. The Ministry of Health in collaboration with USAID is implementing a pilot of performance based financing, which may also serve as motivation to stop the data strike.

A network of epidemic surveillance sites in the Senegal River Basin and the flood-prone suburbs of Dakar has been collecting and reporting malaria data throughout the data retention strike. Malaria incidence has decreased dramatically in some districts in the Senegal River Valley, and the Malaria Control and Elimination Partnership for Africa (MACEPA) is collaborating with the NMCP to pilot a pre-elimination strategy of enhanced surveillance and case investigation, providing a valuable learning opportunity.

Senegal is the first sub-Saharan African country to pilot a continuous DHS. While balancing the needs of malaria and other sectors is challenging, it provides an opportunity to collect information to measure trends and to guide decision-making on a more frequent basis.

Challenges

Since May 2010, the nationwide data retention strike has affected not only malaria data, but all health data collected in the public sector. This has limited the ability to evaluate the trends in malaria incidence and to prevent and respond to stockouts of key commodities.

Achieving the objective of pre-elimination requires a re-evaluation of the tools for monitoring and evaluation, potentially including the development of new tools and strengthening surveillance.

With the decrease in malaria transmission, an increasing proportion of cases are expected to be severe. Operational research on improving the quality of treatment of severe disease has been identified as a key priority by the NMCP.

Plans and Justification

The continuous DHS will collect rounds three and four using FY 2013 funding, continuing to provide data on malaria indicators in both rainy and dry season, as well as information regarding services and commodities available at health facilities.

Four new sites will be added to the network of epidemic surveillance sites. As Senegal approaches pre-elimination status the regions of the country that are epidemic prone are expected to increase.

Operational research will evaluate case management of severe malaria in health centers, leading to recommendations for improvement. Following implementation of these recommendations, re-evaluation will determine if case management of severe malaria has improved.

Proposed activities with FY 2013 funding ($600,000)

1. *Epidemic surveillance ($100,000)*

These funds will support equipment and training for four new sites as well as supervision of existing sites.

2. *PMI contribution to the implementation of the continuous DHS ($400,000)*

3. *Operational research to improve case management of severe malaria ($100,000)*

PMI will support a multidisciplinary evaluation of case management aimed at identifying weakness in case management practices and subsequent re-evaluation to determine if these have been adequately resolved by the recommendations implemented after the baseline.

6. Behavior Change Communication

NMCP/PMI Objectives

Senegal developed a national strategy for malaria communication in 2008, which outlined 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 from 42% to > 80%
- Increase the proportion of pregnant women who take the two doses of SP under directly observed treatment at ANC from 47% to >80%
- Increase the proportion of people who seek care at health facilities within 24 hours of the onset of fever from 45% to >80%
- Increase compliance in the treatment of uncomplicated malaria
- Increase acceptance of indoor residual spraying to >90% of households in targeted districts
- Strengthen partnerships with the private sector, media, local government, Parliament and other government departments.
- Monitor and evaluate the NMCP communication plan

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

Progress during the last 12 months

In response to concerns raised by partners and stakeholders regarding the weaknesses in BCC programming, PMI contributed to support for the National Health Education and Information Service (SNEIPS) to implement a national BCC framework including the development and validation of a national annual communications plan. It strengthened the SNEIPS and its decentralized regional and district representatives to improve the development and implementation of BCC activities at all levels of the health system and in communities (e.g. national campaigns, World Malaria Day, ongoing community mobilization and interpersonal communications).

Communication activities and net promotion for the universal coverage campaign have continued to center on the "*Trois Toutes*" slogan – emphasizing use of LLINs by all members of the family, every night, all year long. The messages, though primarily in French, have been translated into four languages – Wolof, Serere, Malinke, and Poular. Individual health districts have developed their own communications plans utilizing multiple channels such as community radio, marketplace activities, traditional communicators, household visits, and local press to educate and promote net use. BCC messaging reached nearly 900,000 people through household visits this past year. Nearly half of all health districts carried out local communication initiatives including community radio and traditional media.

In January 2012, PMI conducted the first phase of the Culture of Net Use study, which will continue to take place every six months to coincide with both dry and rainy seasons. The study seeks to understand the context of household ITN use, including barriers to consistent use, how families care for nets, and ITN allocation within the household, with the goal of improving targeting of BCC strategies.

PMI also supports communication activities to inform potential beneficiaries about IRS and what they should expect from it, how it is beneficial to them and their family's health, and what precautions they need to take. Before each spray round, information pamphlets were updated, printed and distributed. Radio spots, community meetings, and home visits were also used to disseminate information to potential beneficiaries. These same approaches are also used to

communicate with the population regarding prompt care seeking for fever and other prevention/case management messages. Finally, tools to collect data on communications activities were revised and materials to support BCC activities (posters, training guides, and manuals) were produced.

Challenges

Senegal lacks a unifying national framework for health communications and social and behavior change communication activities tying together different health spheres beyond malaria. Despite the existence of the National Health Education and Information Service and its decentralized representatives, there is limited capacity to lead BCC program development, implementation and coordination. BCC interventions could be strengthened through better coordination between these representatives and more effective use of communication channels. Additionally, the multiplicity of programs leads to a plethora of materials for health promotion and behavior change which are not harmonized, hampering the development and use of targeted, coordinated messages and approaches.

Opportunities

Senegal has had very visible media campaigns spearheaded by various celebrities. Mass and entertainment media encourage knowledge and education; however, many people are already aware of key malaria prevention methods. The opportunity exists to focus the scope and delivery of messages to specific targeted audiences through sustained advocacy on the part of influential members of society (e.g. religious leaders, locally elected officials). Specifically targeting this group of stakeholders would complement the already strong interpersonal communication activities carried out by community health workers, *relais*, and health care providers to create a "culture" of healthy behaviors related to malaria.

To date, the role of the for-profit private sector in supporting health and behavior change communications is under-appreciated and under-utilized. For example, opportunities exist to involve private companies in the production and dissemination of malaria prevention materials and messages. Similarly, social marketing as an approach for providing key messages and products to people has not been fully exploited. Preliminary results of the Culture of Net Use study will be used to inform the future design and focus of BCC activities. Drawing from one finding that showed a preference for nets purchased from pharmacies, PMI support for the development of a routine LLIN distribution system presents an opportunity to involve the private sector as a potential channel for nets, among other services.

Despite several years of program implementation, various "entrenched" behaviors and attitudes towards malaria prevention remain. For example, qualitative and quantitative studies have shown that net use remains sub-optimal (29% of the general population, according to the 2010 Demographic and Health Survey) for myriad reasons. This calls for redoubled efforts to understand the key determinants of these behaviors and attitudes. Moreover, this points to probable message fatigue, and the need to find new messages that will influence behavior change.

Plans and Justification

Communications Channels: With FY 2013 funds, PMI implementing partners 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, when and where to seek care). PMI will work in close partnership with the SNEIPS, NMCP, the Ministry of Health and other ministries (the Ministry of Education, Ministry of the Family, etc.), non-governmental organizations, faith-based organizations, 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. Similarly, they will include a robust mix of mass media, interpersonal communication, and community mobilization to promote improved social norms related to malaria. Implementing partners will continue to support community mobilization and BCC activities in health huts and will actively seek linkages with Peace Corps Volunteers. As such, Volunteers and their communities benefit from the technical resources that partners provide and partners benefit from the long-term community presence of volunteers.

Key Messages: For LLINs, the objective will be to maintain high demand and ensure that regular LLIN use is sustained throughout the year, particularly during the months following the rainy season when the chances for contracting malaria remain high and perceived risk is low. Messages about the appropriate care of nets will also be reinforced.

PMI will inform potential beneficiaries in the six target districts about IRS and what they should expect from it, how it is beneficial to them and their family's health, and what precautions they need to take. Before each spray round, information pamphlets for these household visits will be updated, printed and distributed. Radio spots, community meetings, and house-to-house visits will also be used to disseminate information to potential beneficiaries.

Additionally, PMI will support a wide variety of malaria communication and education activities on case management, MIP and other preventive behaviors.

Monitoring and Evaluation for BCC: PMI implementing partners will continue to enhance coordination across ministries, donors, implementing partners, and the private sector to harmonize the implementation of BCC programming. PMI/Senegal will continue conducting qualitative and quantitative studies to identify determinates of malaria-related prevention and care-seeking behaviors. Additionally, PMI/Senegal will employ sophisticated social marketing methods and tools to design, implement, and evaluate the impact of communication activities. The PMI Senegal team will monitor all planned BCC activities in order to improve their outcomes and impact. Based on this, the Senegal team will pursue a more strategic and focused approach to its mix of communication channels as needed.

Proposed activities with FY 2013 funding ($1,371,000)

1. *Strategy development and monitoring of BCC activities ($721,000)*
2. *Sustaining community mobilization activities ($400,000)*

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

7. Health System Strengthening and Capacity Building

NMCP/PMI Objectives

The 2011 – 2015 National Strategic Plan on Malaria Control 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 monitoring and evaluation of the 2011-2015 Malaria Strategic Plan

Progress in the last 12 months

Since beginning work in Senegal, PMI has supported strengthening of the health system and building the capacity of the Ministry of Health to operate its malaria control program. PMI has provided health system strengthening support through pharmaceutical management activities, training, supervision, drug quality monitoring and policy reform.

During FY 2012, support to the CMS was provided to implement specific recommendations from the 2011 assessment. 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. Ten health system staff attended the annual data management and monitoring an evaluation course at the African Center for Advanced Management Studies. Finally, samples of antimalarials were collected from the nine surveillance sites around the country and tested using international quality standards. The Directorate of Pharmacies and Laboratories (DPL) began implementing a plan to address problems, including a new strategy for marketing authorization, improving storage conditions at health facilities, taking measures to withdraw non-conforming lots from the market, and possibly suspending the medicine marketing authorization. PMI also supported an assessment of DPL capacities with a view to working toward ISO certification.

The NMCP is also in the process of revising national malaria treatment policies. Plans are underway to introduce seasonal malaria chemoprevention in children, pre-referral treatment with rectal artesunate, and using ACTs to treat malaria during the second and third trimesters of pregnancy, in line with WHO recommendations. A consensus meeting has been already held and PMI will support the policy reform process and training of health personnel at all levels to implement the new policies. Finally, PMI support was instrumental in helping the NMCP to bring together its numerous partners to validate a consolidated action plan for the year.

Opportunities

The NMCP is fortunate to have a wealth of in-country technical capacity at its disposal, including entomologists working at SLAP, as well as several entomologists and parasitologists

teaching at UCAD. In addition, the Institute for Research for Development (IRD) and the Pasteur Institute house many experienced epidemiologists, parasitologists and entomologists who collaborate on a regular basis with the NMCP.

Challenges

The NMCP has been severely hampered in its ability to implement activities due to the delay in disbursement by the Global Fund. In addition, several staffing changes also occurred, including two changes in the Coordinator position within six months. In order to maintain and consolidate the significant achievements in the malaria control in Senegal, recruitment of other key staff is underway.

Senegal's 2011 – 2015 National Strategic Plan for Malaria has been written with the objective of achieving pre-elimination status. Although Senegal has a wealth of malaria prevention and control expertise at all levels, capacity building is still needed to strengthen skills for effective monitoring and evaluation, for applied epidemiology, and for planning and implementing IRS activities through the government system. The parastatal CMS, which is responsible for the procurement of drugs and laboratory products, has two institutional links. Organizationally, it lies outside the MOH and reports to both the MOH and the Ministry of Finance. This split leadership has made it difficult to institute real changes to improve the functioning of the CMS, as the two ministries do not necessarily have the same vision for its future.

Plans and Justification

As Senegal continues to make progress in reducing malaria transmission and decreasing under-five mortality rates, the NMCP will require ongoing skills development to respond to changes in malaria trends. Technical assistance from PMI aims to provide institutional support and strengthen the pharmaceutical management system. The problems at the CMS are not limited to malaria commodities and several health partners are working together to bring the issue to the attention of the MOH and the Ministry of Finance in an attempt to find and implement solutions.

Proposed activities with FY 2013 funding ($1,210,000)

With FY 2013 funding, PMI will support the following activities to strengthen the health system and develop capacity at sub-national and central levels to sustain and carry forward the NMCP's accomplishments in malaria control.

1. *Support to NMCP to enable program supervision ($150,000)*

With FY 2013 funds, PMI will contribute to support the costs associated with the NMCP's supportive supervision visits to regional and health district levels.

2. *Support for an Entomologist at the NMCP ($35,000)*

PMI will support an Entomologist at the NMCP to manage the IRS program and insecticide resistance monitoring. This person will serve as the key interlocutor between the NMCP, UCAD, the Hygiene Service and the research institutions with whom they collaborate on a regular basis.

3. *Support to NMCP to organize malariology course ($200,000)*

With FY 2013 funding, PMI will continue to support this course, enabling the participation of other categories of health system personnel beyond medical officers. The FY 2013 investment will support the training of 60 health professionals from district and regional health management teams, with another 15 health professionals being trained through support from the Global Fund.

4. *Supply chain management and pharmaceutical management strengthening ($550,000)*

With FY 2013 funds, PMI will continue to support the implementation of key recommendations from the CMS assessment. This major activity will be conducted in close collaboration with the Ministry of Health and pharmaceutical stakeholders, including the private sector and civil society groups (consumers' associations). PMI will also support the NMCP and health districts to improve quantification methods and ensure the delivery of malaria commodities, bypassing the CMS distribution system if necessary.

5. *Support for planning and policy reforms related to malaria ($75,000)*

PMI will continue to support the NMCP to implement the policy reforms it has undertaken and will work to maintain a regular schedule of coordination meetings with malaria partners. This will be done in the spirit of the "three ones" approach – one strategic plan, one monitoring and evaluation plan, and one coordination mechanism.

6. *Drug quality monitoring and advocacy ($200,000)*

In collaboration with the NMCP, UCAD, the DPL and the National Laboratory for Drug Quality Control, PMI will continue its support to drug quality monitoring in nine sites. In addition, PMI will support advocacy for policy enforcement of drug quality standards.

Activities will also include technical assistance to the national level structures for drug quality assurance/quality control, using high standard technologies, to ensure that quality control tests are conducted according to national and international norms.

8. Staffing and Administration

PMI staff includes two PMI resident advisors, one representing CDC and one representing USAID, and a team of USAID Foreign Service National technical specialists that work with the two advisors.

All PMI team members in Senegal 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, management of collaborating agencies, and supervision of day-to-day activities. The PMI team works together to oversee all technical and administrative aspects of PMI in Senegal, including project design, implementing malaria prevention and treatment activities, M&E of outcomes and impact, and reporting results. The PMI resident advisors report to the USAID Health Program Team Leader. The CDC staff person is supervised by CDC, both technically and administratively. All technical activities are undertaken in close coordination with the MOH, the NMCP and other national and international partners, including the WHO, UNICEF, the Global Fund, World Bank, and the private sector.

Locally-hired staff to support PMI activities either in Ministries or in USAID are 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 must be approved by the USAID Mission Director and Controller.

Proposed activities with FY 2013 funding: ($1,680,000)

These funds will 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
FY 2013 Budget Breakdown by Partner $(000)

#	Partner Organization	Geographic Area	Activity	Budget*
1.	DELIVER	Nationwide	Procurement of LLINs, ACTs, RDTs, SP-AQ, and rectal artesunate	6,450
2.	IRS IQC TO #4	6 districts: Velingara, Nioro, Malem Hoddar, Koumpentoum, Guinguinéo, and Koungheul	Indoor Residual Spray operations and community mobilization for IRS	5,990
3.	CDC-IAA	Nationwide	Technical assistance for entomologic monitoring and M&E	12
4.	NetWorks	Nationwide	Technical assistance for maintaining routine distribution system	250
5.	Community Health Program Component	Nationwide	Sustaining community mobilization activities	400
		Nationwide	Community-based case management of fever in functional health huts. Includes training, supervision, and monitoring of staff.	500
		Nationwide	Support for the NMCP's PECADOM program	500
			Sub-total Community Health	**1,400**
6.	Health Services Improvement Program Component	Nationwide	Reinforce provision of effective MIP services in health facilities and in outreach strategies	587
		Nationwide	Training, supportive supervision of health care providers on RDTs	100
		Nationwide	Improve case management of malaria	300
			Sub-Total Health Services Improvement	**987**
7.	Health System Strengthening Program Component	Nationwide	Supply chain management and drug management strengthening: follow-up on CMS assessment recommendations	550
		Nationwide	Support for planning and policy reforms related to malaria	75
			Sub-Total Health System Strengthening	**625**

#	Partner Organization	Geographic Area	Activity	Budget*
8.	Measure/DHS	Nationwide	Technical assistance for the continuous demographic and health survey	200
9.	NMCP	Nationwide	Operational cost for implementing and maintaining LLINs routine distribution system	1,000
		Nationwide	Extension of seasonal malaria chemoprevention	700
		N/A	Malariology course for district and regional staff	200
		N/A	Entomologist	35
		Nationwide	Strengthen malaria epidemic surveillance	100
		Nationwide	Support to NMCP to enable program supervision	150
			Sub-Total NMCP	**2,185**
10.	Health Communication and Promotion	Nationwide	Strategy development and implementation of BCC activities	721
11.	National Statistics and Demography Agency	Nationwide	Support to Malaria module in CDHS	200
12.	Directorate of Laboratory	Nationwide	Drug quality monitoring and advocacy	200
13.	UCAD entomology	6 priority districts	Strengthen entomologic capabilities and entomologic monitoring post IRS, plus continued entomologic monitoring in Richard Toll, with subgrant to Institut Pasteur of $30,000	400
14.	UCAD parasitology	Nationwide	Training, supervision quality assurance and quality control for microscopy and RDTs	200
			Sub-Total UCAD	**600**
15.	TBD	TBD	Operations research	100
			Grand Total	**19,920**

* Does not include staffing and administration

Table 2

President's Malaria Initiative - Senegal

Planned Malaria Obligations for FY 2013

Activity	Mechanism	Budget	Geographic Area	Description of Activity
PREVENTIVE ACTIVITIES				
Insecticide treated nets (ITNs)				
Procurement of LLINs for distribution through campaigns and routine	DELIVER	5,000,000	Nationwide	1,250,000 nets for distribution through routine system
Technical assistance for maintaining routine distribution system	Networks	250,000	Nationwide	Personnel to assist with transition from project to NMCP management
Operational costs of implementing and maintaining routine distribution system or for mass distribution campaigns	NMCP	1,000,000	Nationwide	Training, transport, coupons, supervision
ITN Total		**6,250,000**		
Indoor Residual Spraying (IRS)				
Indoor residual spraying operations	IRS IQC TO #4	5,740,000	Velingara, Nioro, Malem Hoddar, Guinguinéo, Koumpentoum and Koungheul	Indoor residual spraying in six priority districts
Strengthen entomologic capabilities and entomologic monitoring	UCAD - Entomology	370,000	7 priority districts	Entomologic monitoring post IRS, plus continued entomologic monitoring in Richard Toll
	Institut Pasteur (via UCAD)	30,000	7 priority districts	
	CDC IAA	12,000	N/A	1 visit for CDC entomologist
IRS Total		**6,152,000**		
Malaria in Pregnancy (MIP)				
Reinforce provision of effective MIP services in health facilities and in outreach strategies	Health Services Improvement Program	587,000	Nationwide	Training, monitoring and supportive supervision of MIP service delivery, counseling and

Activity	Mechanism	Budget	Geographic Area	Description of Activity
	Component			interpersonal communication skills. Cups and water filters as needed for directly-observed treatment with SP.
MIP Total		**587,000**		
PREVENTION TOTAL		**12,989,000**		
CASE MANAGEMENT				
Malaria Diagnosis				
Training, supportive supervision of health service providers on RDTs	Health Services Improvement Program Component	100,000	Nationwide	Support for supervision of malaria diagnosis by microscopy and RDTs for health worker staff
Training, supervision, quality assurance and quality control for microscopy and RDTs	UCAD - Parasitology	200,000	Nationwide	Conduct supervision for quality assurance and quality control of microscopy and RDTs
Procurement of RDTs	DELIVER	825,000	Nationwide	Procurement of 1.2 million RDTs
Diagnosis Total		**1,125,000**		
Malaria Treatment				
Improve case management of malaria	Health Services Improvement Program Component	300,000	Nationwide	Support for supervision of case management of malaria at all levels of the health system, including the private sector
Community case management of malaria with ACTs and diagnosis with RDTs as part of an integrated package of services	Community Health Program Component	500,000	Nationwide	Community based case management of fever in functional health huts. Includes training, supervision, and monitoring of staff.
Support of the NMCP's PECADOM program	Community Health Program Component	500,000	Districts meeting PECADOM criteria	Training and supervision of DSDOM as well as provision of PECADOM boxes.
Procure ACTs	DELIVER	400,000	Nationwide	Procure 354,000 treatments of ACT to cover transition period to Global Fund (Phase 2)

Activity	Mechanism	Budget	Geographic Area	Description of Activity
Seasonal malaria chemoprevention	NMCP	700,000	Kedougou, Sedhiou, Kolda, Tambacounda	Monthly doses of SP-AQ during transmission season to 550,000 children 3-120 months of age
Procurement of drugs for seasonal malaria chemoprevention	DELIVER	200,000	Kedougou, Sedhiou, Kolda, Tambacounda	Approximately 1.65 million doses of SP-AQ
Procurement of drugs for pre-referral treatment	DELIVER	25,000	Target Districts (TBD)	Procure and distribute rectal artesunate drugs for pre-referral treatment of severe malaria
Treatment Total		**2,625,000**		
Case Management Total		**3,750,000**		
Monitoring and Evaluation / Operations Research				
Strengthening malaria epidemic surveillance	NMCP	100,000	Nationwide	Ongoing support to sites in pre-elimination and epidemic prone zones. Support to 4 new sites and active surveillance activities in Richard Toll.
Support to malaria module in continuous demographic and health survey	National Statistics and Demography Agency	200,000	Nationwide	Support to a full malaria module as part of continuous DHS, including biomarkers.
Technical assistance for the continuous Demography and Health Survey	Measure DHS	200,000	Nationwide	Technical Assistance to the National Statistics and Demography Agency
Operational Research on case management for severe malaria	TBD	100,000	TBD	Support the evaluation of quality of case management for severe malaria
M&E/OR Total		**600,000**		
BEHAVIOR CHANGE COMMUNICATION				
Strategy development and implementation of BCC activities	Health Communication and Promotion	721,000	Nationwide	Support development and implementation of a BCC strategy
Sustaining community mobilization activities	Community Health Program Component	400,000	Nationwide	Comprehensive malaria community mobilization activities addressing MIP, case management, ITNs

Activity	Mechanism	Budget	Geographic Area	Description of Activity
Community sensitization and mobilization for IRS	IRS IQC TO#4	250,000	6 priority districts	Communications at community level to increase cooperation with IRS activities
BCC Total		**1,371,000**		
HEALTH SYSTEMS STRENGTHENING AND CAPACITY BUILDING				
Capacity Building				
Support to NMCP to enable program supervision	NMCP	150,000	Nationwide	Support visits by national staff to regional and district levels
Entomologist	NMCP	35,000	N/A	Second and final year of support for this position
Support for NMCP malariology course	NMCP	200,000	N/A	Malariology course for 70 district and regional staff
Capacity Building		**385,000**		
Health Systems Strengthening				
Supply chain management and drug management strengthening	Health Systems Strengthening Program Component	550,000	Nationwide	Follow-up on reforms instituted prior year and provide technical assistance to implement assessment recommendations
Support for planning and policy reforms related to malaria	Health System Strengthening Program Component	75,000	Nationwide	Support to NMCP for work planning and policy changes
Drug quality monitoring and advocacy	Directorate of Laboratories	200,000	Nationwide	Increase the number of drug quality monitoring sites
Health Systems Strengthening		**825,000**		
Capacity Building & HSS Total		**1,210,000**		
IN-COUNTRY MANAGEMENT AND ADMINISTRATION				
In-country staff Administrative expenses	CDC/USAID	1,680,000	Nationwide	Coordination of all in-country PMI activities
Administration total		**1,680,000**		
GRAND TOTAL		**21,600,000**		

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