

**PRESIDENT'S MALARIA INITIATIVE**

**Malaria Operational Plan**

**Year Two – Fiscal Year 2008**

**SENEGAL**

*Final November 6, 2007*

## TABLE OF CONTENTS

Abbreviations.....	3
Executive Summary.....	4
President’s Malaria Initiative .....	9
Malaria Situation in Senegal .....	10
National Malaria Control Plan.....	11
Major Partners in Malaria Control .....	12
Current Status of Malaria Indicators .....	15
Goal and Targets of President’s Malaria Initiative .....	16
Expected Results – Year Two.....	16
Interventions – Prevention	
Insecticide-treated nets (ITNs) .....	17
Indoor residual spraying (IRS) .....	22
Malaria in Pregnancy .....	25
Interventions – Case Management	
Malaria diagnosis.....	27
Treatment.....	29
Pharmaceutical management and drug quality.....	32
Interventions – Community .....	34
HIV/AIDS and malaria .....	36
Communication and coordination.....	38
Capacity Building .....	39
Monitoring and Evaluation Plan .....	40
Staffing and Administration .....	43
Annex 1:	
Table 1 .....	45
Table 2 .....	46
Table 3.....	51
Table 4.....	54
Table 5.....	55

## **ABBREVIATIONS and ACRONYMS**

ACT – artemisinin-based combination therapy  
 AIDS – Acquired Immunodeficiency Syndrome  
 ANC – antenatal clinic  
 AS–AQ – artesunate-amodiaquine combination therapy  
 BCC – behavior change communication  
 CCF – Christian Children’s Fund  
 CDC – Centers for Disease Control and Prevention  
 CTO – Cognizant Technical Officer  
 CMS – Central Medical Stores  
 DHS – Demographic and Health Survey  
 DPL - Directorate of Pharmacies and Laboratories  
 FBO – faith-based organization  
 FY – fiscal year  
 GFATM – Global Fund to Fight AIDS, Tuberculosis, and Malaria  
 GOS – Government of Senegal  
 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  
 IRS – indoor residual spraying  
 ITN – insecticide-treated net  
 LLIN – long-lasting insecticide-treated net  
 MICS – Multiple Indicator Cluster Survey  
 MIP – malaria in pregnancy  
 MIS – malaria indicator survey  
 MOH – Ministry of Health  
 MOP – Malaria Operational Plan  
 MSH – Management Sciences for Health  
 NGO – non-governmental organization  
 NMCP – National Malaria Control Program  
 PLWHA – people living with HIV/AIDS  
 PMI – President’s Malaria Initiative  
 PMTCT – prevention of mother to child transmission (of HIV)  
 PVO – private voluntary organization  
 RBM – Roll Back Malaria  
 RDT – rapid diagnostic test  
 RTI – Research Triangle Institute  
 SP – sulfadoxine-pyrimethamine  
 SPS – Strengthening Pharmaceutical Systems Project  
 UCAD – University Cheikh Anta Diop (Senegal’s national university in Dakar)  
 UNDP – United Nations Development Program  
 UNICEF – United Nations Children’s Fund  
 USAID – United States Agency for International Development  
 WHO – World Health Organization

## EXECUTIVE SUMMARY

In June 2006, the United States Government announced that Senegal was selected to be included in a five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa.

Senegal has a population estimated at 11.3 million, with approximately 1.9 million children under five, 452,000 pregnant women and 61,000 children and adults living with HIV/AIDS. Malaria is a major cause of morbidity and mortality in Senegal and a high priority for the government. Between 1-1.5 million cases of malaria are reported each year, over one-quarter in children less than five years of age. Malaria is responsible for about one-third of all outpatient consultations and 28% of mortality in health facilities.

The most recent information on nationwide coverage of key malaria prevention and control measures in Senegal comes from a Malaria Indicator Survey (MIS) conducted from November to December 2006. As artemisinin-based combination therapies (ACTs) had been introduced into the health system in Senegal in early 2006, only 3% of children under five with fever were reported to have taken an ACT within 24 hours of the onset of their symptoms. Approximately 49% of pregnant women reported receiving two doses of intermittent preventive treatment for malaria in pregnancy (IPTp). Approximately 36% of households possessed at least one insecticide-treated mosquito net (ITN), with greater ownership in rural compared to urban areas and in the poorer as opposed to the richer quintiles. Seventeen percent of pregnant women and 16% of children under five had slept under an ITN the night before the survey.

Senegal is the recipient of a \$33.3 million Round 4 malaria grant from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and has submitted a malaria application for Round 7 requesting \$61.5 million over five years. With additional support from the Government of Senegal, PMI, World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the World Bank, and other national and international partners, a scaling up of malaria prevention and control interventions is underway in the country.

The following table shows the proposed Year 1 targets and the early implementation activities supported by PMI and partners during this initial year:

<b>Proposed Year 1 Targets (PMI and partners)</b>	<b>Expected Results after 1 Year of Implementation (March 2008*)</b>
1 million ITNs distributed	As of October 2007, nearly 1.8 million ITNs had been distributed or retreated (486,156 through PMI funds)
500,000 residents living in 75,000 houses protected by IRS in three districts	As of September 2007, over 650,000 residents living in over 76,000 houses had been protected by IRS in three districts <i>(98% of targeted houses were actually sprayed)</i>
ACTs will be implemented in all MOH health facilities in 50% of MOH districts nationwide	By March 2008, PMI will have directly supported training and supervision of over 400 health workers at health centers and posts, and will have provided technical assistance to quantify ACT needs with the expectation that GFATM supported ACTs will be available in health facilities in 50% of districts nationwide <i>(covering at least 50% of children under five)</i>
Community-based treatment of malaria with ACTs implemented in 30% of MOH districts nationwide	By March 2008, PMI will have expanded implementation of community-based delivery of GFATM supported ACTs to over 1000 village communities covering 30% of districts nationwide <i>(covering at least 30% of the population)</i>
IPTp will be fully implemented in all MOH districts	By March 2008, PMI will have supported training and supervision of health workers, including revisions to ANC registries and implementation of IPTp will be underway in all MOH districts nationwide. <i>(increasing coverage with 2 doses of IPTp to 60%).</i>

\*Year 1 implementation ends March 31<sup>st</sup>, 2008

This PMI Year 2 Malaria Operational Plan (MOP) was based on Year 1 progress and experiences and a planning visit carried out in July 2007. 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 in well with the Ministry of Health (MOH) Strategic Plan for Malaria Control, 2006 – 2010.

The following paragraphs describe the progress to date and Year 2 plans for each of the major interventions.

**Insecticide-treated nets (ITNs):** A key NMCP strategy for malaria prevention is the distribution of ITNs, especially LLINs, to pregnant women and children under five years of age. During Year 1, PMI supported a comprehensive, four-pronged strategy to increase household ownership and use of ITNs, especially among vulnerable populations. 1) The free distribution of 193,851 LLINs to children under five in the four peri-urban districts of the Dakar region through the Government of Senegal's (GOS's) National Micronutrient Days campaign. 2) The distribution of 2,121 LLINs to networks of PLWHA, 3) The subsidized distribution of 95,302 LLINs to pregnant women and children under five at health centers and health posts through an expanded LLIN voucher program and an increased voucher value of about \$6.00 in order to promote redemption of the more effective but more expensive LLINs. 4) Commercial sales of unsubsidized ITNs to the general public resulting in the sale of 69,250 ITNs sold between October 2006 and September 2007. PMI also supported the retreatment of more than 125,632 conventional mosquito nets. Because net ownership does not necessarily translate into net usage,

the PMI also has invested in information, education, and communication (IEC) and behavior change communication (BCC) activities at the health facility and community level to ensure that residents understand the value of ITNs and their correct care and use.

During Year 2, PMI will support procurement of approximately 710,000 LLINs for distribution free of charge during the spring 2008 National Micronutrient Days Campaign, with an additional 2,000 LLINs to be set aside for distribution to people living with HIV/AIDS. PMI will work closely with the NMCP and other malaria partners to leverage additional resources to procure and distribute enough LLINs to target all 1.9 million children under five during this integrated nationwide campaign. Continued support will also be provided for distribution of subsidized LLINs through the voucher program in five regions and for IEC/BCC activities at the facility and community level nationwide. It is expected that more than 1 million ITNs will be distributed directly through PMI support to vulnerable populations as a result of Year 2 PMI efforts and that nationwide household ownership of one or more ITNs will increase to 70%.

**Indoor residual spraying (IRS):** During Year 1, PMI strengthened vector control capabilities by supporting spraying with a synthetic pyrethroid insecticide in three districts, one in each of the three ecological zones covering a total population of over 680,000. More than 98% of houses targeted for spraying were actually sprayed. In addition, PMI collaborated with entomologists at the *Université Cheikh Anta Diop* (UCAD) and the Institut Pasteur (IP) to develop a detailed IRS monitoring and evaluation plan, including both epidemiological and entomological variables. In Year 2, PMI will continue to support spraying in the three original districts from May through July 2008. Because of the presence of permanent water sources, a second round of spraying may be necessary in certain areas of Richard Toll District in January 2008. PMI will continue to collaborate with UCAD and IP to conduct insecticide susceptibility testing in sentinel sites in order to provide the NMCP with data for operational planning of vector control measures.

**Intermittent preventive treatment in pregnant women (IPTp):** In 2003, the NMCP adopted IPTp with two doses of sulfadoxine-pyrimethamine (SP). The 2006 MIS showed that 49% of women received two or more doses of SP during prenatal care during their last pregnancy, a significant increase from 21% reported in the 2005 DHS. With the efforts of PMI and other partners, IPTp implementation is underway in all MOH antenatal care service delivery sites nationwide. During Year 1, PMI supported training and supportive supervision of health care workers on IPTp in five regions, including accurate record keeping and the diagnosis and management of malaria in pregnancy. In addition, PMI supported the development and dissemination of IEC/BCC messages designed to improve community awareness of the risks of malaria during pregnancy, promote the use of IPTp beginning early in the second trimester of pregnancy, and stress the importance of completing the recommended two doses of SP. All SP needs are covered by the GOS. In Year 2, PMI will expand the support of health worker training, supportive supervision, and IEC/BCC nationwide in order to further strengthen prevention and treatment of malaria in pregnancy. The activities should bring nationwide coverage with two doses of SP to 70% of all pregnant women.

**Case management:** *Diagnosis:* Fewer than 13% of malaria cases in Senegal were laboratory confirmed, with the quality and availability of laboratory diagnosis generally viewed as poor. During Year 1, PMI worked closely with the NMCP and other partners to assess existing

laboratory capacity, equipment, and needs for regional and district-level health facility based laboratory services. Based on this assessment, PMI purchased needed laboratory equipment and supplies and developed a plan for training and increased supervision of laboratory workers. By March 2008, labs in all districts and some regional level facilities will be furnished with new microscopes, and 65 malaria microscopists will have received refresher training. In Year 2, PMI will continue to support activities to strengthen laboratory diagnosis including refresher training for laboratory staff, supportive supervision of district laboratories, strengthening the laboratory quality control system, and procurement of supplies. PMI will also support the NMCP to implement Senegal's new rapid diagnostic test (RDT) policy.

*Treatment:* Through the GFATM grant, the NMCP is able to meet all public sector needs for ACTs through 2009. In Year 1, PMI provided assistance to strengthen the pharmaceutical management system including improving forecasting of ACT needs and development of a system for drug quality assurance. PMI also supported refresher training in case management and supportive supervision at health center and health post levels in five regions. In Year 2, PMI will continue support to the pharmaceutical management system and will expand activities to reach all regions and districts in Senegal with refresher training of health workers and supportive supervision to improve case management with ACTs.

**Community Interventions:** In Year 1, PMI supported malaria interventions at the community level through a consortium of international and local NGOs. PMI-funded achievements included development of a training module, a community health worker data collection registry, reference tools, and IEC/BCC materials for training of and use by community health workers at health hut level. Effective community-based case management with ACTs was supported at 283 health huts in five regions of Senegal. IEC/BCC activities encouraged early care seeking for children with fever, early and frequent antenatal care (ANC) visits including IPTp, and consistent use of ITNs. PMI also has supported nurses to bring IPTp to the community level through regular outreach visits. By March 2008, these activities will be expanded to all functional health huts, covering about 64% of the country's total population. In the three target districts for IRS, additional IEC interventions focused on increasing community understanding of and participation in IRS activities.

In Year 2, IEC/BCC and community-based interventions will continue to encourage prompt and appropriate treatment, use of IPTp, and regular use of ITNs in all of Senegal's 1058 functional health huts. In the three target districts for IRS, additional IEC interventions will focus on maintaining community understanding of and participation in IRS activities.

**Monitoring and Evaluation (M&E):** In Year 1, PMI provided support to build national capacity in monitoring and evaluation, including implementation of a national Malaria Indicator Survey in November-December 2006 to provide baseline data for PMI and support to two sentinel sites to obtain facility level malaria-specific mortality data for children under five. In Year 2, PMI will help the NMCP measure coverage and utilization rates for ACTs, ITNs, IPTp and IRS through a second MIS in the fourth quarter of 2008. In addition, new sentinel sites will be developed to expand the ongoing collection of data on malaria-specific mortality and morbidity.

**Budget:** The FY2008 PMI budget for Senegal is \$16 million. Of this amount, 41% will support household ownership and use of ITNs, 19% IRS, 7% improved malaria diagnosis and treatment at the health facility level, 3% malaria in pregnancy activities, and 17% community-based malaria interventions (including case management and promotion of ITNs, IRS, and malaria in pregnancy activities). A total of 40% 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% after three years of full implementation in each country. This will be achieved by reaching 85% coverage of the most vulnerable groups---children under five years of age, pregnant women, and people living with HIV/AIDS---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. Funding began with \$30 million in FY 06 for the initial three countries, increased to \$135 million in FY 07 for the initial three countries plus the four additional countries, and will increase to \$300 million in FY 08, and reach \$500 million in FY 10 in 15 countries.

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 to Fight AIDS, Tuberculosis, and Malaria (GFATM), Roll Back Malaria (RBM), the World Bank, the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), 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, will be highly consultative and held in collaboration with the national malaria control program and other partners.

This PMI Year 2 Malaria Operational Plan (MOP) for Senegal was developed with the participation of the National Malaria Control Program (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) Strategic Plan for Malaria Control 2006-2010 and build on investments made by the PMI in Year 1 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 2 PMI activities.

## MALARIA SITUATION IN SENEGAL

Senegal has a population of approximately 11.3 million<sup>1</sup> with 45% living in urban areas. In rural areas 62%, in Dakar 32% and in other urban areas 39% of Senegalese live below the poverty line<sup>2</sup>. Although substantial improvements have been achieved since the 1960s, Senegal's indicators of human development remain unacceptably poor with Senegal ranked 156 out of 177 countries worldwide in terms of the human development index<sup>3</sup>. The infant mortality rate is 61 and the under five mortality rate is 121 per 1,000 live births. Maternal mortality is estimated to be 401 per 100,000 live births and the mean life expectancy is 56 years<sup>4</sup>. The adult HIV prevalence rate is estimated at 0.7% for adults 15-49 years of age<sup>4</sup> with 56,000 adults 15-49 years of age and 5,000 children estimated to be living with HIV/AIDS<sup>5</sup>.



Administratively, the country is divided into 11 regions and 35 departments with three new administrative regions expected to be created during 2008. 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 oversees both the District Health Center and the staff at peripheral facilities throughout the district. There are currently 64 health districts in Senegal.

<sup>1</sup> Agence National de la Statistique et de la Démographie. Rapport National de Présentation des Résultats du Troisième Recensement General de la Population et de l'Habitat – (2002), December 2006. Estimate for 2007 on page 124.

<sup>2</sup> Based on comparing the cost of a standard basket of food and non-food item to the per-capita annual consumption. République du Sénégal. Evaluation quantitative du DSRP-I (2003-2005), July 2007

<sup>3</sup> Human Development Index (HDI) Report 2006

<sup>4</sup> 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

<sup>5</sup> UNAIDS and WHO. Epidemiological Fact Sheet on HIV/AIDS and Sexually Transmitted Infections for Senegal, December 2006

Malaria is endemic throughout Senegal. The three ecological zones are the Senegal River valley (arid, near water) with perennial transmission, a central zone with seasonal high transmission, and a southern zone with perennial transmission and a peak during the rainy season. Malaria is responsible for about one-third of all outpatient consultations<sup>6</sup> and 28% of deaths in children under five in health facilities<sup>7</sup>. The 2006 Malaria Indicator Survey (MIS) estimated (with data collected at the very end of the rainy season), that 37% of children under five had an episode of fever or convulsions during the two previous weeks. The incidence of fever during the high transmission season is unknown. Only 11% of these children received some type of antimalarial drug within the first 24 hours of symptom onset, with only three percent having received an ACT.

Peak malaria transmission occurs from June to November. Transmission is becoming less seasonal in peri-urban areas and in areas close to rivers or other water sources that remain during 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* (both M and S sub-species), *An. arabiensis*, *An. funestus*, and *An. melas* in the Senegal River delta area.

The vulnerable groups in Senegal comprise an estimated 1,921,000 children under five, 452,000 pregnant women, and the estimated 61,000 adults and children living with HIV/AIDS.

## NATIONAL MALARIA CONTROL PLAN

The NMCP resides in the MOH's Division of Disease Control. The activities that the PMI is proposing to support fit 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 indoor residual spraying;
- 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 will focus on strengthening prevention and assuring correct and timely treatment at all levels. 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

---

<sup>6</sup> NMCP Report of Activities, 2006

<sup>7</sup> WHO Statistical Yearbook, 2007

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

- **Prevention of malaria in pregnant women:** intermittent preventive treatment with two doses of SP using directly observed therapy;
- **Vector control:** indoor residual spraying and use of LLINs, particularly among pregnant women and children under five;
- **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 (LLIN, IRS, etc.).

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

A multisector Steering Committee is 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. The Steering Committee has not recently been active, and is targeted to be reconstituted under the draft 2006-2010 Strategic Plan for Malaria Control. The PMI intends to support the revitalization of this committee and participate fully in its activities.

## **MAJOR PARTNERS IN MALARIA CONTROL**

### **Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM)**

The Global Fund Round 1 grant of \$4.2 million was approved in April 2003 and suspended in 2005 due to inadequate progress, inability to document progress, and other irregularities.

In Round 4, the Global Fund awarded a \$33.3 million grant to Senegal that runs through 2010, with approved funding of \$23.1 million for first phase (2005-2006). The Principal Recipient of the Global Fund malaria grant is the NMCP. The first phase of the Global Fund grant has been evaluated and is performing well, with 86.8% of the approved budget expended. Thus far, this grant has been used to procure 3,000,000 treatment courses of artesunate-amodiaquine (AS-AQ) and 340,000 doses of SP (through the WHO), and 400,000 untreated bednets bundled with insecticide treatment kits (through UNICEF) for 2006. All of these commodities have been distributed to public health facilities and the private sector throughout the country. Based on a recent quantification exercise, including evaluation of the existing stock and consumption rate, the second shipment of 3,000,000 treatment courses of AS-AQ has been authorized and is expected to be delivered by the end of October 2007. In addition, 171,000 RDTs have been received out of a total order of 300,000 and were used in a recently completed pilot study on the feasibility of their use. For the second phase of this grant, a request of \$12,050,404 was submitted covering the time period of 2007-2010, with \$2,958,028 to be used for commodities including purchase of LLINs, re-impregnation kits, and RDTs. On August 14, 2007 the Global Fund Board approved the phase two funding for this grant in the amount of \$7,327,690. The NMCP also uses the Global Fund malaria grant to make sub-grants to community-based

organizations (CBOs) working on malaria prevention throughout the country. Most of these interventions involve IEC/BCC and occasionally ITN distribution, but to date do not involve case management, IPTp, or vector control measures, such as IRS. The LLIN voucher program has recently proposed a partnership with the NMCP's CBO grants program to include promotion and education about the voucher program and other PMI-supported LLIN activities in the CBOs' IEC activities.

### **World Bank**

Recently, the World Bank adopted a budgetary support mode of financial assistance for Senegal. It is unknown to what extent these funds are used to finance malaria-related activities.

Previously, World Bank funds were used to procure ITNs and to support IEC activities focused on malaria prevention messages. The current country assistance strategy (2007 – 2010) for the World Bank in Senegal is based on three pillars, one being human development / shared growth. Part of this pillar is improving health services provision for women and children, with a goal of reducing malaria mortality by one third in 2010 compared to a 2005 baseline and a target that 50% of targeted households will use an ITN by 2009. The Bank will support the Government of Senegal in reaching these goals and outcomes through Poverty Reduction Support Credits and two separate Bank programs.

The first of these World Bank-funded programs is the Senegal River Basin Project. This project plans to provide \$12 million over the next five years to provide LLINs, with a goal of covering 80% of all households in 14 districts in the Senegal River basin (St. Louis, Matam, Tambacounda, and Louga Provinces). LLIN coverage will be assessed using lot quality assurance sampling methods. The World Bank has specifically asked that PMI contribute support for behavior change and communications to increase net usage in the areas where its LLINs will be distributed under the Senegal River Basin project.

The second World Bank project is the Nutrition Enhancement Project. This community-based project completed Phase 1 in 2005 and started phase 2 in 2006. During Phase 1, 42,500 ITNs and 17,000 net re-treatment kits were distributed to children under three. Phase 2 operates in 115 local communities in 29 districts, serving all children in rural locations and selected children in urban areas. A mass distribution of 483,000 LLINs (budgeted at \$3.8 million) targeting children under five is planned for October through November 2007 to cover 96 communities in 25 districts (the four excluded districts are those in Dakar that have benefited from the mass distribution supported by PMI in May 2007).

### **World Health Organization (WHO)**

WHO 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.

### **UNICEF**

UNICEF provides support to the health sector in Senegal primarily through support of district level health plans. Since 2002, UNICEF has spent \$2.1 million on malaria specific activities targeted primarily to the Kolda and Tambacounda regions through the multi-country Accelerated Child Survival and Development Project. These activities have included the purchase and

distribution of 342,000 subsidized ITNs and 475,000 KO Tab insecticide re-treatment kits and 20,000 bottles of deltamethrin insecticide.

### **Islamic Development Bank**

The Islamic Development Bank is planning to provide \$8 million dollars in loans for the procurement of 800,000 LLINs and insecticide treatment kits, the re-treatment of 300,000 nets, and the training of health personnel. This support will extend from the second semester of 2007 through the first semester of 2009.

### **USAID**

Prior to PMI, USAID provided, on average, \$2.5 million annually in support of malaria activities. USAID's efforts were concentrated in four regions (Kaolack, Louga, Thiès and Ziguinchor), representing about 37% of Senegal's population and contributed to the implementation of combination therapy (and later AQ-AS) at both the clinical and community levels, of IPTp with SP at all facilities where ANC services are provided, and of the introduction of a voucher system as a mechanism to provide subsidized ITNs to pregnant women and children under five. On a national level, USAID has supported the expansion of the social marketing of ITNs through the commercial sector and the strengthening of drug resistance surveillance and drug quality assurance systems.

In July, 2006, USAID/Senegal competitively awarded a five-year Cooperative Agreement to IntraHealth, International to implement maternal and child health activities, including facility-based malaria prevention and control, in USAID's previous focus regions of Kaolack, Louga, Thies, and Ziguinchor, plus the new focus region of Kolda. At the same time, a competitively-awarded, five-year Cooperative Agreement was also granted to a consortium of NGOs led by Christian Children's Fund (CCF) and including Plan International, Africare, and World Vision, to implement community-based malaria prevention and control activities in the same five focus regions. The consortium of NGOs has since expanded to include Counterpart International and Catholic Relief Services (CRS) for malaria activities. Both of these Cooperative Agreements were amended in the spring of 2007 to expand their geographic focus to be nationwide under the PMI.

### **Other Bilateral Donors**

**The Belgian Cooperation** has been involved with both clinical and community-level malaria prevention and treatment activities, primarily in the Diourbel region. The current project has ended and the future of Belgian cooperation has not yet been determined. The **German Cooperation** (GTZ) was formerly active in public health activities, including malaria in the Kolda region and the District of Pikine (Dakar). At present the GTZ is not specifically involved with malaria activities in Senegal. The **French Cooperation** is involved with malaria activities through French government support to the Global Fund and staffing of technical assistants at the MOH. The **Japanese** (JICA) provided several hundred thousand ITNs several years ago but as these were ineffectively distributed through the Ministry of Health, JICA has provided no further support for malaria activities. No other bilateral donor has been involved in the malaria program in Senegal.

## Private Donors

The Pfizer pharmaceutical company has begun a malaria intervention program that will likely focus on IEC/BCC for improved care-seeking behavior to reduce the delay in seeking medical care in the presence of malaria symptoms. Their work will likely be focused in 3 districts in the Tambacounda Region. Funds are expected to be at the level of \$300,000 per year for five years. Details are not completely known at this time, but Pfizer has been in contact with PMI staff in country during the development of its new program.

## CURRENT STATUS OF MALARIA INDICATORS

The PMI funded a Malaria Indicator Survey (MIS) in Senegal to provide baseline data for the PMI. According to this survey, conducted just after the rainy season in November 2006, 57% of households owned at least one bednet and 36% of households owned at least one ITN. Approximately 16% of children under five slept under an ITN the previous night compared to 17% of pregnant women. These results are increases over the results of the Demographic and Health Survey done in January 2005, where only 20% of households owned at least one ITN and 7% of children under five and 9% of pregnant women slept under an ITN the night before the survey. The 2006 MIS also showed an increase in pregnant women receiving one dose of IPTp with SP during prenatal care from 21% in 2005 to 69%, with 49% of women having received 2 or more doses of SP in 2006. As ACTs had been introduced into the health system in Senegal in early 2006, only 3% of children under five with fever were reported to have taken an ACT within 24 hours of the onset of their symptoms. Except for malaria treatment, the comparison of these surveys show a considerable increase in coverage and utilization of major malaria prevention and control activities, however, they also show that continued support is needed to scale up interventions rapidly to reach targets established by the NMCP and PMI.

<b>Recent Estimates of Malaria Indicators: 2005 Senegal DHS; 2006 Senegal MIS</b>		
<b>Indicator</b>	<b>2005 DHS</b>	<b>2006 MIS</b>
Proportion of children under five years old with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever	--	3%
Proportion of households with at least one ITN	20%	36%
Proportion of children under five who slept under an ITN the previous night	7%	16%
Proportion of pregnant women who slept under an ITN the previous night	9%	17%
Proportion of women who received 2 or more doses of IPTp during their last pregnancy in the last 2 years	21%	49%
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months (NMCP)	0%	98% <sup>†</sup>

<sup>†</sup> Activity and progress report from the 2007 IRS campaign; Source: NMCP and RTI

## **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 TWO**

At the end of Year 2 of the PMI in Senegal (31 March, 2009, end of Year 2 implementation), the following results will have been achieved:

### Prevention:

- More than 1 million LLINs (in addition to Year 1) will have been distributed nationwide to pregnant women and children under five (expected to increase household ownership of an ITN to more than 70% of the targeted population nationwide);
- Approximately 76,000 houses in three districts targeted for IRS will have been sprayed, protecting more than 680,000 residents (with at least 85% of targeted houses sprayed);
- IPTp will be fully implemented in all Ministry of Health antenatal care services nationwide (expected to increase coverage of pregnant women receiving two or more doses of IPTp to 70%).

### Treatment:

- Malaria treatment with ACTs will have been implemented in government health facilities in 100% of districts nationwide (with estimated coverage of 75% of children under five);
- Community-based treatment of malaria with ACTs will have been implemented in 100% of functional health huts nationwide (with estimated coverage of about 50% of the population).

## INTERVENTIONS – PREVENTION

### Insecticide-treated nets (ITNs)

Current Status:

#### *Data and Trends*

Comparisons between the most recent DHS, conducted in January 2005, several months after the rainy season, and the MIS, conducted in November-December 2006, just at the end of the rainy season, show the status of indicators of mosquito net ownership and use:

<b>Indicator</b>	<b>2005 DHS</b>	<b>2006 MIS (national)</b>	<b>2006 MIS Regional Range</b>
% Households with $\geq 1$ net (treated or untreated)	38.0	56.7	37 (Dakar) – 89 (Ziguinchor)
% Households with an ITN*	20.2	36.3	15 (Matam) – 58 (Kolda)
% Children under five sleeping under a net	13.9	27.9	13 (Louga) – 67 (Ziguinchor)
% Children under five sleeping under an ITN*	7.1	16.4	6 (Louga) – 41 (Kolda)
% Pregnant women sleeping under a net	14.4	31.8	4 (Dakar) – Kolda (65)
% Pregnant women sleeping under an ITN*	8.5	17.2	0 (Dakar) – 46 (Kolda)

\*ITN in this survey is defined as a long-lasting treated net, a treated net purchased within the past 12 months, or a net re-treated within the past 12 months

#### NMCP Policies and ITN distribution mechanisms

Key strategies for malaria prevention in the NMCP 2006-2010 Strategic Plan are the distribution of ITNs, especially LLINs, to pregnant women and children under five years of age and improving and reinforcing communication on the use of ITNs, with a goal that 80% of each group will sleep under an ITN by 2010. As a result of USAID and other donor dialogue with the government of Senegal in 2004, national taxes and tariffs on ITNs were dramatically reduced from about 40% to the present 2.5% (which is regionally required by the Economic Community of West African States (ECOWAS) – there is no additional tax in Senegal). This reduction, 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 and for those with ability to pay unsubsidized prices. In its Strategic Plan, the NMCP remains committed to diversifying suppliers of ITNs while providing subsidized nets at community level. The NMCP promotes three approaches

for distribution of ITNs: targeted subsidies through a voucher program, untargeted subsidies through health facilities and CBOs, and commercial sales.

**1. Nets sold at subsidized prices through a voucher program (voucher worth FCFA 3000; \$6) targeting pregnant women and children under five**

A targeted subsidy voucher program is based on contracts between LLIN distributors and local health committees at each facility. The health committees decide which brands (limited to LLINs) and sizes of nets they will offer at their facilities. Agreements signed between the health committees and the distributors assure a consistent supply of stock and stipulate the sale price to the health committee at that facility.

Health personnel are provided vouchers and are trained to counsel pregnant women attending ANC and children under five attending child health services about the use of ITNs to prevent malaria. If the client does not currently own an ITN, they receive a personalized 3000 FCFA (about \$6) coupon that the family can then redeem for the purchase of an LLIN at the health facility's pharmacy. Currently co-payments range from 800 CFA (about \$1.60) for the Olyset rectangular LLIN to 1500 CFA (about \$3.00) for a circular LLIN. In July 2007, the Minister of Health announced that all ITNs in Senegal were to be available to the public for 1,000 FCFA, effective immediately. However, the actual implementation of the declaration is still in progress. It is expected that two new brands of LLINs (Interceptor® and NetProtect®) will join the current three brands (Olyset®, PermaNet® and Dawa Plus®) participating in the voucher system early in fiscal year 2008.

Voucher program distributors make periodic visits to the facilities, collect the redeemed vouchers, and restock the nets. NetMark then reimburses the distributors for exchanged vouchers. This program operates on the premise that all parties benefit, and thus all have an incentive to make the system work: the health committees make a small profit from what is sold at their facility, and have an incentive to promote nets and help ensure that women redeem their vouchers and use the nets. The private sector distributors make a profit by selling their nets and have an interest in ensuring a constant supply of stock at all participating facilities. They assume the cost of transport and logistics for delivery of the nets to the distribution point.

Because the end prices to the user are determined by the health committees' agreements with the private sector, prices are not directly set by the voucher program or the NMCP. Though end-user prices are similar to the NMCP's pricing policy for ITNs (not LLINs), PMI remains concerned that financial access could be a barrier for many pregnant women and families with young children. During Year 1 planning for PMI in Senegal, it was decided that an effort would be made to ensure that at least one type of LLIN would be made available through the targeted subsidy program at a cost of 500 FCFA (about \$1) co-payment, a lower cost than what had been available through the program at that time. Unfortunately, as a result of inaccurate information on the lowest cost LLIN at that time (e.g., the information used was for the lowest priced ITN, not LLIN), this reduction in co-payment did not immediately take place and the lowest cost LLIN under the voucher program until recently still required a co-pay of 800 FCFA (about \$1.60). However, this issue has been addressed with one LLIN currently available with a co-payment of 500 FCFA (approximately \$1.00).

## **2. Subsidized sales of bednets purchased by other donors or GOS (FCFA 1000 or about \$2 for any buyer (untargeted subsidies))**

The NMCP supports untargeted sales of subsidized nets at health facility pharmacies. In the last two years, nets for this program have come from donations by UNICEF and the World Bank and direct procurement through the GFATM. The NMCP also uses GFATM funds to provide nets to CBOs through the P15 and ABCD programs described in the “Community Interventions” section. Maintaining a consistent supply of nets through these channels has been a challenge for the NMCP. Because of production shortages of LLINs, during 2006 the NMCP purchased conventional nets bundled with insecticide treatment kits, switching to LLINs in 2007. They are available for purchase by the general public at the price of 1,000 FCFA (about \$2.00). The PMI in-country team has initiated dialogue with the NMCP to encourage an emphasis on LLINs for these programs in the future.

## **3. Commercial nets sold at market prices to the general public (FCFA 3500 – 6000; \$7- \$12)**

Five major distributors supply ITNs and LLINs in Senegal, all of whom partner with the NMCP and NetMark. NetMark collaborates with NMCPs in sub-Saharan Africa to increase access to and appropriate use of ITNs through public-private partnerships. Commercial suppliers reach all 11 regions of Senegal, but do not reach certain rural areas (specifically Kédougou). Commercial sales of ITNs and LLINs from October 2006 to September 2007 totaled 69,250, representing a decrease from the same period in 2005-2006 when NetMark partners sold 161,126 ITNs and LLINs. A 2007 evaluation of the program noted that increased access to subsidized nets through vouchers and NMCP subsidies had weakened the retail market for full-priced nets. The commercial partners project their sales for calendar years 2007 and 2008 to be approximately 100,000. The number of retailers is estimated to be at least 700, including pharmacies, gas stations, the Pridoux chain of stores, NGOs, CBOs, etc., down from last year (estimated at 900). This decrease is because one supplier did not receive WHOPES II certification for its long-lasting ITN. It is unknown whether the supplier will re-introduce the Netto ITN or search for a certified LLIN to place on the market. Unbranded, untreated nets are also widely available in Senegalese markets. Prices range from 2500 CFA to as much as 4000 CFA.

<b>Distributor</b>	<b>Product</b>	<b>Retail Sales Oct '06 - Sept '07</b>	<b>Average Retail Price (estimate, FCFA)</b>
DNS	PermaNet (LLIN)	467	5000-6000
PaluNet	Sentinelle (ITN)	63,970	5000-8000
CAD	KO Net (ITN)	4,813	3500-5000
TOTAL		69,250	

### Progress to Date:

During Year 1, PMI supported a comprehensive, four-pronged strategy to increase household ownership and use of ITNs, especially among vulnerable populations. 1) PMI supported the free distribution of 193,851 LLINs to the mothers of young children in peri-urban Dakar participating in the MOH's national micronutrient days campaign in May, 2007. PMI also supported the free distribution of 2,121 LLINs to people living with HIV/AIDS (PLWHA) through regional

PLWHA networks and the ambulatory treatment center for AIDS in Dakar. 2) More than 97,200 conventional mosquito nets were retreated with insecticide using USG funds, and an additional 28,432 were retreated with matching funds as part of the bednet retreatment campaign. 3) PMI supported distribution of subsidized long-lasting bednets to pregnant women and children under five through expansion of the voucher program from the original 20 health facilities in 6 districts to 194 facilities in 28 districts, covering 5 of the country's 11 regions. 454 health workers, members of local health committees, and local NGO representatives have been trained in the voucher system. Vouchers and bednets have been placed in all the participating facilities, and voucher distribution has begun. The expanded system began operating at full capacity in May 2007, and more than 95,302 pregnant women or parents of young children have exchanged vouchers for LLINs by October 2007 (an additional 11,000 vouchers were redeemed from October to December 2006 under a previous voucher program). The current voucher redemption rate is over 97%. When fully operational in all five regions, the program should deliver an average of 25,000-30,000 LLINs per month. 4) 69,250 socially-marketed ITNs were sold commercially from October 2006 to September 2007 as a result of PMI support. In total, PMI *directly* supported distribution/re-treatment of 486,156 ITNs during Year 1.

From December 2006 through the first half of 2007, the NMCP distributed 735,000 Global Fund-supported ITNs through its health facility and CBO programs. The World-Bank supported Nutrition Strengthening Program will also distribute 500,000 LLINs to children under five in their target areas by the end calendar year 2007. These nets were procured through SONI, a distributor that entered the local market thanks to the NetMark voucher program. Combined with PMI supported distribution and retreatment efforts, nearly 1.8 million ITNs have been distributed during Year 1 of PMI in Senegal.

Proposed Year 2 Activities: (\$6,593,000)

In Year 2, PMI will continue to support the NMCP to implement its multi-pronged ITN strategy that includes the “catch-up” and “keep-up” strategies endorsed by the RBM partnership to rapidly increase and maintain high coverage. As the quality, age, and state of older nets is unknown, PMI will focus its resources on extending access to new LLINs to reach the vulnerable populations rather than undertaking future retreatment campaigns. The Initiative will focus on the following interventions for Year 2 that will result in more than 1 million LLINs being distributed by PMI and its partners:

*1. Distribution of free LLINs during the spring 2008 National Micronutrient Days: (\$5,304,000)*

To rapidly increase possession and use of LLINs by children under five years of age, PMI will support the MOH and NMCP to link the distribution of LLINs to the annual micronutrient campaign (Vitamin A coupled with albendazole), organized by the Ministry's Child Survival Division either in May or September / October 2008. PMI, in collaboration with the NMCP and other major donors, will organize a nationwide free net distribution, with the goal of providing one free LLIN to each child participating in the campaign. PMI will procure at least 712,000 LLINs for free distribution during the campaign. Discussions with other global and in-country partners have begun to secure additional nets for the campaign in order to cover the estimated 1.9 million children under five. Extra support will be given to

geographic areas that have both the lowest coverage of ITN use and the highest risk of malaria transmission, in order to maximize impact. PMI will also provide support for promotion, logistics, information, and communication, and evaluation activities for the campaign. (*\$1,034,000 of the total \$5,304,000 is allocated for logistics and promotion/IEC/BCC, and the remaining \$4,270,000 is for procurement of nets*)

Of the 712,000 LLINs procured for free distribution, PMI will set aside 2,000 nets prior to the micronutrient campaign for distribution to PLWHA, who will also receive malaria and ITN counseling as part of a comprehensive package of HIV care and support services provided by the GOS and USAID, with no additional cost to PMI.

2. Subsidized distribution of LLINs to pregnant women and children under five via the voucher system: (*\$1,139,000*)

PMI will continue to support the existing subsidized LLIN distribution program for pregnant women and children under five in all 28 districts in the five USAID focus regions. Expansion of the voucher program to other regions is limited by funds in Year 2, but may become feasible in Year 3 when catch-up activities are less of a focus. The entry of new brands into the market in FY 2008 should give consumers more choice, and the increased competition is likely to reduce co-payments as more competition enters the market. The value of the voucher will be maintained at 3000 FCFA (about \$6), and vouchers will continue to be valid only for LLINs. This restriction is to promote use of the more effective but more expensive long-lasting nets, while maintaining consumer choice. Approximately 25 – 30,000 LLINs will be distributed per month as a result of this activity (estimated at 300,000 – 360,000 total LLINs).

3. Support to NMCP for untargeted subsidized distribution: (*no additional costs to PMI*)

The PMI in-country advisors will work with the NMCP to identify the cause of ITN stock-outs and resolve the problems in order to assure uninterrupted supply. Since these programs have national reach, assuring their success is an important element of a sustainable malaria control strategy (“keep up”). It is expected that at least 600,000 ITNs will be distributed through these programs in Year 2.

4. Private sector sales of ITNs: (*\$150,000*)

The PMI will continue to support efforts of local private ITN and LLIN distributors to expand their markets and sales, particularly in urban areas of Senegal, targeting those consumers who can afford to pay full price for the commodity. The focus will be on increasing sales and distribution points for distributors of LLINs. It is expected that sales of ITNs by private sector distributors will increase to at least 200,000 in 2008.

4. Operations Research: Phase III evaluations of long lasting insecticide treated nets. (*\$52,000 from Core funds*)

Currently, there are 2 LLINs (PermaNet, Vestergaard-Frandsen; Interceptor, BASF) with interim recommendation from WHO Pesticide Evaluation Scheme (WHOPES) and 1 (Olyset, Sumitomo) with full recommendation. PMI has approved the purchase of these three nets as well as 3 new nets that have been submitted to WHOPES. These new nets (DAWAplus, DuraNets and InTecton) have passed phase I testing but have not completed phase II testing as required for interim approval. It is essential that these products be thoroughly evaluated to ensure that they are providing the long-lasting protection as expected. These studies will evaluate the expected lifespan as measured by the insecticidal activity and the physical durability of these LLIN products under field conditions.

### **Indoor residual spraying (IRS)**

#### **Current Status:**

Although the NMCP has had little previous experience with IRS, the 2006-2010 Strategic Plan for Malaria Control includes IRS as one of its key strategies for control of malaria. The NMCP proposes to train and equip community-level spraying agents with help from the Hygiene Service, which would monitor spraying activities. Since DDT is not approved for use in Senegal, synthetic pyrethroids will be the insecticides of choice.

The country can be divided into three main areas based on annual rainfall: a) the tropical south with 1000-1250 mm of rain and rainy season from May until November; b) the central Sahelian zones with 400-1000 mm of rain and rainy season from July to October; and c) the north Sahelian zone with less than 300 mm of rain and a rainy season from July to September.

The distribution of vector mosquitoes is dependent upon rainfall and the presence of permanent sources of water. Some vectors, such as *An. melas*, that predominate in the mangrove swamps of coastal river deltas, prefer to feed outdoors. Consequently, in areas where they are the major vectors, IRS would probably have limited impact. *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. In addition, because malaria transmission is seasonal in much of the country, a single round of spraying just before the rains begin should suffice each year. In Dakar, where approximately 25% of Senegal's population resides, malaria transmission is limited to a few districts and many cases are imported from rural areas when students and workers return to the city after working on farms during the growing season. Therefore, vector control activities such as IRS would probably not be cost effective in this setting. A possible exception is the Pikine area (in the Dakar region), where malaria transmission increases as the distance from freshwater ponds decreases. Here, targeted larviciding might have an impact on transmission and could eventually be considered.

Senegal is fortunate to have strong national entomology experts at the NMCP, UCAD, the Parasite Control Section, and the Institut Pasteur. A strong collaborative relationship exists among these groups and they have published much of the recent literature on malaria vectors in Senegal. They also monitor mosquito resistance to DDT, permethrin, and deltamethrin at 11

sites throughout the country. Nevertheless, support from PMI would still help to improve the monitoring program both epidemiologically and entomologically and provide the NMCP with data for operational planning of continuing control measures needed over time.

Progress to Date:

*Scaling up of IRS*

From May to August 2007, spray campaigns were carried out in the three targeted districts (Vélingara, Nioro and Richard Toll) and 76,279 houses were covered, protecting a population of 678,971 (see below). Spray teams reported a 98% acceptance rate among households targeted for spraying, with a slightly lower acceptance in Vélingara District as compared to the others.

IRS coverage in three districts of Senegal

<b>District</b>	<b>Spray dates</b>	<b>Houses targeted</b>	<b>Houses sprayed</b>	<b>% sprayed</b>	<b>Population covered</b>
<b>Vélingara</b>	5/21- 8/3	24,387	23,137	95%	247,693
<b>Nioro</b>	5/29- 8/3	31,147	30,740	99%	275,899
<b>Richard Toll</b>	6/11 – 8/10	22,647	22,402	99%	155,379
<b>Total</b>		78,181	<b>76,279</b>	98%	<b>678,971</b>

PMI supported training for more than 45 spray trainers and supervisors (16 in Vélingara, 16 in Nioro, 13 in Richard Toll) as well as 230 spray applicators (76 in Vélingara, 99 in Nioro and 55 in Richard Toll). In addition, entomologists at NMCP, UCAD, the Parasite Control Section and members of the MOH's public hygiene department attended IRS training activities prior to the commencement of training in the districts and they provided assistance in the RTI training activities. IEC activities were carried out by CCF. A lesson learned from this round is to better involve local and district health teams with training, supervision and IEC activities.

The Institut Pasteur has increased mosquito numbers available from its insectary to provide sufficient quantities for the entomological evaluation teams. Technical assistance to the Institute entomology staff to further improve rearing techniques is underway. Renovations for a new insectary at the UCAD are currently being planned.

Early entomologic evaluations found high mortality upon exposure to treated walls using cone bioassays. The entomologist carried out pyrethroid spray catches and indoor and outdoor landing catches in an untreated village as a comparison to treated villages. Over 400 anophelines were collected in the untreated villages, less than 10 were found in and around houses of the treated villages. The monthly cone bioassays, indoor and outdoor landing catches, and PSCs will continue until November in the two southern districts, Vélingara and Nioro, and until January or February in the areas near permanent waters sources in Richard Toll.

Proposed Year 2 Activities: (\$3,075,000)

In Year 2, PMI will support IRS in the same districts as in Year 1. In addition, PMI will expand entomological monitoring to an additional district where IRS could potentially be added in the future. PMI will provide support to strengthen entomological capacity at UCAD and the Institut Pasteur.

1. Continuation of IRS; procurement of equipment and supplies for IRS: (\$2,800,000)

In Year 2, the current sites of Vélingara, Nioro and Richard Toll, representing each of the three primary ecological/entomological zones, will receive another round of spraying May through July 2008. Because areas of Richard Toll have permanent water sources, additional funds were set aside in case entomological and epidemiological evaluations indicate the need for a second round in such areas before May of 2008.

IRS will be not expanded beyond the first three districts at this time as the entomologic evaluations will not be completed before November 2007. Members of NMCP, UCAD and PMI agreed that information and experience garnered from the evaluation of these first rounds will be essential for planning future IRS activities in Senegal.

PMI support for IEC activities related to IRS to encourage the population's cooperation with spraying their homes is discussed under community mobilization. This work will be done through USAID's PVO partners who have experience working in the area.

2. Strengthen entomologic capabilities and entomologic monitoring: (\$265,000)

UCAD and Institut Pasteur in collaboration with entomologists at CDC will continue entomologic monitoring and evaluation related to IRS, with particular interest in detecting changes in insecticide susceptibility and behavior of the vectors. Insecticide susceptibility assays will be done with CDC bottle assays and/or WHO papers on field caught mosquitoes; in addition PCR assays for the presence of *kdr* gene, which is associated with resistance to synthetic pyrethroids, will be done. Vector behavior will be assessed by monitoring indoor and outdoor biting rates and indoor resting densities. In addition, mosquitoes will be identified to strain level via PCR identification and checked for sporozoite using ELISA. Cone bioassays to determine quality of spraying (measured immediately after spraying) will be done as in the first year.

Baseline entomological studies will be done during the 2008 rainy season for any new districts that may be added for the 2009 season. Selection on new districts for IRS will be made in conjunction with NMCP and UCAD and will be based on results of evaluations of the three districts targeted in 2007.

PMI will support insecticide susceptibility testing at sentinel sites, especially in agricultural areas where pyrethroid insecticides are used frequently.

3. Operations Research: Assessing of longevity of different classes of insecticides (\$120,000- from Core funds)

This study will evaluate the duration of the efficacy of different insecticides for IRS on different wall surfaces. One of the major limitations of IRS is the need for frequent application of insecticide to the walls. The greater the duration of efficacy of insecticides used for IRS, the more cost-effective this approach becomes. Another limitation involves the choice of insecticide used. Currently, compounds from four different classes of insecticides (pyrethroids, organophosphates, carbamates and organochlorines) have WHO approval for use for IRS, and ICON, a formulation of the pyrethroid lambda-cyhalothrin, is the most frequently used for IRS in PMI countries. This class of insecticide is the only one available for use in manufacturing ITNs. A rational approach to insecticide resistance management would indicate that pyrethroid use IRS should be curtailed to reduce selection pressure for pyrethroid resistance and to ensure that pyrethroid treated ITNs will remain an effective malaria prevention tool for many years. We propose to test formulations of several non-pyrethroids in comparison to commonly used pyrethroid insecticides in villages in Senegal to determine their residual efficacy on different wall surfaces. Insecticides to be tested will include: lambda-cyhalothrin (ICON WP and ICON CS), fenitrothion, bendiocarb, a new formulation of chlorpyrifos-methyl and DDT. Two villages will be selected for each insecticide and the entire village will be sprayed to ensure good community acceptance. Sentinel homes with mud, plastered mud and brick walls will be selected and monitored in each village.

Note: The use of DDT in this study will depend on approval from Senegal's National Commission of Pesticides Management and the Direction of the Environment and Classified Establishments.

4. Technical assistance for entomology: (\$10,000)

CDC entomologist will provide technical assistance for the implementation of entomological monitoring activities.

**Malaria in pregnancy (MIP)**

Current Status:

Following a national consensus meeting in 2003, intermittent preventive therapy for pregnant women (IPTp) was adopted by the NMCP as one of the key malaria control strategies in Senegal. The IPTp policy recommends that all pregnant women receive at least two doses of SP, directly observed, during the second and third trimesters and at a minimum of one month separation between doses. The MOH disseminated the policy and it is now being implemented in all health districts. A situation analysis of reproductive health service delivery in seven regions, conducted just prior to PMI assistance, found that 92.3% of health workers cited IPT1 with SP (88.3% cited IPT2 with SP) as elements of prevention of malaria in pregnancy.

After the policy was adopted, a national telethon held in Senegal raised enough funds for initial stocks of SP to be placed in all public facilities. When these initial supplies ran out, the MOH issued a directive to all health committees, asking them to keep SP stocked using part of the

“decentralization funds” that the MOH sends to all districts for basic supplies and equipment. Supplies of SP are considered to be adequate to meet needs nationwide.

Ideally, malaria in pregnancy (MIP) activities should be implemented jointly by the division of reproductive health (DRH) and the NMCP. The DRH has a coordinator for MIP who is responsible for working closely with the NMCP. Despite this, to date the DRH has had little impact on MIP decision-making and implementation. The DRH policy on prenatal service promotes four prenatal care visits for normal pregnancies. Though 87% of pregnant women make at least one visit to a medical care professional for antenatal care during pregnancy, health care workers complain that these first visits are often late (35% of women make their first antenatal visit after the fourth month of pregnancy). About 48% of women do complete 2-3 visits, and only 40% complete the recommended four visits (DHS 2005).

The latest data from the NMCP indicates increase in IPTp uptake from 47% in 2005 to 69% according to the 2006 MIS. However, this increase is mostly for the first dose of SP (IPT1) as uptake for the second dose (IPT2) is still less than 50%. The percentage of women receiving IPT2 is closely aligned with the percentages who attend 2-3 ANC visits. The challenge therefore is not convincing health workers to implement IPT2 with SP, but rather convincing women to attend the recommended number of ANC visits. While 87% of pregnant women attended at least one ANC visit and the same percentage reported taking some kind of anti-malarial during pregnancy, only 69% received IPT1 as part of ANC. Ensuring continuous stocks of SP and targeted retraining of health workers may help to close this gap.

The NMCP intends to increase IPT2 intake through a number of strategies including advocacy (IEC/BCC) to health workers and the population at large and training and supportive supervision of health workers. High IPT2 uptake is the main target for MIP and the chosen strategies are being supported by PMI.

A challenge for providers is the lack of updated ANC data collection tools (registries and patient cards) to accurately record the two doses of IPT. Many service providers record the doses in the “comments” column of their registries, and some keep notes on separate sheets of paper or other notebooks.

#### PMI Progress to Date:

With the efforts of PMI and other partners, IPTp implementation is underway in all MOH antenatal care service delivery sites nationwide.

During Year 1, PMI supported refresher training and supportive supervision of health care workers on IPTp in five regions, including accurate record keeping, and the diagnosis and management of malaria in pregnancy. Counseling skills were also reinforced to improve health workers’ effectiveness with clients. PMI supported the development and dissemination of community-based IEC/BCC messages designed to improve mothers’ awareness of the risks of malaria during pregnancy, promote the use of IPTp beginning early in the second trimester of pregnancy, and stress the importance of completing the recommended two doses of SP.

Community-based IEC/BCC and social mobilization activities are further described in the “Community Interventions” section.

In Year 1, PMI supported revisions of the ANC registries used by providers, and of women’s ANC cards, to include two doses of directly observed IPTp with SP, so that health workers are reminded to give the doses and that IPT 1 and 2 can be more accurately recorded. Disposable cups to facilitate directly observed treatment were purchased in Year 1.

#### Proposed Year 2 Activities (\$400,000)

In Year 2, PMI will support efforts to strengthen MIP interventions at the facility and community level. PMI will not support the purchase of SP as it is being purchased by the districts through the Senegalese government funding.

#### 1. Conduct Focused Antenatal Care training for health workers on IPTp: (\$400,000)

The PMI will continue to support the training and supervision of health workers on IPTp and malaria case management among pregnant women. Since community health workers are not authorized to provide ANC services, PMI will also support outreach activities by health workers, allowing health post nurses to offer ANC services, including IPT, in health huts and villages to reduce the distance women must travel to seek care. All MIP interventions will expand from the Year 1 coverage of five regions to all 11 regions of the country. PMI is providing on-going support for the improvement of data collection which includes IPTp data, and will continue in Year 2 to provide disposable cups for directly observed treatment.

PMI will also promote ANC attendance, ITN ownership and use, and referral in cases of fever among pregnant women as part of comprehensive community-based activities as reflected in the “Community Interventions” section below.

## **INTERVENTIONS – CASE MANAGEMENT**

### **Malaria diagnosis**

#### Current Status:

When studies confirmed increasing resistance to chloroquine, the previous first-line antimalarial drug, the NMCP and malaria control stakeholders reached consensus in June 2003 to replace chloroquine with artesunate and amodiaquine (AS/AQ) as the new first-line drug for the treatment of uncomplicated malaria. Amodiaquine + sulfadoxine-pyrimethamine (SP) was adopted as the first-line drug until the first shipments of AS/AQ arrived in Senegal in January 2006. With the change in policy, the cost of a treatment dose for adults increased from \$0.10 for chloroquine to about \$1.20 for AS/AQ. In malaria endemic countries WHO recommends the use of the Integrated Management of Childhood Illness (IMCI) algorithm for diagnosis of malaria in children. These guidelines recommend that all children under five with fever in malaria endemic areas receive antimalarial treatment without laboratory diagnostic testing. Given the

development of drug resistance and the increased cost of new first-line therapies, the NMCP is re-emphasizing the need to confirm malaria diagnosis before treatment in older children and adults.

In Senegal, health facilities with laboratories having the capacity to conduct microscopy for blood film are almost exclusively limited to hospitals and health centers, with only 40% of health facilities overall capable of conducting microscopy. Obstacles to the smooth performance of diagnostic testing for malaria include poor quality or non-functioning microscopes, non-availability of supplies or reagents and insufficient human capacity to conduct microscopy. All these contribute to the low confidence of clinicians in the results of laboratory tests. Health posts and community health huts, where a majority of sick people seek care, do not have laboratories capable of diagnosing malaria. The GFATM Round 4 Evaluation found that only 13% of malaria cases were laboratory confirmed. To increase the rate of confirmatory testing, the capacity of laboratories to perform malaria diagnosis need to be strengthened.

The NMCP's strategy for improving diagnostic capacity in the health service is expected to lead to:

- improvements in the quality of care (simpler and clearer treatment guidelines, allowing for more appropriate care even at peripheral health centers)
- reductions in over-notification of malaria (excluding cases with negative results)
- reductions in over-prescription of antimalarials by clinicians
- delaying the development of resistance to artesunate
- avoiding expenses for unnecessary treatment

Progress to Date:

A one-year study on RDT use and acceptability has just been completed by staff of the UCAD and the results were used by the NMCP to develop a policy on RDT usage, including guidance on what health facility levels will have them and an algorithm for their use. The NMCP continues to receive technical support from the Department of Parasitology of UCAD for improving malaria diagnosis and in training health worker and laboratory staff on the use of RDTs. Training of district-level health staff should be completed by November 2007, followed by training of staff in health posts.

PMI in Year 1 conducted a district-level laboratory assessment with the NMCP to assess training and equipment needs. Based on this assessment, PMI purchased microscopes for health all centers and a limited number of capable health posts, a teaching microscope and digital camera, EARL lamps, slides, and reagents. These are expected in the country in Q4 2007. Training will be carried out when the equipment arrives by a PMI partner in collaboration with the Division of Parasitology at UCAD, the Network of Laboratories, and the Parasitology Service based in Thiès, with technical support by a CDC expert in malaria diagnosis. By March 2008, 60 technicians from district and regional levels should have benefited from this refresher training.

Proposed Year 2 Activities: (\$170,000)

PMI will focus efforts in Year 2 for malaria diagnosis on training and supervision on the use of RDTs and ongoing training, supervision and material support for malaria laboratories.

1. Refresher training on diagnosis of malaria using microscopy: (\$45,000)

This training will be targeted mainly for regional, district and health center laboratory staff and for some health post staff. The PMI in collaboration with the NMCP laboratory technical team will develop a supervision visit check list and implement a plan for supportive supervision of district laboratories in order to maintain quality assurance of laboratory performance and build capacity.

2. Supportive supervision of malaria diagnosis with quality assurance and control: (\$100,000)

PMI through various partners will provide supportive supervision of malaria diagnosis by microscopy and by RDTs for laboratory and health worker staff. PMI will also assist the NMCP and its partners to develop quality assurance and control standards for laboratories and other health facilities performing diagnostic tests.

3. Technical Assistance for diagnostics: (\$10,000)

To assist with the refresher course for diagnosis using microscopy, a CDC diagnostic expert will travel to support the staff from UCAD in finalizing the curriculum and participate in the initial trainings.

4. Laboratory consumables: (15,000)

PMI will purchase laboratory consumables, including reagents for microscopy and slides to ensure the laboratory personnel have the resources to continue their work.

## **Treatment**

### Current Status:

Since January 2006, AS/AQ has been the treatment recommended for uncomplicated malaria in Senegal. This medication comes in blister packs and is available in three different dosages: children less than five years old, adolescents and adults. The child and adolescent dosage packs are sold for 300 CFA (approximately \$0.60) and the adult dosage pack is sold for 600 CFA (approximately \$1.20). These prices are significantly higher than the cost of the previous first line monotherapy treatment, but are in the range of other co-payments for medications. The 2006 NMCP national guidelines outline four dosage regimens for children and adolescents based on age and/or weight. PMI is not purchasing antimalarial drugs because Senegal has adequate financial support from the Global Fund Round 4 for all of its ACT needs until 2009.

Public sector facilities should only stock AS/AQ for malaria treatment, though some facilities still stock some monotherapies. In the private sector, any new malaria drug should be an ACT, though monotherapy drugs licensed before the change in the standard of care to ACTs can still be found.

Quinine is the drug recommended by the NMCP for treatment of severe malaria. District medical funds purchase injectable quinine and other supplies necessary for treating severe malaria. Oral quinine is the recommended drug for clinical malaria in pregnant women. Enough quinine and supplies are available through 2008; the GFTAM Round 7 application does not include these drugs.

The malaria treatment and referral guidelines in Senegal for children under five, following those of IMCI, do not include a recommendation for pre-referral treatment for malaria. The Plan of Action for the NMCP focuses on strengthening health communication for behavior change, specifically early care seeking for fever, and ensuring correct diagnosis and treatment in facilities. Pre-referral administration of antimalarial medication is not officially recommended in Senegal at the present time.

Case management with ACTs is implemented in all public health facilities nationwide. The MOH also allows community health workers to treat uncomplicated malaria and community-based case management is a key strategy of the NMCP. Though the NMCP has conducted training sessions for community health workers in several districts and urges all districts to fully implement community-based management, currently it is rarely operational outside of USAID-supported districts. The “Community Interventions” section discusses NMCP and PMI activities in greater detail.

Wholesalers may also purchase GFATM-subsidized ACTs from the Central Medical Stores (CMS) and distribute them to privately-owned 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. Private pharmacies also sell numerous other antimalarial drugs, including monotherapies such as chloroquine and SP, and ACTs including AS/AQ syrup for children, Coartem ®, and other various combinations.

PMI is supporting on-going in-vivo monitoring of AS/AQ efficacy with the support of UCAD. This activity is critical to detect the appearance of resistance to the first-line drug of choice.

#### Progress to Date:

In Year 1, PMI funds supported refresher training in case management and malaria prevention for 100 providers at health center and health post levels. Training to improve provider counseling and interpersonal communication skills will have reached 400 providers by the end of Year 1.

PMI also funded supportive supervision on-site at health center and health post levels to improve service delivery in 5 regions of the country. 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.

Provider job aids for malaria, as well as informational materials for patients, were also developed and pre-tested in Year 1.

Case management activities were also supported at the community level, and are described in the “Community Interventions” section below.

Proposed Year 2 Activities: (\$650,000)

In Year 2, the PMI will continue to provide support to strengthen case management of malaria with ACTs at the facility and community level. The PMI Year 2 plan does not include the purchase of antimalarial drugs, since all needs are covered by the Global Fund. In-country PMI staff will begin to work with public and private sector groups to explore ways to decrease and ideally stop importation of anti-malarial drugs taken as monotherapies. They will also work with the NMCP to determine what information is needed to assess the need for pre-referral treatment.

1. Improve case management with ACTs: (\$500,000)

As part of the effort to improve case management of malaria with ACTs and strengthen quality of services at health facilities, PMI will support the refresher training of health workers. PMI will also provide support to the NMCP to carry out supportive supervision of health workers at all health facilities, focusing on those in the community where many patients first seek attention. The provider job aids and client materials developed in Year 1 will be disseminated in Year 2, and a national malaria campaign will be organized at the start of the rainy season in Year 2, in close collaboration with the NMCP. This campaign will not focus only on case management/care seeking but will include all aspects of malaria prevention/control. Localized IEC/BCC activities to encourage early care seeking and appropriate treatment will also be implemented at the community level and are reflected in the “Community Interventions” section below.

PMI in-country staff will explore if the cost of ACTs in the public sector is a barrier to treatment. Existing implementing partners are well-placed to help gather data on ability to pay, so no additional costs will be incurred. Results will be shared and discussions on the co-pay policy initiated with the MOH if indicated.

2. Improve dispensing practices of ACTs by private sector: (\$150,000)

The private sector delivers a significant proportion of health care in Senegal, as in most countries in the sub-region. Often private pharmacies, drug dispensers or private medical practitioners are the first providers seen by patients for treatment of malaria despite the higher cost. Malaria constitutes the reason for about 40% of all visits to private sector clinics. PMI will support the training of private providers to encourage ACT dispensing

practices according to national protocol through a special training program tailored to suit their time and needs. A monitoring and evaluation plan will be developed in collaboration with the NMCP and private-sector pharmacist groups.

### **Pharmaceutical management and drug quality**

#### **Current Status:**

CMS is responsible for national procurement of drugs, health commodities and equipment, including antimalarial drugs, ITNs, laboratory products, and treatment kits. The NMCP is responsible for quantification of the needs of malaria commodities. Forecasting of needs and budgeting are usually based on cases registered at health facilities including cases registered at health huts at the community level. Because of the low utilization of health facilities in the country, this method of forecasting can underestimate needs. In the case of ACTs purchased by the GFATM grant, the quantification estimates have been based on all expected cases of fever rather than cases expected to be treated in a facility.

Distribution of malaria commodities to the nine Regional Medical Stores is the responsibility of CMS. Health districts are responsible for identifying the commodity needs for all health facilities in their district and for collecting these commodities from their respective regional medical store. Health facilities, including community health posts and health huts, collect their commodity orders from the district level. Commodity tracking and management is computerized at the central and regional levels with a paper system at the levels below. Distribution functions under a cost recovery scheme where each level pays cash to the higher levels for the commodities that were ordered and collected. At the health facility level, the cost-recovery system requires patients and their families to participate in the financing of the health system by paying up to 90% of the total expenditures for drugs through user fees.

The Directorate of Pharmacies and Laboratories (DPL) provides quality assurance and, in collaboration with CMS and the National Laboratory for Drug Quality Control, is responsible for establishing regulations and the right to market a drug. The national drug approval and pharmacovigilance committees are based within the DPL. In 2007, using GFATM money, the NMCP initiated a pharmacovigilance program focused on adverse drug reaction reporting about ACTs. An adverse drug reporting form was developed and a system for routine reporting up the levels of the system has been established.

CMS has set up a pharmaceutical management information system with forms and guidelines. This system is separate from the health management information system (HMIS), since the HMIS does not provide the necessary information needed to manage medicines and other health commodities. A plan is in place for supervision and follow-up of distribution activities countrywide, but CMS only supervises the distribution system to the regional level. At the district and health facility levels, information is not flowing as it should and the NMCP does not have the capacity to monitor the distribution system. Computerization of the pharmaceutical management system down to the district level is planned.

Progress to Date:

In March 2007, PMI provided technical assistance to the NMCP to quantify ACT needs including providing refresher training to three MOH program staff in quantification. Technical assistance is on-going to strengthen the pharmaceutical management system in order to improve ACT implementation with emphasis on ensuring good ACT prescribing and dispensing practices at the facility and community levels. In addition, PMI collaborated with UCAD in monitoring antimalarial drug quality and producing evidence-based data on drug quality.

Proposed Year 2 Activities: (\$230,000)

Promoting prompt and effective treatment with ACTs will continue to be a major challenge for the NMCP and the PMI, given the relatively short shelf life of AS-AQ (about 24 months), the limited reach of health centers and health posts, and the possible economic barrier to some families of co-payments for the drugs at health facilities (300CFA or \$0.60 for children). Achieving high coverage rates for ACTs will require continuously improving the pharmaceutical management system and strengthening the drug quality system to ensure that only high-quality drugs are being distributed.

1. Drug management capacity building and training: (\$100,000)

The PMI will build on several years of activities, including Year 1 PMI funding, to continue strengthening the national logistics and pharmaceutical management systems regarding ACTs through improved drug quantification and forecasting, importing, quality control, storage and inventory management. This strengthening is also supported through similar USAID-funded work to improve the management of tuberculosis drugs. 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 full implementation of ACT prescribing and dispensing practices and appropriate use.

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

In collaboration with the NMCP and UCAD, the 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 monitoring of patients diagnosed with malaria and who are receiving ACTs for treatment.

3. Drug quality monitoring: (\$100,000)

The PMI in collaboration with the NMCP, UCAD, and the National Drug Quality Control Laboratory will continue to strengthen national capacity for drug quality surveillance including maintaining a system of drug quality assurance that enforces regulatory action to be taken when poor quality drugs are found.

## INTERVENTIONS – COMMUNITY

### Current Status:

Senegal’s health care system rests on a lower tier of “health huts” that serve rural populations and are operated by three types of workers: community health workers, who offer preventive and curative services and referral for more complicated medical care; matrons, who are trained birth attendants; and *relays*, who are health educators and communicators. Though not officially part of the MOH system, health huts are supervised and supplied by nurses from health posts. The health posts are staffed by nurses, midwives and *relays*. Posts are in turn supported and supervised by the health district management team, made up of district-level program directors (such as reproductive health and primary health care). Since many people do not seek care for malaria at health facilities, or go only when it is too late for the treatment to be effective, community-level prevention and treatment interventions are critical for reaching the coverage and mortality reduction goals of the NMCP and of PMI . Working through community channels is essential for ensuring that caregivers know how to recognize and treat malaria, that LLINs in the household are being properly used, that participation in IRS campaigns is high and that safety precautions are taken, and that pregnant women understand the necessity of attending prenatal care and receiving at least two doses of IPT.

Currently, there are 1,058 functional health huts in Senegal. A functional health hut is defined as having a trained community health worker (literacy is preferred but not required), regular supervision by the chief nurse of the health post, and the basic equipment and space needed to provide services.

The NMCP recognizes the need to implement community-based malaria activities. The NMCP’s community-based efforts began in 2004 with the P15 program, where the NMCP supported 15 under-performing districts to implement community-based malaria control activities. An evaluation in 2005 found the program doing well but not reaching enough beneficiaries. In response the NMCP replaced it with the ABCD program (*Atteindre les bénéficiaires communautaires à travers les districts* or Reach the beneficiaries in the community through the district). This program, now operational in 41 districts, is based on health districts spending at least 60% of the GFATM money they receive from the NMCP through contracts with CBOs. Under these contracts, the CBOs agree to provide a package of malaria-control activities such as organizing community meetings and home visits to discuss malaria, distribution of bednets and treatment kits, and hygiene and “clean environment” education. The P15 and ABCD program evaluation in December 2006 was generally positive, except that it found that the introduction of ACTs at the community level remained weak. The key recommendation of the evaluation was that districts and CBOs urgently strengthen the introduction of ACTs at the community level to ensure prompt and proper case management by community health workers.

### PMI Progress to Date:

Through a consortium of international and local NGOs, PMI is supporting these community-level activities:

- Community mobilization for IRS in three districts  
 In the three districts where IRS was carried out, focus groups were held to learn about the public's perceptions of IRS and any concerns they might have regarding the spraying. Public information campaigns were then organized to promote IRS and encourage the population's acceptance of spraying homes. A training manual and a handbook were developed for the *relays*, as well as information materials for the public – including a poster and pamphlets in three languages. Radio spots, community meetings, and house-to-house visits were also organized. Partly as a result, the refusal rate during the IRS activities was only 2%.
- Organization and promotion of free distribution of LLINs in four districts  
 The PMI implementing partner worked through local CBOs, health post nurses and community *relays* to organize and promote the distribution of free LLINs in four districts of peri-urban Dakar during the National Micronutrient Days (NMD) in May 2007. The *relays* accompanied the teams distributing vitamin A and albendazole door-to-door, and filled out a coupon to give to each household with children participating in the campaign. The families then exchanged these coupons for LLINs at distribution points set up in each neighborhood. At the time of distribution, the *relays* also provided education about how to properly hang and use the nets. More than 99% of the coupons distributed were redeemed and 193,751 LLINs were distributed during the campaign. Leading up to the NMD campaign, the community health implementing partner also carried out localized IEC and community mobilization activities to raise awareness of the NMDs coupled with LLIN distribution, and the importance of obtaining and using LLINs.
- Training on ITN retreatment  
 PMI's implementing partners have also trained more than 60 community relays and representatives of women's groups in five districts on bednet retreatment, and (as described in the ITN section above), 97,200 nets were retreated with insecticide (K-O Tab and K-O Tab 1-2-3). An additional 28,432 were re-treated with non-PMI sources of funding.
- Community case management  
 Training of community health workers in the use of ACTs to treat simple malaria is ongoing. There are currently 283 health huts offering treatment of simple cases with ACTs, and referral for complicated cases, in 16 districts. During the second quarter of FY07 (Year 1 PMI), over 3,600 cases of malaria/fever in children less than five were treated with ACTs at these community sites. Community health workers have demonstrated excellent adherence to treatment protocol, often surpassing their health facility counterparts. With Year 1 funds, PMI partners along with other stakeholders have updated and validated training materials, job aids, and data collection tools for use by community health workers.
- Ongoing IEC/BCC  
 In addition to the IEC and social mobilization activities for the special events described above, the PMI implementing partners and the community health workers, matrons, and *relays* they collaborate with carry out ongoing IEC/BCC activities. Typical activities in Senegal include 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 ITNs, prompt treatment-seeking at the health hut or health post in case of fever, recognition of danger signs, the importance of attending ANC visits and of receiving the recommended IPT, environmental hygiene and cleanup of standing water.

Proposed Year 2 Activities: (\$2,679,000)

Community-level activities are integral to the success of all prevention and case management activities. In Year 2 PMI will continue with the community mobilization and training activities begun in Year 1, scaling them up to a national level. A challenge in Year 2 will be harmonizing PMI and NMCP supported community-level activities.

1. Scaling up community mobilization activities: (\$1,279,000)

Working through CBOs and all types of community health workers, PMI will implement a variety of information, education and communication activities aimed at:

- Informing and mobilizing the population around interventions such as IRS and ITN distribution campaigns and ongoing ITN distribution through the voucher system, health facilities, and other CBOs
- Increasing knowledge of the causes of malaria and its prevention and correct treatment and signs of severe illness in children
- Encouraging early care seeking/treatment, and prevention and management of malaria in pregnancy
- Educating the population and following-up on the correct use of ITNs
- Local environmental hygiene and sanitation

2. Scaling up community-based case management with ACTs: (\$1,400,000)

Training and supervision on correct prescribing, stocking, and dispensing practices will continue for community health workers and will, if fully-funded in Year 2, reach 100% of the 1,058 functional health huts nationwide. Data collection tools, job aids, and IEC materials will be disseminated to health workers at all health huts, along with the case management training. Systems for monitoring and supervision of these workers will also be strengthened (see Capacity Building section below).

## **HIV/AIDS AND MALARIA**

Current Status:

The HIV/AIDS epidemic in Senegal is characterized by a low prevalence in the general population (0.7% of adults 15 to 49 years of age)<sup>4</sup> with higher prevalence of infection among some risk groups: 19.4% among commercial sex workers, 21.5% for men having sex with men, and 3.4% among women of reproductive age. No significant differences exist between urban and rural areas but the southern regions have higher rates, respectively 2.8% in Kolda and 2.3%

in Ziguinchor. The estimated number of adults infected is 56,000 in 2006, of whom 47% are on anti-retroviral therapy (ART).<sup>5</sup>

USAID supports the Senegal Strategic objectives to maintain the HIV prevalence below 3%; to improve the quality of life of PLWHA and reduce the socio-economic impact of HIV/AIDS. The approach is based on a strong partnership with civil society and communities enlisted to participate in key interventions, including a comprehensive behaviour change program towards most at risk groups, encouraging prevention and treatment-seeking behaviour for sexually transmitted infections. USAID also promotes voluntary counselling and testing services and care and support programs.

In 2000, Senegal began a pilot program to introduce ART use in the public health sector. By the end of 2007, the National AIDS Plan anticipates that over 5,000 Senegalese will be on ART out of the 11,000 PLWHA who are eligible. The pilot PMTCT program for prevention of mother to child transmission of HIV (PMTCT) has also been expanding since it began in 2005.

To complement the ART program, USAID supports a comprehensive package of care and support services which began in 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 and care and support, on integrated tuberculosis screening and management; and income generation and the program targets over 7000 PLWHA through these efforts. One ambulatory integrated care and treatment unit and 15-20 sites for psycho-social care will be established in each region over the life of the program.

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

#### PMI Progress to Date:

In Year 1, working closely with the GOS, the National AIDS Committee, and civil society groups, PMI supported the free distribution of 2,121 LLINs to people living with HIV/AIDS (PLWHA) through regional PLWHA networks and the AIDS ambulatory treatment center in Dakar.

#### Proposed Year 2 Activities: (no funding during Year 2 of the PMI)

As the ambulatory unit and care and support sites serve as the starting point for the provision of a package of services for PLWHA, 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.

















**Table 2**

**President's Malaria Initiative – Senegal  
Planned Obligations for FY08 (\$000)**

<b>Proposed Activity</b>	<b>Mechanism</b>	<b>Budget (<i>commodities</i>)</b>	<b>Geographic Area</b>	<b>Description of Activity</b>	<b>Relation to Interventions</b>
<b>PREVENTIVE ACTIVITIES</b>					
<b>ITNS</b>					
Procurement of LLINs for free mass distribution	DELIVER Malaria Task Order 3	4,270 (4,270)	TBD	712,000 nets at \$6/LLIN including freight to district; including 2000 LLINs to PLWHA	ITNs
Logistics and operations support for LLINs distribution	CCF consortium and IntraHealth	1,034	TBD	Distribution and operational support for LLIN mass distribution campaign at the district and community level	ITNs
Distribution of LLINs to pregnant women and children under five—subsidized voucher	NetMark	1,139 (1095)	All districts of the 5 USAID supported regions (Thiès, Kolda, Kaolack, Louga, Ziguinchor)	Supporting the subsidized voucher system for pregnant women and children under five distributing between 25,000 – 30,000 LLINs per month	ITNs
Social marketing/private sector sale of ITNs	NetMark	150	Urban areas nationwide	Support the social marketing and sales of over 200,000 ITNs through the commercial sector	ITNs
Operations Research: Phase III evaluations of long lasting insecticide treated nets	CDC	Core Funding	Select Villages TBD (one village per insecticide tested)	Support for an OR study to test formulations of several pyrethroids insecticides in comparison to commonly used pyrethroid insecticides	ITNs









**Table 3**

**Senegal – Year 2 Targets  
Assumptions and Estimated Year 2 Coverage Levels**

Year 2 PMI Expected Results:

- More than 1 million LLINs (in additional to Year 1) will have been distributed nationwide to pregnant women and children under five (expected to increase household ownership of an ITN to more than 70% of the targeted population nationwide);
- Approximately 76,000 houses in three districts targeted for IRS will have been sprayed, protecting more than 680,000 residents;
- IPTp will be fully implemented in all Ministry of Health antenatal care services nationwide (expected to increase coverage of pregnant women using two or more doses of IPTp to 70%).
- Malaria treatment with ACTs will have been implemented in government health facilities in 100% of districts nationwide (with estimated coverage of 75% of children under five);
- Community-based treatment of malaria with ACTs will have been implemented in 100% of functional health huts nationwide (with estimated coverage of about 50% of the population).

Assumptions:

Population of Senegal (estimated for 2007): 11,300,000

Pregnant women:	4% of total population = 452,000 pregnant women
Children <5:	17% of population = 1,921,000 children under five
Older children (5-19):	39% of population = 4,407,000 older children
	44% of population = 4,972,000 adults

Average number of malaria-like illnesses per year and cost per treatment with AS/AQ:

Adults:	
Children <5:	3.5 illnesses/year at \$0.60 each
Older children (5-19)	2.0 illnesses/year at \$0.90 each
Adults:	0.5 illness/year at \$1.50 each (assume that the PMI will cover only one-third of adult illness episodes)

Cost of IPTp with SP: \$0.20 (\$0.10 for each of the two treatments a woman will receive during her pregnancy)

Cost of LLIN: \$6.00/LLIN; Average of 3.0 nets/household needed to cover all pregnant women and children under five in family; Average of 8 persons/household (2005 DHS survey)

Intervention	Needs for 100% Nationwide Coverage over 3 Years*	Needs for 85% Nationwide Coverage over 3 Years*	Annual Needs to Achieve 100% Coverage	Needs to Achieve Year 2 PMI Targets	Year 2 Contributions
IPTp	452,000 pregnant women x 2 treatments/woman = 904,000 treatments/year x 3 years = 2.7 million treatments	2.7M x 85% = 2.3 million SP treatments	904,000 SP treatments	<b>Target:</b> 70% of pregnant women receive 2 doses of IPT = 633,000 treatments	GOS indicates sufficient resources for procurement of public sector SP needs <b>Sufficient SP to achieve 100% coverage</b>
LLINs	Mean household size = 8  1.4 million households x 3.0 nets/household=4.2 million nets x 3 years =12.6	12.6 million LLINs X 85% =10.7 million LLINs over 3 years	4.2 million LLINs	<b>Target:</b> 70% of households have at least one ITN = 2,940,000 ITNs  2,940,000 – 1,200,000 nets distributed in Year 1 = 1,740,000 nets	GFATM – unspecified quantity at this time UNICEF – unspecified quantity at this time USG (PMI) – at least 1 million LLINs (712,000 campaign + at least 300,000 voucher + 200,000 private partners) World Bank- approximately 2 million LLINs over next 5 years Islamic Bank – 800,000 LLINs <b>TOTAL = at least 3.8 million LLINs</b>  <b>100% of Year 2 LLINs needs are met</b>
ACTs – children < 5	1.9 million children under 5 x 3.5 episodes/year = 6.7 million treatments/year x 3 years = 20 million	6.7M x 85% = 5.7 million treatments x 3 yrs = 17.1 million	6.7 million treatments	<b>Target:</b> 50% of children under 5 receive ACTs  6.7 million x 50% = 3.35 million treatments	GFATM – 3M doses procured with expected arrival end of calendar year 2007
ACTs – older children	4.4 million older children x 2.0 episodes/year= 8.8 million treatments x 3 years = 26.4 million	8.8 x 85% = 7.5 million treatments x 3 yrs. = 22.4 million	8.8 million treatments	8.8 million x 50% = 4.4 million treatments	If all 3.35 million child treatments are covered at \$.60/treatment = \$2.01 million, and all 4.4 older child treatments are covered at \$.90/treatment = \$3.96 million, and all 1.3 million adult treatments are covered at \$1.50/treatment = \$1.95 million
ACTs - adults	5.0 million persons x .5 episodes/year = 2.5 million treatments/year x 3 years = 7.4 million	2.5 X 85% = 2.1 million treatments X 3 years = 6.3 million	2.5 million treatments	2.5 million x 50% = 1.3 million treatments	TOTAL of \$7.92 million needed and <b>100% of Year 2 ACT needs are met.</b>
				9 million Total	

<b>TOTAL</b>	54 million treatments	46 million treatments	18 million treatments	treatments	
IRS	Approximately 681,000 population (approximately 681,000 population total in 3 districts to be targeted for IRS)	681,000x 85% =579,000 people =72,400 households targeted over three years=217,200	72,400 households targeted for IRS annually (85 % coverage)	<b>Target:</b> 72,400 households targeted for spraying	USG (PMI) – 72,400 households targeted for spraying at a cost of \$3.50/person once a year  <b>Thus, 100% of Year 2 needs are met.</b>

\*These calculations are based on the assumption that the total population of Senegal is at risk of malaria. Since malaria transmission probably does not occur in large areas of the capital, Dakar, which represents 23% of the country's population, it is likely that only 80-85% of the population is at risk of a malaria infection and needs preventive and curative malaria services.

**Table 4**

**Senegal Year 2 (FY08) Estimated Budget Breakdown by Intervention (\$000)**

<b>Area</b>	<b>Commodities (%)</b>	<b>Other (%)</b>	<b>Total</b>
Insecticide-treated Nets	5,365 (81%)	1,228 (19%)	6,593 (100%)
Indoor Residual Spraying	1,000 (33%)	2,075 (67%)	3,075 (100%)
Malaria in Pregnancy - IPTp	0	400 (100%)	400 (100%)
Case Management	35 (3%)	1015 (97%)	1050 (100%)
Community Interventions	0	2,679 (100%)	2,679 (100%)
Capacity Building	0	330 (100%)	330 (100%)
Monitoring and Evaluation	0	630 (100%)	630 (100%)
Administration	0	1,243 (100%)	1,243 (100%)
<b>Total</b>	<b>6,400 (40%)</b>	<b>9,600 (60%)</b>	<b>16,000 (100%)</b>

**Table 5****Year 2 (FY08) Budget Breakdown by Partner (\$000)**

<b>Partner Organization</b>	<b>Geographic Area</b>	<b>Activity</b>	<b>Budget*</b>
CCF Consortium of PVOs (World Vision, Africare, Plan International, and various local CBOs)	Nationwide	Community promotion of LLIN, ACTs, and IRS, and support to NMCP and MoHP for supervision and monitoring	\$3,513
CDC IAA	N/A	Technical assistance visits for entomology, diagnostics and M&E	\$30
DELIVER	Nationwide	Procurement of LLINs and some laboratory supplies for malaria diagnosis	\$4,285
GOS (NMCP) (through WHO)	Nationwide	Support National Level Program Management and Supervision to Regions	\$50
IRD (through WHO)	1 Site	Support for demographic surveillance system to obtain data on malaria specific mortality	\$5
ISED (through WHO)	1 Site	Support for demographic surveillance system to obtain data on malaria specific mortality	\$5
IntraHealth	Nationwide	Health worker training, promotion of IPTp, ITNs, ACTs, IEC, and support to NMCP and MoHP for supervision and monitoring; M&E training	\$1,410
MEASURE	Nationwide	MIS November 2008, midpoint data for PMI indicators; an additional 300-500k will be budgeted in FY09	\$500
NetMark	Nationwide minus WB districts and 4 peri-urban districts in Dakar	Procurement and Distribution of LLINs for the subsidized voucher system targeting pregnant women and children <5 years old and support to private sector ITN capability	\$1,289
RTI	Nioro, Richard Toll, and Vélingara districts	IRS in 3 districts	\$2,800
SPS	Nationwide (except private sector focus in urban areas)	Drug stock management for dispensers and HC managers; training of	\$250

