A MALARIA IN PREGNANCY CASE STUDY:

Senegal's Successes and Remaining Challenges for Malaria in Pregnancy Programming

July 2011

Prepared by:

Reena Sethi
Karim Seck
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Ministry of Health Reproductive Health Division

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UNFPA

UNICEF

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The Maternal and Child Health Integrated Program (MCHIP) is the USAID Bureau for Global Health's flagship maternal, neonatal and child health (MNCH) program. MCHIP supports programming in maternal, newborn and child health, immunization, family planning, malaria and HIV/AIDS, and strongly encourages opportunities for integration. Cross-cutting technical areas include water, sanitation, hygiene, urban health and health systems strengthening.

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Acronyms

ACT	Artemisinin-Based Combination Therapy
ANC	Antenatal Care
BCC	Behavior Change Communication
CBO	Community-Based Organization
CDA	Community Development Agency
CDC	Centers for Disease Control and Prevention
CHP	Community Health Program
CHW	Community Health Worker
CIDA	Canadian International Development Agency
DHS	Demographic and Health Survey
DOT	Directly Observed Therapy
ENDSS	National Nurse and Midwives School (Ecole Nationale de Développement Sanitaire et Social)
HMIS	Health Management Information System
IEC	Information, Education, and Communication
IPTp	Intermittent Preventive Treatment in Pregnancy
IRS	Indoor Residual Spraying
ISED	Health and Development Institute (Institut Santé et Développement)
ITN	Insecticide-Treated Bed Net
LLIN	Long-Lasting Insecticide-Treated Bed Net
MAC	Malaria Action Coalition
MCH	Maternal and Child Health
MCHIP	Maternal and Child Health Integrated Program
M&E	Monitoring and Evaluation
MICS	Multi-Indicator Cluster Survey
MIP	Malaria in Pregnancy
MIS	Malaria Indicator Survey
MNCH	Maternal, Neonatal and Child Health Program
MOH	Ministry of Health
MSH	Management Sciences for Health
NMCP	National Malaria Control Program (Programme National de Lutte Contre le Paludisme) (PNLP)
PMI	President's Malaria Initiative

PMTCT	Prevention of Mother-to-Child Transmission
PNLP	National Malaria Control Program (Programme National de Lutte Contre le Paludisme) (NMCP)
RAOPAG	Le Réseau d'Afrique de l'Ouest contre le Paludisme Pendant la Grossesse (West Africa Network Against Malaria in Pregnancy)
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
RPM Plus	Rational Pharmaceutical Management Plus
SNIS	National Health Information Service (Service National de l'Information Sanitaire)
SP	Sulfadoxine-Pyrimethamine
USAID	United States Agency for International Development
WHO	World Health Organization

Executive Summary

Introduction and Background: Many countries in sub-Saharan Africa have made significant progress toward achieving their malaria in pregnancy (MIP) program goals. However, most countries are still far from achieving the coverage targets set by Roll Back Malaria (RBM) (80%), and the President's Malaria Initiative (PMI) (85%) for intermittent preventive treatment in pregnancy (IPTp), and insecticide-treated bed net (ITN) coverage among pregnant women.

Among malaria-endemic countries in Africa, Senegal is a leader in successfully implementing interventions to prevent and control MIP. With support from PMI, the Maternal and Child Health Integrated Program (MCHIP) conducted a case study from December 2009 through March 2010 to examine MIP implementation in Senegal. The country was selected based on two MIP-related indicators: IPTp uptake[1] and ITN use,[2] as well as cultural and geographic considerations. Compared to other sub-Saharan countries, Senegal is considered "high performing" with respect to MIP programming and likely to have applied successful strategies or best practices that could potentially be adapted and replicated in other malaria-endemic countries.

Objectives and Methods: As countries scale up their prevention and control of MIP programs, there are critical lessons learned, as well as promising implementation practices, that should be considered, adopted, and applied, based on the contextual needs of each country (Jhpiego/ACCESS 2008). The purpose of this case study is to gain a better understanding of MIP programming in Senegal, specifically:

1. Best practices[3]/strategies that have supported MIP programming success;
2. Existing bottlenecks in MIP program implementation and how these are addressed; and
3. Lessons learned that could inform future MIP programming.

The case study will also contribute to developing a standardized framework for the analysis of best practices and bottlenecks in MIP implementation.

The methodology used consisted of a desk review of secondary data sources and in-depth qualitative interviews. The findings were then analyzed according to the MIP Readiness Scale, a framework developed by Jhpiego and Malaria Action Coalition[4] (MAC) partners to determine a country's stage of MIP program implementation and guide actions to strengthen MIP control. The framework examines eight key areas of MIP programming:

- Integration
- Policy
- Commodities
- Quality Assurance
- Capacity Building
- Community Awareness and Involvement
- Monitoring and Evaluation (M&E)
- Financing

[1] IPTp uptake is defined as the percentage of pregnant women, in areas of stable malaria transmission, who receive at least two doses of IPT at least one month apart (WHO 2007).
[2] ITN use is defined as percentage of pregnant women who report having slept under an ITN the previous night (WHO 2007).
[3] For the purposes of this assessment, the term best practice will be used in the context of innovative practices because the assessment will primarily be based on existing data analysis and qualitative interviews.
[4] From 2002–2007, the USAID-funded MAC provided technical support for the prevention and treatment of malaria in Africa, in support of the Roll Back Malaria (RBM) Partnership. The MAC consisted of: the U.S. Centers for Disease Control and Prevention (CDC); Access to Clinical and Community Maternal, Neonatal and Women's Health Services (ACCESS) Program led by Jhpiego; Rational Pharmaceutical Management Plus (RPM Plus)/Management Sciences for Health (MSH); and, the World Health Organization (WHO).

Best Practices: Overall, Senegal has achieved a moderate to high level of implementation of the essential MIP program components. Major strengths have been observed in the areas of integration, policy development and implementation, M&E, and engagement of community organizations. Some areas that require further, significant strengthening include the supportive supervision system, increasing of ITN availability and use among pregnant women, and scheduling of regular meetings between the RH Division and National Malaria Control Program (NMCP).

Key best practices identified that contributed to the strengths observed include:

- Development of a clear IPTp policy
- Integration of MIP into antenatal care (ANC)
- Significant progress made in policies and logistics to maximize access to sulfadoxine-pyrimethamine (SP)
- Involvement of community-based organizations and community health workers (CHWs) to increase access to MIP services
- Overhaul of M&E system with increased access to and use of MIP data for decision-making

Bottlenecks and Lessons Learned: A number of challenges as well as mitigation strategies and lessons learned were reviewed and are presented in the table below.

Bottlenecks and Lessons Learned in Senegal's MIP Implementation

COMPONENT	CHALLENGE/ BOTTLENECK	CURRENT MITIGATION STRATEGIES	LESSONS LEARNED
Integration	Linkage between the MOH RH Division and NMCP remains weak	Discussing having more regular meetings between the RH Division and NMCP. Strengthening collaboration between the RH Division and the NMCP by developing a joint plan for prevention and case management of MIP, as outlined in the 2011–2015 NMCP National Strategic Plan.	Although MIP services are integrated as a key component of maternal, newborn, and child health services at the health center level, a strong relationship between the RH Division and the NMCP ensures an integrated policy that facilitates the delivery of a holistic package of MIP services to pregnant women. Fostering the partnership in which NMCP provides technical guidance and RH manages implementation efforts is essential for long-term success.
Policy	Use of only quinine to treat MIP	Revising NMCP policy, in accordance with WHO guidelines, to use artemisinin-based combination therapies (ACTs) during the second and third trimesters of pregnancy.	Quinine and the supplies used for its administration are costly to pregnant women in Senegal, but ACTs are provided free to the rest of the population. Revising policy to include ACTs for pregnant women is important to improve access to effective treatment for pregnant women.

COMPONENT	CHALLENGE/ BOTTLENECK	CURRENT MITIGATION STRATEGIES	LESSONS LEARNED
Commodities	Inadequate availability and distribution of long-lasting insecticide treated bed nets (LLINs)	Prioritizing distribution to the most affected areas and vulnerable populations, including pregnant women. Implementing universal coverage strategy of LLINs (started in 2010) that includes distribution of free LLINs to pregnant women attending ANC and an education campaign to promote use.	LLINs are a cost-effective strategy for reducing the incidence of MIP. Pregnant women are less likely to contract malaria when all members of a household sleep under LLINs. A universal coverage strategy, including free distribution and a community component to promote LLIN use, demonstrates commitment to rapid scale-up of prevention for all.
	Inadequate supply of SP in 2010	Working with the NMCP, Central Medical Stores quantify the correct amount and procure SP supply for the country. Purchasing forecasted SP need by government rather than relying on donor support. MOH is taking steps to address supply issues.	Without sufficient SP supply, pregnant women cannot receive IPTp during ANC, leaving them vulnerable to contracting malaria. Key to SP's availability are prioritizing SP for pregnant women, ensuring the correct drug is ordered, understanding the policy of providing SP for free at ANC, and managing stocks properly at national, regional, and district levels.
Quality Assurance	Weak system of supportive supervision	Developing standardized norms and protocols tools for reproductive health services for different levels of the health system. Training supervisors on implementation of tools.	Routine supportive supervision of health providers is necessary to ensure the appropriate delivery of MIP services. Supportive supervision is an opportunity to address gaps in programming and create new program areas that need attention and support. Quality assurance standards that can be used to guide supportive supervision should be used at all levels of the health system and should be modified according to the specific services available at different types of facilities. The lack of resources for routine supportive supervision should not prevent the process from occurring, but strategies should be developed for making the best use of resources, including focusing on lower-performing facilities and providers as well as on-site supervision.

COMPONENT	CHALLENGE/ BOTTLENECK	CURRENT MITIGATION STRATEGIES	LESSONS LEARNED
Capacity Building	Inadequate performance of providers in delivering MIP services	Delivering recently updated MIP curricula to all cadres of professionals (other than doctors who receive a separate curriculum that also includes MIP). NMCP ensuring that newly hired health facility staff receive in-service training in malaria prevention and control, including MIP. Training district chief medical officers and primary health care supervisors through an NMCP comprehensive malaria course	Along with supportive supervision, the training curriculum for malaria prevention and control, including MIP, should be updated routinely to capture changes in protocols and policy.
	Health care personnel shortage	Training CHWs and assessing their performance by community members and health facility staff.	CHWs can be trained to deliver messages about prevention and control of MIP to women in their community, especially with clinical staff shortages. These messages should include information on the importance of using nets during pregnancy, having four ANC visits, and using IPTp. Having CHWs deliver this information may alleviate some of the burden on health facility providers, particularly if there is a shortage of qualified ANC staff.
Community Awareness and Involvement	Late attendance at ANC Use of insecticide-treated nets (ITNs) among pregnant women needs to increase	NMCP working with community-level organizations to organize social mobilization efforts at the community level. NMCP with the National Service for Health Education and Information is implementing a communication plan for malaria that includes MIP. Through the USAID-supported Community Health Program, providing a basic package of quality health services, including ANC and MIP, to the most remote populations via health huts.	Community involvement in malaria prevention and control efforts during pregnancy can encourage women to attend ANC early in pregnancy and raise awareness about the importance of using ITNs and IPTp. Community-level behavior change communication (BCC) campaigns can also help to correct misconceptions about using ITNs. Combining quality services with community outreach to remote areas increases access to and use of ANC and MIP services.
Monitoring and Evaluation	Poor tracking of malaria indicators	Overhauling the M&E system including revision of reporting forms and templates. Developing computerized database to capture standardized information across different levels of health system.	Proper M&E of MIP interventions can help inform implementers, program designers and all key stakeholders of the progress toward achieving the desired objectives, as well as indicate the impact that the current MIP activities are having on pregnant women.

Recommendations: To ensure that the target—80% of pregnant women have access to the package of MIP interventions[5]—is achieved, the following actions are recommended:

- Strengthen collaboration among the RH Division, NMCP, and HIV Division to support coordinated policies and activities
- Develop a simplified orientation package on the key elements of MIP policy and guidelines for rapid dissemination to providers
- Continue to invest resources in training CHWs as part of a strategy to educate pregnant women on MIP and increase adherence to IPTp and use of ITNs
- Develop capacity for on-site supportive supervision and self-assessment to improve MIP services
- Provide LLINs free of charge to pregnant women through rapid scale-up of the universal coverage strategy

Senegal is the second country to document and analyze its MIP implementation best practices and bottlenecks, utilizing a combination of the framework and stakeholder interviews. The process was previously applied in Zambia in 2009, resulting in a report on that country's findings and recommendations. This exercise will not only help Senegal analyze its current status of implementation, but also identify lessons learned that can inform future efforts. Using the case studies from Senegal and Zambia as a model and adapting them to specific local situations can assist other African countries to evaluate their progress in MIP prevention and control and determine next steps. The information resulting from such a combined effort, shared and discussed in a regional forum, has the potential to rapidly accelerate progress in reducing MIP.

[5] The Roll Back Malaria Global Strategic Plan 2005–2015 advocates 80% coverage of malaria interventions by 2010. MIP interventions are defined through the WHO three-pronged approach of prevention through use of: 1) IPTp, 2) ITNs, and 3) case management for malaria illness. Senegal's 2011–2015 National Strategic Plan for Malaria Control includes increasing the ITN usage rate and IPTp coverage to 80% and treating all cases of malaria in pregnant women seen in health facilities.

A Malaria in Pregnancy Case Study:
Senegal's Successes and Remaining Challenges for Malaria in Pregnancy Programming

INTRODUCTION

Throughout sub-Saharan Africa, malaria in pregnancy (MIP) programs are at a crossroads. Many countries have taken important strides in achieving their goals; however, most countries are still far from achieving the Roll Back Malaria (RBM) Initiative targets (80%) and the President's Malaria Initiative (PMI) targets (85%) for intermittent preventive treatment (IPTp) and insecticide-treated net (ITN) coverage among pregnant women.

Among malaria-endemic countries in Africa, Senegal is a leader in successfully implementing interventions to prevent and control MIP. With support from PMI, the Maternal and Child Health Integrated Program (MCHIP) conducted a case study from December 2009 to March 2010 to examine MIP implementation in Senegal. The country was purposively selected based on two MIP-related indicators: IPTp uptake and ITN use, as well as cultural/geographical considerations. Compared to other sub-Saharan African countries, Senegal is considered "high performing" with respect to MIP programming and likely to have applied successful strategies or best practices that could potentially be adapted and replicated in other malaria endemic countries.

During the last decade, the number and types of surveys that collect MIP-related data have increased. Despite the variety of nationally representative data surveys, which include key RBM and PMI indicators of IPTp uptake and ITN use, the reason why MIP prevention and control services and programs in most African countries are not making greater progress is still not fully understood. Gaps in information still remain and vary by country. As this case study details, linking coverage data with MIP documentation of program implementation is necessary to determine implementation bottlenecks as well as success stories, and why these deficiencies or successes exist. Such lessons learned can lead to the development of best practices that can help all endemic countries work harder to meet MIP and other malaria indicators.

BACKGROUND

Senegal, a Sahelian country located at the westernmost point of Africa, is bordered by Mauritania to the north, Mali to the east, Guinea and Guinea Bissau to the south, and the Atlantic Ocean. Senegal also surrounds the nation of Gambia, which separates the Casamance region of Senegal from the rest of the country. With a surface area of 196,840 square kilometers (76,000 square miles), Senegal is divided into 14 regions, 46 departments and 75 health districts. In 2010, Senegal's population was approximately 12,861,000 (World Bank 2011).

Malaria, which is endemic throughout Senegal, is the leading cause of morbidity and mortality for vulnerable groups such as pregnant women (Ndiaye and Ayad 2009). In Senegal, according to the 2005 Demographic and Health Survey (DHS), the maternal mortality ratio is 400 per 100,000 live births (Ndiaye and Ayad 2006), which underscores the importance of continuing to scale-up efforts to improve maternal health outcomes. During the past two years, Senegal has seen a dramatic decrease in the number of reported cases of malaria, primarily attributed to a change in policy that requires parasitological confirmation of all cases (PMI 2009). Malaria prevention and case management during pregnancy remain a priority for the Ministry of Health (MOH). Working through the NMCP and RH Division and in collaboration with local and

international partners, the MOH implements its policies and programs aimed at improving services for pregnant women and ultimately reducing the incidence of MIP.

PURPOSE AND OBJECTIVES OF THE CASE STUDY

This case study aims to gain a better understanding of MIP programming in Senegal, specifically to learn about:

1. Best practices[6]/strategies that have supported MIP programming success,
2. Existing bottlenecks in MIP program implementation and how these are addressed, and
3. Lessons learned that inform future MIP programming.

The lessons learned and promising implementation practices in Senegal may be considered, adopted, and applied to other countries based on their contextual needs as they expand and accelerate their MIP programming efforts. The case study will also contribute to developing a standardized framework for future analysis of best practices and bottlenecks.

METHODOLOGY

To obtain a comprehensive picture of the levels of MIP indicator coverage and program implementation, an MIP framework for analysis (Appendices 1 and 2) was developed in 2008 by the USAID-supported Malaria Action Coalition[7], which aimed to make better use of existing MIP-related information. The framework examined eight key areas of MIP programming:

- Integration
- Policy
- Commodities
- Quality Assurance
- Capacity Building
- Community Awareness and Involvement
- Monitoring and Evaluation (M&E)
- Financing

Regarding these program areas, the framework offered specific guidance on:

- Identifying and obtaining MIP-related coverage data available at the country level,
- Determining the level of MIP program implementation on a scale of 1–4 across the eight key areas (Appendix 2),
- Suggesting methods to gather additional information based on gaps in the first two items, and
- Linking coverage and implementation information to identify bottlenecks and best practices.

This MIP framework for analysis was applied to Senegal. Data and information were reviewed from existing population-based surveys, such as the DHS, Malaria Indicator Survey (MIS), and MOH and other secondary data sources. In-depth qualitative interviews were conducted with national MIP stakeholders, including the NMCP, MOH Reproductive Health Division, RBM,

[6] For the purposes of this assessment, the term best practice will be used in the context of innovative practices because the assessment will primarily be based on existing data analysis and qualitative interviews.
[7] From 2002–2007, the USAID-funded Malaria Action Coalition (MAC) provided technical support for the prevention and treatment of malaria in Africa, in support of the Roll Back Malaria (RBM) Partnership. The MAC consisted of: the U.S. Centers for Disease Control and Prevention (CDC); Access to Clinical and Community Maternal, Neonatal and Women's Health Services (ACCESS) Program led by Jhpiego; Rational Pharmaceutical Management Plus (RPM Plus)/Management Sciences for Health (MSH); and, the World Health Organization (WHO).

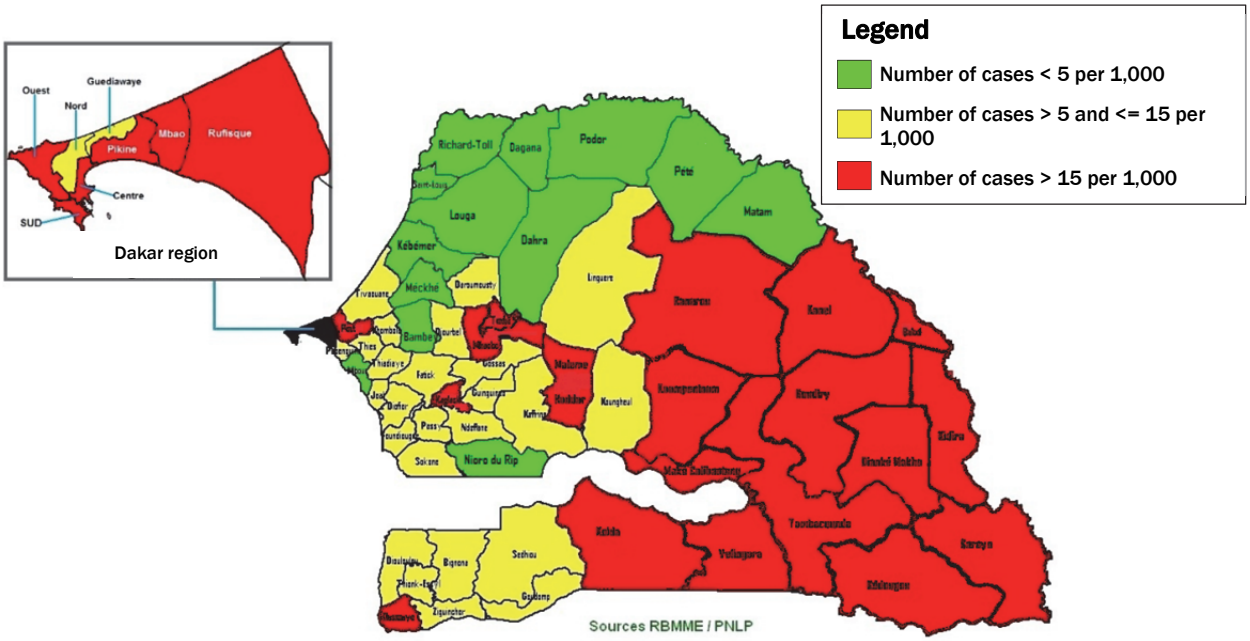
and PMI, and implementing partners. The findings were then analyzed according to the Stages of MIP Program Implementation (Appendix 2).

FINDINGS

Epidemiological Profile of Malaria in Senegal

Endemicity

Figure 1. Malaria Incidence per 1,000 Population per District in 2009



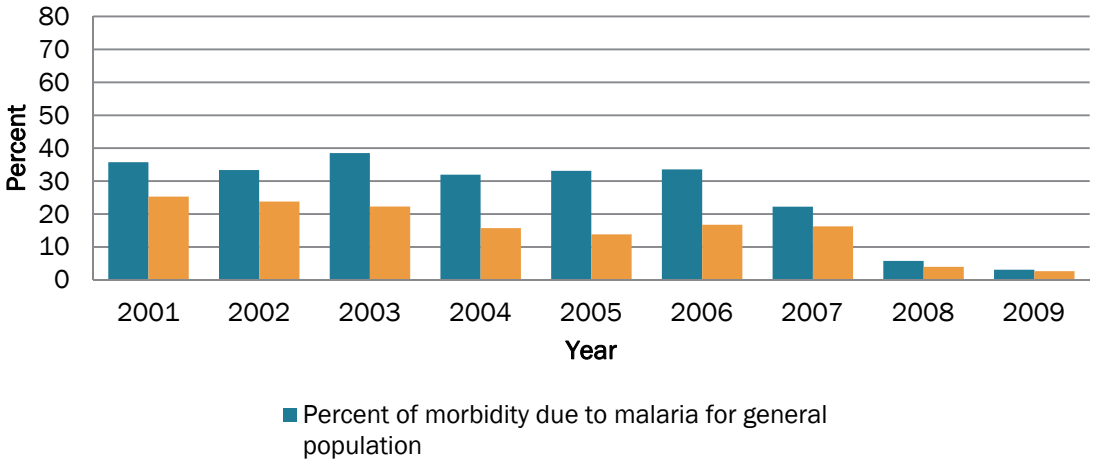
The parasite *Plasmodium falciparum*, transmitted year-round by the female anopheles mosquito, is responsible for more than 90% of infections. Although malaria is endemic in Senegal, the level and intensity of transmission varies in each of Senegal's ecological zones (see Figure 1). The northern Sahelian zone has rainfall of less than 300 millimeters between July and September, the central Sahelian zone has rainfall between 400 and 1,000 millimeters between July and October, and the southern tropical zone has rainfall between 1,000 and 1,250 millimeters between June and October. The Sahelian zones have high rates of transmission around the end of the rainy season and low rates the rest of the year. The tropical zone experiences year-round transmission, which peaks during the rainy season. In peri-urban areas and places near rivers or other perennial water sources, transmission may occur year-round, often as small outbreaks. The differences in transmission among the zones are an important factor in Senegal's approach to malaria control and prevention. The entire population in Senegal is at risk for malaria, which has particularly severe health implications for pregnant women and children under five. Approximately 488,000 women become pregnant each year in Senegal and are at greater risk for malaria infection (PMI 2009).

Morbidity and Mortality

Until recent years, malaria was one of the primary causes of mortality and morbidity in Senegal. In 2009, 174,890 cases were reported, and, of those, 6,749 (3.9%) occurred in pregnant women (Figure 2). Pregnant women are four times more likely to suffer complications from malaria than non-pregnant women (Ndiaye and Ayad 2009). Further, women in their first or

second pregnancies and pregnant women with HIV are at especially high risk for malaria infection (Newman, Robalo, and Quakyi 2004). Because the malaria parasite is sequestered in the placenta, there is an increased risk of premature birth, intrauterine growth retardation, low birth weight, spontaneous abortion, stillbirth, congenital malaria in newborns, and maternal anemia (Newman, Robalo, and Quakyi 2004).

Figure 2. Percentage of Morbidity Due to Malaria in Senegal—General Population and Pregnant Women



Source: PNLP 2009.
Source: Annuaire Statistique 2008, prepared by the Service National de l'Information Sanitaire.

As illustrated in Figure 2, in 2009, malaria accounted for approximately 3.07% morbidity in the general population in Senegal, and 2.63% morbidity in pregnant women, a substantial decrease from 2007, when morbidity was 22.25% and 16.25% for the general population and pregnant women, respectively. In October 2007, the malaria policy was revised to include a new directive to test all suspected cases of malaria, provide treatment and report only cases with positive test results (Ministère de la Santé et de la Prévention Médicale 2007). Previously, malaria cases were confirmed based on the presence of fever and other clinical symptoms. Although it is difficult to compare data before and after the policy change, the reduction in malaria cases is partly a result of the policy change in favor of biological confirmation and of improved knowledge among the population about malaria (PMI 2010).

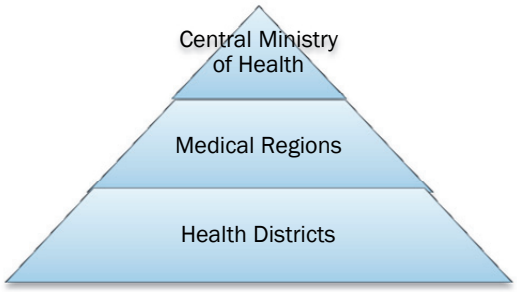
Malaria and HIV Interactions

Co-infection with HIV and malaria has serious consequences for both the mother and fetus. HIV-infected women experience consistently more peripheral and placental malaria and higher parasite densities than HIV-uninfected women. Women with both diseases tend to experience more febrile illness, anemia, and adverse birth outcomes than women with only one disease. Malaria leads to increased HIV viral replication and viral load, which may lead to faster HIV progression if not treated appropriately (Ter Kuile 2004). Placental malaria infection is associated with an increase in peripheral and placental HIV-1 viral load, which might increase the risk of mother-to-child HIV transmission (Mwapasa et al. 2004).

In Senegal, the HIV prevalence rate in the general population is approximately 1%, and the MOH has outlined its intention to maintain HIV prevalence below 2% (PMI 2010). Statistics from 2003 on HIV prevalence indicate a median prevalence of 1.2% and 1.4% among pregnant women in urban areas and non-urban areas, respectively (UNAIDS/WHO 2008). There are no specific data on the level of malaria and HIV co-infection in Senegal, but guidelines exist for malaria prevention among HIV-infected pregnant women.

MIP Program Management and Coordination

Figure 3. Organizational Structure of Senegalese Health Care System



The national health system is organized as a pyramid (Figure 3). The MOH manages all health activities. A network of regional referral hospitals provides health care and is supported by district-level health centers, health posts in larger rural towns, and health huts in rural villages. Currently, Senegal has 75 health districts, an increase from 65 in 2008. Each district has at least one health center, which is operated by doctors, who are supported by a team of surgeons, nurses, midwives, and community health workers (CHWs). The health center is linked to a network of health posts and health huts, which are smaller structures found in rural areas. Health posts are generally run by chief nurses and may also be staffed by midwives. Health huts are the first point of contact for primary care in rural communities (PNLP 2010c). They are staffed by trained birth attendants (matrones) and CHWs, and should be periodically overseen by the health post nurse.

In 1995, the Senegal NMCP (Programme National de Lutte Contre le Paludisme) (PNLP) was created as part of the Division of Disease Control, which is under the Health Directorate. The NMCP is composed of a coordination unit that includes four departments that oversee activities: administration and finances; M&E; prevention and partnership; and case management, research, and pharmacovigilence. To support the functioning of the NMCP, a National Steering Committee (or Comité de Pilotage) was created by the MOH in 1997 with several sub-committees (e.g., prevention) including representation from the RH Division and other divisions including HIV/AIDS. The Steering Committee has not been functional in recent years.

Although no document defines the roles and coordination between the NMCP and RH Division, the NMCP receives funding for MIP activities and provides technical guidance and strategic oversight to the RH Division, and the RH Division primarily coordinates services related to antenatal care (ANC), including MIP and prevention of mother-to-child transmission (PMTCT) of HIV.

The roles of the NMCP and RH Division are clear, however, coordination of activities is sometimes still challenging. One interviewee explained that a MIP focal point exists within the RH Division for better coordination with the NMCP, as was recommended by the West African Network against Malaria during Pregnancy (Le Réseau d'Afrique de l'Ouest contre le Paludisme pendant la Grossesse) (RAOPAG). The NMCP has attempted to have a joint planning process, yet as of the latest strategic planning process, the RH Division was part of the program review but not part of the entire process. According to one implementing partner, coordination meetings between the MOH, RH Division and NMCP do not regularly occur. In fact, although the three national bodies exist under the same directorate and each has representatives who attend the directorate coordination meetings, there is no independent coordinating mechanism between these three organizations. One suggestion was to have more regular meetings and ensure that representatives from different programs attend. An MIP partner suggested strengthening the RH Division's lead in coordinating and improving the integrated approach between HIV, malaria and tuberculosis. To this end, the NMCP is currently considering strategies to give more leadership to the RH Division. Another interviewee suggested strengthening the Primary Health Care Division to better coordinate care and services and to be aware of the activities taking place at the local levels.

Strategy

In 1999, Senegal began the process of adopting the RBM objectives. At the 2000 Abuja Summit, Senegal committed to ensuring that by 2005 at least 60% of the population at risk for malaria would have access to the following:

- Correct, affordable, and appropriate treatment within 24 hours of onset of symptoms;
- Suitable personnel and community protective measures, such as ITNs, particularly for pregnant women and children under five; and
- IPTp for all pregnant women who are at risk of malaria, especially those in their first pregnancies (RBM Partnership 2000).

In coordination with supporting and implementing partners, the NMCP has developed a comprehensive strategy for controlling the spread of malaria and mitigating its effects (Global Fund to Fight AIDS, Tuberculosis and Malaria 2002). The NMCP, which operates through a five-year planning cycle, has implemented two national malaria strategic plans thus far (2001–2005 and 2006–2010). It has begun implementation of its third strategic plan for 2011–2015. The plans have reflected the MOH's continued commitment to RBM objectives.

Strategies for reaching malaria targets 2006–2010:

- Strengthen management
- Strengthen capacity
- Develop communication
- Strengthen research for action
- Strengthen/develop monitoring and evaluation
- Scale-up malaria interventions

The 2006–2010 strategic plan (Programme National de Lutte Contre le Paludisme 2005) aimed for a 50% reduction in morbidity and mortality by 2010 by reaching the following objectives:

- 80% ITN coverage and use,
- 80% of households in target zones covered by indoor residual spraying (IRS),
- 80% of malaria cases treated at all levels of the health system, in accordance with national directives,
- 80% coverage of IPTp, in accordance with national directives, and
- Improve program management at all levels (Programme National de Lutte Contre le Paludisme).

The strategic plan for 2006–2010 emphasized two major components: strengthening prevention, and improving correct and rapid treatment of malaria cases at all levels of the health system and in the community. These components relied on the principles of rapid scale-up for impact; implementation of an integrated intervention package[8] at all levels, sectors and with all partners; and performance monitoring and impact evaluation (PNLP 2005).

From March to June 2010, the government of Senegal and its partners evaluated its malaria program to assess implementation of its strategies and activities. The malaria program review confirmed that malaria morbidity and mortality had significantly declined, and concluded that the impact objectives from the 2006–2010 strategic plan had been met. This conclusion, along with other findings and recommendations from the evaluation, informed the development of the national malaria strategic plan for 2011–2015 (Programme National de Lutte Contre le Paludisme 2010d).

[8] The integrated intervention package includes: malaria case management (uncomplicated and severe), prevention of malaria in pregnant women, vector control, environmental management/hygiene, and epidemic prevention and control.

The latest strategic plan (Plan Stratégique National 2011–2015), with a vision of "an emerging Senegal without malaria," aims to reduce morbidity to the pre-elimination epidemiological threshold,[9] and to reduce malaria mortality by 75% by 2015. The objectives are organized into eight categories: vector control; malaria in pregnancy; case management; epidemics and emergencies; product and supply management; health promotion; program management; and M&E. Objectives specific to malaria in pregnancy include:

- Protect at least 80% of pregnant women with IPT using sulfadoxine-pyrimethamine (SP) and with (long-lasting insecticide treated bed nets) LLINs in accordance with national guidelines through 2015
- Treat 100% of malaria cases in pregnant women seen in health facilities in accordance with national guidelines through 2015

Policy Development

Before 2003, Senegal's policy mirrored the former WHO recommendation of providing full antimalarial treatment to pregnant women at the first ANC visit followed by weekly chemoprophylaxis using chloroquine. The national policy was changed after research by the Dakar-based Université Cheikh Anta Diop and Institut Pasteur found increasing resistance of *Plasmodium falciparum* to chloroquine.

A steering committee composed of key stakeholders was assigned by the NMCP to lead the management and coordination of policy change. The steering committee coordinated a series of sectoral workshops, which included all partners (public and private providers, researchers, manufacturers and distributors of medicines, union organizers, nongovernmental organizations (NGOs), and development partners), followed by a national-level workshop from 23–25 June 2003 to obtain consensus on the malaria treatment policy.

During this national workshop, participants reviewed malaria prevention and control in Senegal; reviewed data from studies on therapeutic efficacy and resistance to antimalarials being used; evaluated the policy on antimalarials used in Senegal; studied new approaches and aspects related to changing malaria policy; and, adapted the national malaria treatment policy to the current context and needs within Senegal. The revised policy included providing IPTp with SP as a key intervention for MIP. Since the introduction of artemisinin-based combination therapies (ACTs) in 2006, SP has been strictly reserved for IPTp. The MOH directed all health districts to ensure that SP is stocked and provided to pregnant women for free during ANC. On the community level, the workshop participants emphasized the need for the use of ITNs, implementation of communication strategies adapted to current context, and early referral to health facilities to prevent cases of simple malaria becoming severe (PNLP 2003.)

Prevention Guidelines

According to the National Guidelines for the Prevention and Treatment of Malaria issued in 2006, and in accordance with WHO and RBM recommendations, all pregnant women should receive at least two directly-observed doses of SP during the second and third trimesters of pregnancy, with at least one month in between doses. A third dose is recommended for HIV-positive pregnant women (PNLP 2005).

[9] WHO defines pre-elimination as "the period of re-orientation of malaria control programs between the sustained control and elimination stages, when coverage with good-quality laboratory and clinical services, reporting and surveillance are reinforced, followed by other program adjustments to halt transmission nationwide" (WHO 2009b). A malaria test positivity rate of less than 5% during the malaria season marks the readiness for transition to the pre-elimination stage (WHO 2010b).

Ideally, the first ANC visit should be made during the first trimester. Although the pregnant woman would not be eligible for IPTp at that time, she should receive counseling on the use of ITNs and a personal voucher or prescription to procure an ITN at a reduced rate of about two USD.

In 2011, Senegal will begin implementing a new policy to provide pregnant women attending routine ANC with vouchers to exchange for free LLINs at district warehouses. At the time of publication of this case study, a guide was under development to initiate the free routine distribution during ANC.

The table below illustrates how the MIP policy should be implemented in Senegal through ANC according to the National Guidelines for the Prevention and Treatment of Malaria.

Table 1. Schedule for MIP Service Delivery

VISIT	COUNSELING	PROVIDE IPT	PROVIDE MICRONUTRIENTS/LLIN
First	Malaria prevention/ITNs/anemia prevention/micronutrients	No IPTp during first trimester	Iron Folic Acid LLIN
Second	Assess and repeat/review	Give 3 tablets of SP as directly observed therapy DOT during ANC	Iron Folic Acid
Third	Assess and repeat/review	Give 3 tablets of SP as DOT during ANC at least 1 month after last dose	Iron Folic Acid
Fourth	Assess and repeat/review	Give third dose of SP as DOT at least 1 month after last dose (for HIV-positive women)	Iron Folic Acid

Case Management Guidelines

The National Guidelines consider all cases of MIP to be severe. Although ACT is used to treat uncomplicated malaria in children and non-pregnant adults, quinine remains the treatment for severe malaria and for malaria in pregnant women. Quinine may be administered intravenously or by injection, but injections are reserved only for cases of extreme need (Ministère de la Santé et de la Prévention Médicale 2006).

Table 2. MIP Case Management Guidelines

TRIMESTER	COMPLICATED/SEVERE MALARIA
First, Second, Third	Quinine—25mg/kg/day in 10% glucose divided in 2 or 3 infusions, decreasing to 5% glucose. Quinine is diluted in 5–10 ml/kg of glucose. Each infusion lasts 4 hours. For 2 infusions per day, infusions should be spaced 10–12 hours apart. For 3 infusions per day, spacing is every 8 hours. The duration of treatment is 5–7 days.

At the health post level, the National Guidelines specify that the head nurse should: follow the diagnostic and treatment algorithm and test all eligible patients with a rapid diagnostic test (RDT); administer the correct treatment following norms and protocols; ensure clinical follow-up for the prescribed treatment; document negative side effects reported by patients; utilize the management tools in place; ensure the collection and transmission of information relating to the management of medicines; and adopt appropriate treatment in cases of severe malaria. Health centers are to follow similar protocols for outpatients. Hospitalized patients should also have thick and thin films for parasite density and speciation, glycemia measurements, and blood test analyses (Ministère de la Santé et de la Prévention Médicale 2006).

Senegal's treatment guidelines for pregnant women differ from the current WHO recommendation, which incorporates the use of ACT. Although more research is needed to determine the safety of ACTs during the first trimester of pregnancy, there have been no adverse side effects reported in more than 1,500 documented cases where ACTs were provided during the second and third trimesters. For uncomplicated malaria, WHO recommends giving quinine plus clindamycin for seven days for the first trimester, and, for the second and third trimesters, giving an ACT with known effectiveness in the country/region, artesunate plus clindamycin for seven days, or quinine plus clindamycin for seven days. For complicated malaria, parenteral (intravenous or intramuscular) artesunate is recommended over quinine during the second and third trimesters. Quinine or artesunate may be considered during the first trimester, whichever is immediately accessible, until more evidence on the safety of artesunate is available (WHO 2010a). Senegal's 2011–2015 strategic plan prescribes a revision of treatment policy in favor of using ACTs during pregnancy in accordance with WHO guidelines.

Progress in Interventions: MIP Indicators

According to the 2006–2010 NMCP Strategic Plan, Senegal aimed to achieve at least 80% coverage and utilization of ITNs by 2010; 80% coverage of households in targeted zones with IRS; 80% of malaria cases treated in accordance with national directives; and 80% coverage of IPTp in accordance with national directives. An analysis of Senegal's progress in meeting these goals follows below.

Actions for Improving MIP Outcomes

- Reduce SP and ITN stock-outs
- Encourage initiation of ANC attendance in the first trimester at facilities that offer the full range of focused ANC services
- Provide focused ANC mentorship to all "qualified" providers in both public and private sectors
- Improve coordination between the NMCP and RH/MCH

MIP Intervention Coverage and Output Indicators

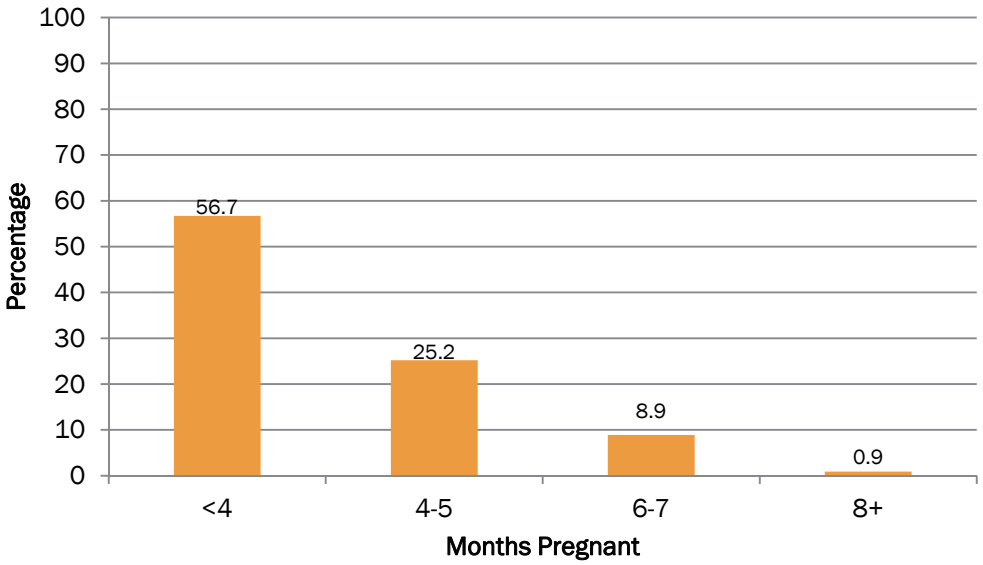
Table 3 shows DHS 2005 data on ANC attendance for the recommended four or more visits, and Figure 4 provides the percentage of women by number of months pregnant attending their first ANC visit. Among women surveyed, ANC attendance is high (91.1%) for the first visit and 87.3% for the second visit. The first ANC visit occurs relatively early, at 3.7 months gestation for 56.7% of women. This percentage is high compared to other African countries, and is the result of nationwide information, education, and communication (IEC) and community programs. Furthermore, there is an opportunity to provide a majority of pregnant women with the recommended two doses of IPTp during ANC.

National and international guidelines stipulate that women should attend ANC as soon as they know they are pregnant. Although IPTp cannot be given until 16 weeks of pregnancy or quickening, providers can counsel on the use of and ensure access to ITNs, which are most effective the earlier they are used. Pregnant women can thus increase their benefit from this intervention if they attend ANC before 16 weeks gestation.

Table 3. DHS Findings on ANC Visits

	DHS 1999	DHS 2005
Received any ANC from a skilled provider	82.3%	91.1%
Attended two or more ANC visits	77.1%	87.3%
Attended four or more ANC visits	n/a	39.8%
Attended first ANC visit at <4 months of pregnancy	46.4%	56.7%

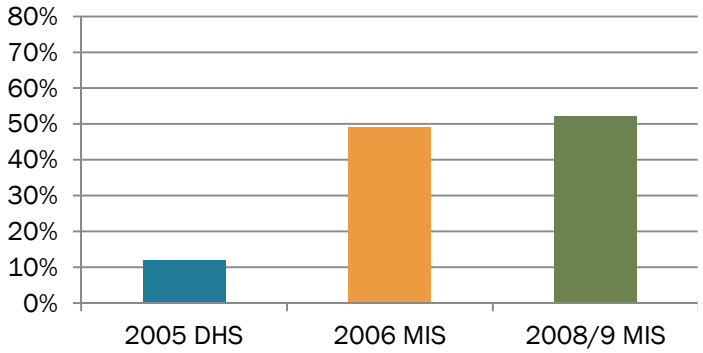
Figure 4. Number of Months Pregnant at First ANC Visit, 2005



Source: Ndiaye and Ayad 2006.

According to the 2008/9 Senegal MIS, the percentage of women who received one dose of IPTp with SP increased from 69% in 2006 to 76% in 2008/9. Women receiving two doses of IPTp during their last pregnancy increased to 52% from 12% in 2005 (Figure 5). As stated earlier, the high figures for attendance at the first and second ANC visits suggest an opportunity to reach many more women with two doses of IPTp during ANC.

Figure 5. Percentage of Pregnant Women Who Received Two or More Doses of IPTp



Source: Ndiaye and Ayad 2009; Ndiaye and Ayad 2007; Ndiaye and Ayad 2006.

Table 4 shows a decrease in health consultations by pregnant women and confirmed malaria cases from 2006 to 2009, resulting in decreased malaria morbidity from 16.75% to 2.63%. As mentioned earlier in this case study, this decrease is a reflection of Senegal's change in policy, requiring biological confirmation of malaria.

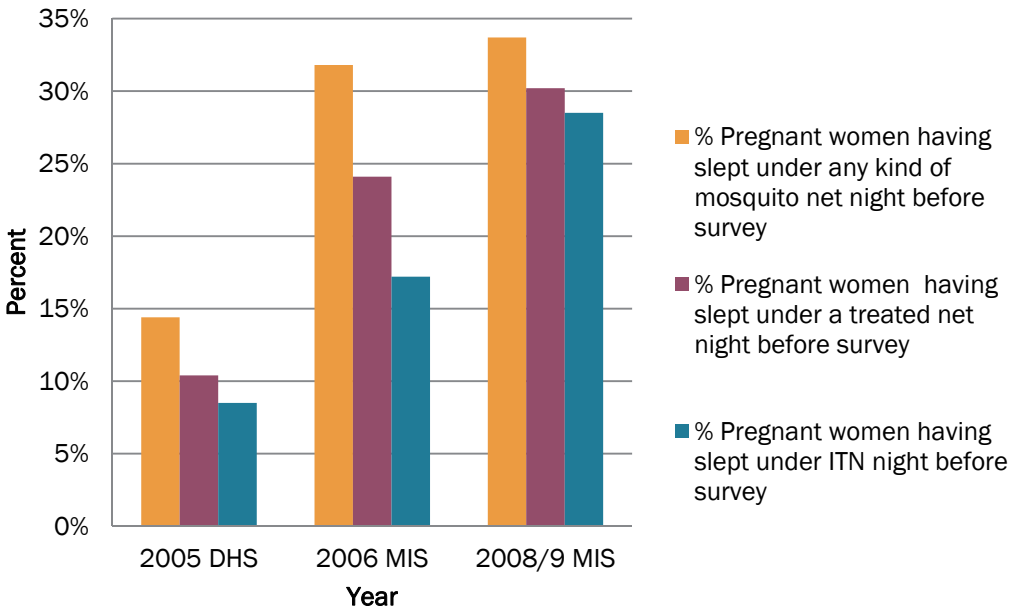
Table 4. Malaria Consultations, Cases, and Morbidity among Pregnant Women

PREGNANT WOMEN			
Year	Consultations	Malaria Cases	Malaria Morbidity
2006	285,718	47,859	16.75%
2007	275,946	44,832	16.25%
2008	232,152	9,146	3.94%
2009	257,039	6,749	2.63%

Source: PNLP 2009.

Figure 6 reflects increased mosquito net use among pregnant women between 2005 and 2008. The percentage of women sleeping under an ITN increased from 10% in 2005 to 30% in 2008. In 2009, Senegal implemented a national mass distribution of LLINs. The post-campaign survey results report an increase to 49% of pregnant women reporting use of LLINs (PNLP 2010c). Although Senegal is a leader in MIP implementation, net use remains significantly below the NMCP target of at least 80% coverage for pregnant women. This low use could be due in part to the fact that surveys sometimes occur during the dry season when malaria transmission is lower and people tend not to use ITNs. Transmission is higher during the rainy season from May through September, whereas the surveys included in Figure 6 did not occur during that time period. Another reason for low use may be related to gender, wherein a pregnant woman may give her LLIN to her husband instead of using it herself.

Figure 6. Mosquito Net Coverage among Pregnant Women



Source: Ndiaye and Ayad 2009; Ndiaye and Ayad 2007; Ndiaye and Ayad 2006.

ANALYSIS—STAGES OF MIP PROGRAM IMPLEMENTATION

The "Stages of MIP Program Implementation Matrix" (Appendix 2), developed by Jhpiego and MAC partners as part of a broader MIP analytical framework, uses eight components to summarize and rank the country's MIP readiness. Readiness is defined by a country's capacity

and ability to implement MIP programs that will reach national-level scale and coverage. Table 5 and Figure 7 summarize the components of the stages matrix as well as how the scale is used.

Table 5. MIP Readiness Scale

COMPONENT	SCORE = 0	SCORE = 4
Integration	No integration among ANC, RH, malaria, HIV, and other related MIP service areas	MIP is integrated with ANC and other related services through joint planning
Policy	No MIP policy	MIP policy disseminated and used
Commodities	No MIP commodities	No MIP commodity stock-out
Quality Assurance	No MIP quality assurance standards developed	MIP quality assurance standards developed, disseminated, and systematically used; reinforced through supportive supervision
Capacity Building	No MIP in-service or pre-service training; inadequate human resources devoted to MIP	Adequate graduates and providers with MIP knowledge and skills deployed
Community Awareness and Involvement	No MIP community education or involvement	Communities and facilities partner to ensure pregnant women receive appropriate MIP services
M&E	No MIP data collected through health management information system HMIS	Accurate MIP data available and used for planning
Financing	No MIP funding	Sufficient MIP funds available

Figure 7. Stages of MIP Readiness

Using the Stages of MIP Implementation Matrix as a reference, this section describes Senegal's MIP level of progress for each component and offers explanations for the level of achievement of the indicators.

Integration (Stage 3)

Senegal is at approximately Stage 3 in integrating MIP programming into the national RH program. Malaria in pregnancy is integrated into Senegal's national malaria policy, strategy, and guidelines. Further, IPTp policies are well-disseminated and have now become a routine part of ANC. As explained earlier in this report, MIP interventions are implemented through a platform of focused ANC services, recognizing that most Senegalese women attend an ANC clinic at least once (91.1%) and often four or more times (39.8%) during pregnancy (Ndiaye and Ayad 2006). It is important to note, however, that although prevention and case management of

MIP are included in focused ANC activities coordinated by the RH Division, the NMCP coordinates MIP training and distribution of SP and LLINs. One interviewee stated that the level of integration between the NMCP and RH Division is not as strong as between the HIV and RH Divisions. Effective communication and coordination between the RH Division and the NMCP is thus essential for Senegal to implement a smoothly functioning MIP program.

Although substantial efforts have been made to integrate MIP with RH and HIV services at the central level, improvements can be made. At least one interviewee mentioned that integration is more effective at the regional and district levels than at the national level—similar to other sub-Saharan African countries. National-level integration may be less effective because coordination of national activities is not routine even when services are delivered together at the operational level (e.g., a woman attending ANC is supposed to receive malaria and HIV services because clinical services are delivered in the same space by the same providers). According to another interviewee, there is some level of partnership between all programs and divisions at the central level, but there is no direct collaboration between the malaria program and the HIV Division, and the level of joint planning between divisions is low. The HIV and malaria programs have their own strategic plans but, as one MIP partner said, there could be links among those programs and the RH Division to develop a joint plan. Integrating provider training could be a solution because currently, the same provider may receive trainings from three different programs on the same topic (e.g., IPTp is included in RH Division training on ANC; NMCP malaria training; and HIV program training).

Another MIP partner said that IPTp and PMTCT have helped strengthen maternal and child health (MCH) programs because the shift in focus and funding away from MCH and toward HIV and malaria brings additional funding to improve comprehensive services. MCH can continue to benefit from resources by integrating PMTCT and IPTp into their programs. One of the MIP partners added that HIV and malaria programs need the RH Division to reach their targets, recognizing that pregnant women and children are the most vulnerable. WHO in Senegal attempted to increase integration by organizing joint supervision visits, but this was not successful because the different divisions felt that their program was not the priority during the visits.

Even though integration of health services for pregnant women is de facto at the operational level, there were complaints about the seemingly vertical collection of many indicators. In response, the MOH is working on how to integrate the programs and to consider the mother and child as a "couple" versus individuals. The MOH is also examining how to integrate indicators to create a comprehensive set that will cover all data needs without precluding a program from collecting additional data necessary for the management of activities.

Policy (Stage 4)

Senegal is at Stage 4 in policy implementation for MIP, and has benefited from strong leadership from the NMCP, which has worked closely with partners to develop national policies and implement them at all levels of the health system.

When the current MIP policy was developed in 2003, a newly formed national working group adapted the policy into training guidelines and conducted a systematic training of health providers. The working group also organized field missions at the regional level to disseminate the policy and sensitize all health providers on the rationale behind the new policy that was based on the high level of chloroquine resistance. Dissemination occurred through several channels, including an official memo from the MOH, press releases, and publicized interviews with NMCP staff. The current policy has also been integrated into the malaria and the PMTCT training packages, however, one integrated training package would be ideal. Cheikh Anta Diop

University played a major role in the policy change process through sharing their research findings on chloroquine resistance and by designing training guidelines. A staff member of a USAID implementing partner asserted that involvement of the university facilitated the acceptance of the new policy by all participants. Private sector providers were trained during separate sessions. Collectively, these activities contributed to overcoming potential resistance from both providers and clients and allowed for relatively easy scale-up because of the strong partnerships that led the policy development and implementation.

A national norms and protocols guide for reproductive health, titled *Protocoles de services de santé de la reproduction*, was updated in 2007. The process to adopt the norms and protocols occurred through meetings with technical committees and involved input from different cadres of health staff from all levels. Standards specifically related to MIP include the recommendation of four ANC visits; the provision of two doses of SP during pregnancy that are directly observed by the provider; provision of a third dose of IPTp for HIV+ pregnant women; and LLINs for pregnant women.

Key to the successful policy formulation and rollout in Senegal is having strong political will and commitment at different levels of the health system. A technical consensus was reached before policy implementation even began to ensure buy-in from all partners.

Despite the success in the new policy rollout, there are still some issues that impede full implementation. Some private practitioners (both clinical and pharmaceutical), concentrated around urban centers, still do not adhere to the prevention and treatment protocols. They believe that SP is harmful to pregnant women and that chloroquine should continue to be used despite the local scientific evidence that proves otherwise. With PMI funding and IntraHealth International support, a focal point person is working with the private sector on MNH services (including MIP) to address this issue. Through advocacy and presentation of scientific documentation to resistant practitioners, the issue has mostly been resolved. However, there is still some marginal resistance from the private sector.

Although IPTp is a routine part of ANC in Senegal and several documents, guidelines, and policies have been produced, one interviewee mentioned that documents are not adequately disseminated, particularly to lower levels. It is essential to ensure that these reference materials are available at all levels of the health system.

As mentioned earlier in this case study, Senegal's policy for treating cases of malaria in pregnant women is to use quinine. Pregnant women pay for quinine and the supplies for its administration, which can be a barrier to access. ACTs, currently used for the rest of the population, are provided free. The NMCP's 2011–2015 National Strategic Plan indicates that its treatment policy will be revised in accordance with WHO guidance, which recommends ACTs during the second and third trimesters of pregnancy.

Commodities: Procurement and Supply Management (Stage 2)

Senegal currently stands at Stage 2 in commodities for MIP prevention and control. Significant progress has been achieved in implementing policies to facilitate delivery of drugs for the prevention and treatment of malaria and to increase access to ITNs. However, stock-outs of SP and inadequate distribution of ITNs still occur. Although SP and quinine are procured by the MOH's national drug supply system, Senegal relies on donors for other malaria commodities (RDTs and LLINs).

Sulfadoxine-Pyrimethemine

The WHO recommended medicines for malaria, which are SP for IPTp and quinine for treatment of MIP, have been approved and adopted in Senegal. Under current MIP policy, SP is free for pregnant women and available at health facilities during ANC. Procured through the national drug supply system, SP is purchased by the government and was purchased only once by the Global Fund. Per its "Roadmap of Needs for 2010," Senegal projected its need for SP to have been met; the quantification was based on the number of expected pregnancies. Nevertheless, throughout 2010, stock-outs of SP occurred because of problems with management of stocks at all levels. Other contributing factors include an instance of the incorrect drug being ordered and not adhering to the ministerial protocol of providing SP for free to pregnant women. The MOH is aware of these issues and is working to address them.

LLINs

Although the proportion of households with at least one ITN has significantly increased during the past several years, and ITN use among pregnant women has risen to 49% based on the 2009 post-campaign survey results, attaining the 80% goal for ITN coverage remains a challenge. Issues of cost and distribution have contributed to the low use of ITNs.

In 2004, the Senegal government provided the first stock of LLINs (about 200,000) and fixed the cost to 1,000 CFA (2 USD) for pregnant women and children under five. In comparison, the rest of the population paid the full price ranging from 3,000 to 7,500 CFA (7–18 USD) per LLIN. To encourage LLIN coverage for pregnant women, two strategies were implemented for their routine distribution. Under the USAID-funded NetMark program implemented in seven regions[10] from 2002 to 2009, pregnant women were given vouchers to buy nets at a reduced cost, with the difference in cost being reimbursed to distributors by the project upon submission of exchanged vouchers. To promote ANC visit attendance, the vouchers were distributed only during ANC visits. This program resulted in less than 20% coverage of the estimated target population. The ABCD project (Atteindre les Bénéficiaires Communautaires à travers les districts – Reaching community beneficiaries via the health districts) used a community approach to provide services, including net distribution, community sensitization for ANC attendance, and follow-up on effective net use. Prescribed LLINs were purchased at a subsidized price directly from the health facility or from a private pharmacy when LLIN stock-outs occurred at the facility. This program began before any large-scale distribution of LLINs and delays in disbursement of funds for the Global Fund Round 4 Grant negatively impacted availability of LLINs from 2008 onward. Currently, under the new strategic plan, LLINS are provided for free to pregnant women through ANC.

In response to the gap in coverage, the NMCP has prioritized districts with the lowest coverage for distribution. Because the NMCP shifted from distribution of regular ITNs to LLINs in 2007, retreatment is not necessary every year. Funding for nets primarily comes from partner organizations (PMI 2007). Yet, the logistics needed for distribution presents a challenge. Mass distribution campaigns, which have been undertaken in the past, can rapidly increase coverage, but cannot sustain it.

Lessons Learned to increase ITN coverage:

- Importance of LLIN availability at health facilities
- Use of community-based organizations (CBOs) to provide nets to women
- Community sensitization on importance of bed net use and proper use of nets
- Follow-up with pregnant women on net use

[10] Seven regions: Thiès, Louga, Kaolack, Ziguinchor, Kolda, Dakar, and Fatick.

In 2010, Senegal embarked on a rolling, national distribution of LLINs to achieve universal coverage in all households. With support from the new PMI-funded partner for LLIN distribution, NetWorks, the NMCP began distributing nets in the regions of Kédougou, Tambacounda, Kolda, and Sédhiou first because of their relatively weak availability of nets and high rates of malaria-related morbidity. The plan is to cover 100% of sleeping spaces and achieve 80% of the general population sleeping under nets the night before, nationwide by December 2011. To attain this level of coverage, various stakeholders at all levels need to coordinate efforts to support a census of sleeping spaces and existing ITNs at the household level, procurement and supply of ITNs, community distribution ceremonies, and follow-up on the use of ITNs. Although the approach is designed to achieve rapid scale-up of coverage and use of nets, its complexity does not permit it to be repeated annually. During the years without distribution campaigns, routine distribution of LLINs will sustain access. Under the new strategic plan, ANC will remain an important channel through which pregnant women will have access to free LLINs (PNLP 2010c).

Quality Assurance (Stage 2)

Quality assurance related to MIP in Senegal is currently at Stage 2. As the NMCP moves toward reaching its goals for coverage of malaria interventions and decreasing mortality rates and malaria prevalence, it must also consider how to maintain progress by improving the quality of services. As a result, Senegal identified scaling up supportive supervision as a key element needed to improve its health system as a whole and developed quality assurance standards for reproductive health that include MIP (Global Fund 2007). The ability of Senegal to adequately meet its goals for supportive supervision is hindered by its lack of human and logistical resources.

In 2009, the NMCP visited all districts and health posts and implemented a malaria-specific supervision checklist to monitor the quality of malaria services, including MIP. The supervision session in each district took three days and was conducted with the support of a task force including chief medical officers trained in malaria. During the visits, the supervisors check whether norms and protocols are adequately applied. They also conduct a data quality audit using a retrospective analysis of registers and hospitalized cases and observe the quality of care and the application of policies, including MIP. Supervision feedback is immediately given to the field team and a final report with recommendations is developed at the central level and then sent to the regions and districts. Based on the report, an M&E task force, which includes WHO, USAID, PMI, IntraHealth International, and MSH, formulates recommendations to the program.

The district is supposed to perform monthly supervision visits of health posts, the regional level should perform quarterly district visits, and the national level should perform semi-annual visits to the regions. However, the frequency of these visits is often inconsistent, and the tools and activities associated with supervision are not applied in a standard fashion at all health facilities because of resource, logistical, and human resource constraints. One study found that in the last six months, most facilities (60%) received one or two visits. However, nearly 31% of facilities did not receive any supervision. Under these conditions, the capacity of supervision to improve service quality has been limited (Suh, Moreira, and Ly 2007).

Several respondents suggested that the lack of logistical resources made routine supervision visits a challenge. Because of the paucity of logistical resources, one respondent suggested focusing on the facilities/areas with the most problems instead of having regular routine supervision everywhere. Also, to address the issue that the supervision visits are time- and labor-intensive, there is discussion of making supervision checklists shorter or focusing on low-performing facilities.

With support from IntraHealth International, the MOH has provided facilities with new data collection tools and registers for reproductive health services, including MIP. These tools were produced in 2008 and have now been distributed nationally. IntraHealth International reported relying on a focal point in each region to assist regional health teams with supervision. The organization is planning to conduct a new assessment measuring progress since the last situational analysis and to conduct a final project evaluation.

One interviewee mentioned the importance of adapting quality assurance methods from other countries and programs to local context. IntraHealth International worked with the MOH to create these standards. However, provider behavior still must be changed to focus more on the process of providing quality care rather than just the result of having offered a service.

Capacity Building (Stage 3)

Senegal is at Stage 3 for capacity building because MIP is taught in most academic institutions and too many providers.

The MOH Training Department, headed by the MOH Human Resources Division, supervises the National Nurse and Midwives School (Ecole nationale de développement sanitaire et social) (ENDSS), which is responsible for malaria pre-service training, including MIP. The ENDSS develops and revises its teaching approach, curricula and tools based on technical information and updates provided by the NMCP. There is also regular collaboration between private training institutes and the NMCP, with the NMCP providing updates to teachers on new policies and guidelines. The last MIP pre-service update occurred in December 2009. Nurses, midwives, and laboratory technicians are included in pre-service MIP training. With the support of the Canadian International Development Agency (CIDA), a competency-based training approach is in the test phase of being introduced into the national pre-service curricula. The ENDSS has also received strong support from a five-year JICA program to help regional programs to enhance the capacity of teaching staff in teaching techniques and provide job aids and tools for teaching.

Every year, the NMCP ensures that newly hired health facility staff members receive in-service training in malaria prevention and control, including MIP. PMTCT in-service training also includes giving a third dose of IPTp for pregnant, HIV-positive women and providing counseling on ITN utilization. Although this in-service training may seem repetitive of pre-service education, this training is often needed as a refresher for graduates who experience delays between graduation and being hired at a facility. The NMCP, with technical assistance from the Health and Development Institute (Institut Santé et Développement) (ISED), has also developed a comprehensive malaria course that is dedicated to chief medical officers in the districts and to primary health care supervisors. During this course, one full day is dedicated to discussing MIP. Roundtable discussions are held where the trainees are able to share issues and solutions related to control of MIP. By the end of the training, the participants generally develop action plans that they implement in their districts.

The lack of coordination and integration among the RH Division, the HIV program, and NMCP often leads to repeated and unnecessary trainings in MIP. Another challenge is the staff mobility that could lead to over-training of some personnel while others are not trained or are insufficiently trained. An MIP partner suggested the potential usefulness of a training database to prevent the unnecessary retraining of health providers. This database should also capture information on staff mobility to ensure that providers are well-distributed within the health care system. The partner mentioned further that having this information on human resources capacity would promote effective use of training funds.

Monitoring and Evaluation (Stage 4)

M&E was a challenge for Senegal and had represented one of the NMCP weaker areas. After the Global Fund Round 1 Grant Phase 1 review, funding was stopped and the grant was lost, partially because the M&E system was inadequate to track outcome indicators of interest (Global Fund 2009a). However, during the past several years, Senegal has since made significant progress in improving M&E systems. The NMCP developed an M&E plan in 2005, held an M&E systems strengthening workshop in 2007, and developed a new plan in 2010. The NMCP overhauled its M&E system and hired a new team with the skills necessary to analyze strategic and programmatic information. Senegal is now at Stage 4 in the implementation of M&E systems for malaria.

The Ministry of Health's M&E Unit (Bureau Suivi, Evaluation, Planification et Gestion de l'Information in the Direction de Santé et Soins Primaire) has the overall responsibility for follow-up and evaluation of the performance of health districts. The National Health Information Service (Service National de l'Information Sanitaire) (SNIS) is responsible for the collection of health data, and the NMCP is responsible for the collection of malaria-specific data. The SNIS itself does not collect all detailed malaria data, but does gather information on IPTp and ITNs. A monthly template report for health posts exists for all health services and diseases, including MIP. This template was created through a collaborative process so that all MOH health programs were able to provide input in the forms. However, as mentioned, this template needs to be more detailed for the malaria M&E system.

Information about ANC attendance, IPTp uptake, provision of an ITN voucher, and whether a woman has slept under a net the night before is also captured in the ANC register, first tallied in the facility and then submitted monthly to the district for inclusion in the SNIS. Data for the template report form that are entered into the district database come from general consultation, prenatal consultation, healthy newborn consultation, hospitalization, and drug distribution registers and stock sheets. Lack of updated ANC data collection tools had been a challenge for providers, so PMI supported the development of new ANC registers to facilitate better record keeping (PMI 2009). These registers are now used in all 75 districts.

Data had been organized in Excel spreadsheets, but a new Web-based data collection system has been installed at the districts and data are entered by data clerks who were recently hired in all districts. Information from the template reporting forms is now available in this database. This computerized system allows the national level to have information down to the health post level rather than the district level, which was not possible before. Data can be extracted at the regional level as well. Compared to the older system, data entry errors with the new system are minimized. A system is currently being developed to allow the calculation of standard indicators, including MIP indicators, from the new computerized database.

The NMCP collects more detailed malaria-related data on morbidity, mortality, case management, and the use of IPTp and ITNs. The NMCP holds quarterly reviews to enable it to receive data from the district and allow all districts to present and review their data. The districts collect data from the health posts every month and enter them into the computerized database. The MOH and SNIS are able to generate a regular annual report because the data systems are in place. One interviewee said that the data collection system for malaria data is better than for reproductive health data because WHO had provided technical support to the NMCP for designing the system. With PMI funds, IntraHealth International is also working with the NMCP to strengthen the system and make the tools easier for health providers to use.

Table A1-2 in Appendix 1 includes priority MIP indicators and their data sources. PMI has supported two nationwide MIS conducted in Senegal in 2006 and 2008–2009. Both surveys

calculated indicators such as the proportions of children under five and pregnant women who slept under an ITN the previous night, and the proportion of pregnant women who have received two or more doses of SP for IPTp during their most recent pregnancy. USAID has supported three DHS in 1999, 2005, and 2010 that also provided data on these two indicators, as well as ANC attendance. The 2010 DHS report was not yet available at the time of this case study. Data on anemia in women are captured in the 2008 MIS and are part of the 2010 DHS data collection as well. A new MIS is planned for 2012. The NMCP conducted a program review in April–June 2010. Surveys, such as the evaluation of quality of case management and the evaluation of IPTp use in one district, are conducted through NMCP subcontracts with research institutes, including University Cheikh Anta DIOP de Dakar and the Pasteur Institute.

In the *Malaria in Pregnancy Guidelines for Measuring Key Monitoring and Evaluation Indicators* (2007), WHO outlines key indicators for monitoring and evaluating MIP interventions globally by type—output, outcome, and impact—that should be captured by population-based surveys (such as the DHS and MIS) and routine health information and supervisory systems (such as the HMIS). Most of these are collected in Senegal's DHS and HMIS. Table 6 lists data gathered by each data source, with indicators recommended by WHO identified with an asterisk.

Table 6. M&E Indicators for MIP Interventions

LEVEL	INDICATOR	DATA SOURCE
Outcomes	Percentage of pregnant women receiving at least 1 ANC visit from a skilled provider	DHS
	Percentage of pregnant women attending 2 or more ANC visits	DHS
	Percentage of pregnant women attending 4 or more ANC visits	DHS
	Percentage of women >4 months pregnant at first ANC visit	DHS
	Percentage of pregnant women who received any IPT	DHS
		MIS
	Percentage of pregnant women who received IPT by dose (dose 1, dose 2, dose 3)*	DHS
		MIS
	Number of pregnant women who received at least 2 doses of IPT/SP through DOT	MOH survey reports
		DHS
		MIS
	Percentage of pregnant women who received 2 or more doses of IPT	DHS
		MIS
	Percentage of households with at least 1 ITN	DHS
		MIS
	Percentage of pregnant women who report having slept under an ITN the previous night*	DHS
		NMIS
		2009 national post-campaign survey (LLINs)
	Number of pregnant women receiving IPT2 /number of pregnant women attending ANC1	MOH
Impact	Confirmed cases of MIP	MIS
		NMCP
	Confirmed cases of deaths from MIP	MIS
		NMCP
	Percentage of births with a reported birth weight less than 2.5 kg*	DHS

* Indicators recommended by WHO.

A few indicators recommended by WHO are, however, notably missing, including:

- Percentage of antenatal care staff trained in the control of MIP in the past 12 months.
- According to WHO, these data should be collected at least once yearly per health facility during supervisory visits.
- Percentage of screened pregnant women with severe anemia in the third trimester, by gravidity.
- Percentage of pregnant women (HIV-positive) receiving a third dose of IPTp under direct supervision.

Note: This information would fall under the outcome indicator of percentage of women receiving IPT under direct observation (first dose, second dose, third dose, according to national guidelines).

Community Awareness and Involvement (Stage 3.5)

Senegal has made a concerted effort to involve communities in malaria prevention and control activities and currently is between Stages 3 and 4 for community-based MIP programs. In some areas, community organizations have assisted with mosquito net distribution campaigns and malaria education efforts, and CHWs are playing a stronger role in IEC/behavior change communication (BCC) activities. Community knowledge and understanding of malaria prevention and control seem to be fairly strong; however, there is still a gap between knowledge and implementation for some indicators, such as choosing to sleep under ITNs.

The NMCP has committed to work with CBOs and NGOs on social mobilization efforts at the community level. Examples of community-level activities include discussions, home visits, environmental clean-up, net distribution, net retreatments, and programs on community radio stations. The NMCP has also coordinated with the MOH National Service for Health Education and Information (Service National d'Education et Information pour la Santé) (SNEIPS) to develop and implement a malaria communication plan. The NMCP has been able to utilize the resources of this agency to produce television and radio advertisements as well as television debates to promote malaria prevention and control messages (Global Fund 2007).

Example of Community Monitoring of Net Usage: In Thiénaba (about 80 km from Dakar), "surveillance squads" monitor net usage at night in the community. If they find a household is not using their net properly, the squad levies a fine on the household. (Source: Africare interview)

Example of Community Action in Thiénaba: Fifty village chiefs have developed "combat malaria" funds collecting contributions of 50 to 100 CFA, part of which is used to provide ITNs to pregnant women and children under 5. (Source: Le Soleil, 13 Sept. 2010).

From 2003 to 2006, USAID funded the CAMAT program (Community Action against Malaria and Tuberculosis) implemented by ChildFund International in four health districts (Mbour, Joal, Popenguine, and Thiadiaye), covering an overall population of 502,035, including 57,441 women of reproductive age. CAMAT's main strategies were experimenting with new approaches and inclusion of the community. Major CAMAT interventions specific to MIP were the promotion of ITN use, IPTp and malaria case management, according to NMCP norms and protocols. Through implementation of CAMAT, communities noticed that pregnant women were using ITNs more and consequently experiencing less sickness due to malaria and fewer cases of severe malaria (Christian Children's Fund 2006).

In 2006, CAMAT was succeeded by the USAID-funded Community Health Program (CHP) implemented by a consortium of six NGOs[11] led by ChildFund. Building on its predecessor, the CHP aims to bring a basic package of preventive and curative services to rural populations through equipping and staffing rural health huts. Although the government does not fund health huts, they are recognized as an important part of the health pyramid and are linked to government-supported health posts and health centers. A chief nurse from the nearest health post regularly supervises each health hut, which is run by a team of volunteers that includes a CHW, birth attendant and outreach worker. CHWs conduct group discussions and home visits to ensure correct, nightly usage of LLINs, promote ANC and IPTp, and encourage early care-seeking behavior in case of signs of malaria. They also mobilize the community for monthly or bi-monthly outreach activities during which the chief nurse provides ANC services, including IPTp. In addition, CHWs refer pregnant women with suspected cases of malaria to the nearest health post for treatment, providing them with referral forms. The CHP trains the team and provides occasional refresher training on the basic package of services, which includes ANC and MIP. The CHP also incorporates a supervisory role through paid Community Development Agents (CDA) who visit their assigned health huts frequently, sometimes as often as once to twice per week. The CDA monitors the health hut team and provides support with problem solving and planning to ensure they are delivering quality services. Another function of the CDA is to maintain a relationship with the health committee, which communicates directly with the community. The health committee oversees accounts funded by proceeds from fees and the sale of medicines. These accounts are used to replace stocks of medicines and make needed repairs to health huts.

Since its inception, the CHP has grown from five to 13 regions and 65 health districts, including 1,620 health huts. Funding has increased from $13 million to $26 million and plans are being considered to bring the CHP to near national scale through 2016. An assessment of CHP conducted in March 2011 concluded that it provides good quality primary care to communities, which eases the load on government health facilities. Use of services offered at health huts has also increased, especially by women. Although the CHP has succeeded in reaching a high level of coverage of health services compared to similar community health programs in other countries, during the assessments at some health huts a few challenges have been noted, such as out-dated medicines, drug stock-outs, dirty and disorganized storage rooms, out-of-date patient registers, absence of referral forms, and irregular outreach visits by the Chief Nurse. Overall, sustainability of the CHP will depend on identifying and implementing approaches to generate resources from within the community to support the services they have come to rely on. As the CHP enters an expansion phase, it is critical to consider the lessons learned from the first five years of the program (Barry, Putnam, and Touré 2011).

A national initiative launched in January 2009 called Badjenou Gokh ("neighborhood godmother") was implemented in every village, through which women leaders raise awareness among the population about maternal and child health, including the importance of accessing malaria prevention and control services through ANC. The Badjenou Gokh are oriented to their responsibilities during a two-day session and equipped with portable phones and reference materials, such as brochures and flip charts adapted in local languages. They hold meetings to sensitize village women and their families and provide follow-up to learn about outcomes and to reinforce messages. The Badjenou Gokh provide monthly reporting at the district level to Chief Medical Officers, which is then given quarterly to Regional Medical Officers. These meetings provide opportunities to discuss progress, obstacles, and opportunities (MOH 2010).

[11] CHP NGOs include: ChildFund, Africare, Plan, World Vision, Catholic Relief Services, and Counterpart International.

Financing (Stage 3)

Senegal is at Stage 3 for financing its MIP program. The Government of Senegal has committed its own resources to fully fund IPTp with SP, demonstrating a strong commitment to preventing MIP. Substantial financial support from PMI and the Global Fund goes toward LLINs. Senegal's recently approved Global Fund to Fight AIDS, Tuberculosis and Malaria's Malaria Round 10 Grant alone targets procurement of 7,543,940 of the 11,943,940 LLINs estimated as needed to implement the Universal Coverage program.

Major donors contributing to the MIP initiatives coordinated between the NMCP and RH Unit include: PMI, Global Fund, WHO, United Nations Children's Fund, Japan International Cooperation Agency (JICA), CIDA, and the World Bank. Other partners include Malaria No More, the Youssou N'Dour Foundation, and the Sonatel Foundation. (See Appendix 3 for a list of donor and implementing organizations and funding/programming scopes.)

The funding organizations frequently disburse monies through a combination of the following channels: direct grant/donation to the MOH; direct implementation of programs; commodity donations; and/or through local or international implementing organizations. Donor funds going to the MOH are disbursed into MOH accounts in response to semi-annual requests based on annual plans. The funds are provided to the health directorate account and not directly to the RH Division or NMCP.

Senegal's strategy for achieving sustainability includes linking government support to performance outcomes. The government has adopted a spending framework and plans for communication and education strategies to focus on interventions that will encourage people to set up initiatives to be responsible for their own health (Global Fund 2007).

DISCUSSION AND LESSONS LEARNED

Factors Influencing Bottlenecks and Overcoming Bottlenecks

There are a host of bottlenecks in the prevention and treatment of MIP in Senegal that have been identified in the literature and in stakeholder interviews. Some of these bottlenecks are already being addressed, but others require further programmatic and financial commitment. These challenges, the current strategies in place to overcome them, and the greater lessons learned are outlined in Table 7.

Table 7. Bottlenecks and Lessons Learned in Senegal's MIP Implementation

COMPONENT	CHALLENGE/ BOTTLENECK	CURRENT MITIGATION STRATEGIES	LESSONS LEARNED
Integration	Linkage between the MOH RH Division and NMCP remains weak	Discussing having more regular meetings between the RH Division and NMCP. Strengthening collaboration between the RH Division and the NMCP by developing a joint plan for prevention and case management of MIP, as outlined in the 2011–2015 NMCP National Strategic plan.	Although MIP services are integrated as a key component of maternal, newborn, and child health services at the health center level, a strong relationship between the RH Division and the NMCP ensures an integrated policy that facilitates the delivery of a holistic package of MIP services to pregnant women. Fostering the partnership in which NMCP provides technical guidance and RH manages implementation efforts is essential for long-term success.

COMPONENT	CHALLENGE/ BOTTLENECK	CURRENT MITIGATION STRATEGIES	LESSONS LEARNED
Policy	Use of only quinine to treat MIP	Revising NMCP policy, in accordance with WHO guidelines, to use ACTs during the second and third trimesters of pregnancy.	Quinine and the supplies used for its administration are costly to pregnant women in Senegal, while ACTs are provided free to the rest of the population. Revising policy to include ACTs for pregnant women is important to improve access to effective treatment for pregnant women.
Commodities	Inadequate availability and distribution of LLINs	Prioritizing distribution to the most affected areas and vulnerable populations, including pregnant women. Implementing universal coverage strategy of LLINs (started in 2010) that includes distributing free LLINs to pregnant women attending ANC and education campaign to promote use.	LLINs are a cost-effective strategy for reducing the incidence of MIP. Pregnant women are less likely to contract malaria when all members of a household sleep under LLINs. A universal coverage strategy, including free distribution and a community component to promote LLIN use, demonstrates commitment to rapid scale-up of prevention for all.
	Inadequate stock of SP in 2010	Working with the NMCP, Central Medical Stores quantify the correct amount and procure SP supply for the country. Purchasing forecasted SP need by government rather than relying on donor support. MOH is taking steps to address supply issues.	Without sufficient SP supply, pregnant women cannot receive IPTp during ANC, leaving them vulnerable to contracting malaria. Key to SP's availability are prioritizing SP for pregnant women, ensuring the correct drug is ordered, understanding the policy of providing SP for free at ANC, and managing stocks properly at national, regional, and district levels.
Quality Assurance	Weak system of supportive supervision	Developing standardized norms and protocols tools for reproductive health services for different levels of the health system. Training supervisors on implementation of tool.	Routine supportive supervision of health providers is necessary to ensure the appropriate delivery of MIP services. Supportive supervision is an opportunity to address gaps in programming as well as foster new program areas that need facilitated attention and support. Quality assurance standards that can be used to guide supportive supervision should be used at all levels of the health system and should be modified to take into consideration the specific services available at different types of facilities. The lack of resources for routine supportive supervision should not prevent the process from occurring but strategies should be developed for making the best use of resources including focusing on lower-performing facilities and providers as well as on-site supervision.

COMPONENT	CHALLENGE/ BOTTLENECK	CURRENT MITIGATION STRATEGIES	LESSONS LEARNED
Capacity Building	Inadequate performance of providers in delivering MIP services	Delivering recently updated MIP curricula to all cadres of professionals (other than doctors who receive a separate curriculum that also includes MIP). NMCP ensuring that newly hired health facility staff receive in-service training in malaria prevention and control, including MIP. Training District Chief Medical Officers and primary health care supervisors through a NMCP comprehensive malaria course.	Along with supportive supervision, the training curriculum for malaria prevention and control, including MIP, should be updated routinely to capture changes in protocols and policy.
	Health care personnel shortage	Training CHWs and assessing their performance by community members and health facility staff.	CHWs can be trained to deliver messages about prevention and control of MIP to women in their community, especially with clinical staff shortages. These messages should include information on the importance of using nets during pregnancy, having four ANC visits, and using IPTp. Having CHWs deliver this information may alleviate some of the burden on health facility providers, particularly if there is a shortage of qualified ANC staff.
Community Awareness and Involvement	Late attendance at ANC Use of ITNs among pregnant women still needs to be increased	NMCP working with community-level organizations to organize social mobilization efforts at the community level. NMCP, with the National Service for Health Education and Information, is implementing a communication plan for malaria that includes MIP. Through the USAID-supported Community Health Program, providing a basic package of quality health services, including ANC and MIP, to the most remote populations via health huts.	Community involvement in malaria prevention and control efforts during pregnancy can encourage women to attend ANC early in pregnancy and raise awareness about the importance of using ITNs and IPTp. Community level BCC campaigns can also help to correct misconceptions about using ITNs. Combining quality services with community outreach to remote areas increases access to and use of ANC and MIP services.
Monitoring and Evaluation	Poor tracking of malaria indicators	Overhauling the M&E system including revision of reporting forms and templates. Developing computerized database to capture standardized information across different levels of health system.	Proper M&E of MIP interventions can help inform implementers, program designers, and all key stakeholders of the progress toward achieving the desired objectives as well as indicate the impact that the current MIP activities are having on pregnant women.

Successes and Best Practices

Despite many challenges, from 2005 to 2010, IPTp uptake and the proportion of pregnant women sleeping under an ITN increased—signifying the effectiveness of MIP programming in Senegal. Several of Senegal's innovations in program development and implementation, which can serve as models for and be adapted to other country situations, stand out, including:

- **Development of a clear IPTp policy**
  The NMCP worked with relevant partners to formulate the current IPTp policy that is being implemented throughout the health system. Backed by its own national-level research on parasite resistance to chloroquine, Senegal adopted the WHO three-pronged approach in 2003 regarding IPTp, use of ITNs, and prompt case management for pregnant women. The policy was translated into national service delivery guidelines, pre-service curricula, and in-service training materials. Information about the importance of IPTp and ITN use is implemented almost uniformly at public facilities.

- **Integration of MIP with ANC**
  MIP interventions are an integral component of MCH services through a platform of focused ANC. Because most Senegalese women attend ANC at least once, by integrating MIP with an established ANC program, Senegal is reaching a high number of pregnant women earlier in their pregnancies.

- **Significant progress in policies and logistics to maximize access to SP**
  The NMCP works with the Central Medical Stores to quantify the correct amounts of SP required based on projected number of clients, pregnancy rates, and malaria prevalence. Providing SP for free to pregnant women increases their likelihood of receiving SP and can provide incentive to attend ANC for access to the full package of antenatal services.

- **Involvement of CBOs and CHWs to increase access to MIP services**
  The NMCP works through CBOs and CHWs to reach pregnant women in the most remote areas with messages about the importance of attending ANC, taking SP, and using ITNs. CHWs are an important link between pregnant women and facilities, ensuring that women understand and access MIP interventions available to them through ANC.

- **Overhauled M&E system with increased access to and use of MIP data for decision-making**
  Country-level expertise and awareness have been increased to understand how to strengthen routine health information systems and to improve data quality. The NMCP is able to produce an annual report that includes national data on MIP because of the data systems that are currently in place, including a database with facility-level information. Information is available and discussed at regular intervals to aid in program decision-making.

Conclusions and Recommendations

Overall, Senegal has achieved a moderate to high level of implementation of essential MIP program components. Major strengths have been observed in the areas of integration, policy development and implementation, capacity building, M&E, and community awareness and involvement. Some areas that require further, significant strengthening include commodities, quality assurance, and financing.

- **Integration**
  Senegal has integrated MIP and HIV through a platform of ANC services, ensuring that pregnant women receive a holistic package of care.

  One of the main lessons learned through the integration process is that all relevant partners (malaria, HIV, RH) should feel ownership of health activities. A more concerted effort is needed to strengthen collaboration among the RH Division, NMCP, and the HIV Division to ensure coordination of policies, guidelines, and activities among the three programs. Further, it should be recognized that an essential function of the RH Division is to manage the ANC program while drawing on technical oversight and guidance from the NMCP and HIV Division. In its 2011–2015 National Strategic Plan, the NMCP states that collaboration will be improved between the RH Division and NMCP through development of a joint plan for MIP.

- **Policy**
  Senegal developed clear MIP policies, which were translated into and disseminated through national service delivery guidelines, in-service training materials, and pre-service curricula.

  Although the policy is integrated into both malaria and PMTCT training packages, having one, integrated training package would be most beneficial. Some challenges remain affecting adherence to policy, including inadequate dissemination. Developing a simplified orientation package on the key elements of MIP policy and guidelines can be used to quickly disseminate policy to service providers at the facility level. Resistance by some private practitioners to adopt use of SP rather than chloroquine is being addressed through advocacy and presentation of scientific research, coordinated by a focal person specifically for the private sector. It would be most beneficial to include private practitioners routinely in dissemination and training as well. The use of quinine to treat cases of malaria in pregnancy, in accordance with Senegal's current policy, poses a financial burden to pregnant women. The NMCP plans to revise policy to switch to administration of ACTs during the second and third trimesters. This important change will improve access to treatment for pregnant women suffering from malaria.

- **Commodities**
  Senegal has made significant efforts to ensure that MIP-related commodities are available and affordable for all pregnant women by distributing SP for free and LLINs at reduced cost and eliminating taxes on commodities.

  Inadequate stock of SP was experienced at all levels of the system. Despite the recurrent stock-outs of SP, data show that uptake of the first and second doses of IPTp has been high compared to other countries. Addressing issues of SP procurement and management of stocks will be critical to ensure that Senegal continues to move toward global targets for uptake of IPTp.

  ITN use among pregnant women has improved significantly in recent years, but a number of factors contribute to the inability to reach the target of 80% of pregnant women sleeping under an ITN. The universal coverage campaign launched in 2010, perhaps the most important commitment that Senegal has made to reach every pregnant woman with an LLIN, employs a comprehensive strategy to assess household need, implement free distribution through campaigns and ANC, and promote usage at the community level.

- **Quality Assurance**
  Quality assurance standards exist for all levels of the health system based on the type of facility and include standards for MIP activities as part of ANC service delivery. Feedback from supervision visits is given immediately to supervisors and providers to increase their understanding of performance gaps and improve implementation.

  Despite these efforts, regular supportive supervision visits still remain a challenge because of lack of logistical resources, lack of time and personnel to implement the labor-intensive process; and the lack of implementation of recommendations from supervisory visits.

  To address these constraints, respondents recommended targeting only the facilities/areas with the most problems, shortening supervision checklists, and working closely with providers to ensure that recommendations are implemented. Implementing on-site supervision whereby supervisors and providers are trained to apply the MIP standards to self-assess both facility and provider performance may also help. The MOH is also considering implementing a performance-based financing approach that will include the delivery of quality MIP services.

- **Capacity Building**
  The NMCP has drawn on local expertise and support from international organizations to develop and implement MIP training. The NMCP has made efforts to ensure that MIP education and training are conducted on a number of levels: health providers enter the workforce after having received pre-service MIP education, newly hired health facility staff receive in-service training, and chief medical officers and primary health care supervisors receive comprehensive malaria training. In addition, the NMCP also provides updates on malaria policy and guidelines to teachers of private training institutes.

  The NMCP has prioritized the need to improve training supervision in health districts, hospitals, and private facilities. Insufficient coordination among the NMCP, RH Division and HIV Program often leads to repeated and unnecessary MIP in-service training. High staff mobility also affects adequate management of the training program. These issues could potentially be solved by implementing a training database to better target and track provider training and by combining the malaria and PMTCT training packages into one, integrated training package.

- **Monitoring and Evaluation**
  M&E was a challenge for Senegal, but the NMCP has made significant progress in improving M&E systems over the past several years. The SNIS collects health data and information on IPTp and ITNs, but the NMCP collects more detailed malaria-related data. The NMCP receives data quarterly from the district level, reviews the data with all districts, and generates an annual report because the data systems are in place. Senegal's relatively high levels of IPTp2 uptake may also be partially explained by its strong M&E system that captures data for this indicator.

  Despite these significant efforts, there are still some challenges to address. Coordination and integration of databases among malaria, HIV, and RH programs need to improve and one overall M&E system needs to be created that includes M&E plans and indicators from different donors. There are also insufficient data on MIP indicators coming from the private sector necessitating interventions toward better involvement of the private sector. More capacity building is needed at decentralized levels to build skills in data monitoring and analysis for decision-making at the local level. This capacity building is critical for managers, providers, community volunteers and others involved with data entry and

management to understand the importance of a quality MIP data management system and the benefits to their programs and clients.

- **Community Awareness and Involvement**
  Senegal has made a concerted effort to involve communities in malaria prevention and control activities. Community knowledge and understanding of MIP seem to be fairly strong through a variety of interventions. Senegal has also collaborated with donors and partners to implement innovative community-based interventions like the CHP and the Badjenou Gokh initiative.

  CHWs play an important part in raising awareness about MIP among women who may not otherwise seek care. The CHP has potential for national-level success, but is not without challenges, specifically ensuring quality and sustainability, which must be addressed as the program expands. Instituting supportive supervision of health hut teams could target and correct the recurrent problems with availability and use of referral forms by CHWs, incomplete patient registers, and tidiness and organization of storage rooms. Supervision may not fully address the problem of drug stock-outs, but it can discourage the use of outdated medicines. The CHP has made a significant impact on community knowledge and use of health hut services such that communities have come to depend on them. Moving forward, sustainability of the CHP is a critical issue to be tackled by the program and the community health committees. Although SP for IPTp and LLINs are free in Senegal, new approaches are needed for generating income to support the delivery system and structure of health huts, keeping them viable.

- **Financing**
  Senegal relies on various sources of funding to support its MIP initiatives. Allocating its own resources to fully fund SP demonstrates the government's commitment to MIP programming. Senegal has made remarkable strides in securing funding for LLINs needed to implement its nationwide universal coverage strategy; however, the total estimated need is not yet met. Covering the LLIN funding gap will be important to overcoming the issue that Senegal has experienced with LLIN stock-outs at ANC.

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Appendix 1

COUNTRY DATA SOURCES FOR CASE STUDY

DATA SOURCE	SENEGAL
DHS	1999, 2005
MIS	2006, 2008–2009
Program and government reports	Quality of care (Suh et al. 2007)
	Malaria morbidity (Service National de l'Information Sanitaire 2009)
Research studies	Plasmodium falciparum and HIV in pregnant women (Mwapasa et al. 2004)
	IPTp in Senegal (Olliaro et al. 2008)
	Malaria knowledge, attitudes and practices (Seck et al. 2008)
	Knowledge of malaria treatment policies (Souares et al. 2006)
	HIV and malaria co-infection in pregnant women (Ter Kuile et al. 2004)

Appendix 2

PRIORITY MIP INDICATORS AND CORRESPONDING DATA SOURCES—SENEGAL

LEVEL	INDICATOR	DATA SOURCE	DATA/ VALUE	LOCATION OF DATA [REPORT SECTION(S) AND PAGE NUMBERS, URL]	COMMENTS
Outputs	Percentage of antenatal clinic staff trained (pre-service, in-service or during supervisory visits) in the control of MIP during the past 12 months (including IPT, counseling on use of ITNs and case management for pregnant women	MIS			
	Percentage of health facilities reporting stock-out of the recommended drug for IPT (currently SP) in the past month or in the determined period (according to national guidelines)	MIS			
Outcomes	Percentage of pregnant women who received any ANC from skilled provider	DHS 2005	91.1	Maternal and Child Health Chapter, p. 136	
		DHS 1999	82.3	Maternal and Child Health Chapter, p. 58	
	Percentage of pregnant women who attended two or more ANC visits	DHS 2005	87.3	Maternal and Child Health Chapter, p. 136	
		DHS 1999	77.1	Maternal and Child Health Chapter, p. 58	
	Percentage of pregnant women receiving IPT under DOT (first dose, second dose, third dose, according to national guidelines)	DHS 2005	Any: 9.2	Malaria Chapter, p. 175	Records any SP taken
		DHS 1999	N/A		Data not available for 1999
		MIS 2008–2009	Any: 75.5 Two or more: 52.2	Chapter 5: Prevention and treatment of malaria, p. 50	Records any SP taken and two or more doses
		MIS 2006	Any: 71.8 Two or more: 51.2	Chapter 4: Prevention and treatment of malaria, p. 28	Records any SP taken and two or more doses

LEVEL	INDICATOR	DATA SOURCE	DATA/ VALUE	LOCATION OF DATA [REPORT SECTION(S) AND PAGE NUMBERS, URL]	COMMENTS
	Percentage of households with at least one ITN	DHS 2005	27.1	Malaria Chapter, p. 170	
		DHS 1999	N/A		Data not available for 1999
		MIS 2008–2009	63.3	Chapter 4: Possession and use of bed nets, p. 34	
		MIS 2006	44.9	Chapter 3: Possession and use of bed nets, p. 18	
	Percentage of pregnant women who report having slept under an ITN the previous night	DHS 2005	10.4	Malaria Chapter, p. 174	
		DHS 1999	N/A		Data not available for 1999
		MIS 2008–2009	28.5	Chapter 4: Possession and use of bed nets, p. 43	
		MIS 2006	24.1	Chapter 3: Possession and use of bed nets, p. 23	
Impact*	Percentage of LBW singleton live births (<2,500g), by parity	DHS 2005	6.3	Maternal and Child Health Chapter, p. 144	Records percent distribution of births with a record birth weight below 2.5 kilograms
		DHS 1999	N/A		Data not available for 1999
	Percentage of screened pregnant women with severe anemia (Hb <7g/dl) in the third trimester, by gravidity	MIS 2008–2009	N/A		The 2008–2009 MIS provides data on anemia in women, not specific to pregnant women

*Influenced by other factors, such as nutrition, hookworm infection and pre-term birth.

Appendix 3

STAGES OF MIP PROGRAM IMPLEMENTATION MATRIX*

MIP READINESS COMPONENT	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Integration	No meetings or communication between NMCP and RH program at national level Poor or coincidental integration at district level No integration of MIP with other public health programs	Some meetings or communication between NMCP and RH program at national level Attempts at integration at district level Attempts to integrate MIP with other public health programs	Sharing of information and regular meetings occur between the NMCP and RH program at national level Stated focus of integration at district level Some MIP, RH, child health, and/or HIV/AIDS services have been bundled together in health services	Joint strategies, planning, and sharing of information between NMCP and RH programs at national level District level promotes integration of RH, child health, HIV/AIDS and MIP in administration and supportive supervision MIP, RH, child health, and/or HIV/AIDS are provided together in health services
Policy	No or minimal MIP policies, strategies or service delivery guidelines available in country	Some MIP policies, strategies or service delivery guidelines developed Dissemination not done or not yet completed	MIP policies, strategies or service delivery guidelines developed Partial dissemination Utilization unknown or incomplete	MIP policies, strategy, and service delivery guidelines developed and being used at all levels of the health system
Commodities	Malaria drug and ITN procurement and distribution systems for ANC clinics poorly functional (e.g., stock-outs) WHO-recommended medicines for malaria and/ or MIP have not been approved	Malaria drug and ITN procurement and distribution systems for ANC clinics functional WHO-recommended medicines for malaria and/or MIP have been approved but not widely available ITNs available sporadically	Malaria drug and ITN procurement and distribution systems for ANC clinics functional WHO-recommended medicines for malaria and/or MIP have been approved and are widely available ITNs available in many places	Malaria drug and ITN procurement and distribution systems for ANC clinics efficient WHO-recommended medicines for malaria and/or MIP are always available ITNs always available

MIP READINESS COMPONENT	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Quality Assurance	MIP quality assurance standards have not been developed Supportive supervision not in place to maintain quality in MIP services Quality of MIP services poor	MIP quality assurance standards have been developed but are not widely used Supportive supervision for MIP services in place to limited extent Quality of MIP services low	MIP quality assurance standards have been developed and are used in some areas Supportive supervision for MIP services increasingly utilized Quality of MIP services moderate	MIP quality assurance standards have been developed and are used systematically Supportive supervision for MIP services utilized systematically Quality of MIP services high
Capacity Building	No competency-based training on MIP has been planned Pre-service nursing, midwifery, and medical curricula outdated in regards to MIP	Competency-based in-service training on MIP planned or has occurred on limited basis Pre-service nursing, midwifery, and medical curricula have been revised in regards to MIP but not consistently taught to students	Competency-based in-service training on MIP conducted for many health service providers Updated pre-service nursing, midwifery, and medical MIP curricula are being taught at most academic institutions	Competency-based in-service training on MIP conducted for all appropriate cadres of health service providers Updated pre-service nursing, midwifery, and medical MIP curricula are being taught at all academic institutions
Community Awareness and Involvement	Community action/awareness on MIP low No resources available for community Low community acceptance of MIP prevention and treatment measures (ITNs, IPTp, and case management)	Community action/awareness on MIP raised through research, advocacy, and/or programs Few resources developed for communities Some community acceptance of MIP prevention and treatment measures	Community action/awareness on MIP strong through research, advocacy, and/or programs Appropriate resources widely available Moderate community acceptance of MIP prevention and treatment measures	Community action groups are strong partners in national MIP prevention efforts Appropriate resources widely available Widespread community acceptance of MIP prevention and treatment measures
Monitoring and Evaluation	Routine data for MIP service delivery not available No MIP indicators developed No baseline[12] information or research results exist for country	Routine data for MIP service delivery available MIP indicators designed but not integrated into national system Some baseline information or research results exist for country	Routine data for MIP service delivery available, collected, and reported on MIP indicators agreed upon and data collection started Baseline information or research results exist for country	Routine data for MIP service delivery available, collected, reported on, and used for decision-making MIP indicators being collected regularly Some endline studies designed to capture achievements and/or impact studies being conducted

[12] Relevant baseline information includes: community utilization of MIP, epidemiology of malaria transmission, and pharmacovigilance.

MIP READINESS COMPONENT	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Financing	National government has not committed funds to MIP programs No donor funding exists for MIP No proposals submitted to donors for MIP funding	National government has not committed adequate funds to MIP programs to cover projected costs Limited donor funding exists for MIP	National government has committed funds to MIP programs that significantly contribute to projected costs Strong donor funding exists for MIP	National government has committed and disbursed funds to MIP programs that significantly contribute to projected costs Ample donor funding exists for MIP and is being used effectively

* The sections highlighted in purple represent Senegal's stage of implementation for the particular component.

Appendix 4

MIP PARTNER ORGANIZATIONS—SENEGAL

Organization	Funding	Implementing	Scope of MIP Program	Location	Funding Source	End Date
IntraHealth		X	▪ Supervise and monitor ANC ▪ Support strategy to bring ANC, IPTp, and LLIN to pregnant women at the community level through health post outreach activities ▪ Reinforce MIP services in health facilities ▪ IEC/mass media for early ANC attendance and IPTp uptake ▪ Improve case management with ACTs at the facility level	Countrywide	USAID/PMI	2011
DELIVER		X	▪ Procure LLIN ▪ Procure ACTs	Countrywide	USAID/PMI	
Global Fund to Fight AIDS, Tuberculosis, and Malaria	X		▪ Provide Round 7 Grant to NMCP for malaria interventions (LLINS, IEC/BCC)	Countrywide	Donor countries	2012
UNICEF	X	X	▪ Procure and distribute LLINs		UN member countries	
World Health Organization (WHO)	X	X	▪ Support development of policy and guidelines ▪ Provide technical support for quantification of SP	N/A	UN member countries	N/A
Islamic Development Bank (IDB)	X		▪ Provide grants to NMCP for LLINS and RDTs	N/A		
ChildFund International		X	▪ Assist with community mobilization and behavior change for malaria, including support for MIP ▪ Implement on community level RDTs and ACT through health huts	Countrywide	USAID/PMI	2011
NetWorks		X	▪ Procure and distribute LLINs ▪ Conduct IEC/BCC to promote net use	Countrywide	USAID/PMI	2014
MSH		X	▪ Train and supervise pharmaceutical stock management (including SP, quinine)	Countrywide	USAID/PMI	
USP		X	▪ Monitor drug quality/conduct post-marketing surveillance (includes SP)	Countrywide	USAID/PMI	

Appendix 5

REFERENCES FOR FURTHER INFORMATION

A Strategic Framework for Malaria Prevention and Control during Pregnancy in the African Region (World Health Organization)
http://whqlibdoc.who.int/afro/2004/AFR_MAL_04.01.pdf

Malaria in Pregnancy (MiP) Consortium
http://www.mip-consortium.org/

Malaria in Pregnancy Resource Package
http://www.jhpiego.org/resources/pubs/malarialrp/index.htm

Maternal and Child Health Integrated Program (MCHIP)
http://www.mchip.net

President's Malaria Initiative (PMI)
http://www.fightingmalaria.gov/

Roll Back Malaria (RBM) Partnership
http://www.rollbackmalaria.org