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PRESIDENT'S MALARIA INITIATIVE

Malaria Operational Plan

Year Four – Fiscal Year 2010

SENEGAL

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ABBREVIATIONS and ACRONYMS

ABCD	<i>Atteindre les Bénéficiaires Communautaires à travers les Districts</i> (Reaching community beneficiaries via the health districts)
ACT	artemisinin-based combination therapy
AIDS	Acquired Immunodeficiency Syndrome
ANC	antenatal care
AL	artemether-lumefantrine combination therapy
ART	anti-retroviral therapy
AS–AQ	artesunate-amodiaquine combination therapy
BCC	behavior change communication
CBO	community-based organization
CCM	Country Coordinating Mechanism
CDC	Centers for Disease Control and Prevention
CFA	West African Financial Community Franc (USD \$1 = Fr CFA 420)
CMS	Central Medical Stores
DHS	Demographic and Health Survey
DSDOM	<i>distributeur de soins à domicile</i> (village malaria worker)
FY	fiscal year
GIS	Geographic Information Systems
HIV	human immunodeficiency virus
HMIS	health management information system
IEC	information, education, communication
IMCI	integrated management of childhood illnesses
IPTp	intermittent preventive treatment in pregnant women
IRD	<i>Institut pour le Recherche et Développement</i>
IRS	indoor residual spraying
ITN	insecticide-treated bednet
JICA	Japan International Cooperation Agency
LLIN	long-lasting insecticide-treated bednet
M&E	monitoring and evaluation
MIP	malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
NGO	non-governmental organization
NMCP	National Malaria Control Program
PECADOM	<i>prise en charge à domicile</i> (home-based management of malaria)
PLWHA	people living with HIV/AIDS
PMI	President’s Malaria Initiative
PMTCT	prevention of mother to child transmission (of HIV)
RBM	Roll Back Malaria
RDT	rapid diagnostic test
RTI	Research Triangle Institute
SLAP	<i>Service de Lutte Antiparasitaire</i> (Parasite Control Service)
SP	sulfadoxine-pyrimethamine
SPS	Strengthening Pharmaceutical Systems Project

SRCS	Senegalese Red Cross Society
UCAD	<i>Université Cheikh Anta Diop</i>
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

EXECUTIVE SUMMARY

Senegal has a population estimated at 12.5 million, with approximately 2.4 million children under five and 488,000 pregnant women. Malaria is a major cause of morbidity and mortality and a high priority for the government; however, the number of reported cases of malaria has dropped significantly in the last two years, due to change in the case definition of malaria¹, as well as the effects of malaria control programs. While malaria had been responsible for one third of all outpatient consultations and 18% of deaths reported in health facilities in 2007², malaria was responsible for only 6% of all outpatient consultations and 7% of deaths in 2008.

The PMI funded a midpoint Malaria Indicator Survey (MIS) in Senegal beginning in late 2008. According to this survey, child mortality had dropped by 30% from 121 per 1000 live births in 2005 to 85 in 2008/9 and parasite prevalence was less than 6% nationwide. The MIS also showed that 63% of households owned at least one insecticide-treated bednet (ITN), and that approximately 31% of children under five and 29% of pregnant women had slept under an ITN the night before the survey. These results represent increases from the baseline MIS done in December 2006, where only 45% of households had owned at least one ITN and 21% of children under five and 17% of pregnant women had slept under an ITN the previous night. The proportion of pregnant women receiving one dose of intermittent preventive treatment with sulfadoxine-pyrimethamine (SP) also increased from 69% in 2006 to 76% in 2008/9, with 52% of women having received two or more doses of SP during antenatal care (ANC).

The Global Fund to Fight AIDS, TB, and Malaria (Global Fund) awarded a five-year \$33.3 million Round 4 grant to Senegal covering activities through 2010. Senegal was also awarded a \$67 million grant in Round 7, with \$29.8 million approved for Phase one in March 2008. Senegal also submitted an application for Round 9, requesting nearly \$62.3 million over five years to focus on three major interventions: home-based management of fever (*Prise En Charge à Domicile* - PECADOM), the scale-up of indoor residual spraying (IRS) to 16 districts and support for LLIN distribution through routine channels. The results of this application should be announced in November 2009. With additional support from the President's Malaria Initiative (PMI), World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the World Bank, the United States Peace Corps, and other national and international partners, the Government of Senegal has made significant progress in the scale-up of malaria prevention and control interventions.

This PMI Year 4 Malaria Operational Plan (MOP) is based on progress in Years 1-3, and a planning exercise carried out in July 2009. The MOP was developed with the participation of the NMCP and nearly all national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support fit well within the Ministry of Health (MOH) 2006-2010 Strategic Plan for Malaria Control.

The following paragraphs briefly describe progress during the last 12 months and Year 4 plans for each of the major interventions:

¹ The old malaria case definition relied only on fever and clinical findings; the new one requires parasitological confirmation of all cases

² World Health Organization Malaria Country Profile: Senegal, 2007

Insecticide-treated nets (ITNs): In Year 3 PMI supported a comprehensive, three-pronged strategy to increase household ownership and use of ITNs: 1) **free distribution** of 1.8 million LLINs to young children participating in the MOH's local supplementation days, to which PMI provided 380,000 LLINs and supported operations costs; 2) **subsidized distribution** of more than 90,000 LLINs to pregnant women and children under five through a voucher program in 539 health facilities; and 3) **social marketing**, resulting in retail and institutional sales of more than 57,000 nets. To promote high rates of ITN demand and use, PMI has also invested in information, education, and communication (IEC) and behavior change communication (BCC) activities.

With FY2010 funding, PMI and the NMCP will focus efforts on maintaining high coverage among vulnerable populations and extending these achievements to the general population via a strong routine distribution system and possibly subnational distribution campaigns. The PMI will also continue to support social marketing activities to stimulate the commercial market for LLINs. In 2010, an estimated 1.7 million additional LLINs are needed to cover all sleeping spaces in Senegal, beyond the 4.4 million nets estimated to be in-country. The 1.925 million LLINs expected to be distributed by PMI in 2010-2011 will fill the estimated gap and ensure high rates of household possession.

Indoor residual spraying (IRS): During Years 1-3, PMI conducted IRS in three districts, one in each of the three ecological zones, covering a total population of approximately 675,000 each year. More than 98% of houses targeted by spray teams were successfully sprayed. The PMI also collaborated with entomologists at the *Université Cheikh Anta Diop* and the *Institut Pasteur de Dakar* to develop an IRS entomological monitoring and evaluation plan. Based on results from entomological monitoring, program monitoring, and a programmatic evaluation, the training, organization and supervision of spray teams were improved in Years 2 and 3. The PMI supported an additional round of spraying in Richard Toll District in March-April of both 2008 and 2009.

With FY2010 funds, PMI will support IRS in the same three districts, and will expand coverage to three additional priority districts, increasing the population covered to approximately 980,000. In order to assist the NMCP with increased IRS activities anticipated under the Global Fund Round 9 proposal, PMI will also support the hiring of an additional entomologist to help the NMCP manage and monitor its IRS activities. Year 4 funds will also support activities to facilitate the transfer of IRS capacities and responsibilities from PMI implementing partners to the Ministry of Health (MOH).

Intermittent preventive treatment in pregnant women (IPTp): Intermittent preventive treatment in pregnant women has been implemented in all MOH antenatal care service delivery sites nationwide. During the past year, PMI worked with the MOH and other partners to strengthen malaria in pregnancy (MIP) interventions nationwide through training, monitoring, and supportive supervision of health care workers. To date, a total of 2,921 health workers have been trained in MIP interventions by PMI. A program of outreach visits to provide ANC services at health huts was also started and expanded to 800 health huts in 33 districts. With FY2010 funding, PMI will continue to support training, monitoring, and supportive supervision

of health care workers in MIP service delivery, as well as expand its ongoing outreach program nationwide. PMI will also continue support for mass media and community IEC/BCC activities to increase ANC attendance early in pregnancy and promote IPTp and use of LLINs.

Case management: *Diagnosis:* In Year 3, PMI supported workshops for the development of a quality assurance / quality control protocol for parasitological diagnosis of malaria and supported implementation of this system. In Year 4, PMI will continue support for training in parasitological diagnosis of malaria, quality assurance, and supervision of diagnostics, and will provide 20 additional microscopes for newly-trained laboratory personnel from military health centers and new health districts.

Treatment: Through its Round 4 and 7 Global Fund grants, the NMCP is able to meet all public sector needs for artemisinin-based combination therapy (ACT) through 2012. During the last three years, PMI funded refresher training in case management and supportive supervision at health center and health post levels in all regions for 2,921 clinical-level providers and management staff. In Year 3, PMI also initiated a system to subsidize treatment of severe malaria. With FY2010 funds, PMI will continue to strengthen case management of malaria with ACTs through supportive supervision and monitoring, training of new health care workers, and preparation for the transition from artesunate-amodiaquine to artemether-lumefantrine as the first-line drug for the treatment of malaria in 2010. The PMI will also continue to provide medications and supplies for the treatment of severe malaria.

Pharmaceutical Management and Drug Quality: In Year 3, technical assistance has been ongoing to strengthen the national pharmaceutical management system with emphasis on ensuring good ACT prescribing and dispensing practices at the facility and community levels. Since 2008, 338 personnel in three regions have been trained on the management of antimalarial medicines, with about half of these also benefitting from post-training supervision (a total of 588 personnel in seven regions have been trained to date). An additional 251 health workers in two regions were trained by the same implementing partner under the NMCP's Round 7 Global Fund grant. The PMI has also contributed significantly to the advancement of pharmacovigilance activities by providing technical assistance in this area.

Community Interventions: Community interventions supported by PMI in Senegal reached every district with FY07 funds and encompass two broad categories of activities: 1) community case management of malaria, and 2) community mobilization for malaria prevention and control. Both sets of activities are implemented in 1,371 functional health huts nationwide and the communities in which they are located. The NMCP has recently piloted a home-based management of fever program in three districts and has requested the help of PMI to train and supervise new village malaria workers and to support expansion of the program. During 2010, PMI will continue the community case management and mobilization efforts made in Years 1-3, and will work to expand the implementation of an integrated package of care for childhood diseases at the community level.

Monitoring and Evaluation (M&E): The PMI's M&E activities have included a baseline MIS in 2006, a midpoint MIS in 2008/9, and interim monitoring of the four main intervention areas through data collected during quarterly NMCP review meetings, periodic reports from groups

providing commodities and conducting IRS activities, visits to health facilities, and reports from international and local partners. In Year 3, PMI is also supporting a post-LLIN-distribution survey focusing on the effectiveness of communications activities, their effect on LLIN utilization rates and the success of targeted under-five campaigns in attaining universal coverage goals.

The PMI's M&E activities will be done jointly with the NMCP and other partners, and PMI will support implementation of the NMCP M&E plan. Support during FY2010 will include implementing a new routine data management system, supporting the evaluation of the NMCP's 2006-2010 Strategic Plan, and assisting in the development of a new 2011-2015 Plan. To assess the impact of malaria interventions, PMI, the NMCP, and partners will contribute to a nationwide Demographic and Health Survey (DHS) in September 2010, including a full malaria module with anemia and parasitemia testing. After years of heavy investment in malaria control, PMI will join other NMCP partners in collecting entomological and epidemiological data to provide a new epidemiological profile of malaria in the country. This profile, along with routine morbidity data, will guide program planning, the evaluation of the 2006-2010 Strategic Plan, and the formulation of the new strategic plan.

Budget: The proposed FY2010 PMI budget for Senegal is \$27 million. Of this amount, 51% will support household ownership and use of LLINs, 19% IRS activities, 6% improved malaria diagnosis and treatment at the health facility level, 4% malaria in pregnancy activities, 10% community-based malaria interventions (including case management and promotion of ITNs, IEC for IRS, and malaria in pregnancy activities), 1% on capacity building of the NMCP, 5% on monitoring and evaluation, and 4% on administration and staffing. A total of 51% will be spent on commodities.

PRESIDENT'S MALARIA INITIATIVE

On June 30, 2005, the United States Government announced a new five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa. The goal of this initiative is to reduce malaria-related mortality by 50% in PMI countries. This will be achieved by reaching 85% coverage of the most vulnerable groups -- especially children under five years of age and pregnant women -- with proven preventive and therapeutic interventions. These include artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment (IPTp) of pregnant women, and indoor residual spraying (IRS).

The President's Malaria Initiative (PMI) began in Fiscal Year 2006 in three countries, Angola, Tanzania, and Uganda. Senegal was added as one of the four additional countries announced on June 8, 2006, beginning implementation in Fiscal Year 2007. Funding for the initiative began with \$30 million in FY06 with three initial countries, increased to \$135 million in FY07 with four additional for a total of seven countries, increased further to \$300 million in FY08 and FY09 with 15 countries, and is expected to reach \$500 million in FY10.

In implementing this initiative, the United States Government is committed to working closely with host governments and within existing national malaria control strategies and plans. Efforts are being coordinated with other national and international partners, including the Global Fund, Roll Back Malaria (RBM), the World Bank, the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the US Peace Corps, and the non-governmental and private sectors, to ensure that investments are complementary and that RBM and Millennium Development Goals can be achieved. Country assessment and planning sessions for the PMI, as well as subsequent evaluations, are highly consultative and held in collaboration with the National Malaria Control Program (NMCP) and other partners.

This PMI Year 4 Malaria Operational Plan (MOP) for Senegal was developed in close collaboration with the NMCP and nearly all national and international partners involved with malaria prevention and control in the country. The proposed PMI activities fit well with the Ministry of Health (MOH) 2006-2010 Strategic Plan for Malaria Control. Proposed programming also builds on investments made by the PMI in Years 1, 2, and 3 to improve and expand malaria-related services and activities. This plan briefly reviews the current status of malaria control policies and interventions in Senegal, outlines progress achieved to date, identifies persistent challenges and current unmet needs if the targets of the PMI are to be achieved, and provides a detailed description of proposed Year 4 PMI activities.

MALARIA SITUATION IN SENEGAL

Senegal has a population of approximately 12.5 million³ with 47% living in urban areas. The proportion of the population living below the poverty line is 62% in rural areas and 32% in

³ Agence National de la Statistique et de la Démographie. Les indicateurs clés sur le Sénégal. Available on web at http://www.ansd.sn/senegal_indicateurs.html accessed 15 July 2009. Estimate for 2010 found by applying growth rate to 2009 estimate.

Dakar⁴. Although substantial improvements have been achieved since the 1960s, Senegal's indicators of human development remain unacceptably low with the country ranked 153 out of 179 countries worldwide on the Human Development Index⁵. The infant mortality rate is 54 and the under-five mortality rate is 85 per 1,000 live births⁶. Maternal mortality is estimated to be 401 per 100,000 live births and the mean life expectancy is 56 years⁷. The adult HIV prevalence rate is estimated at 1.0% for adults 15-49 years of age, with 64,000 adults and 3,100 children estimated to be living with HIV/AIDS⁸.



Map of Senegal showing the current 14 Regions

Administratively, the country is divided into 14 regions and 46 departments, with three new regions in the south and east: Kaffrine (originally in Kaolack), Sédhiou (originally in Kolda) and Kédougou (originally in Tambacounda). 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 Health District Management Team, oversees both the District Health Center and the staff at peripheral facilities throughout the district. There are currently 65 health districts in Senegal, with four more in the process of being established. Although not a formal part of the health system, Senegal's health care pyramid rests on a foundation of 1,383 "functional"⁹ health huts that are established and managed by local

⁴ Based on comparing the cost of a standard basket of food and non-food items to the per-capita annual consumption. République du Sénégal. Evaluation quantitative du DSRP-I (2003-2005), July 2007

⁵ Human Development Indices : A statistical update 2008. Available on web at http://hdrstats.undp.org/2008/countries/country_fact_sheets/cty_fs_SEN.html accessed 15 July 2009.

⁶ Ndiaye, S, et al. 2009. 2008/9 Senegal Malaria Indicator Survey. Calverton, Maryland USA: Centre de recherche pour le développement humain (Sénégal) and Macro International

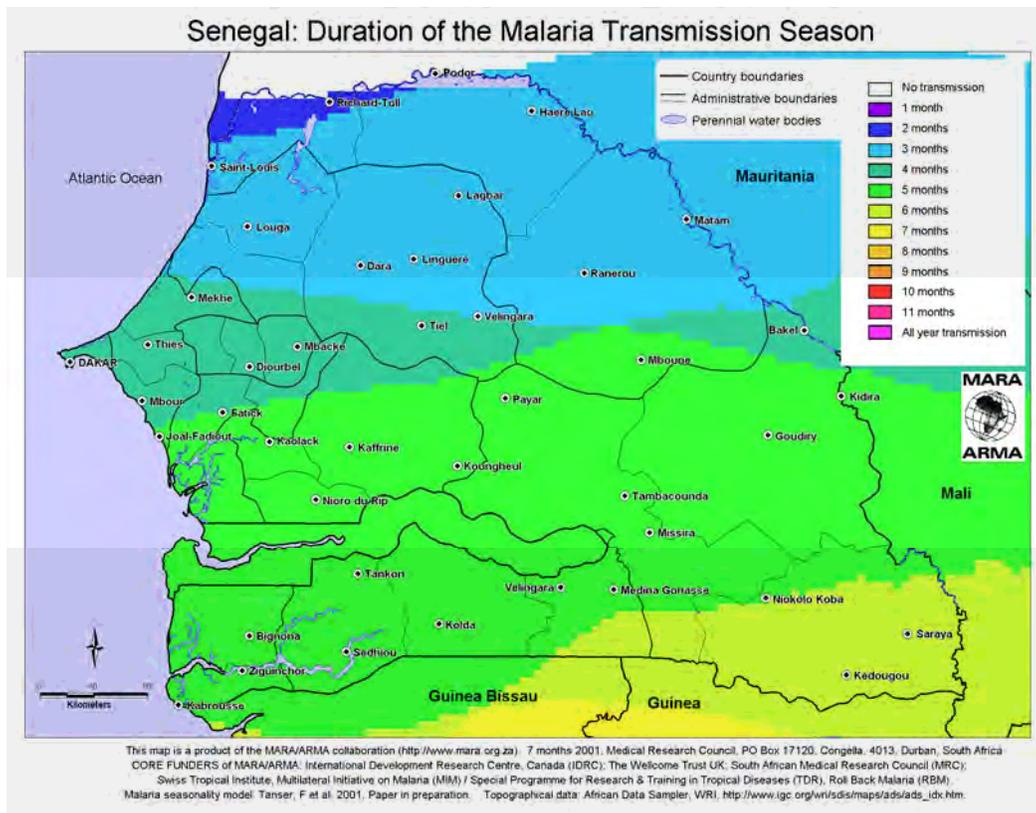
⁷ Ndiaye, S, Ayad, M. 2006. 2005 Senegal Demographic and Health Survey (DHS). Calverton, Maryland USA: Centre de recherche pour le développement humain (Sénégal) and ORC Macro

⁸ UNAIDS/WHO Epidemiological Fact Sheet on HIV and AIDS for Senegal, September 2008. Available on web at http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008_SN.pdf accessed 15 July 2009.

⁹ 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. There are 1371 functional health huts currently supported by the PMI program. In 2007, the MOH

communities and cover approximately 16% of the country's population. The community health workers (CHWs) who staff the huts are supervised by the nurse at the nearest health post and offer preventive and curative services or referral for more complicated medical care. Additional staff includes *matrones*, who are trained birth attendants; and *relais*, who are health educators and communicators.

Malaria is endemic throughout Senegal. 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 and 400 – 1000 mm of rainfall occurring between July and October, and a southern tropical zone with 1000 – 1250 mm of rainfall and a rainy season from June to October. The two epidemiological zones are 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 occurs throughout the year, often as small outbreaks, in peri-urban areas and in areas close to rivers or other water sources that persist through the dry 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 2.5 million children under five and 488,000 pregnant women. According to routine data collected by the NMCP between 2001 and

reported a total of 1383 functional health huts nationwide; however, since then the Global Fund has been supporting efforts to make additional health huts functional.

2006, malaria was responsible for just over one third of all outpatient consultations. In October 2007, the definition of a case of malaria changed from a purely clinical definition to one that relies on parasitological confirmation. After pilot testing rapid diagnostic tests (RDTs), the NMCP in September 2007 distributed tests to all districts and trained health care workers. From this point on, clinicians were directed to test all suspected cases of malaria, to treat with antimalarials and to report only cases with positive results. After this change, the proportion of all outpatient visits due to malaria went from 24.7% in 2007 to 5.6% in 2008. The proportion of all deaths in children under five in health facilities that were attributed to malaria also went from 40% in 2001 to 21% in 2007 to 7.1% in 2008. While the scale up of malaria prevention and treatment measures is responsible for some of this drop, it is mostly due to the change in late 2007 from a clinical case definition of malaria to one requiring parasitological confirmation.

CURRENT STATUS OF MALARIA INDICATORS

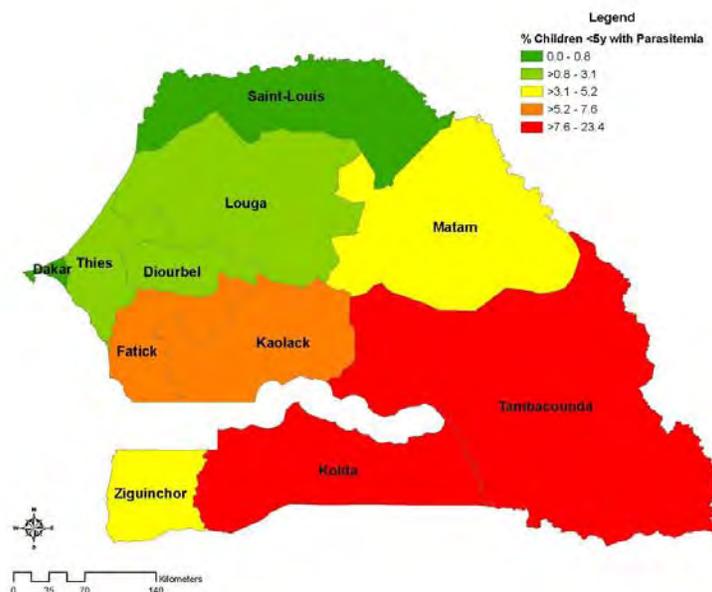
The PMI funded a midpoint Malaria Indicator Survey in Senegal in 2008 that included infant and child mortality, parasitemia and anemia. This survey showed improvements for most malaria indicators since the baseline MIS, done in December 2006, and the Demographic and Health Survey done between February and June 2005. In 2006, 36% of households owned an ITN; in 2008/9 63% owned an ITN. In 2006, 16% of children under five were reported to have slept under an ITN; in 2008/9 30% slept under an ITN. Similar trends were observed with pregnant women and in the general population.

The proportion of pregnant women receiving one dose of intermittent preventive treatment (IPTp) with sulfadoxine-pyrimethamine (SP) also increased from 69% in 2006 to 76% in 2008/9, with 52% of women having received two or more doses of SP in 2008/9. Comparing the proportion of children with fever who receive prompt treatment with an ACT between 2006 and 2008/9 surveys is difficult given the introduction of artemisinin-containing therapies (ACTs) in early 2006 and the implementation of a new treatment algorithm in late 2007 that mandates testing of all suspected cases and treatment only for those testing positive. Overall in 2008/9, only 2% of children were reported to have received an ACT within 24 hours for fever. Care or advice was sought for 52% of children with fever; 65% of these went to a public hospital, health center, or health post and 13% to a public, community-level structure such as a health hut. Only 9% of all children with fever had a malaria test. Of those whose mothers reported the test was positive, 20% were treated within 24 hours.

Indicator	2005 DHS	2006 MIS	2008/9 MIS	2008/9 MIS Regional Range
% Households with an ITN*	20	36	63	40 (Dakar) - 92 (Fatick)
% General population who slept under an ITN* the previous night	6	12	24	13 (Louga) – 52 (Fatick)
% Children under five who slept under an ITN* the previous night	7	16	31	14 (Louga) - 66 (Fatick)
% Pregnant women who slept under an ITN* the previous night	9	17	30	16 (Louga) - 62 (Fatick)
% Women who received 2 or more doses of IPTp during their last pregnancy in the last 2 years	12	49	52	43 (Tambacounda) - 71 (Diourbel)
% Children under 5 years old with fever in the last 2 weeks who received treatment with an ACT within 24 hours of onset of fever	--	3%	2%	0.2 (Matam) - 7 (Kolda)
% Women of childbearing age with anemia (< 11 g/dL)	59	--	64	57 (Diourbel) - 86 (Tambacounda)
% Children under five with anemia (< 11 g/dL)	83	--	79	72 (Ziguinchor) - 87 (Fatick)
% Children under five with parasitemia (<i>P falciparum</i>)	--	--	6	0.8 (Dakar) - 23 (Tambacounda)
Under 5 mortality rate per 1000 live births	121	--	85	59 (Dakar) - 160 (Kolda)

The 2008/9 MIS included several measures of the impact of malaria control efforts in Senegal. The under five mortality shows a significant drop between 2005 and 2008 of thirty percent. Since the 2005 DHS, the proportion of children with anemia has declined modestly while the proportion of women of childbearing age with anemia increased slightly. As anemia rates vary according to the season and the level of malaria transmission, it is unclear whether the results for women represent any real change. The parasite prevalence overall was 6% in children 6-59 months of age, with regional prevalence (see map) increasing from 0% in Saint Louis in northern Senegal to 23% in Tambacounda in the southeast. These results correspond to the ranking of regions by malaria morbidity according to routine data collected by the NMCP.

Percent of children 6-59 months of age with parasitemia due to *P falciparum* by region, Senegal, 2008/9



Except for malaria treatment, the comparison of these surveys shows a considerable increase in coverage and utilization of major malaria prevention and control activities and evidence of impact on overall child mortality; however, it also shows that continued support is needed to scale up interventions to reach targets established by the NMCP and PMI.

NATIONAL MALARIA CONTROL PLAN

Proposed PMI activities align well with the 2006-2010 Strategic Plan for Malaria Control, which has the overall objective of reducing morbidity and mortality due to malaria by 50% by 2010. In addition, the following specific objectives are identified:

- Increase to 80% the rate of coverage and utilization of ITNs by 2010;
- Cover 80% of households in targeted zones with IRS;
- Treat 80% of malaria cases at all levels of the health pyramid in accordance with national directives;
- Increase to 80% coverage of IPTp in accordance with national directives; and
- Improve the management of the program at all levels.

In order to accomplish these objectives, the NMCP focuses on strengthening prevention measures and ensuring correct and timely treatment at all levels of the healthcare system. The Strategic Plan for Malaria Control outlines an integrated package of activities with the following components:

- **Malaria case management** (uncomplicated and severe): improved diagnosis using rapid diagnostic tests (RDTs) and microscopic verification, early and correct treatment with

ACTs (uncomplicated malaria) or quinine (severe malaria and malaria in pregnancy), and community case management;

- **Prevention of malaria in pregnant women:** intermittent preventive treatment with at least two doses of sulfadoxine-pyrimethamine (SP) using directly observed therapy during antenatal care;
- **Vector control:** IRS and use of ITNs, particularly among pregnant women and children under five, with an overall goal of universal coverage with LLINs;
- **Environmental management/hygiene:** identification and destruction of mosquito breeding areas through community-based interventions; and
- **Epidemic prevention and control:** establishment of sentinel surveillance sites in high-risk districts, epidemic response planning, strengthening prevention measures (ITNs, IRS, etc.).

Supporting interventions include human resource management, management and mobilization of financial resources, supply chain management, coordination of partnerships, and community mobilization.

MAJOR PARTNERS IN MALARIA CONTROL

Multilateral and Bilateral Donors

Global Fund to Fight AIDS, Tuberculosis and Malaria

In the 4th Round of funding, the Global Fund awarded a \$33.3 million grant to Senegal covering activities from September 2005 to August 2010, with the agreement for the second phase of funding signed in early 2008. The Principal Recipient of this grant is the NMCP. Thus far, the Round 4 grant has been used to procure ACTs, SP, ITNs/LLINs, and RDTs. This funding also supports training, supervision and communications activities and grants to community-based organizations (CBOs) working on malaria prevention throughout the country. These interventions have included IEC/BCC and subsidized sale of ITNs when available, but to date have not involved case management, IPTp, or vector control measures.

In Round 7, the Global Fund awarded a \$67 million grant to Senegal with \$29.8 million approved for Phase one in March 2008. With this grant the NMCP is expanding the availability of ACTs at the community level, including making more than 500 additional health huts functional and providing ACTs to communities where there is no health hut; purchasing RDTs for use in all public health facilities and community health huts; providing 1.3 million LLINs for the nationwide free distribution campaign in 2009 and the distribution of 300,000 – 500,000 per year thereafter; and reinforcing the institutional capacities of the NMCP and the Central Medical Stores (CMS). Funding from this grant will cover activities through 2012.

In June 2009, Senegal submitted an application for the Global Fund Round 9. The proposal requests \$62.4 million and focuses on three major interventions:

- Home-based management of fever (*PECADOM*) - expansion to 24 new districts, adding 749 village malaria workers trained in the management of uncomplicated malaria with RDTs and ACTs.

- Indoor Residual Spraying - expansion from the current 3 to 16 health districts, focusing on those with high malaria morbidity and mortality.
- Long-lasting insecticide treated bednets – procurement of nearly 4,280,000 LLINs for distribution, with 2,548,000 to be given out during a follow-up campaign in 2012 and the rest through routine systems.

In developing this MOP, the PMI Senegal team discussed extensively with the NMCP and other partners how to best take into account the uncertainty of whether the Round 9 grant would be awarded. The response of the Global Fund should be announced in November 2009. This MOP proposes activities that both complement and lay the groundwork for what could be funded by the Round 9 grant, and assumes that PMI money would be available before funds from Round 9. The final mix of funding for various activities will depend on the award of the grant, the timeline for disbursement of funds, and negotiations.

World Bank

In past years, World Bank malaria funds were used to procure ITNs and to support IEC activities focused on malaria prevention messages. The Bank currently supports the Government of Senegal in reaching its malaria-related goals and outcomes through Poverty Reduction Support Credits and two separate Bank programs:

- Senegal River Basin Project, including the Integrated Water Resources Management Program. This project had intended to distribute 400,000 LLINs to children under five in 19 districts in the Senegal River Basin (St. Louis, Matam, Tambacounda, and Louga regions) during the national mass campaign in June 2009. However, procurement and delivery delays meant that the nets were not available in time. The NMCP diverted other ITNs to high risk areas during the campaign, and the project is now discussing the best approach for distributing its nets. A second batch of 375,000 LLINs is also being procured for distribution in 2010. The project implemented a baseline survey in June/July 2009 using the standard MIS questionnaire adapted to include questions on schistosomiasis and geohelminths. The sample included populations all along the Senegal River Valley in Senegal, Mauritania, Mali and Guinea.
- Nutrition Enhancement Project. During this community-based project's first phase (which ended in 2005), a total of 42,500 ITNs and 17,000 net re-treatment kits were distributed to children under three. Phase two currently operates in 251 local communities in 29 districts, serving all children in rural locations and selected children in urban areas. In 2008, the project distributed approximately 450,000 LLINs to children under five and an additional 50,000 LLINs to pregnant women in its intervention areas. The Nutrition Enhancement Project does not plan to distribute any LLINs in 2010, but will continue malaria communication/education activities targeted to pregnant women and mothers of children under five.

World Health Organization (WHO)

The World Health Organization provides technical and some financial support for the implementation of treatment and prevention policies, planning, monitoring and evaluation, research, surveillance, and management of the NMCP.

United Nations Children’s Fund (UNICEF)

The United Nations Children’s Fund provides support to the health sector in Senegal primarily through support of district-level health plans in the regions of Kolda, Sédhiou, Kédougou, Tambacounda and Matam. Activities have included the purchase and distribution of ITNs and net retreatment kits. In late 2008, UNICEF provided 60,000 LLINs to the regions of Matam, Kolda and Tambacounda (approximately 20,000 per region), which the districts distributed to health posts for subsidized sale to the general population. During the organization of the 2009 mass LLIN distribution campaign, UNICEF was also a major partner, having contributed approximately \$150,000 to operational expenses in their focus regions and played an important role in the organization and supervision of the campaign.

Islamic Development Bank

The Islamic Development Bank is providing \$8 million in loans for the procurement of LLINs and RDTs, health personnel training, and support for supervision. One million LLINs and RDTs are being procured through UNICEF with this funding, with delivery expected before the end of 2009.

African Development Bank

The African Development Bank is financing a community project in the Fatick and Matam Regions (including IEC and net retreatment) and supported the development of the NMCP’s communication plan.

Other Bilateral Donors

The **French Cooperation** is involved with malaria activities through French government support to the Global Fund and staffing of a technical advisor at the MOH. The French also contribute significantly to research activities through the *Institut Pasteur de Dakar* and the *Institut pour la Recherche et Développement (IRD)*. The **Japan International Cooperation Agency (JICA)** supports about 10 volunteers in the health sector, with one dedicated to malaria. The **Chinese Cooperation** donated 358,880 ACT treatments (duo-cotexin) in 2007-2008, sponsored training in malariology, and has constructed a training and research center in cooperation with the MOH. The Embassy of **Thailand** has also supported the participation of Senegalese health personnel at malaria training courses in Thailand.

The United States Peace Corps

Peace Corps and USAID have been working collaboratively on various programs in Senegal over the past few years, and under PMI, this relationship has been strengthened. The program currently has 160 Volunteers and will soon be growing to 250 Volunteers posted in all 14 regions. The Peace Corps Country Director has asked all Volunteers, not only those assigned to health, to work on malaria, and a third-year health Volunteer based in Dakar is designated as the PMI focal person. The PMI staff and implementing partners regularly participate in pre-service and in-service training sessions to discuss ideas for collaboration. The Volunteers have designated a representative for each geographic zone to facilitate communication among all Volunteers with the PMI staff and implementing partners. A reporting mechanism is being put in place to track the work that Volunteers do toward achieving PMI goals.

Non-governmental and Faith-Based Organizations

ChildFund Senegal Consortium¹⁰

Community-level activities in Senegal are implemented by a consortium of non-governmental and faith-based organizations led by ChildFund Senegal. Members of the consortium include World Vision, Plan International, Counterpart International, Catholic Relief Services and Africare. These groups cover all health districts in the country with the interventions described in the “Community-based Interventions” section. Occasionally members contract with local organizations to help meet specific needs.

In addition, PMI’s clinical/facility-based and policy-level activities are managed by several US-based organizations, including IntraHealth International, RTI International, the Academy for Educational Development, and Management Sciences for Health.

The Senegalese Red Cross Society (SRCS)

The Senegalese Red Cross Society has become active in malaria in recent years, contributing significantly to the 2008 LLIN mass distribution campaign through the national planning committee and mobilization of nearly 1,000 local volunteers. In 2009, SRCS received core funds from PMI via the International Federation of Red Cross and Red Crescent Societies (IFRC) to support nearly 2,000 volunteers and nearly 100 supervisors/coaches during the mass distribution campaign and to implement follow-up activities encouraging net hanging and use.

Malaria No More / Youssou Ndour Foundation

Malaria No More has recently become active in Senegal with the negotiated donation of LLINs from Sumitomo Chemical for the 2009 national mass campaign, posting of a short-term advisor to Senegal, and funding for the mass media/marketing “Surround Sound” campaign in collaboration with the Youssou Ndour Foundation.

Community-based Organizations

The NMCP and health districts routinely contract with community-based organizations for the distribution of ITNs, retreatment campaigns, and other social mobilization activities, which are described in the “Community-based Interventions” section.

Academic Research Partners

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

Private Sector Donors

The **Pfizer** pharmaceutical company is implementing a malaria intervention program focused in three health districts in the Tambacounda Region, with funding estimated at \$300,000 per year for five years. The program focuses on IEC/BCC for improved care-seeking behavior, as well as

¹⁰ As of July 1, 2009, Christian Children’s Fund began operating under the name of ChildFund Senegal.

increasing access to care by making additional community health huts functional through staff training and provision of basic equipment. This activity is managed by one of PMI's implementing partners and significant efforts have been made by the PMI staff, Pfizer, and the project Chief of Party to ensure that the programs are complementary rather than duplicative. The Pfizer project is using the BCC and training materials developed under PMI. To date, 24 health huts have been restored covering 96 villages. A total of 25 CHWs have been trained in malaria case management, use of rapid diagnostic tests, and use of monitoring tools for reporting. Seventy-two village volunteers have been trained in interpersonal communication and malaria prevention, and 120 members of village health committees have been trained in managing the health huts. Radio spots and plays are being aired in local languages along with community talks performed by the CHWs.

The Australian company **Mineral Deposits Limited** has carried out three spray operations in two mining camps and 2,000-3,000 houses in eight villages near its gold mine in Saraya District in southeastern Senegal. Since 2008 they have been collaborating directly with the NMCP and the Hygiene Service with respect to implementation of their IRS program.

GOAL AND TARGETS OF THE PRESIDENT'S MALARIA INITIATIVE

Goal

The goal of the PMI is to reduce malaria-associated mortality by 50% compared to pre-Initiative levels in all PMI countries.

Target

By the end of 2010, 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 6 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;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with an ACT within 24 hours of onset of their symptoms.

EXPECTED RESULTS – YEAR FOUR

At the end of Year 4 of the PMI in Senegal (March 31, 2011), the following results will have been achieved:

Prevention:

- Approximately 225,000 houses in six districts targeted for IRS will have been sprayed, protecting approximately 980,000 residents (with at least 85% of targeted houses sprayed);
- At least 1.9 million LLINs will be procured and distributed with PMI support; and
- At least 85% of pregnant women will receive two doses of SP for IPTp as per data gathered by the NMCP.

Treatment:

- >90% of presumed malaria patients will be confirmed with diagnostic testing (as per data gathered by the NMCP); and
- Malaria diagnosis with RDTs and treatment with ACTs will be available in 1,397¹¹ health huts through community health workers and in 314 additional villages through trained village malaria workers

INTERVENTIONS – PREVENTION

Insecticide-treated nets (ITNs)

Please refer to the “Community-based Interventions” and “HIV/AIDS and Malaria” sections for additional ITN activity descriptions.

Background:

Key strategies for malaria prevention in the NMCP 2006-2010 Strategic Plan are the distribution of LLINs¹² to pregnant women and children under five years of age and the improvement and reinforcement of communication on the use of ITNs, with a goal that 80% of each group will sleep under an ITN by 2010. In addition, the NMCP has endorsed the WHO-recommended goal of universal coverage with LLINs, with a goal that 80% of the population will own and sleep under an ITN by 2010. The NMCP is following the “catch-up” and “keep-up” strategies endorsed by the RBM partnership¹³ to rapidly increase and maintain high coverage with LLINs. The NMCP remains committed to diversifying sources of ITNs and promotes four approaches for LLIN distribution: 1) periodic mass free distribution, 2) targeted subsidies for vulnerable groups, 3) untargeted subsidies through health facilities and CBOs, and 4) commercial sales. The NMCP also conducts campaigns to re-impregnate existing nets just before the rainy season, although this will cease after 2009.

Detailed descriptions of the four approaches for ITN distribution supported by the NMCP are as follows:

¹¹ Includes 1371 PMI/Senegal supported health huts and 26 Caritas supported health huts, which receive funding from the PMI Malaria Communities Program managed from USAID/Washington

¹² Since 2007, the NMCP only procures long-lasting insecticide treated nets, however it continues to measure coverage and utilization based on ITNs.

¹³ RBM Working Group for Scaling-up Insecticide-treated Netting. Scaling-up Insecticide-treated Netting Programmes in Africa: A Strategic Framework for Coordinated National Action. 2nd Edition. Geneva: Roll Back Malaria, 2005

1. Periodic mass free distribution of LLINs

The NMCP in 2007 began to work with partners on large-scale mass distributions of LLINs to “catch-up” net ownership among children under five, culminating in a national campaign in 2009. Because the target population for Senegal’s “local supplementation days” campaign is 6-59 months, LLINs have been distributed to this group in an integrated approach (with vitamin A and deworming medication). The inclusion of children under six months in the LLIN distribution was felt to be too complicated for the door-to-door teams as it involves changing the normal target population for the supplementation days. Children 0-5 months remain a target population for prevention efforts under PMI, and other LLIN distribution mechanisms work to support coverage of this vulnerable group. The “catch up” strategy is complemented by ongoing routine distribution and IEC to ensure LLINs are properly used.

2. Targeted subsidies for vulnerable groups

Since 2004, PMI has supported the NMCP by subsidizing the sale of ITNs and LLINs to pregnant women and children under five. Under the system in operation before 2010, health committees at participating facilities negotiated agreements with private sector LLIN distributors to stock and sell nets through the health facility’s pharmacy. These agreements specified the co-payment required of the client for each type of LLIN (generally 1,000 FCFA [about \$2.17] for rectangular nets and 1,500 FCFA [about \$3.26] for circular) and the amount of the co-payment retained by the health committee. The distributors were in turn responsible for ensuring a consistent supply of LLINs to the points of sale.

Senegal is a Bamako Initiative country and has a long tradition of co-payments for health services and products, a practice generally well-accepted by the public. While the NMCP and partners feel strongly that the co-payment is not a barrier to most people, it is recognized that free mass distributions help to reach many families that cannot afford an LLIN through routine services.

3. Untargeted sales of subsidized bednets

The NMCP supports untargeted bednet sales at health facility pharmacies and through CBOs at a subsidized price of 1,000 CFA (about \$2.17). Nets for this program have come from donations by UNICEF and the World Bank and procurements with the Global Fund Round 4 grant. The health districts and CBOs each retain a portion of the 1,000 CFA payment. To date, the NMCP has not dedicated sufficient funds to supply the quantity of bednets necessary to meet demand, so the system suffers from frequent and lengthy stock-outs. In addition, the NMCP has experienced long delays in ordering LLINs through the Global Fund. Health districts and the NMCP have also not always received regular and reliable reports from some CBOs regarding their distribution activities, posing problems for accountability. In turn, some CBOs have had difficulties collecting money from those receiving the bednets, complicating the reimbursement to the districts and the NMCP.

4. Commercial bednets sold at market prices to the general public

The elimination of national taxes and tariffs on ITNs in 2004, along with increased availability of competing brands on the commercial market, has brought down retail prices of ITNs over the past few years, increasing access for the general population. Six major manufacturers supply ITNs and LLINs in Senegal. Commercial suppliers reach 13 of 14 regions, but do not reach some rural areas (specifically Kédougou). These bednets are sold at 3000 – 7500 CFA (\$7.15 – 17.90) each.

Social marketing efforts have also resulted in a consistent stock of nets being available in-country at any time. Expanding the market has encouraged net manufacturers to invest in Senegal, to develop their own marketing plans, and to promote their products. The in-country stocks have also served other large buyers of nets; for example, the local Olyset® distributor was awarded a contract to provide LLINs for the World Bank supported distributions in 2008 and 2009, and the Vestergaard Frandsen distributor was awarded a contract to provide 371,000 LLINs for the NMCP's 2009 free distribution campaign. Vestergaard also recently introduced insecticide-treated curtains to the Senegalese market and is implementing a high-visibility marketing campaign.

Progress During Last 12 Months:

The PMI supports the NMCP's comprehensive strategy to increase household ownership of LLINs, especially among vulnerable populations. Equally important are the efforts to boost LLIN use that are included in social marketing activities and in the community interventions supported by PMI.

- 1) The NMCP organized a **free distribution** of 1,838,400 LLINs to children under five through the MOH's 2009 "local supplementation days" campaign. The PMI contributed 380,000 LLINs and \$500,000 to support operational costs, including transport of all nets to health districts, printing and delivery of communications materials and data collection tools, and on-the-ground implementation costs in selected districts, plus significant technical assistance from the PMI Resident Advisors and implementing partners. Additional PMI core funds supported Senegalese Red Cross Society volunteers to participate in the distribution in seven regions of the country. Advocacy by PMI attracted an additional 86,000 LLINs from other partners (including the Canadian Red Cross, the Against Malaria Foundation and Sumitomo) and \$200,000 for operational costs. The PMI also supported the free distribution of 2,000 LLINs to people living with HIV/AIDS (PLWHA) through regional PLWHA networks.

Peace Corps Volunteers in the areas of Kolda and Kaolack distributed 2,200 LLINs that were leftover from PMI's 2008 mass campaign. In addition, Peace Corps was able to procure 20,000 LLINs through other partners (primarily NetLife, the Against Malaria Foundation, and family donations) and distribute them after the 2009 mass campaign. These distributions targeted sleeping spaces not eligible for the campaign, with a goal for universal coverage in 40 villages where volunteers live and work and throughout the district of Saraya (Kédougou Region).

- 2) The PMI supported **subsidized distribution** of LLINs to pregnant women and children under five through the voucher program functioning in 539 facilities in seven of the country's 14 regions. During Year 3, 90,783 pregnant women or parents of young children exchanged vouchers for LLINs. The voucher redemption rate for Year 3 was 92%.

As described in the FY09 MOP for Senegal, PMI is working with the NMCP to expand the routine LLIN distribution system to reach national scale. In-country partners have begun discussions to define the scope and expected results of a new LLIN project that will seek to integrate the PMI-supported, targeted, facility-based system and the NMCP-supported, untargeted, community based system. The project will likely begin with a review of the existing systems and analysis of available data on ability to pay in order to determine the most appropriate mechanisms and levels of subsidy, including the possibility of full subsidy for some groups. Data on ability to pay will come from a PMI-support study of the effects of user fees for health services and ACTs. The PMI also expects the new routine LLIN project to include technical support to the NMCP to assist with, for example, the development of routine net monitoring and replacement strategies.

- 3) Partly as a result of PMI **social marketing** support, which funds such activities as billboards, TV and radio spots, newspaper insertions, and technical assistance in planning and marketing, nearly 60,000 unsubsidized ITNs were sold by local commercial distributors during FY09. Social marketing messages strive to identify the advantages of LLINs over other types of bednets and strengthen the brand identity of suppliers in Senegal.

Proposed Year 4 Activities: (\$13,775,000)

In Year 4 PMI and the NMCP will focus efforts on maintaining high coverage among vulnerable populations and extending these achievements to the general population via a strong routine distribution system and subnational distribution campaigns.

Gap analysis:

In 2010, an estimated 6.1 million LLINs are needed to cover all sleeping spaces in Senegal, based on an average of two people per LLIN. Using results from the 2008/9 MIS, at the end of 2008 roughly 2,452,000 LLINs were in Senegalese homes. After the completion of the LLIN distribution in Dakar, 2,405,000 additional nets will have been distributed in 2009. Assuming that 490,000 LLINs or 20% of LLINs present at the end of 2008 will need to be replaced during 2010, 4,366,600 LLINs would have been distributed, leaving a gap of 1,733,400. Based on manufacturers' reports of LLIN deliveries to Senegal from 2004 – 2008, assuming that LLINs need replacement after three years, and that in the year after delivery, 5% of LLINs are lost or damaged for various reasons, an additional 1.7 million LLINs need to be procured in 2010 to ensure universal coverage. The 1.925 million LLINs expected to be distributed by PMI in 2010 will fill the estimated gap and ensure high rates of household possession by March 2011.

1. Support for distribution of LLINs: (\$13,500,000)

As requested by the NMCP, PMI support for LLIN distribution in Year 4 will focus on maintaining the national routine subsidized distribution system for pregnant women and

children under five, and expanding it to include the general population. As data on nets distributed compared to the estimated target population suggest that high national coverage of young children was largely achieved with the 2009 free campaign, PMI will now move to supporting universal coverage goals. The routine system will combine the PMI facility-based approach with the NMCP's community-based approach, resulting in one integrated and comprehensive program. The PMI plans to distribute at least 1,450,000 LLINs through this system by the end of 2011. The new mechanism for implementing this activity has yet to be awarded, but PMI anticipates that the project design will include varying levels of subsidy by target group.

The next nationwide LLIN mass distribution campaign is planned by the NMCP for 2012. During 2010, PMI will conduct sub-national LLIN mass distribution campaigns in priority areas based on high parasite prevalence, high malaria incidence, and/or low household LLIN coverage. Approximately 425,000 LLINs will be delivered in campaigns piloting different approaches in order to find a workable strategy for Senegal that could be used in 2012. In addition, 10,000 nets will be distributed free through networks of PLWHA and 40,000 will be distributed free through Peace Corps Volunteers in communities that have not yet received them. More information on BCC activities to be undertaken with PLWHA can be found in the HIV/AIDS and Malaria section, and additional malaria prevention activities performed via Peace Corps volunteers can be found in the Community-Based Interventions section.

2. *Social marketing to promote LLINs: (\$275,000)*

The PMI will continue to use social marketing strategies to increase consumer awareness of the benefits of LLINs and their proper use. Mass media such as billboards, TV and radio spots and newspaper ads, as well as localized activities such as "road shows" and other promotional activities, will be utilized. PMI will also continue to work with local commercial LLIN distributors to expand their markets and promote their products to those consumers who prefer the choice and convenience possible when paying full retail price for a net. It is expected that sales of ITNs by private sector distributors will reach at least 65,000 consumers in Year 4

Indoor residual spraying (IRS)

Background:

The 2006-2010 Strategic Plan for Malaria Control includes IRS as a key strategy for malaria prevention in Senegal. As the NMCP had little experience with IRS before 2007, PMI proposed training and equipping locally-recruited spraying agents with help from and supervision by the Hygiene Service (the environmental public health division of the Ministry of Health). The MOH and its partners selected synthetic pyrethroids for use in this activity.

Anopheles gambiae and *An. arabiensis* are the principal vectors over much of the country and *An. funestus* is found around permanent bodies of water in the south. All three species feed and rest indoors to some extent and thus are susceptible to IRS. Other vectors, such as *An. melas*,

which predominate in the mangrove swamps of coastal river deltas, prefer to feed outdoors. Consequently, in areas where they are the major vectors, IRS would be expected to have limited impact. Because malaria transmission is seasonal in much of the country, a single round of spraying just before the rains begin each year is believed to be adequate in most areas. The irrigated areas upriver from the Diama Dam on the Senegal River experience a second peak of transmission in April and May but with the use of residual insecticides of long duration one round of spraying suffices. In Dakar, where approximately 25% of Senegal's population resides, malaria transmission is limited to a few peri-urban districts and these densely populated neighborhoods would pose special challenges to IRS activities. Therefore, vector control activities such as IRS are likely not cost effective in this setting.

Based on the positive experience of IRS implementation in Senegal since 2007, the NMCP plans to expand IRS activities. Senegal submitted an application for the Global Fund Round 9 competition that requests funding for IRS expansion from the current three districts to a total of 16 with focus on those districts with high malaria morbidity and mortality.

Senegal is a beneficiary of a WHO/Gates Foundation grant to improve insecticide resistance monitoring capacity. Entomologists from UCAD, the *Institut Pasteur de Dakar*, the *Institut de Recherche pour Développement* (IRD), and the Parasite Control Service in Thiès (SLAP), together with members of National Hygiene Service, have developed a detailed 12-day course to train district and regional Hygiene Service staff on entomologic control and surveillance methods. Two sessions of the course from June to July 2008 trained 42 staff of the Hygiene Service from 11 of Senegal's 63 districts. At present, it is unclear whether Hygiene Service staff will carry out these methods independently or will assist trained entomologists in the studies.

The Australian company **Mineral Deposits Limited** has carried out three spray operations in two mining camps and 2,000-3,000 houses in eight villages near its gold mine in Saraya District in southeastern Senegal. The company used a pyrethroid, alpha cypermethrin (Fendona®), during the first round and an organophosphate during the second round. Company representatives stated that the pyrethroid was greatly appreciated by the local population but that the organophosphate's noxious fumes made it less acceptable and spray operations therefore returned to alpha cypermethrin in 2009. In 2008 Mineral Deposits Limited contacted PMI with the desire to collaborate more closely with the NMCP and the National Hygiene Service on future spray rounds; PMI facilitated their introduction and following this, the company has brought the National Hygiene Service leadership to the mining camp to monitor activities in 2008 and 2009.

Progress During the last 12 months:

In 2008, PMI Year 2 funds supported IRS campaigns in the health districts of Vélingara, Niour and Richard Toll – with each district representing one of the country's three ecological zones. The campaign achieved high coverage rates in all three districts, protecting a population of 645,346 or 98.5% of the originally estimated population living in the houses visited. For the 2008 spray round, the insecticide used changed from lambda-cyhalothrin wettable powder (ICON 10-WP®) to lambda-cyhalothrin capsular suspension (ICON 10-CS®).

From July 2008 until May 2009, entomologists from UCAD, the NMCP, the *Institut Pasteur de Dakar*, the SLAP, and the IRD conducted monitoring in five villages of each of the three districts. The monitoring included cone bioassays on walls to test for insecticidal activity, knockdown spray catches and human landing catches. In contrast to the results after the 2007 IRS campaigns, the insecticide application in 2008 was found to be consistent and effective, with almost all walls tested having high insecticidal activity. This consistency and efficacy indicated that the spray quality was much improved since 2007. In addition, the testing demonstrated that ICON 10-CS still had effective insecticidal activity 10 months after application. However, in the district of Vélingara, insecticide resistance to pyrethroids was found to be increasing indicating that for the 2010 spray round a different class of insecticide may be needed. The resistance levels will be monitored closely after completion of the June - August 2009 round of spraying.

An additional spray round was carried out in Richard Toll during March - April 2009, in order to prevent the second peak of malaria transmission. Data on duration the insecticidal activity of ICON-CS® applied during June - July 2008 campaign was not available prior to the planning phase for the March - April 2009 campaign, therefore the decision was made to continue with the spray activities. Because another spray round was scheduled a few months later in the district (July 2009), surplus ICON-10 WP®, a formulation of shorter durability, left over from the previous year was selected for use at this time. More than 21,589 houses were sprayed and 113,544 people were protected. This round was initially complicated by high rates of refusal due to inadequate community mobilization leading up to the campaign. These problems required a halt to spray operations, but after re-planning of IEC activities, the spray round finished successfully.

Between June and August 2009, a complete round of spraying with ICON 10-CS® in all three districts was implemented, resulting in 176,279 houses sprayed (94% covered of those found and eligible to be sprayed), and protecting 661,814 people (97% of the estimated total population in the three districts).

Year 3 PMI funds had originally intended to support the expansion of entomological monitoring into a fourth district. Instead of expanding entomologic monitoring to only one additional district, Year 3 PMI funding will be used to conduct baseline monitoring during August-September 2009 in the three new districts that will be targeted for IRS in Year 4 of PMI.

Community sensitization for IRS

The PMI uses separate implementing partners for spray operations and IEC/BCC for IRS, which varies by district. A training manual and handbook for *relais* and information pamphlets in three languages were developed and validated at the central level. Before each spray round, the information pamphlets were distributed and radio spots, community meetings, and house-to-house visits were organized. In 2009, PMI's spray operations partner in Vélingara District hired an IEC/BCC specialist who was paired with the IEC/BCC focal point of the health district and who was asked to develop and implement a new IEC strategy to overcome difficulties observed in the 2008 campaign. In Richard Toll, the post-campaign evaluation meeting held after the fourth round of spraying (March-April 2009) identified deficiencies at all levels of implementation. The result of this meeting was a newly designed IEC/BCC strategy that

included the establishment of a consultation committee within each health post zone. This committee, composed of the health post nurse, the local Imam, village leaders and others, was responsible for selecting *relais* and spray operators, and dealing with families who refused spraying. With increased transparency and community ownership of the process, the difficulties encountered in previous campaigns were almost eliminated and refusal rates decreased.

Although National Hygiene Service agents and MOH personnel at many levels of the health system have been engaged in IRS activities to date, for future rounds district health teams need to be even more involved with training, supervision, IEC, and micro-planning for IRS, and a greater emphasis needs to be placed on capacity-building and the development of a sustainability plan.

Proposed Year 4 Activities: (\$5,212,000)

In Year 4, PMI will support IRS and entomological monitoring in the same three districts as in Years 1-3 and expand IRS operations to three additional districts that were identified as priority districts for IRS by the NMCP.

1. IRS Operations: (\$4,500,000)

In Year 4 one round of spray operations will be repeated between May and July 2010 in the current districts of Vélingara, Nioro and Richard Toll and expanded to include three additional districts: Guingénéo, Maleme Hoddar, and Koumpentoum. These three districts are among the 16 priority districts identified by NMCP in their Global Fund Round 9 proposal. PMI will support the expansion to a total of six districts to help the NMCP prepare for this expansion under the Global Fund. The NMCP plans to take over IRS activities in PMI districts at the conclusion of PMI and manages a long-term comprehensive vector control plan that includes universal LLIN coverage and IRS.

Because the duration of effective mosquito killing by the pyrethroid utilized in July – August 2009 was shown to be at least 10 months, a second round of spraying in Richard Toll, scheduled for March 2010, will not be done in Year 4. The PMI is engaging in discussions with the NMCP regarding the future of IRS in this district. Possible plans include implementation of universal coverage with LLINs, followed by a district-level cessation of IRS.

2. IEC/BCC for IRS: (\$150,000)

The PMI will continue to support IEC/BCC activities related to IRS in the three current districts and take advantage of the lessons learned from previous rounds to develop and implement IEC/BCC strategies in the three expansion districts.

3. IRS capacity building: (\$100,000)

The goal of this activity is to manage the political process involved in transferring responsibility for IRS from RTI to the MoH. This process would not only need to go beyond the NMCP to engage different directorates of the MOH, including the Hygiene Service and

the Parasite Control Service, but also different ministries, such as the Ministry of the Environment. The NMCP and RTI COP strongly feel that in order to be effective this kind of capacity building needs to be managed through a neutral partner such as the WHO. WHO's involvement could also expedite the process as they would play a facilitative role and be responsible for convening all necessary stakeholders. RTI would still continue its overall capacity building activities, and maintain the technical role of training members of the Hygiene Service to conduct spray operations.

Specifically, the PMI will support a consultant to work with the NMCP and facilitate activities aimed at increasing IRS-related capacity and skills at national and local levels. Possible responsibilities for this consultant could include helping to plan and facilitate meetings with IRS stakeholders so as to enhance the ability of the NMCP to implement and expand effective IRS programs. The consultant-led activities will emphasize strengthening national and local capacity for IRS in order for the MOH to ultimately assume full responsibility for IRS in the future. The PMI will work with partners to advocate for the establishment of an IRS oversight committee, within the overall malaria coordination mechanism, composed at minimum of members from the MOH including the National Hygiene Service, the NMCP, PMI partners for spray operations and IEC/BCC activities, and PMI team members. The committee will develop a sustainability micro-plan to be led by the MOH. In addition, participants at all levels of past IRS activities will assist in the drafting of an IRS implementation guide based on lessons learned from three years of IRS and will help update this document over time. In addition, members of the MoH and NMCP could benefit from observing the nationally-run IRS program of Zambia.

4. Strengthen entomologic capabilities and entomologic monitoring: (\$402,000)

The PMI will continue to support entomologists from UCAD and *Institut Pasteur de Dakar* to conduct entomologic monitoring and evaluation for IRS. Entomologists will conduct cone bioassays immediately after spraying and at monthly intervals in all six spray districts. Vector behavior will be assessed by monitoring indoor and outdoor biting rates and indoor resting densities. Parity rates will aid in determining female longevity and transmission potential. Finally, mosquito strains will be identified and checked for malaria sporozoites. Particular interest will be paid to insecticide susceptibility as resistance may be developing after repeated rounds of IRS with the same insecticide and must be monitored closely. Insecticide susceptibility assays will be performed not only in the six IRS districts, but also in five additional sites throughout the country to ensure that pyrethroid resistance is not developing to a level that will negatively impact the effectiveness of LLINs. In addition to susceptibility assays, entomological monitoring will include molecular assays for the presence of genes associated with resistance to synthetic pyrethroids, such as *lambda cyhalothrin*, the active ingredient of ICON. A CDC entomologist will provide technical assistance for the implementation of entomological monitoring activities and ensure the completion of OR projects.

5. Additional entomologist at the NMCP: (\$35,000)

Due to the increased supervision and entomological monitoring that will be required with the expansion to three additional districts, the NMCP has requested that an additional entomologist be seconded to work with the National Program and assist with the IRS scale-up.

6. *Technical assistance for environmental compliance monitoring and capacity building: (\$25,000)*

Support will be provided for one external environmental compliance visit aimed at ensuring and documenting compliance of IRS activities according to USG environmental regulations. This technical assistance will also be aimed at building the capacity of PMI and Mission colleagues and NMCP counterparts to effectively carry-out environmental compliance monitoring during spray operations.

Malaria in Pregnancy (MIP)

This section describes facility-based MIP interventions. Please refer to the “Community-based Interventions” section of this MOP for a discussion of community mobilization to improve ANC attendance and use of IPTp.

Background:

In 2003, IPTp with sulfadoxine-pyrimethamine (SP) was adopted by the NMCP. The national IPTp policy is for all pregnant women to receive at least two directly observed doses of SP during the second and third trimesters with a minimum of one month between doses. The MOH has issued a directive that requires that SP is stocked and given free of charge to women receiving antenatal care (ANC).

The MOH’s Division of Reproductive Health policy recommends four ANC visits for normal pregnancies. The 2005 DHS found that 87% of pregnant women make at least one visit to a medical professional for ANC during pregnancy, with 88% of those coming for ANC making two or more visits. However, the first visit is often late: 35% of women make their first visit after the fourth month of pregnancy and only 40% complete the recommended four visits.¹⁴ The 2008-2009 MIS found that 75.5% of pregnant women had taken at least one dose of SP at an ANC visit; however, only 52.2% had taken two or more doses. This is similar to the 49% found in the 2006 MIS¹⁵ and shows a need for improvements in the implementation of IPTp during antenatal visits. In addition, convincing women to attend the recommended number of ANC visits early in their pregnancies remains a challenge.

¹⁴ Ndiaye, S, Ayad, M. 2008. 2005 Senegal Demographic and Health Survey (DHS). Calverton, Maryland USA: Centre de recherche pour le développement humain (Sénégal) and ORC Macro

¹⁷ Ndiaye, S, Ayad, M. 2006. 2006 Malaria Indicator Survey. Calverton, Maryland USA: Centre de recherche pour le développement humain (Sénégal) and ORC Macro

The NMCP is implementing a variety of strategies aimed at increasing IPTp uptake, including advocacy to health workers and the population at large, and training and supportive supervision of health workers. In Years 1 and 2, PMI supported the production, dissemination and use by health care workers of new ANC registers and ANC cards that allow for accurate recording of IPTp treatments; job aids to promote the correct management of malaria in pregnancy and to improve the counseling skills of health care providers; and refresher training and supportive supervision for 1,849 health care workers, including regional and district health care teams from all 11 regions, on MIP interventions as an integral part of the package of ANC services. This training included data collection and record-keeping, the prevention of malaria in pregnancy including IPTp with SP and use of LLINs, and diagnosis and case management of malaria in pregnancy with quinine. In total, PMI has supported the purchase and dissemination of 1,500 job aids for MIP, 1,500 water filters/dispensers and 30,000 reusable cups to facilitate directly-observed SP treatment for IPTp. With the efforts of the NMCP, PMI and other partners, IPTp implementation is underway in all MOH ANC service delivery sites nationwide.

Progress During the Last 12 Months:

In the last 12 months, an additional 1,072 personnel have been trained in the prevention and treatment of malaria in pregnancy. Supervision to ANC health workers supported by PMI has continued nationwide. In addition, outreach visits to provide ANC services, including IPTp, have been initiated in 800 health huts in 33 districts, and 321 personnel have been trained in outreach strategies. As noted in the LLIN section, PMI funds have also supported the program by subsidizing the purchase of LLINs by pregnant women.

Proposed Year 4 Activities: (\$1,100,000)

In Year 4, PMI will continue to support efforts to strengthen MIP interventions nationwide.

1. *Reinforce provision of effective MIP services in health facilities and in outreach strategies: (\$900,000)*

The PMI will increase support for outreach ANC activities to health huts to expand them nationwide, bringing ANC services including IPTp and access to subsidized LLINs closer to the population to improve timely and regular use of ANC services and increase the proportion of pregnant women who complete two doses of IPTp. The PMI will continue to support activities aimed at reinforcing the provision of effective MIP services in health facilities in all regions in Senegal. Support will include 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. The PMI anticipates that 300 staff will receive training. The PMI will continue to support monitoring and supportive supervision of MIP service delivery and the improvement of data collection including IPTp data. These activities will be integrated as one component of PMI support for overall monitoring and supportive supervision of comprehensive malaria service delivery. The PMI will also continue to provide cups and water filters as needed for directly-observed treatment with SP in health facilities.

2. *Support for mass media activities to increase ANC attendance and promote IPTp: (\$200,000)*

Infrequent and late ANC attendance is a limiting factor in reaching IPTp coverage goals. Efforts in the first two years of PMI were aimed at improving the availability and quality of services at health facilities. In Year 3, PMI began to fund communications programs aimed at promoting ANC attendance early in pregnancy and increasing compliance with the recommended frequency of visits. These include bill boards, radio spots, and community outreach programs and performances. Support for this mass media campaign to improve ANC attendance and to promote IPTp will be continued in Year 4.

INTERVENTIONS – CASE MANAGEMENT

This section describes facility-based case management interventions. Please refer to the “Community-based Interventions” section of this MOP for a discussion of community-based case management.

Malaria diagnosis

Background:

In Senegal, health facilities with laboratories having the capacity to conduct microscopy for malaria diagnosis are limited almost exclusively to hospitals and district-level health centers, which represent about 10% of all health facilities¹⁶. To expand the availability of malaria diagnostic testing, the NMCP purchased RDTs through its Round 4 Global Fund grant and commissioned UCAD to conduct a year-long study of their sensitivity, specificity, feasibility, and provider use and acceptability. Based on results from this study, an algorithm for the treatment of uncomplicated malaria using RDTs and ACTs was developed by the NMCP, health care workers in all districts were trained, and RDTs have been placed in all health facilities.

The treatment algorithm defines a case of presumed malaria as a patient of any age with fever and no symptoms indicating another illness (such as cough, draining ears, or sore throat). All presumed cases are to be tested with an RDT for malaria and only patients with positive tests are to be treated with an ACT. Patients with another cause of fever are to be treated appropriately, and if they remain febrile, may return in two days for follow-up and RDT testing. The NMCP reports that 73% of suspected malaria cases were confirmed with an RDT in 2008, increasing from 20% in January to 90% in December. For cases of malaria requiring hospitalization, the NMCP requires a blood slide to be prepared and read before giving antimalarial treatment. Exceptions include critically ill patients, who may be treated pending laboratory results, patients admitted to centers without laboratories, and during hours when the laboratory is normally closed. According to data collected by the NMCP, in 2008 71% of hospitalized cases were confirmed by microscopy.

¹⁶ Most health posts do not have laboratories.

The NMCP continues to receive technical support from the Department of Parasitology of UCAD and SLAP for improving malaria diagnosis and in training health worker and laboratory staff on the use of RDTs. In 2008, the NMCP commissioned UCAD to conduct quality control testing of RDTs at the Central Medical Stores; the 11 lots tested gave results matching microscopic diagnosis for all samples tested (positive and negative). UCAD recommended continuing these tests at regular intervals, as well as extending testing to RDTs found at peripheral stores and at points of service and reinforcing supervisory visits to ensure their proper use.

During its first two years of implementation, PMI conducted a district-level laboratory assessment with the NMCP to assess training and equipment needs. Based on this assessment, PMI purchased and distributed 82 microscopes, lab consumables including slides and reagents, and battery-powered microscope lamps for reference laboratories, hospitals, all regional and district medical laboratories and a limited number of capable health posts. The PMI also provided three teaching microscopes, a digital camera and a desktop computer for storing and displaying images to SLAP. In collaboration with the Department of Parasitology at UCAD, the Network of Laboratories, SLAP and PMI, the NMCP developed a curriculum for the microscopic diagnosis of malaria and a revised system of supervision, quality assurance and quality control. Beginning in March 2008, laboratory technicians from the 82 sites selected to receive a microscope were trained using the new curriculum.

Progress During Last 12 Months:

In Year 3, PMI supported workshops for the development of a quality assurance / quality control protocol for parasitological diagnosis of malaria and supported the implementation of the system, as well as continued courses in laboratory diagnosis of malaria. An additional 28 staff have been trained in microscopic diagnosis of malaria, and 10 trained in maintenance of microscopes. In addition, PMI initiated an operations research protocol to examine the diagnostic algorithm for determining RDT eligibility. All consenting febrile patients presenting to selected health facilities will be evaluated according to a standardized form for history and physical examination, and then will undergo RDT for diagnosis. A subset of RDTs will be confirmed microscopically by simultaneously collected blood films. Patients will be categorized as to if they would have received an RDT according to the case management algorithm. We are interested in the proportion of RDTs that are positive, in all patients, and among those that would not have received an RDT according to the algorithm. The PMI anticipates that results from this study will inform the diagnostic and treatment policy in Senegal.

Proposed Year 4 Activities: (\$300,000)

In Year 4, PMI will focus efforts related to malaria diagnosis on strengthening the supervision and quality assurance of laboratories in microscopy and of health facilities in RDTs. The PMI will also support the NMCP's initiative to scale-up community management of malaria using RDTs and ACTs (PECADOM), as described in the "Community-based Interventions" section.

1. Supportive supervision, quality assurance, and quality control for microscopy and RDTs (\$250,000)

PMI will provide supportive supervision of malaria diagnosis by microscopy and RDTs for laboratory and health facility staff. The PMI will also assist the NMCP and its partners to implement the quality assurance and control standards they have developed for laboratories and other health facilities performing diagnostic tests. Supportive supervision of RDT use will also be part of supervisory activities listed in the Treatment and Community-based Interventions sections. Additional training will be provided to new laboratory technicians and to additional laboratory staff, to ensure all districts have adequate levels of trained individuals. This activity will include a technical assistance visit from a CDC laboratory expert to work with in-country partners to identify barriers to implementation of the QA/QC system and assist with implementation.

2. Procurement of microscopes (\$50,000)

Under Senegal's geographic re-organization, four additional medical districts are being created, and 15 military health centers have requested assistance with microscopic diagnosis of malaria. Personnel working in these districts have received training, but do not have adequate microscopes. The PMI will support the procurement of 20 additional microscopes to enable quality microscopic diagnosis in these facilities.

Treatment

Background:

Since early 2006, artesunate-amodiaquine (AS-AQ) has been the first-line treatment of uncomplicated malaria in Senegal, and case management with this drug is currently implemented in all public health facilities nationwide (as well as in all functional health huts). The medication comes pre-packaged in blister packs in three different dosages: children less than seven years old, adolescents 8-14 years old, and adults (children under one year receive ½ of a child's tablet). Child and adolescent dosage packs are now sold for 150 CFA (approximately \$0.33) and the adult dosage pack is sold for 300 CFA (approximately \$0.67). Given the large number of AS and AQ tablets adults must take, the difficulties many patients report in tolerating amodiaquine, and concerns that many patients may be taking only the artesunate tablets from the co-blistered dosage packs, the NMCP has decided to change the first-line drug from AS-AQ to artemether-lumefantrine (AL). This transition will be supported with Global Fund monies, and since instructions for treatment with AL were included in ACT training for AS-AQ, the NMCP is optimistic that minimal re-training will be required. The PMI is not purchasing ACTs because the NMCP has planned to meet all of its ACTs needs through 2012 using its Global Fund Round 4 and 7 grants.

In addition to supplying ACTs to the public sector and community health huts, the NMCP allows private sector wholesalers to purchase Global Fund-subsidized ACTs from the Central Medical Stores (CMS) and distribute them to retail pharmacies, where they are sold at the same prices as in the public sector. In order to keep these prices equal to the end-user, the CMS sells the drugs to the wholesalers at a lower price than it sells to the districts, therefore allowing for a private sector profit margin. In addition to AS-AQ, private pharmacies also sell numerous other

antimalarial drugs, including chloroquine and SP, artemether and artesunate monotherapies, AS-AQ syrup for children, AL, and other combinations.

Senegal has recently submitted an application to the Affordable Medicines Facility for Malaria (AMFm) to expand access to low-cost ACTs in both the public and private sectors. If approved, wholesale suppliers will be able to purchase subsidized drugs directly from the manufacturers. Planned support activities include training and supervision of private sector pharmacies, communications, review of the pharmaceutical legal framework, and introduction of RDTs in pharmacies.

Quinine is recommended by the NMCP for treatment of severe malaria. As malaria in pregnancy is considered by definition to be severe, injectable quinine is also the recommended treatment of malaria in pregnant women during all trimesters. District medical funds purchase injectable quinine and other supplies necessary for treating severe malaria, requiring in turn that these supplies be purchased by patients. Drugs and supplies can be relatively expensive, with costs varying across health facilities, and the time taken to seek funds often delays treatment. Senegal's malaria treatment and referral guidelines for children under five, following those of Integrated Management of Childhood Illness, do not include a recommendation for pre-referral treatment for severe malaria.

The PMI has supported case management through the training of district health team members and health providers in malaria case management and interpersonal communication skills. The PMI has also supported the development and distribution of job aids for RDTs and treatment of uncomplicated and severe malaria. The PMI funds supportive supervision at all levels of the health system, as well as outreach visits from the health post nurses to provide services at community health huts. Supervision visits are carried out jointly by technical staff from PMI implementing partners with MOH personnel from the central, regional, or district level to lower levels.

Progress During the Last 12 Months:

In the last year, PMI has supported refresher training of 1249 providers in malaria case management and interpersonal communication, and supported joint supportive supervision visits at 192 locations, covering 561 providers. In addition, PMI supported the development and distribution of 2,000 job aids for RDT performance, 1,500 on the treatment of uncomplicated malaria, and 1,500 on the treatment of severe malaria. The PMI also supported the on-going *in vivo* efficacy monitoring of AS-AQ in five health districts by UCAD researchers. In Year 3, PMI initiated support for the highly subsidized treatment of severe malaria by providing medication and equipment for treatment of severe malaria free of charge to the districts (quinine, intravenous tubing, syringes, needles, and glucose-containing intravenous fluid). The initial plan was to create and distribute kits for one day of treatment for severe malaria, but logistic challenges, related to the complexity of designing and distributing age-specific kits with appropriate equipment sizes and medication dosages prompted a re-evaluation. The plan is now to provide districts with intravenous quinine and supplies for treatment of severe malaria to subsidize the treatment of severe malaria.

Proposed Year 4 Activities: (\$540,000)

In Year 4, PMI will continue to provide support to strengthen case management of malaria with ACTs through supportive supervision and monitoring, training of new health care workers, and the transition from AS-AQ to AL in 2010. The PMI Year 4 plan does not include the purchase of ACTs, as all needs are being met by the Global Fund, but does include purchase of drugs and supplies for the treatment of severe malaria. Additional support for the implementation and supervision of treatment with ACTs in health posts is included in the “Community-based Interventions” section.

1. Improve case management with ACTs: (\$300,000)

As part of the effort to support the management of uncomplicated malaria with ACTs, PMI will support the training of 200 health care workers in case management. Implementing partners will also work with the MOH to provide supportive supervision in the management of malaria with ACTs at all levels of the health care system. The NMCP does not foresee a need for massive retraining of healthcare workers to accommodate the transition from AS-AQ to AL, since AL was also covered in the original transition to ACTs and its use is included in the current treatment guidelines.

2. Treatment of severe malaria (\$240,000)

Initiation of treatment for severe malaria is often delayed when families first have to seek funds for the medication and intravenous administration kits, potentially increasing mortality. In Year 4, PMI will continue to support the provision of highly subsidized severe malaria treatment. PMI will also work with partners and the NMCP to monitor the cost and the administration of this treatment in health facilities.

Pharmaceutical management and drug quality

Background:

The parastatal Central Medical Store (CMS) is responsible for the national procurement of drugs, ITNs, laboratory products, and RDT kits. The NMCP is responsible for quantifying needs for these commodities. In the past, forecasting and budgeting have been based on cases registered at health facilities, including community level health huts, but more recently, the NMCP has quantified needs for ACTs based on all expected cases of fever to account for the low utilization of health facilities.

Distribution of malaria commodities to the eleven Regional Medical Stores is the responsibility of the CMS. Health districts quantify the commodity needs for all health facilities in the district and purchase them from their Regional Medical Store, with health facilities in turn purchasing from the district. Senegal is a Bamako Initiative country and operates under a cost-recovery system. At the health facility, this system requires patients to pay user fees for consultations, drugs and other supplies, and laboratory tests other than RDTs.

The NMCP began procuring ACTs and ITNs/LLINs through its Global Fund grants in 2006 and large-scale procurement of RDTs in late 2007. Purchasing was initially done through WHO and UNICEF, but under the Round 7 grant, this responsibility was transferred to the CMS as a capacity-building measure. The most recent procurements of AL and LLINs experienced numerous delays related to both CMS internal procedures and difficulty adapting to the new government procurement code. As a result, the NMCP had to negotiate with the Global Fund for direct payment to LLIN suppliers in order to have the nets in-country in time for the June campaign, and previous stocks of ACTs expired before the new order of AL arrived. A small stock (400,000 doses) of fixed dose combination AS-AQ, for eventual use in patients who are unable to tolerate the AL treatment, had already been procured and was distributed to Regional Medical Stores for purchase by district pharmacies, but it is not clear whether this stock will be sufficient to cover case treatment needs through the high transmission season or until the first order of AL arrives.

A plan is in place for supervision and follow-up of distribution of medical commodities countrywide, but the CMS only supervises the distribution system to the regional level. At the district and health facility levels, information is not flowing as it should, so the NMCP collects data on LLIN, RDT and ACT stocks during their quarterly review meetings (described in the Monitoring and Evaluation section). Commodity tracking and management are computerized at the central and regional levels, and the necessary software has been installed in four districts to date.

The Directorate of Pharmacies and Laboratories provides quality assurance and, in collaboration with the CMS and the National Laboratory for Drug Quality Control, is responsible for establishing regulations and granting the right to market a drug. The Ministry of Health has established an Antimalarial Quality Surveillance Coordination Committee that brings together the CMS, Directorate of Pharmacies and Laboratories, the National Laboratory for Drug Quality Control, NMCP, and other partners. The Committee meets quarterly to review the status of ACT stocks at the national and regional pharmacies, applications for drug licensing, and the results of drug quality monitoring; however, in 2009 Committee meetings occurred irregularly.

The national pharmacovigilance committee was previously based within the Directorate of Pharmacies and Laboratories, but roles were reorganized in 2008 such that the Poison Control Center has technical responsibilities, while the Directorate maintains administrative authority. In 2007, the NMCP had initiated a separate pharmacovigilance program focused on reporting adverse drug reactions related to ACTs, including the development of an adverse drug reporting form and training of over 1,600 health personnel, but steps are being taken to re-establish a unified national system that builds on the NMCP's experience. A national pharmacovigilance plan has been developed, a national coordinator has been appointed, and focal persons have been designated for the different health programs, including malaria and tuberculosis; however, functionality of this system is still quite low. Sixty-four adverse reactions, none of which were serious, were reported for ACTs in 2007 and 45 were reported in 2008 (33 for AS-AQ, of which only 15% could be attributed to the drug with certainty).

Progress During Last 12 Months:

In Year 3, technical assistance has been on-going to strengthen the pharmaceutical management system with emphasis on ensuring good ACT prescribing and dispensing practices at the facility and community levels. In 2008, PMI field tested and finalized a pharmaceutical management procedures manual and supervision guide, and representatives from each of the 11 regional depots and the CMS participated in a training of trainers on these materials. Since then, 338 health post and health center staff members in three regions have been trained with PMI funds on the management of antimalarial medicines, with about half of these also benefitting from post-training supervision. The PMI also trained 250 health post and health center staff on ACT stock management in Years 1 and 2, totaling 588 individuals who have benefited from this training to date.

The implementing partner for this activity also receives funding through the NMCP under its Round 7 Global Fund grant to conduct training on pharmaceutical management. Sessions were held using the same resource materials in January 2009 for four districts in two regions, covering a total of 251 health workers, followed by supervision visits by a national-level team in the spring.

In addition, PMI collaborated with the MOH Division of Pharmacies and Laboratories and with UCAD in the monitoring of antimalarial drug quality. Results of drug quality monitoring at six sites around the country in September 2008 showed that 7% of a sample of antimalarial drugs did not conform to one or more quality standards, such as visual inspection and proper concentration of the active ingredient. Most of the non-conforming drugs were in the informal sector - 21% of those samples did not meet the standards, compared to 4% in the public and private sectors. In July 2008, PMI supported a communications campaign to inform people about the dangers of buying drugs in the informal sector, a subject which has been brought into the spotlight recently due to an increasing number of thefts at pharmacies and the channeling of those stolen drugs into the black market. The Government of Senegal has made verbal commitments to take action on the particular problem of the illicit drug market, but no clear procedures exist for withdrawing substandard drugs from the formal market.

The PMI is also supporting the participation of Senegal in the multinational Quality of Antimalarials in Sub-Saharan Africa study, jointly sponsored by United States Pharmacopeia and WHO. More than 100 samples of ACTs and SP were collected from around the country and tested locally using MiniLabs, with confirmatory testing conducted by US Pharmacopeia. The ten-country report is being finalized.

Finally, PMI has contributed significantly to the advancement of pharmacovigilance activities by providing technical assistance and supporting the participation of the new National Pharmacovigilance Coordinator at a training course at the WHO Collaborating Centre for International Drug Monitoring in Sweden, as well as intensive and practical training for a Poison Control Center staff member at the pharmacovigilance center in Morocco. In July, Senegal completed all of the necessary requirements and became the 95th full member of the WHO Pharmacovigilance Program.

Proposed Year 4 Activities: (\$680,000)

Achieving high rates of treatment with ACTs within 24 hours of the onset of fever requires a reliable supply of high-quality drugs at the most peripheral levels. As a result, ensuring an adequate supply of ACTs will continue to be a major challenge for the NMCP and PMI in Senegal, in part due to complicated national procurement regulations, capacity issues at the CMS, and the extension of antimalarial therapy through the home-based treatment approach. Achieving high rates of treatment with ACTs in Senegal will require not only continuously improving the pharmaceutical management system, but also strengthening the drug quality system to ensure that only high-quality drugs are being distributed.

1. Drug management capacity building and training: (\$400,000)

The PMI will build on the past several years of activities to continue strengthening the national logistics and pharmaceutical management systems for ACTs and RDTs through improved drug quantification and forecasting, quality control, storage and inventory management, and supervision. These activities are complemented by similar USAID-funded work to improve the management of drugs for the treatment of tuberculosis, as well as funding from the NMCP to carry out training in regions that have not been covered by PMI. In addition, the “Treatment” section above describes the technical assistance that PMI, together with the MOH and other partners, will provide to public health facilities to ensure appropriate ACT prescribing and dispensing practices. An increased level of funding in FY10 will allow training activities to reach national scale and expand into private pharmacies, and supervisory visits to be made at more regular intervals. The PMI will also explore possibilities for providing technical assistance to the CMS to address capacity and coordination problems.

2. Drug efficacy testing: (\$30,000)

In collaboration with the NMCP and UCAD, PMI will continue to support drug efficacy monitoring of first and second-line antimalarial drugs at three sites. This monitoring will include *in vivo* drug efficacy monitoring in patients.

3. Drug quality monitoring and advocacy: (\$235,000)

In collaboration with the NMCP, UCAD, and the National Drug Quality Control Laboratory, PMI will continue to strengthen national capacity for drug quality surveillance. The monitoring program will continue at nine sites spanning the country, with emphasis on border areas. In addition, more focus will be given to IEC activities to inform the public about the dangers of counterfeit and poor quality drugs. The PMI will continue to advocate for regulatory action to be taken when poor quality drugs are found.

4. Pharmacovigilance: (\$15,000)

The PMI will continue to support the institutionalization of an integrated national pharmacovigilance committee and strengthening of the reporting system.

COMMUNITY- BASED INTERVENTIONS

Background:

Support to both community-case management and home-based management of malaria is key to the success of the PMI, as the 2008/9 MIS results reveal that only 52% of all fever cases seek care at all, and 35% of these care-seekers turn to options other than a hospital, health center, or health post. To serve a large proportion of those seeking care outside the traditional health sector, Senegal's health care rests on a foundation of "health huts," which offer services to rural populations. Health huts are operated by three types of workers: community health workers (CHW), who offer preventive and curative health services or referral for more complicated care; *matrones*, who are trained birth attendants but not professional midwives; and *relais*, who are health educators and communicators. In addition, a new type of health worker, village malaria workers (*Distributeur de Soins à Domicile*, DSDOM), has been instituted to preside over a home-based management of fever program (*Prise en Charge à Domicile*, PECADOM) recently piloted by the NMCP.

Under the PECADOM program, DSDOMs are nominated by their villages and then trained in malaria diagnosis with RDTs and treatment with ACTs. After training, DSDOMs receive a kit complete with ACTs, RDTs, a sharps box, data collection forms, and a hat and vest. The DSDOMs sell ACTs at the standard public sector rate and re-stock their supplies from their health post nurse during supervisory visits. Supervision of DSDOMs occurs at multiple levels, with the nearest health post nurse acting as a primary supervisor, the District Management Teams providing quarterly supervision, and the national level supervising periodically. Although officially unpaid volunteers, the DSDOMs receive a stipend during training that serves as a form of motivation.

The NMCP began this program in 2008 with 20 village malaria workers in three districts and plans to introduce PECADOM into four new regions with the highest malaria morbidity and mortality. Further expansion into 16 districts is planned in the Global Fund Round 9 proposal, with the intention of creating a cadre of 314 village malaria workers to work the targeted areas.

Currently, 1,397¹⁷ functional health huts nationwide are enrolled in the PMI-supported community health program. 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 equipment and space needed to provide basic services. Though not officially part of the MOH system, functional health huts are supervised by the chief nurse at the nearest health post. The health posts are staffed by one nurse or midwife, and one or more *matrones* and *relais*. Posts are in turn supported and supervised by the Health District Management Team. In addition, PMI's community health partners work with 529 "sites," generally in more urban areas or places far from health huts, where *relais* implement malaria IEC/BCC activities. In seven of the country's regions, USAID Maternal and Child Health funding complements that of PMI and health huts offer an integrated package of community-level maternal and child health, including the treatment of pneumonia and diarrhea, and tuberculosis and family planning in limited areas. In other regions where PMI is the sole source

¹⁷ 1371 through PMI / Senegal and 26 through Malaria Communities Program grant to CARITAS.

of funding for community interventions, activities only address the treatment of malaria.

With support from the Global Fund, the NMCP also promotes community-based malaria activities through its ABCD program (*Atteindre les bénéficiaires communautaires à travers les districts* or Reach Community Beneficiaries via the Health Districts). Under this program, which is now operational in 41 districts, health districts spend at least 60% of their Global Fund money from the NMCP on contractual arrangements with CBOs. In turn, CBOs provide a package of malaria-control activities, including organizing community meetings and home visits to discuss malaria, distributing bednets and treatment kits, and hygiene and “clean environment” education. A December 2006 evaluation of this program supported its continuation but recommended that districts and CBOs strengthen the introduction of ACTs at the community level to ensure prompt and proper case management by community health workers.

Progress During the Last 12 Months:

Since the beginning of PMI, more than 8,530 community members have been trained in malaria prevention and control interventions in accordance with Senegalese policies through support to a consortium of NGOs. This figure includes community health workers, *matrones*, *relais*, and village health committee members who oversee the functioning of the health hut. Community interventions reached national scale in 2008, covering every district in Senegal, and include two broad categories of activities: 1) community case management of malaria, including home-based care, and 2) community mobilization for malaria prevention and control.

1. Community case management of malaria

With PMI support, a total of 8,530 community health workers, *matrones*, and *relais* have been trained in malaria case management and prevention. In the period April-June 2009, 28 CHWs were trained in malaria case management and 719 CHWs, *matrones*, and *relais* were trained in malaria prevention. Case management training includes the diagnosis and treatment of cases of uncomplicated, clinically-diagnosed malaria using ACTs, and the recognition of danger signs and referral of serious cases (or any malaria in pregnant women or young infants). Overall, community health workers in Senegal have demonstrated excellent adherence to the treatment protocol. From April-June 2009, 5,423 cases of malaria were treated with ACTs at community health huts out of 5,510 reported cases (98%), with 87 cases referred to the next level for more specialized care. The cure rate reported for this period was 99%, with only 8 cases not having experienced improvement after three days. To date, 609 CHWs have also been trained in the use of RDTs for malaria diagnosis, and 266 health huts are currently providing rapid diagnostic testing. The NMCP will continue to roll out RDTs to the community level nationwide throughout the rest of the year.

Under the PECADOM pilot, the NMCP reported a total of 718 RDT tests having been performed in the three pilot districts (for 721 suspected cases), with 322 positive tests and a 100% cure rate.

2. Community mobilization and IEC/BCC for malaria prevention and control

Implementing partners for PMI continue to support community mobilization and IEC/BCC

activities in health huts and sites. Activities include both ongoing malaria communication (mass and interpersonal) and communication promoting specific events, such as IRS or LLIN distribution campaigns. Typical communications activities in Senegal have included community meetings on a specific topic, home visits, theater, community radio (radio spots as well as interviews and programming), and social mobilization (setting aside a day to focus on a specific theme or topic and bringing the whole community together around that topic – for speeches, music, skits, with banners and t-shirts with messages, etc.). Topics of ongoing IEC/BCC at community level include the importance of owning and using ITNs, prompt treatment-seeking at the health hut or health post in the case of fever, recognition of danger signs, the importance of attending ANC visits and of receiving the recommended IPTp.

LLIN hang-up activities

In 2009, several partners are working to ensure high rates of LLIN utilization, including the NMCP, through ABCD programs (CBOs conducting IEC/BCC activities); the Senegalese Red Cross Society, through their post-distribution hang-up campaign; and Malaria No More / Youssou Ndour Foundation, through their “Surround Sound” campaign containing specific messages to encourage people to sleep under LLINs. The community-based activities supported by PMI have included LLIN utilization messages since the beginning of the program, and continue to be implemented with FY09 funds.

Malaria Communities Program

Senegal was the recipient of an FY08 Malaria Communities Program grant, awarded to Caritas Senegal, for a three-year project that supports malaria case-management, community education and LLIN distribution through private Catholic health posts and their associated 27 health huts in five regions. The project follows the model of the USAID/Senegal community health project and has worked closely with their staff to ensure harmonization. In the last 12 months, Caritas has trained 188 community mobilizers, 29 health post nurses, and four health post supervisors; arranged 42 interpersonal communication activities, reaching 2038 people; and produced six radio spots on malaria prevention and control, broadcast in Wolof and Sérère.

PMI-Peace Corps Community based activities

Peace Corps Volunteers are active in malaria education and prevention throughout the country. Their contributions to reaching PMI goals include:

- Assistance in retreating bednets with insecticide that are in good physical condition.
- Participating in planning and implementing mass LLIN campaigns at their sites, with a third-year volunteer participating in planning at the national level.
- Following up on ITN distributions to promote hang-up and use.
- Mobilizing their communities for IRS.
- Supporting IEC/BCC activities promoting net use, ANC and IPTp for pregnant women, treatment-seeking, including hosting programs on local radio stations and working with community theatre groups.

- Training and working with local groups to make *neem* lotion, a natural mosquito repellent.

Proposed Year 4 Activities: (\$2,654,000)

Community-level activities are integral to the success of all prevention and case management activities. In Year 4, PMI will continue with community case management and mobilization efforts and support the NMCP with the roll-out of its home-based management of malaria program. In its community-case management activities, PMI funding will also be used as a platform to expand the implementation of an integrated package of childhood diseases beyond the current seven regions, using USAID Maternal and Child Health funds.

1. Sustaining community mobilization activities: (\$850,000)

Working through NGOs, CBOs and all types of community health workers, PMI will implement a variety of IEC/BCC activities at all 1,900 community intervention points (1,371 health huts and 529 sites) in all 54 districts nationwide, aimed at:

- Informing and mobilizing the population around LLIN mass distribution campaigns and ongoing routine distributions of LLINs provided through the new PMI system, health facilities, other donors, and CBOs.
- Promoting correct hanging, use, and maintenance of LLINs.
- Informing and mobilizing the population around IRS campaigns.
- Increasing knowledge of the causes of malaria, its prevention, correct treatment and the signs of severe illness in children
- Encouraging early care-seeking and treatment
- Promoting ANC attendance, IPTp, LLIN use, and early care seeking for malaria in pregnancy

2. Sustaining community-based case management with ACTs and diagnosis with RDTs: (\$1,279,000)

The PMI will continue to provide technical support on correct diagnosing, prescribing, stocking, and dispensing and referral practices for community health workers, and on timely data collection and integration of case management data with the NMCP's reporting system. Data collection tools, job aids, and IEC materials will be revised to incorporate the implementation of RDTs at the community level and replenished, as necessary, at all 1,397 PMI-supported health huts. The PMI will also continue to support systems for monitoring and supervision of these workers and the transition of the national first-line treatment regimen from AS-AQ to AL.

3. Support roll-out of the NMCP's PECADOM program: (\$500,000)

Implementing partners for PMI were instrumental in the design of the PECADOM pilot, and the NMCP seeks their ongoing and expanded support as the program is scaled-up. Support from PMI will fund the training of village malaria workers in malaria diagnosis with RDTs and case management with ACTs. As regular supervision is crucial to the success of this program,

particularly in the early stages, PMI will support health post nurses in their supervision as needed and provide additional oversight by the project's community development agents.

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

The PMI in-country team will continue to encourage linkages between community implementing partners and Peace Corps Volunteers, as volunteers benefit from the technical resources that partners provide and partners benefit from the long-term community presence of volunteers. The PMI will also continue to make available a small amount of funding through Small Project Assistance that Peace Corps Volunteers can access for local malaria-related projects.

HIV/AIDS AND MALARIA

Background:

The HIV/AIDS epidemic in Senegal is characterized by a low prevalence in the general population (1.0% of adults 15 to 49 years of age), with higher prevalence of infection among some risk groups: 19.4% among commercial sex workers, 21.5% of men having sex with men, and 3.4% among women in the Ziguinchor region. No significant differences exist between urban and rural areas, though the regions in the Casamance have higher rates: 2.0% in Kolda and 2.2% in Ziguinchor. According to the Joint United Nations Program on HIV/AIDS, in 2007 an estimated 67,000 people infected with HIV were living in Senegal¹⁸.

Senegal's strategic objectives to maintain the HIV prevalence below 2%, to improve the quality of life of PLWHA, and reduce the socio-economic impact of HIV/AIDS are supported by USAID. The approach is based on a strong partnership with civil society and communities enlisted to participate in key interventions.

In 2000, the Government of Senegal began a pilot program to introduce anti-retroviral therapy (ART) use in the public health sector. By the end of 2008, more than 14,000 PLWHA were registered and 9,000 were estimated to be on ART out of the approximately 11,000 PLWHA thought to be eligible. The government continues to expand the pilot program for prevention of mother to child transmission of HIV (PMTCT) established in 2005.

To complement the government's ART program, USAID has supported a comprehensive package of care and support services since 2002. The USAID program began with a focus on psycho-social support and was expanded to include nutritional education and food distribution in three ambulatory treatment sites. Within the current program, focus is also placed on building capacity of PLWHA associations to reinforce their involvement in prevention, care, and support, on integrated tuberculosis screening and management, and income generation. The program targets more than 7,000 PLWHA through these efforts. Six ambulatory integrated care and treatment units and 15-20 sites for psycho-social care will be established in each region over the life of the program.

¹⁸ UNAIDS/WHO Epidemiological Fact Sheet on HIV and AIDS for Senegal, September 2008. Available on web at http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008_SN.pdf accessed 15 July 2009.

USAID and the US Department of Defense, which has separate funding in Senegal for HIV prevention among military populations, both support HIV prevention activities including behavior change interventions targeting high-risk groups including the Senegalese military, promotion of voluntary counseling and testing services, and prevention and treatment for sexually-transmitted infections.

HIV infection increases the risk of malaria infection and clinical malaria in adults, especially in those with advanced immunosuppression. Persons infected with HIV are therefore at increased risk of severe malaria and death. Providing integrated health services for malaria and HIV is key to reducing the burden of the two diseases.

Progress During the last 12 months:

In Year 3, working closely with the Government of Senegal, the National AIDS Committee, and civil society groups, PMI supported the free distribution of 2,000 LLINs to PLWHA through regional PLWHA networks, the AIDS ambulatory treatment center in Dakar, and PLWHA associations in other five regions. Ninety counselors and leaders of PLWHA associations have been trained in malaria prevention messages, including emphasis on correct and regular use of LLINs and early care-seeking for fever.

Proposed Year 4 Activities: (\$25,000)

In FY2010, activities are aimed at continuing integration of malaria prevention and treatment within HIV/AIDS prevention, care and treatment efforts. Key components will include (i) promotion of positive behavior change for malaria prevention and care-seeking behavior; (ii) integration of malaria prevention and early treatment within HIV ambulatory treatment settings; and (iii) capacity development of existing partners to be able to effectively integrate scientific and programmatic knowledge for malaria prevention and treatment within their program portfolios.

As the ambulatory unit and care and support sites serve as the starting point for the provision of a package of services for PLWHA, in addition to PLWHA networks, they will serve as a point of contact to increase the access and use of ITNs and to strengthen diagnosis and treatment of malaria for this vulnerable group.

1. *Distribution of approximately 10,000 LLINs to PLWHA and integration of malaria messages into HIV/AIDS communication activities targeting high risk groups: (\$25,000) [cost of 10,000 nets covered in this MOP under Prevention/LLINs/Procurement of LLINs activity above]*

In collaboration with the Government of Senegal and the USG-funded HIV program partners, PMI will support free distribution of approximately 10,000 LLINs to PLWHA. Channels for net distribution will include PLWHA networks and HIV/AIDS peer educators trained to deliver malaria prevention messages through activities that include home visits. Existing networks supporting PLWHAs confirm their combined ability to reach 10,000 HIV-infected individuals through the channels described above. The nets will come from nets

procured with FY2010 MOP funding as described in the Prevention LLIN section above. The PMI will also continue to support training of peer educators, counsellors, and leaders of PLWHA associations to facilitate the integration of malaria prevention messages into interpersonal communication activities with PLWHA. Malaria prevention messages will include emphasis on correct and regular use of LLINs and early care-seeking behaviour for fever.

COMMUNICATION/COORDINATION

Background:

In the framework of the Paris Declaration, the MOH put in place an internal monitoring committee that includes multilateral and bilateral donors in the health sector and meets every six months to share information and strategies and to discuss current issues in the sector. In addition, the Poverty Reduction Strategy is reviewed annually, including specific reviews for sectors such as health. Multilateral and bilateral donors in the health sector have their own coordination mechanism chaired by the national WHO Representative. This coordination mechanism meets monthly to share information and strategies and discuss current issues. The MOH is represented at these meetings by the Secretary General plus additional experts from the MOH as needed to give clarifications on issues related to an ongoing program. USAID also has a specific Steering Committee Meeting occurring on a tri-annual basis, chaired by the Secretary General and attended by all National Directors in the MOH, with representation from the Ministry of Finance.

The Country Coordinating Mechanism (CCM) in Senegal operates in accordance with Global Fund guidelines. It has a yearly agenda and holds regular meetings to monitor the implementation of Senegal's current Round 4 and 7 malaria grants, the Round 7 tuberculosis grant and the Round 6 HIV grant, with extra meetings as necessary. The CCM has a Technical Secretariat, created with assistance from USAID, which facilitates implementation of the existing grants and works closely with the three disease control programs. For the Round 9 proposal the CCM managed the preparations for proposal development, provided input, reviewed drafts, and validated the final submission.

In the past, an active National Malaria Steering Committee, made up of various stakeholders, met on a regular basis. It was responsible for overseeing the activities of four NMCP commissions: (1) planning, monitoring, and evaluation; (2) clinical and therapeutic training; (3) communication and social mobilization; and (4) research. In the past three years, this group has become inactive, although its working groups on drug quality, IPT, ACTs, and ITNs remain active though uncoordinated.

Progress During the Last 12 Months:

In May 2008 the Minister created (and will chair) an internal committee to follow HIV/AIDS, tuberculosis and malaria activities in Senegal. The PMI team continues to advocate for creation of a sub-committee specific to malaria, which is open to all technical and financial partners active in malaria, and which the NMCP Coordinator is given the authority to convene.

Proposed Year 4 Activities: (No additional cost to the PMI)

1. Revive National Malaria Steering Committee:

Efforts will continue by in-country PMI staff to provide support to the NMCP to revive and coordinate regular meetings of the National Malaria Steering Committee, whose membership will include representatives of key stakeholders from public, donor, NGO, and private interests. In addition, PMI will support and participate in the working groups within this Committee, and will work with the NMCP and partners to develop an annual work plan and establish clearly defined roles and responsibilities for Steering Committee representatives and their organizations.

2. Convene periodic PMI/NMCP coordination meetings

In-country PMI Staff will also facilitate periodic coordination meetings with the NMCP and PMI implementing partners to further enhance collaboration and synergy of programming.

3. Convene bi-annual Malaria Stakeholders Meetings

As part of annual Malaria Operational Planning, an annual stakeholders meeting of all partners working in malaria is held, to share experiences, identify gaps in programming and plan future PMI activities. In-country PMI staff with the NMCP will seek to hold the forum on a bi-annual basis and expand the forum to better capture other partners programming, for a more complete review of all malaria activities being carried out in Senegal.

CAPACITY BUILDING

Background:

The Senegal NMCP resides in the MOH's Division of Disease Control and has a well developed strategy for malaria control, a clear organizational structure, and an effective management team. The staff includes four public health physicians, two pharmacists, two public health nurses, an economist, an entomologist, and several other experienced personnel who together manage all aspects of the NMCP's activities (including training, supervision, M&E, research, etc.). Three entomologists work for SLAP, and several entomologists and parasitologists teach at UCAD. In addition, two French institutions (IRD and *Institut Pasteur de Dakar*) have many experienced parasitologists and entomologists who collaborate with the NMCP. While there are no full-time malaria staff at the regional or district levels of the public health system, health workers and depot managers at all facilities are engaged in case management and prevention of malaria in pregnancy, and ITN activities. Employees of the National Hygiene Service are involved in some limited non-PMI spraying and bednet re-treatment campaigns.

Thus, Senegal has a wealth of expertise and staff working on malaria prevention and control at all levels and tapping this expertise has facilitated PMI assistance. However, PMI also

recognizes continuing need for both increased frequency and strengthened supportive supervision capability and capacity-building both at peripheral and national levels in order to achieve the goals set out by NMCP and PMI. Capacity building is needed to strengthen skills and expertise for effective monitoring and evaluation, for applied epidemiology for malaria control, and in areas of planning and implementing IRS activities. Among the recommendations from the M&E Systems Strengthening Tool was the strengthening of NMCP capacity in epidemiological analysis and geographic information systems (GIS). NMCP has specifically requested PMI to consider responding to these gaps and support the participation of NMCP staff in the applied epidemiology training course at the Centers for Disease Control in Atlanta and the organization of training for NMCP staff on GIS software such as ArcView.

Progress During the Last 12 Months:

The PMI's activities in capacity building address the improvement of preventive and curative services at all levels. In addition to funding training and supervision of health workers in all areas of malaria prevention and control as described in previous sections, PMI has supported the training of ten regional and national MOH staff to attend a three-week course in data management and monitoring and evaluation at *Centre Africain des Etudes Supérieures en Gestion* (African Center for Advanced Management Studies in Dakar). With FY09 funds, PMI is also continuing to support supervision visits by the NMCP to all levels of the health system active in malaria prevention and control.

Proposed Year 4 Activities: (\$250,000)

Continued support for activities aimed at building the capacity of the NMCP is critical to achievement of PMI objectives. In Year 4, PMI will support the following capacity building activities:

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

In FY10, the PMI will contribute to supporting the costs associated with the NMCP's supportive supervision to peripheral levels. (Other PMI implementing partners also contribute significantly to supervision activities.)

2. M&E Capacity Building for National Program Staff and District Personnel (\$30,000)

In Year 3, the PMI will support the training of up to 10 people to participate in the annual 3-week francophone data management and monitoring and evaluation course at *Centre Africain des Etudes Supérieures en Gestion* (African Center for Advanced Management Studies). The participants may come from any level of the health care system and will be chosen in collaboration with the NMCP.

3. Support for NMCP Attendance at the International Course on Applied Epidemiology (\$30,000)

In FY10, the PMI will support one member of the NMCP to participate in the international course on applied epidemiology at the CDC in Atlanta. The course emphasizes applied epidemiology in public health practice. The curriculum includes interactive exercises, as well as lectures and a field survey and discussions of the epidemiologic aspects of current major public health programs in international health are included within the course content. This training will further strengthen the capacity of the NMCP in epidemiology.

4. Support for Development of the 2011-2015 NMCP Strategic Plan (\$40,000)

In FY10, the PMI will support a technical consultant to facilitate the development of the new 2011-2015 NMCP Strategic Plan. This assistance will include support for a stakeholder's workshop to provide input and build consensus around the key areas of the strategic plan.

5. Support for IRS ownership by the NMCP (see IRS section)

MONITORING AND EVALUATION

Monitoring and evaluation (M&E) is critical for measuring progress against PMI goals and targets, identifying problems in program implementation, suggesting what modifications should be made, and confirming that the modifications are having their desired effect. In Senegal, monitoring and evaluating the rapid scale-up of malaria prevention and control interventions and achieving high coverage rates with ACTs, ITNs, IPTp, and IRS are priorities not only of PMI, but also the NMCP, the Global Fund, and other national and international partners working on malaria.

Background:

The NMCP developed its first Monitoring and Evaluation Strategic Plan in 2005. This plan focused on collecting routine data on cases and program implementation to monitor the progress of the Global Fund-financed activities and, to provide essential data for the development of new control strategies, as well as developing the capacities at all levels of the program and improving the collection and analysis of program data. The plan was evaluated in August 2007 during a Monitoring and Evaluation Systems Strengthening Tool workshop. The recommendations from this evaluation were to develop a procedure manual for monitoring and evaluation, strengthen the capacities for using data in decision making, improve the storage and archiving of data, both on paper and electronic, train staff in the use of geographic information systems (GIS), improve the collection of data at the community level, and include the collection of community-level data in the quarterly review meetings. During the workshop the NMCP also developed a budgeted M&E Strengthening Plan of Action to implement these recommendations.

The Strategic Plan for Malaria Control 2006-2010 acknowledges the weaknesses of the National Health Management Information System (HMIS) in providing timely and complete data on malaria cases and program implementation. In order to collect timely and complete data on malaria cases and program implementation and to provide timely feedback to health providers, the NMCP conducts quarterly review meetings where each district presents key malaria surveillance and program data, such as the number of reported clinical and confirmed cases and deaths from malaria, stocks of drugs and LLINs, the number of pregnant women taking IPTp,

and other indicators reported to the Global Fund. These meetings allow for a self-critique by the districts and allow the NMCP to provide feedback, clarify existing guidelines, and disseminate new ones. The data are synthesized into a quarterly report that is presented and discussed at the review meeting, then summarized at the national level and submitted to WHO and the Global Fund. Similar reviews are conducted with heads of hospitals, military health care facilities, and NGOs. Clinical drug efficacy and entomological and IRS-related data are also being collected in collaboration with UCAD with support from PMI.

To supplement the reviews, the NMCP also conducts regular supervisory visits at the health facility level. After trying several models, it uses a “supervision by peers” strategy, where medical officers from several districts join regional and central staff to supervise all health facilities in a district, using a standard methodology and form. The form includes elements on the adherence to diagnostic and treatment guidelines, the proper performance of RDTs, and an on-site verification of malaria morbidity data through the review of patient registers.

To allow in-country program managers to assess progress and redirect resources as needed, interim monitoring of the four main intervention areas is tracked through data collected during the quarterly NMCP review meetings, periodic reports from groups providing commodities and conducting IRS activities, visits to health facilities, and reports from international and local partners. Types of activities that are monitored include procurement and distribution of LLINs for distribution during campaigns and routine, the progress of IRS campaigns, training of health care staff to build capacity to improve service delivery, and behavior change communication efforts in areas such as improving treatment seeking for children with fever, the use of LLINs, and accepting visits for IRS.

Progress During the Last 12 Months:

During Year 3, PMI in-country staff continued to participate in the quarterly reviews and on a commission charged with following-up on recommendations to improve these reviews. In 2008, this commission decided that national level staff should present to districts and discuss at the end of each review a comparison of districts on key performance indicators: the proportion of outpatient cases tested, the ratio of ACT doses given to number of outpatient cases confirmed, and IPTp coverage. This immediate feedback was greatly appreciated by the districts and has led to marked improvements in some indicators. The proportion of suspected malaria cases tested with an RDT or microscopy has risen from 20% in January 2008 to 90% in December and the ratio of treatments to confirmed cases has fallen from over 5,000 cases treated for every 100 confirmed to approximately 150 cases treated for every 100 confirmed. In 2009, additional indicators will be presented on the RDT positivity rate for outpatient cases and the proportion of hospitalized cases being tested using light microscopy.

In 2008, the Global Malaria Program of WHO supported several missions to improve the collection, analysis and “real time” use of data collected during the quarterly reviews. The Epi-Info 6 database used to collect case data has been expanded to allow collection of program implementation data, such as the number of ACT treatments dispensed each month. District-level data will then be synthesized into a national database and used to prepare a standard feedback report showing regional / district progress regarding the performance indicators mentioned above

in addition to routine LLIN coverage, Global Fund indicators, etc. The system has yet to be implemented.

The NMCP and the WHO have identified the Senegal River valley as an area where malaria transmission is unstable and thus at risk of epidemics. Using Global Fund Round 4 money, the NMCP developed a system of sentinel surveillance sites for malaria epidemic detection. Eight sites were selected, two in each of four districts along the Senegal River valley, to provide weekly data on the number of patients seen for any reason, the number suspected malaria cases, the number of those tested, and the number confirmed. At the first evaluation of this system in November 2008, these sites presented their data for the first 11 months and district epidemic response plans were presented and validated. Though this system did detect local peaks in the number of cases that were identified at health post or national levels, a major constraint identified was the lack of an “epidemic threshold”. This threshold is typically the number of malaria cases that would be expected to be reported during a certain period of time (typically during a month or a week) from a certain location given the season of the year. If the number of reported cases exceeds this level, then a malaria epidemic would be declared and response plans activated. To improve the collection and transmission of the data, new electronic forms were developed and the sites were provided with computers. Additional meetings are planned every six months to review the data, discuss actions taken, and discuss ways to improve the system.

To measure mid-point coverage and impact of malaria prevention and control interventions, PMI supported a nationwide MIS conducted from November 2008-February 2009. This survey was similar to the baseline 2006 MIS except for oversampling three regions to provide district-level malaria indicators and testing for anemia and parasitemia. The NMCP joined PMI in supporting the budget of the survey, and the NMCP organized a MOH committee to supervise the MIS, with representatives of PMI, UCAD, WHO, UNICEF, the World Bank, NetMark, RBM and other partners. The committee validated the questionnaire and the scope of the survey, ensuring NMCP and MOH ownership of the process and the results. The survey was conducted by Macro International in collaboration with local partners including the *Centre de Recherche pour le Développement Humain* (Center of Research for Development, CRDH). Both the 2006 and 2008/9 MIS calculated indicators such as the proportions of children under five and pregnant women who slept under an ITN the previous night, the proportion of pregnant women who have received two or more doses of SP for IPTp during their most recent pregnancy, and the proportion of children under five with suspected malaria who have received treatment with an ACT in accordance with national malaria treatment policies within 24 hours of the onset of their symptoms.

The nationwide LLIN distribution in 2009 was one of the major malaria control events this past year, resulting in the distribution of almost two million LLINs and the implementation of multiple post-campaign activities to increase LLIN utilization. At the request of the campaign steering committee, the NMCP and PMI are organizing a post-campaign survey focusing on the assessment of the implementation of various communications activities and the effect they had on LLIN utilization rates, on the success of targeted under-five campaigns in attaining universal coverage goals, and on the success of door-to-door voucher campaign strategies in achieving high coverage and utilization rates. This survey will be started in September 2009 and results should be available by the end of the year.

Proposed Year 4 Activities:

Year 4 PMI monitoring and evaluation activities will be done jointly with the NMCP and other partners, and PMI will support implementation of the NMCP M&E plan. The PMI will help build national capacity in monitoring program implementation of ACTs, ITNs, IPTp and IRS, in evaluating the coverage of these interventions through the 2010 Senegal DHS, and in improving health facility and community-level performance through supportive supervision, routine record reviews, and service statistics. The PMI will also support improvements in the collection of routine data proposed by the Global Malaria Program and their implementation nationwide.

Survey data, routine monitoring, and stories from health care providers and community members suggest that the epidemiology of malaria in Senegal has evolved considerably in the last 8-10 years and the subsequent large investments in malaria treatment and prevention. The NMCP and its partners feel that the current epidemiological profile of malaria, derived from data collected in the 1980s and 1990s, no longer provides adequate information for the development of the new 2011-2015 strategic plan or for program planning, the selection of new activities, or the choice of systems for malaria surveillance and monitoring. The new profile, together with disease morbidity data, would identify new areas at risk for malaria epidemics. The PMI will therefore join the NMCP and other partners in updating the epidemiologic profile of the country and using that data to extend the current system for malaria epidemic surveillance.

Year 4 PMI funding will focus on the following interventions (\$1,259,000):

1. Coverage of interventions and impact on malaria mortality: (\$800,000 for contribution to a nationwide Demographic and Health Survey (DHS) conducted in September – December 2010)

To measure end-point coverage for PMI-supported interventions, PMI will contribute support to a nationwide DHS in September-December 2010. This survey will be similar to the standard DHS with the addition of parasitemia testing. The DHS will provide data on the same malaria indicators measured in the 2008/9 MIS. Support from the PMI will ensure that the survey is done at the appropriate time of the year and will include necessary malaria indicators and biomarkers.

2. Evaluation of the NMCP 2006-2010 Strategic Plan (\$75,000)

The current NMCP strategic plan ends in 2010. The NMCP has asked for technical and financial assistance in evaluating the current strategic plan so as to help prepare the subsequent strategic plan. These funds will support meetings and workshops and contracting a consultant to coordinate and help conduct the evaluation. Major components of the evaluation should include a review of relevant documents, interviews with key personnel and partners, a health facility survey, and a community-based survey. The 2010 DHS will serve as the community-based survey, while this activity will support the other components.

3. Malaria Epidemiologic Profile (\$360,000)

The NMCP and its scientific partners feel that the current epidemiological profile of malaria, based on disease morbidity data together with parasitological and entomological data, is no longer reliable for guiding program planning, the preparation of the new strategic plan, or the choice of new programs or activities. The NMCP has therefore requested its partners, including PMI, UCAD, *Institut Pasteur de Dakar*, and others, to participate in a re-profiling of the malaria situation in Senegal. Sites will be selected to adequately reflect the ecological zones and seasonality of transmission in Senegal. Sites selection will take advantage of projects already underway that collect all or most of the necessary data and where data were collected in the past. The PMI will fund 20 sites. Each site would require four combined entomologic/parasitological surveys over the course of one year.

4. Technical Assistance for mid-MOP review (\$12,000)

Funding to support participation by a CDC Atlanta-based Senegal PMI team member in a mid-MOP micro-planning and review meeting in Senegal in January 2010.

5. Technical Assistance for monitoring and evaluation (\$12,000)

The CDC M&E Team Lead will provide technical assistance for data exchange with the NMCP and the implementation of PMI M&E activities.

STAFFING AND ADMINISTRATION

Two resident advisors oversee the PMI in Senegal, one representing CDC and one representing USAID. In addition, several health team members, including one FSN, dedicate significant time supporting PMI. All PMI staff members are part of a single inter-agency team led by the USAID Mission Director or his 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 two PMI professional staff work together to oversee all technical and administrative aspects of the PMI in Senegal, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, and reporting of results. Both staff members report to the USAID Mission Director or his/her designee. 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 GFATM, World Bank and the private sector.

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

ANNEX 1

Tables

Table 1

**President's Malaria Initiative – Senegal
Year 4 (FY10) Timeline of Major Activities**

ACTIVITY	2010					2011											
	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Continued support for distribution of LLINs through various mechanisms including the new routine net system and free distribution through PLWHA networks, Peace Corps Volunteers, and sub-national campaigns																	
National Demographic and Health Survey (full Malaria Module)																	
IRS activities in selected districts																	
Enhanced IRS Capacity Building																	
Reinforce ANC Services in Health Facilities and bring ANC, IPTp and LLIN to community through support of health post outreach strategy																	
Supportive supervision, QA/QC for microscopy and RDTs																	
Procurement of microscopes																	
Case management of uncomplicated malaria with ACTs at facilities nationwide																	
Procurement of drugs and supplies for severe malaria																	

Community case management of malaria with RDTs and ACTs at Health Huts and in communities with trained village malaria workers																	
Development of 2011-2015 NMCP Strategic Plan and support for launching activities																	
Epidemiologic Profile activities																	

Table 2

**President's Malaria Initiative – Senegal
Planned Obligations for FY10**

Activity	Mechanism	Budget	Commodities	Geographic Area	Description of Activity
PREVENTION					
Long-lasting insecticide treated bednets (LLINs)					
Procurement and distribution of LLINs through routine distribution through expanded subsidy program and for free distribution to PLWHAs and by Peace Corps volunteers in their communities	NetWorks / DELIVER	13,500,000	11,550,000	Nationwide	1,925,000 nets at \$6 per net with 10,000 LLINs going to PLWHA, 40,000 for distribution by Peace Corps volunteers, 1,450,000 distributed through the new routine program, and 425,000 through subnational campaigns; plus program development, net delivery, local coordination and technical assistance
Social marketing/mass media	NetWorks	275,000	0	Nationwide	Demand creation for LLINs with messaging to encourage use
LLIN Total		13,775,000	11,550,000		
Indoor Residual Spraying (IRS)					
Indoor residual spraying	IRS IQC Global Task Order	4,500,000	1,800,000	6 districts: Richard Toll, Vélingara, Nioro, Malem Hodar, Guinguineo, Koumpentoum	One round of spraying in the same 3 districts as the previous year, plus 3 new districts

IEC for IRS	ChildFund Senegal Consortium of FBOs / NGOs	150,000	0	6 districts: Richard Toll, Vélingara, Nioro, Malem Hodar, Guinguineo, Koumpentoum	Communications at community level to increase cooperation with IRS activities
IRS capacity building	WHO	100,000	0	Nationwide	Workshops/meetings and onsite facilitation to build capacity for IRS management at local level and in GOS
Strengthen entomologic capabilities and entomologic monitoring	UCAD via WHO	390,000	0	6 districts: Richard Toll, Vélingara, Nioro, Malem Hodar, Guinguineo, Koumpentoum	Entomologic monitoring pre and post IRS implementation in current 3 districts and 3 additional districts, as well as insecticide resistance monitoring.
	CDC IAA	12,000	0	N/A	1 visit for CDC entomologist
Additional entomologist at PNL	WHO or IntraHealth	35,000	0	N/A	Support for a second entomologist at PNL to help coordinate expanded IRS activities and entomological monitoring.
Technical assistance for environmental compliance monitoring	EMCAB	25,000	0	IRS districts	1 visit to monitor compliance with environmental regulations at IRS sites
IRS Total		5,212,000	1,800,000		
MALARIA IN PREGNANCY (MIP)					

Supervision and monitoring of ANC, support outreach strategy, reinforce MIP services in health facilities.	IntraHealth	900,000	0	Nationwide	Bring ANC, IPTp, LLIN for pregnant women to community level through health post outreach activities; Monitoring and supervision of MIP delivery; Training of new health care providers in ANC, IPTp, LLINs, MIP, interpersonal communication; Replacement of water filters and cups for IPTp; Support coordination between NMCP and Division of Reproductive Health.
IEC/mass media for early ANC attendance and IPTp uptake	TBD	200,000	0	Nationwide	Support IEC/mass media activities to mobilize women for early ANC and IPTp uptake
MIP Total		1,100,000	0		
Prevention Total		20,085,000	13,350,000		
CASE MANAGEMENT					
Diagnosis					
Supportive supervision of malaria diagnosis with both microscopy and RDTs with quality assurance and control, microscope maintenance	IntraHealth / UCAD	238,000	0	Nationwide	Support for supervision of malaria diagnosis by microscopy and RDTs for laboratory and health worker staff and implement laboratory quality assurance and control measures. Maintenance of distributed microscopes.
	CDC IAA	12,000	0	0	Support for one CDC TDY to support diagnostic supervision

Procurement of microscopes	DELIVER	50,000	50,000	Health Facilities in new health districts and 15 military health centers	Support for procurement of microscopes to enable quality microscopic diagnosis in health facilities where they are lacking
Diagnosis Total		300,000	50,000		
Treatment					
Improve case management with ACTs at the facility level	IntraHealth	300,000	0	Nationwide	Support for monitoring and supervision of case management of malaria at all levels of the health system
Procurement of drugs for severe malaria cases	DELIVER	240,000	240,000	Nationwide	Provision of drugs and supplies for treatment of severe malaria in health centers and hospitals
Treatment Total		540,000	240,000		
Pharmaceutical Management and Drug Quality					
Drug management capacity building and training	SPS	400,000	0	Nationwide	Drug stock management for dispensers at health centers and health posts, including private pharmacies; possible TA for central level drug management.
Drug efficacy testing	WHO (subgrant to UCAD)	30,000	0	N/A	Therapeutic efficacy tests of first- and second-line drugs

Drug quality monitoring and advocacy	USP DQI	235,000	0	Nationwide	Support for maintaining system of drug quality monitoring in 9 sites. Also includes IEC activities to inform public about counterfeit/poor quality drugs, and advocacy for policy enforcement of drug quality standards. Possible long-term TA to shepherd institutional changes indicated by drug quality monitoring.
Pharmacovigilance	USP DQI	15,000	0	Nationwide	Support for a national pharmacovigilance system
Pharmaceutical Management Total		680,000	0		
Case Management Total		1,520,000	290,000		
COMMUNITY					
Community mobilization and behavior change communication for malaria	ChildFund Senegal Consortium of FBOs/NGOs	850,000	0	Nationwide	Comprehensive malaria community mobilization activities including BCC, support for MIP, case management, ITNs
Community-level implementation of ACTs/RDTs through health huts	ChildFund Senegal Consortium of FBOs/NGOs	1,279,000	0	Nationwide	Community based case management of fever in 1,397 functional health huts. Includes training, supervision, and monitoring of staff. Facilitate the integration of MCH activities into the PMI platform.

PECADOM (Home-based management of malaria)	IntraHealth/ ChildFund Senegal	500,000	0	ChildFund: Fatick, Matam; Intra: Kedougou, Kaolack, Kolda, Kaffrine regions	Supervision of village malaria workers trained to perform RDTs and administer ACTs in communities without health huts
Support to Peace Corps malaria related activities	TBD	25,000	0	Peace Corps Volunteer Communities	Support linkages between community implementing partners and Peace Corps Volunteers, also continue to make available a small amount of funding through Small Project Assistance (SPA) that Peace Corps Volunteers can access for local malaria related projects
Community Total		2,654,000	0		
HIV and MALARIA					
Prevention of Malaria among PLWHA	FHI	25,000	0	TBD	Integration of malaria messages into HIV/AIDS communication activities and distribution of 10,000 LLINs through networks of PLWHAs (cost of net procurement covered in LLIN section)
HIV and Malaria Total		25,000	0		
CAPACITY BUILDING					
Support to NMCP to enable program supervision	NMCP (through WHO)	150,000	0	Nationwide	Support visits by national staff to regional and district levels

M&E capacity building for national program staff and regional and district personnel	IntraHealth	30,000	0	Nationwide	Support for 10 people to participate in the annual 3-week health focused francophone M&E course at CESAG in Dakar (participants chosen in collaboration with NMCP)
Support for NMCP attendance at International applied epidemiology course	TBD	30,000	0	N/A	Support for a member of the NMCP to attend the international applied epidemiology course at CDC, Atlanta
Development of 2011-2015 NMCP strategic plan	TBD	40,000	0	N/A	Workshop/consultant to support development of the 2011-2015 NMCP strategic plan
Capacity building total		250,000	0		
MONITORING AND EVALUATION					
Demographic and Health Survey / Malaria Indicator Survey	Measure / DHS with local partners	800,000	0	Nationwide	Contribution of PMI toward funding for 2010 DHS, which includes full malaria module
Evaluation of 2006-2010 NMCP strategic plan	TBD	75,000	0	N/A	Support to evaluate implementation of NMCP's 2006-2010 malaria control strategy, possibly a consultant
Epidemiologic profile	WHO (subgrant to UCAD)	360,000	0	Selected Sites	Updating parasitemia and entomologic data from sites around country to update epidemiologic profile

TA for mid-MOP review	CDC IAA	12,000	0	N/A	Funding for one CDC person to participate in mid-MOP review in Jan 2010 (one USAID person will be funded from Core)
TA for M&E	CDC IAA	12,000	0	N/A	Funding for one CDC person to provide M&E technical assistance to the National Program
M&E total		1,259,000	0		
IN-COUNTRY MANAGEMENT AND ADMINISTRATION					
In-country staff Administrative expenses	CDC/USAID	1,205,000		Nationwide	Coordination of all in-country PMI activities
Admin total		1,205,000	0		
GRAND TOTAL		\$27,000,000	\$13,640,000 (51%)		

Table 3

Senegal Year 4 (FY10) Estimated Budget Breakdown by Intervention (\$000)

Area	Commodities (%)		Other (%)		Total	
Insecticide-treated Nets	11,550	(84%)	2,225	(16%)	13,775	51%
Indoor Residual Spraying	1,800	(35%)	3,410	(65%)	5,212	19%
Malaria in Pregnancy - IPTp	0	(0%)	1,100	(100%)	1,100	4%
Case Management	290	(19%)	1,230	(81%)	1,520	6%
HIV and Malaria	0	(0%)	25	(100%)	25	0%
Community Interventions	0	(0%)	2,656	(100%)	2,654	10%
Capacity Building	0	(0%)	250	(100%)	250	1%
Monitoring and Evaluation	0	(0%)	1,259	(100%)	1,259	5%
Administration	0	(0%)	1,205	(100%)	1,205	4%
Total	13,640 (51%)		13,360 (49%)		27,000	100%

Table 4

Year 4 (FY10) Budget Breakdown by Partner (\$000)

Partner Organization	Geographic Area	Activity	Budget*
Child Fund led consortium of NGOs/FBOs (World Vision, Africare, Plan International, Counterpart, and CRS/Caritas)	Nationwide	Community mobilization for LLINs, IRS, ACTs, and support for the roll-out of NMCP's PECADOM Program	\$2,529
CDC IAA	N/A	TA for entomological monitoring, mid-year MOP review, diagnostics, and M&E	\$48
DELIVER	Nationwide	Direct procurement of LLINs for distribution through multiple channels (routine system, Peace Corps, and for PLWHA); procurement of microscopes; and procurement of drugs for severe malaria	\$5,090
FHI	Nationwide	Prevention of malaria among PLWHA	\$25
IntraHealth	Nationwide	Supervision/monitoring of ANC and MIP services, support for diagnostics, supportive supervision for case management, support to roll-out of NMCP's PECADOM program, capacity building for M&E	\$1,718
MEASURE/DHS follow-on with local partners	Nationwide	Contribution to DHS with full malaria module	\$800
IRS IQC Global Task Order	Nioro, Richard Toll, and Vélingara districts	IRS implementation	\$4,500
SPS (MSH)	Nationwide	Drug management capacity building and training	\$400
USP DQI	Nationwide	Drug quality monitoring and advocacy, pharmacovigilance	\$250
WHO Umbrella Grant local sub-grants			
University Cheikh Anta Diop (UCAD) (through WHO)	Nationwide	Entomological monitoring, drug efficacy testing, epidemiological re-profiling	\$780

Partner Organization	Geographic Area	Activity	Budget*
GOS (NMCP) (through WHO)	Nationwide	Supportive supervision	\$150
WHO	Nationwide	IRS capacity building	\$100
(Subtotal via WHO)	To UCAD, NMCP, Institut Pasteur de Dakar		
NetWorks	Nationwide	Procurement and distribution of LLINs for routine distribution through expanded subsidy program	\$8,975
EMCAB	IRS districts	TA for environmental compliance	\$25
TBD	Nationwide	IEC/mass media for early ANC attendance and IPTp uptake	\$200
Peace Corps	Peace Corps Volunteer Communities	Support for LLIN distribution and other community-based malaria prevention activities	\$25
TBD	Nationwide	NMCP attendance at international applied epidemiology course, development of 2011-2015 NMCP strategic plan, evaluation of 2006-2010 NMCP strategic plan, support for additional entomologist at NMCP	\$180

* Does not include staffing and administration