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**PRESIDENT'S MALARIA INITIATIVE**

**Malaria Operational Plan – FY 10**

**MOZAMBIQUE**

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## **ABBREVIATIONS and ACRONYMS**

ACT – artemisinin-based combination therapy  
 AIDS – Acquired Immuno-Deficiency Syndrome  
 AL – artemether-lumefantrine  
 ANC – antenatal clinic  
 APE – community health worker  
 ARV – anti-retroviral therapy  
 AS-AQ – artesunate-amodiaquine  
 BCC –behavior change and communications  
 CDC – US Centers for Disease Control and Prevention  
 CMAM – Central de Medicamentos e Artigos Médicos (Central Medical Stores)  
 DDT – dichloro-diphenyl-trichloroethane  
 DHS – Demographic and Health Survey  
 DPS – Departamento Provincial de Saude (Provincial Health Department)  
 FBO – faith-based organization  
 Global Fund – Global Fund to fight AIDS, Tuberculosis, and Malaria  
 HIV – Human Immunodeficiency Virus  
 IMCI – integrated management of childhood illnesses  
 IPTp – intermittent preventive treatment of pregnant women  
 INS – Instituto Nacional de Saude (National Institute of Health)  
 IRCMM – Inter-Religious Campaign against Malaria in Mozambique  
 IRS – indoor residual spraying  
 ITN – insecticide-treated bed net  
 LLIN – long-lasting insecticide-treated bed net  
 LSDI – Lubombo Spatial Development Initiative  
 M&E – monitoring and evaluation  
 MISAU – Ministerio da Saude (Ministry of Health)  
 NMCP – National Malaria Control Program  
 NGO – non-governmental organization  
 OVCs – orphans and vulnerable children  
 PEPFAR – President’s Emergency Plan for AIDS Relief  
 PLWHA – people living with HIV/AIDS  
 PMI – President’s Malaria Initiative  
 PMTCT – prevention of mother to child transmission (of HIV/AIDS)  
 PSI – Population Services International  
 RBM – Roll Back Malaria  
 RDT – rapid diagnostic test  
 SP – sulfadoxine-pyrimethamine  
 TAM – Together Against Malaria  
 UNICEF – United Nations Children’s Fund  
 WHO – World Health Organization

## EXECUTIVE SUMMARY

Mozambique was one of the four countries selected during the second year of the President's Malaria Initiative (PMI). The goal of PMI is to assist African countries, in collaboration with other partners, to reduce malaria mortality by 50% by rapidly scaling-up coverage of vulnerable groups with four highly effective interventions: artemisinin-based combination therapy (ACT), intermittent preventive treatment for malaria in pregnancy (IPTp), insecticide-treated bed nets (ITNs), and indoor residual spraying (IRS).

Malaria is a major cause of morbidity and mortality in Mozambique. Approximately 6 million cases are reported each year. It accounts for approximately 40% of all outpatient visits and 60% of pediatric hospital admissions. Malaria is also the leading cause of death among children admitted to pediatric services. Malaria transmission takes place year round with a seasonal peak extending from December to April. All 21.5 million people in Mozambique are considered to be at-risk of malaria, including an estimated 3.6 million children less than five years and almost one million pregnant women.

The Government of the Republic of Mozambique considers malaria a priority for poverty reduction and its development agenda. Although the Ministerio da Saude (MISAU) is committed to increasing access to health services and increasing the efficiency and quality of those services nationwide, a weak health infrastructure and shortage of health workers are formidable obstacles. In 2000, Mozambique adopted a sector-wide approach for health, led by MISAU and with the participation of more than 15 bilateral and multilateral agencies.

A PMI-supported baseline Malaria Indicator Survey (MIS), conducted during June and July 2007, provides the most current information on the key malaria prevention and control measures. The MIS demonstrated that coverage of key interventions was low. Only 16% of households had at least one ITN, and 7% of pregnant women and 7% of children less than five had slept under an ITN the previous night. Only 4% of children less than five years with fever had received an ACT within 24 hours of onset of symptoms. An AIDS Indicator Survey, funded by PEPFAR, is currently underway and is collecting data on ITN ownership and use and IPTp coverage, which is expected to have increased significantly from the baseline MIS in 2007.

Mozambique has received a \$28 million Round 2 grant from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This award is the first Global Fund grant to be pooled in the Ministry of Health's central basket funding. Mozambique has also been awarded a two-year, \$36 million Round 6 grant, which began disbursing in 2008. In addition, the Lubombo Spatial Development Initiative (LSDI), a three-country control initiative— involving southern Mozambique, Swaziland, and South Africa— has received two, two-year \$21 million grants from Global Fund (Round 2 and Round 6).

In 2009, a five-year, \$35 million World Bank health sector credit was approved that will allocate approximately \$12 million to malaria control. This credit will primarily focus on system strengthening at the national and provincial levels, with a particular emphasis on three northern provinces. With additional support from the World Health Organization, UNICEF, and other

national and international partners, scaling up of malaria prevention and control interventions is well underway.

The Year 4 Malaria Operational Plan for Mozambique was based on the progress and experiences of the first two years and was developed during a planning visit in June 2009 by representatives from the United States Agency for International Development (USAID), the Centers for Disease Control and Prevention (CDC) and the Mozambique National Malaria Control Program (NMCP). This plan was developed in close consultation with nearly all national and international partners involved with malaria prevention and control in the country. Based on these discussions and further meetings with the NMCP, the planning team concluded that the following major activities/expected results will be supported in the third year of the Initiative:

**ITNs:** In October 2008, 800,000 LLINs (of which PMI supplied 720,000) were distributed, free-of-charge, during an integrated measles vaccination-deworming-Vitamin A-LLIN campaign targeted at children less than five years in Nampula Province. Another 380,000 LLINs were procured with FY 08 funding and distributed free-of-charge to pregnant women during routine ANC visits. In 2009, 3.5 million LLINs (of which PMI will provide approximately one million) have been distributed, free-of-charge, through subnational campaigns to children less than five years, to pregnant women through ANCs, and through pilot universal coverage campaigns to all households in selected target districts.

With FY 2010 funding, approximately 7.5 million LLINs (of which PMI will contribute 2 million) will be procured and distributed free through ANCs to pregnant women and through sub-national universal coverage campaigns to all households in the target areas. This projection is based on the assumption that the Global Fund Round 9 proposal will be approved and 4.5 million LLINs will be procured using these resources. This should raise household ownership of at least one ITN to approximately 70% nationwide.

**IRS:** In 2008, IRS activities were conducted in six districts in Zambézia Province covering more than 412,000 structures and 1.45 million residents. Spray operations for the 2009 spray season are nearing completion and will cover approximately 500,000 structures and more than 2 million residents in the same target districts in Zambézia Province.

An insectary and entomology laboratory in Zambézia Province has been established and new equipment, supplies, and reagents delivered. Vector surveillance and insecticide resistance testing is underway in the six IRS districts. Renovations on the entomology laboratories (including an insectary, dissection laboratory and ELISA laboratory) of the Instituto Nacional do Saúde (INS) of MISAU will be completed in October 2009.

With FY 2010 funds, the same 500,000 structures and 2 million residents in the same six districts in Zambézia Province will be covered with IRS. Capacity building activities in entomologic monitoring and insecticide resistance testing will continue.

**Malaria in Pregnancy:** ANCs continue to be a primary route for distribution of LLINs to pregnant women. MISAU and provincial authorities have trained ANC staff on prevention and treatment of malaria in pregnancy, but uptake of IPTp is still low. In the 2007 Malaria Indicator

Survey, only 16% of pregnant women received the recommended two or more doses of sulfadoxine-pyrimethamine (SP). PMI has been coordinating with PEPFAR and reproductive health partners to harmonize service delivery at ANC and PMTCT clinics. PMI and other partners will continue collaborations with MISAU MCH to finalize an integrated training package for roll-out in early 2010. Training of ANC workers in all 11 provinces nationwide should be completed by the end of 2010.

**Malaria Diagnosis:** In 2008, a national policy for malaria case management was developed by NMCP, in collaboration with PMI and other partners, and covers the criteria for use of diagnostic testing. A national integrated laboratory policy is currently under development, with support of PEPFAR and PMI. Refresher training of laboratory technicians in malaria microscopy has been completed in four provinces and will soon be expanded to additional provinces, and will include strengthening diagnostics for HIV, tuberculosis and malaria. Approximately 80% of laboratory technicians will receive this refresher training by the end of 2010. In addition, the national laboratory policy will be finalized in 2010 and updated tools for training, supervision, and quality assurance will be developed. In conjunction with the roll-out of the new malaria treatment policy, approximately 10,000 clinicians will receive training in the use of RDTs for the diagnosis of malaria. In support of the recently revised national malaria treatment guidelines, now requiring confirmation of all suspected malaria cases with a diagnostic test, PMI will provide approximately three million RDTs as well as some microscopes and microscopy kits. The PMI-supported refurbishment of the national malaria reference laboratory also will be completed.

**Malaria Treatment:** With Year 2 funding, PMI supported the purchase and distribution of 1.4 million treatments of artemether-lumefantrine (AL). An additional 3.5 million AL treatments were procured by PMI and are currently being distributed to health facilities to support the roll-out of the new first-line malaria treatment policy. PMI also supported a pilot evaluation to assess alternative distribution schemes for AL. Based on the results of this pilot, PMI has developed capacity in the Maputo and Beira medical stores to prepare malaria drug kits, which will be distributed to all health facilities and to community health workers.

With FY 2010 funding, approximately nine million treatments of AL will be procured by all partners (of which PMI will provide six million treatments). These will be provided free-of-charge at public and non-governmental health facilities. PMI will support training and supervision of health workers in the new drug policy, which will be implemented in all health facilities in all 10 provinces and the city of Maputo (covering at least 60% of fever episodes in children less than five years).

**Monitoring and Evaluation:** Collection of information on selected malaria indicators, including malaria morbidity and mortality, also began at two sentinel sites in September 2008, although there have been challenges with data quality. In addition, vector surveillance and insecticide resistance monitoring are now underway in the six districts being covered with IRS.

In 2010, PMI will continue to strengthen data quality at the two existing sentinel sites; expanding to additional sites will depend on the resolution of the existing data issues. Vector surveillance and insecticide resistance monitoring will continue, as well. In addition, PMI will support the

implementation of a comprehensive malaria component of the planned 2011 Demographic and Health Survey (DHS). These data will provide information on progress at the midpoint of PMI implementation in Mozambique.

**Budget:** The FY 10 PMI budget request for Mozambique is \$38 million. Thirty-five percent will support scaling-up ownership and use of ITNs, 22% for IRS and vector control activities, 31% for procurement of antimalarial drugs and improved malaria case management, 1% for malaria in pregnancy activities, 3% for communication and behavior change activities, 3% for monitoring and evaluation, and 5% for staffing and administrative costs. Overall, 57% will be spent on commodities.



## **INTRODUCTION**

### **President's Malaria Initiative**

In July 2005, the United States Government launched a five-year, \$1.2 billion President's Malaria Initiative (PMI) to rapidly scale up malaria prevention and treatment interventions in 15 high-burden countries in sub-Saharan Africa. The goal of PMI is to reduce malaria-related mortality by 50% in PMI countries. This will be achieved by reaching 85% coverage of the most vulnerable groups—children less than five years of age and pregnant women—with proven preventive and therapeutic interventions, including artemisinin-based combination therapy (ACTs), insecticide-treated bed nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS). Mozambique was one of the four countries selected in the second year of PMI.

In implementing PMI, the United States Government is committed to working closely with host governments and within existing national malaria control strategies and plans. Efforts will be coordinated with other national and international partners, including the Global Fund to Fight AIDS, TB, and Malaria (Global Fund), Roll Back Malaria (RBM), the World Bank Malaria Booster Program, the World Health Organization (WHO), UNICEF, non-governmental organizations (NGOs), and the private sector to ensure that investments are complementary and that RBM and Millennium Development goals can be achieved.

This document presents a detailed implementation plan for the fourth year of the PMI in Mozambique. It was developed in consultation with the National Malaria Control Program (NMCP) and with the participation of nearly all national and international partners involved with malaria prevention and control in the country. The activities that PMI is proposing to support fit well with the Ministry of Health Strategic Plan for Malaria Control and build upon investments made during the first three years of PMI.

This plan reviews the current status of malaria in Mozambique and its malaria control policies and interventions. It identifies challenges and unmet needs if the targets of the PMI are to be achieved, reviews the status of previous years' PMI activities, and provides a description of proposed Year 4 activities.

### **Malaria Situation in Mozambique**

Malaria is a major cause of morbidity and mortality in Mozambique. It also greatly limits productivity, particularly among rural populations, and is a leading cause of school absenteeism. About six million cases of malaria, mostly diagnosed clinically, are reported each year. Malaria accounts for 40% of all outpatient consultations, 60% of all pediatric hospital admissions, and is reported to be the leading cause of death among children admitted to pediatric services. These figures, though, largely underestimate the true burden of malaria since many persons with malaria do not seek care at health facilities.

The PMI-supported Malaria Indicator Survey (MIS), which was conducted in 2007 and provides baseline data for PMI in Mozambique, found the national prevalence of malaria parasitemia

among children 6 to 59 months to be 38.5%, with a range by province from 60.4% in Nampula Province to less than 10% in Maputo. Among pregnant women, the parasite prevalence was 16.3%, with 30.1% of women in their first pregnancy demonstrating parasites on blood slides. Anemia due to malaria is a major cause of morbidity and mortality in children and pregnant women; 67.7% of children age 6-59 months and 48.1% of pregnant women in the survey population were anemic (hemoglobin less than 11 gm/dl), and 11.9% and 5.1%, respectively, had severe anemia (hemoglobin less than 8 gm/dl).

Most of Mozambique has year-round malaria transmission with a seasonal peak from December to April (during the rainy season). Mozambique is, however, prone to natural disasters such as drought, cyclones, and floods and these may have contributed to increases in malaria transmission in recent years, particularly in low-lying coastal areas and along major rivers.

*Plasmodium falciparum* infections account for 90% of all malaria infections, with *P. malariae* and *P. ovale* responsible for about 9% and 1%, respectively. The major vectors in Mozambique are *Anopheles gambiae s.s.*, *A. arabiensis*, *A. funestus s.l.*, and *A. funestus s.s.* Among the major subspecies of the *A. gambiae* complex, *A. arabiensis* is more prevalent in the south and *A. gambiae* in the north.

The national census of 2007 documented the population of Mozambique to be approximately 21.5 million, with 1 million residents residing in urban Maputo and 1 million in the peri-urban Maputo. By 2010, it is projected that there will be 3,800,000 children less than five and 1.1 million pregnant women.

In the previous years, malaria transmission was assumed to be very low in Maputo city. In April 2009, though, a rapid urban malaria assessment was conducted within the city limits of Maputo. Preliminary data from this assessment suggests on-going transmission at higher than expected levels, even in highly urban areas of the city. The prevalence of malaria, diagnosed by rapid diagnostic tests, among febrile patients presenting for care to public health facilities was 11.9% in urban Maputo, 15.8% in peri-urban areas surrounding Maputo, and 19.4% in rural areas in Maputo Province. Based on these results, both urban and peri-urban areas of Maputo should be targeted for malaria prevention and control activities.

### **Malaria Control Plan and Strategy**

The NMCP is in the process of finalizing a new strategic plan for 2010 to 2014. This National Prevention and Control Plan for Malaria in Mozambique focuses on the scaling-up nationally of six key malaria prevention and control interventions:

1. **Integrated vector management (IRS, ITNs and environmental management):** IRS has been a core malaria control strategy in Mozambique for a number of years, with national targets aiming for coverage of at least 40% of the population. Free long-lasting ITN (LLIN) distribution focuses on people at risk of malaria outside the areas covered by IRS. A recently revised policy calls for universal access to LLINs (defined as one net for every two inhabitants).
2. **Prompt diagnosis and correct treatment:** To scale up and improve diagnosis, the NMCP has adopted a policy that all persons with suspected malaria should be tested with a rapid diagnostic test (RDT) or microscopy prior to treatment at both facility and community level. The

Ministério de Saude (MISAU) is currently phasing out combination artesunate/sulfadoxine-pyrimethamine (AS-SP) in favor of artemether-lumefantrine (AL) as its first-line treatment. A launch of this new treatment policy has been delayed, but is expected in the second half of 2009.

**3. Intermittent preventive treatment in pregnancy:** Use of IPTp with SP was scaled-up nationally beginning in early 2006. Every pregnant woman should receive three monthly doses of IPTp during her pregnancy. Uptake figures are low (23% in MIS 2007) considering that more than 80% of pregnant women attend ANC at least once during their pregnancy.

**4. Emergency and epidemic preparedness and response:** Coordination between MISAU and the National Disasters Management Institute is intended to facilitate forecasting and timely detection of malaria outbreaks using health information systems data and weather forecasts.

**5. Health promotion and community participation and involvement:** To improve the knowledge of rural communities, the NMCP promotes increased community participation in developing solutions to significantly impact malaria mortality and morbidity. In addition, a cadre of community health workers, known as Agente Polivalente Elementares (APEs), is being revitalized. APEs will play a key role for the largely rural population in Mozambique in both health promotion and malaria case management.

**6. Program management, monitoring and evaluation, health system strengthening, including operational research:** Strengthened management and planning of malaria activities and capacity at all levels will direct limited resources more effectively; the consolidation and coordination of malaria-related systems to cope with rapid scale-up of malaria control interventions is a cornerstone of the strategy. Effective monitoring and evaluation (M&E) systems (including data collection, processing and use) and operational research will measure progress towards established milestones and help guide evidence-based decision-making.

### Malaria Indicators in Mozambique 2007

Malaria Indicators	MIS 2007 %
Proportion of households with at least one ITN	15.8
Proportion of children less than five who slept under an ITN the previous night	6.7
Proportion of pregnant women who slept under an ITN the previous night	7.3
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years	16.2
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months	52.4
Proportion of children less than five with fever in the last two weeks who received treatment with an antimalarial within 24 hours of onset of fever	17.6
Proportion of children less than five with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever	4.5

### Current Status of Malaria Indicators

The baseline MIS carried out in June and July 2007, at the end of the rainy season, showed that 15.8% of households had at least ITN, but only 7.3% of pregnant women and 6.7% of children less than five had slept under an ITN the previous night (see table above). This represents no

improvement in use of ITNs from the 2003 DHS. Fifty-two percent of those houses targeted for IRS had been sprayed and 16% of pregnant women had received two or more doses of IPTp. Only 4.5% of children less than five with fever had received an ACT within 24 hours of onset of symptoms.

A mid-point MIS will not be conducted as it would have been carried out at the same time as an AIDS Indicator Survey which began data collection in July 2009. A limited number of questions on ITN ownership and use, use of IPTp, and IRS have been included in that survey. Data should be available by late 2009/early 2010.

## **GOAL AND TARGETS OF PRESIDENT’S MALARIA INITIATIVE**

The goal of PMI is to reduce malaria-related mortality by 50% by the year 2010, as compared to pre-Initiative levels. By the end of 2010, PMI will provide resources to achieve the following targets in populations at risk of malaria in Mozambique:

1. More than 90% of households with a pregnant woman and/or a child less than five years of age will own at least one ITN;
2. 85% of children less than five will have slept under an ITN the previous night;
3. 85% of pregnant women will have slept under an ITN the previous night;
4. 85% of houses in geographic areas targeted for IRS will have been correctly sprayed;
5. 85% of pregnant women and children less than five will have slept under an ITN the previous night or in a house that has been sprayed with a residual insecticide within three months before the last transmission season;
6. 85% of pregnant women who have completed a pregnancy in the last two years will have received two or more doses of SP for IPTp during that pregnancy;
7. 85% of government health facilities will have ACTs available for the treatment of uncomplicated malaria; and
8. 85% of children less than five with suspected malaria will have received treatment with an ACT in accordance with national malaria treatment policies within 24 hours of the onset of symptoms.

## **EXPECTED RESULTS – YEAR FOUR**

At the end of Year 4 of the PMI in Mozambique, the following targets will have been achieved:

### Prevention:

- Approximately 5 million LLINs (of which PMI will contribute 2 million) will be procured and distributed free-of-charge to pregnant women through ANCs and to the general population through universal coverage campaigns in areas that are not targeted for IRS, bringing the national household ownership of at least one ITN to 70%.\*

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\* The shift in target for LLIN distribution to the general population reflects a shift in ITN policy from targeting vulnerable groups only to universal coverage, in line with RBM’s recommendations.

- At least 90% of houses in six districts (roughly 0.5 million houses and more than two million residents) targeted for IRS in Zambezia Province will have been sprayed with support from PMI (roughly 500,000 houses representing more than 2.0 million residents will be protected by IRS).
- IPTp will be available in all 11 provinces, with 60% of all pregnant women receiving at least two doses during their pregnancies.

#### Diagnosis and Treatment:

- Diagnostic testing for malaria will be available in at least 60% of all health providers, including community health workers.
- At least 60% of malaria episodes in children less than five will be treated with an ACT.
- Approximately 2,500 community health workers will be trained in case management and use of RDTs.
- At least 60% of health facilities will report no disruption of stock of antimalarial drugs for more than one week during the previous three months

## **INTERVENTIONS - PREVENTION**

### **Insecticide-treated Nets**

#### Current Status, Challenges, and Needs

***National plan for ITNs:*** In January 2006, MISAU declared that malaria is a national emergency and, as such, malaria prevention and treatment services must be provided free-of charge to at-risk populations through the public health service. Children less than five and pregnant women were targeted for the ITN distribution from 2006 until 2009. These populations were reached either through mass campaigns targeted to children less than five or delivered to pregnant women during ANC visits.

The new National Malaria Control Strategic Plan for 2010 to 2014 outlines the new national ITN distribution policy, which focuses on universal coverage (approximately one LLIN for every two persons) for the entire population at risk of malaria in areas that do not have IRS activities. This strategy foresees that the distribution to the high risk groups (children less than five and pregnant women) as one platform to reach the universal coverage in Mozambique. The policy also states that LLINs should continue to be distributed free-of-charge.

The primary objective of this new strategy is to achieve high levels of coverage for the entire population at risk of malaria in unsprayed areas. Mozambique is currently developing a universal coverage distribution model based on local and international experience with this distribution method. UNICEF has just completed a pilot universal coverage campaign in Mabalane District in Gaza Province and is planning to conduct three more district-level campaigns in mid-2009. The lessons learned from these pilots will form the foundation for the universal coverage distribution model for Mozambique.

The model is based on the creation at the local level of a list of all community members through a “mini-census”. Local health authorities in close collaboration with community leaders lead this activity. This list then becomes the basis for the LLIN allocation. Distribution occurs at fixed points in the community, where community members who are on the list come to pick up the LLINs allocated to them. The distribution takes place over several days thereby allowing for all community members to get to the distribution point during the campaign to pick up their LLINs.

Larger-scale universal coverage campaigns are planned to start in Mozambique in late 2009 in provinces that have not had mass distribution campaigns in the past three years, including Sofala and Manica. The goal will be to cover each province every three years.

Distribution of LLINs during ANC visits (85% of pregnant women attend ANC at least once) will continue throughout all of Mozambique, including Maputo province and city, where ITNs have recently been added to the ANC package. However, targeted distribution to other vulnerable populations, such as orphans and vulnerable children (OVCs) and people living with HIV, will be discontinued as the universal coverage campaigns are expected to reach these populations. Many partners conducting the distribution to this population found the logistics overwhelming and inefficient, as well as stigmatizing to the recipients.

A key component of Mozambique’s approach to ITN distribution is that it has focused on building domestic capacity for distribution. For the last few years, campaigns have been conducted throughout the country with significant technical support of in-country partners, and little external assistance. As the strategy shifts to universal coverage, that focus on domestic capacity building will continue.

In the Global Fund Round 9 proposal, which is currently under review, MISAU has requested support for the procurement and distribution of 18 million LLINs, over the five year duration of the grant. The proposal includes warehousing provisions as well as personnel costs to manage LLIN distribution at a provincial level.

**ITN Distribution from All Sources by Province, 2006-2008**

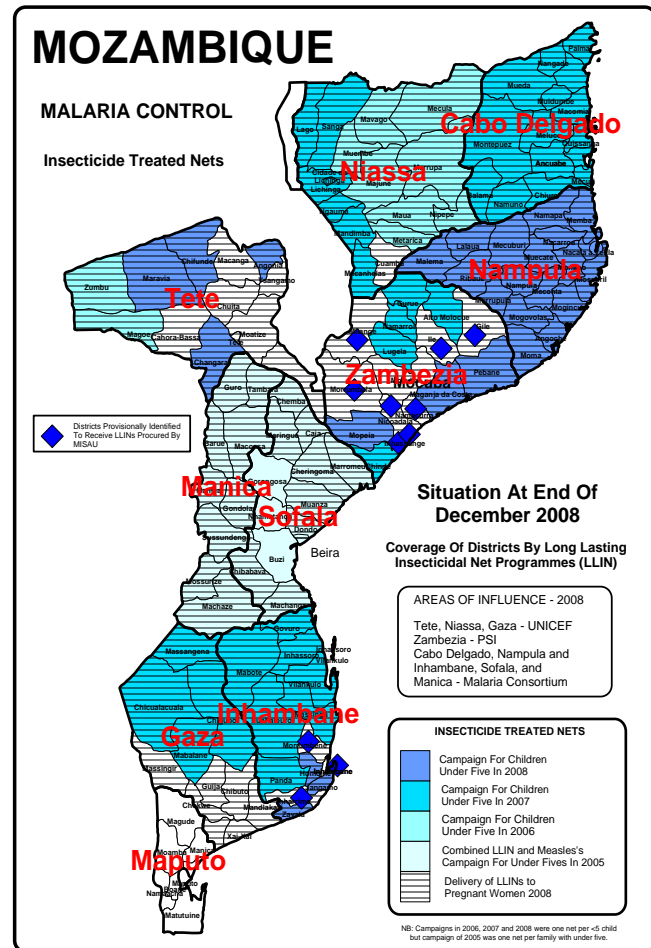
<b>PROVINCE</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Cabo Delgado	38,513	294,051	131,075
Gaza	53,300	66,195	39,237
Inhambane	79,877	191,157	159,861
Manica	8,273	20,386	106,755
Maputo	91,890	132,346	64,350
Nampula	194,712	228,578	1,045,901
Niassa	62,235	161,121	38,811
Sofala	16,304	47,923	76,150
Tete	76,306	82,675	231,604
Zambézia	61,960	282,043	192,624
<b>Total</b>	<b>683,370</b>	<b>1,506,475</b>	<b>2,086,368</b>

## Progress to date

According to provisional data from the NMCP and UNICEF (see table above) approximately 3.5 million LLINs were distributed in 2007 and 2008. During 2006, some traditional ITNs (not long-lasting) were also distributed along with LLINs bringing the total of ITNs distributed since 2006 to 2008 to approximately 4.2 million. PMI procured almost 2 million of these. In addition, PEPFAR resources were used to procure an additional 367,000 LLINs from 2006 to 2008.

Several district-level campaigns for children less than five, including in Zambezia, Niassa, and Cabo Delgado Provinces were conducted in 2007 and 2008. In October 2008, LLINs were distributed to 800,000 children less than five throughout Nampula Province during the national measles-Vitamin A-deworming campaign. PMI provided 720,000 of these nets and provided significant financial and technical support for the distribution. An additional 450,000 LLINs were procured and distributed through ANC with the support of PMI Year 2 funding.

PMI has procured 500,000 LLINs with Year 3 funding, of which approximately 200,000 will be distributed during a large-scale universal coverage campaign in four districts in Sofala Province scheduled to take place in late 2009. The remaining 300,000 PMI LLINs will be distributed through ANC. Additional Year 3 PMI funds will be used to procure another 500,000 LLINs in the last quarter of 2009, which will be distributed through ANC.



In addition to the nets provided by PMI, 800,000 LLINs, purchased by NMCP in 2009, using funding from their Global Fund Round 6 grant, are scheduled to arrive in late 2009. It is anticipated that these nets will be distributed both through ANC visits and universal coverage campaigns in the remaining unsprayed areas in Sofala (excluding those districts that will be covered by PMI's universal coverage pilot) and to the entire unsprayed areas of Manica Province in early 2010.

Despite enormous investments in LLINs and the goal for universal coverage, the performance and durability of these products in real-life settings has not been systematically monitored. Product durability is extrapolated from laboratory data from the manufacturers and a small number of small-scale field trials. Conventionally a 3-5 year lifespan has been assumed. To

assess the true durability of those LLINs distributed in combined measles-deworming-Vitamin A-LLIN campaign in Nampula in October 2008, PMI is supporting an assessment in which a sample of the nets distributed which were bar-coded. Each year, over the next three years, a subset of these nets will be collected to determine net longevity and durability.

***Population-based survey information on ITN coverage and use:*** A baseline PMI-supported MIS survey conducted in June/July 2007 demonstrated that the proportion of households with at least one ITN was only 15.8%, with a range by province of 36.9% in Manica to 5.7% in Maputo. Only 6.7% of children less than five and 7.3% of pregnant women slept under an ITN the previous night. These data show no improvement from the 2003 DHS survey, which did not provide information on household coverage, but found that 10% of children less than five and 12% of pregnant women had slept under an ITN the previous night. It should be noted, though, that these data were collected prior to the campaigns described earlier in Niassa and Cabo Delgado Provinces, and ANC distribution activities in Zambézia. Preliminary results of a 2008 UNICEF-supported Multiple Indicator Cluster Survey indicates that the percentage of children less than five that had slept under and ITN the previous night had increased to 23%. Unfortunately, the survey did not collect information on household ownership of ITNs.

***Communications and behavior change for LLIN uptake and appropriate use:*** Funding from PMI has been used for communications activities focused on increasing demand for LLINs in rural communities, particularly in Zambézia and Nampula Provinces. PMI's major implementing partner for scaling-up ITNs, Population Services International (PSI), also is conducting a survey to better understand barriers to LLIN use. This survey is being conducted in three provinces. Data collected from this survey will serve as evidence to tailor communications and behavior change activities in efforts to further scale-up LLIN ownership and use.

PSI also is collaborating with Together Against Malaria (TAM), another PMI-supported project coordinated by the Inter-religious Campaign against Malaria in Mozambique, which uses religious leaders to mobilize communities around the control of malaria. These two groups are working to coordinate messages around the use of LLINs.

***Projected ITN requirements for FY 10:*** The LLIN gap in Mozambique is based on the MISAU's goal of universal coverage of all areas which are not targeted for IRS. In addition, routine distribution of LLINs through ANCs is carried out in all areas of the country. The most recent census listed that Mozambique has a population of 21.5 million people, of which roughly 40% live in urban or peri-urban areas which are targeted for IRS activities. Excluding the population covered by IRS, 12.9 million people remain as the target for universal coverage. If we assume approximately 4.5 persons per household, then approximately 5.74 million LLINs are needed to provide all 2.87 million target households with two LLINs. If universal coverage is to be achieved over a three year period, then almost 2 million LLINs will be required every year.

Proposed Year 4 USG Component: (\$13,285,000)

Again this year, PMI will make a significant contribution towards increasing LLIN ownership and use in Mozambique. With PMI's support in 2010, all pregnant women in Mozambique will have access to LLINs through ANCs and universal coverage campaigns will be carried out in



two provinces, narrowing the gap towards achieving the NMCP's goal. As in the past, LLINs procured through PMI will be delivered free-of-charge.

The proposed activities for PMI Year 4 are as follows:

- **LLIN procurement:** Approximately two million LLINs will be procured and shipped, assuming a cost per LLIN is approximately \$5.85 each. (\$11,750,000)
- **LLIN distribution through ANCs and universal coverage campaigns:** Provide support to NGOs and provincial and district health teams for management, logistics, and promotional activities related to the LLIN delivery through ANCs and for provincial- and district-level campaigns. (\$1,500,000)
- **LLIN longevity monitoring:** Continue to monitor the durability of LLINs distributed in the 2008 campaign for children less than five in Nampula. (\$35,000)

### **Indoor Residual Spraying**

#### Current Status, Challenges, and Needs

Indoor residual spray remains a priority vector control intervention for MISAU in Mozambique. Several neighboring countries, including South Africa, Zimbabwe and Zambia have large-scale IRS programs using DDT. The Lubombo Spatial Development Initiative (LSDI), a private-public trilateral program among the governments of Mozambique, South Africa, and Swaziland, was established to develop the Lubombo region into a globally competitive zone for trade and tourism. Since malaria was identified as a major deterrent to development, the LSDI developed a specific program with the aim of reducing malaria in the region. Since 2000, the LSDI has supported large-scale IRS in Maputo Province, initially using bendiocarb in two spray rounds per year. Beginning in late 2005, the Government of Mozambique withdrew its ban on DDT and DDT was re-introduced in the Maputo Province with one spray round per year.

At the request of the NMCP, PMI continues to focus on IRS operations in Zambézia Province, providing strategic, technical, operations, and management support for IRS activities, in collaboration with provincial and district health offices and the NMCP.

The MISAU initiated IRS in Zambézia Province using DDT in 2005 in three districts of Quelimane, Namacurra, and Nicuadala with limited expansion to three additional districts, Marrubala, Mocuba, and Milange in 2006. In 2007, the NMCP and provincial health authorities requested PMI to support spraying operations in all six districts. After the initial 2007 PMI-supported spray operations, the NMCP and PMI agreed to consolidate the IRS operations focusing on the more densely populated areas, as opposed to blanket spraying of the entire population. The primary insecticide used in Zambézia has been DDT, consistent with NMCP's strategy of using DDT in highly populated urban and peri-urban areas. Deltamethrin was used in towns where structures with finished or painted walls were found. However, the MISAU has indicated that they will transition from DDT to pyrethroids during the 2009 spray season. All remaining stocks of DDT were to be used up during this campaign.

***Environmental assessment and Compliance:*** In accordance with USG regulatory requirements, a Supplemental Environmental Assessment (SEA) was conducted and approved in early 2008 by USAID and Ministry of Environment (MICOA). At the request of MISAU and with support of PMI, a multi-disciplinary team from WHO, FAO and the Ministry of Health Brazil also conducted an external assessment of the insecticide management system in five provinces (Maputo, Zambézia, Nampula, Sofala and Gaza) in January and February 2008. Subsequently, an Environmental Mitigation and Monitoring Plan was developed. In addition, the PMI-funded Environmental Monitoring and Capacity Building Project, which monitors implementation standards for IRS and ITNs and supports capacity building of relevant Mission personnel, Ministry representatives, and implementing partners to manage and oversee the safe and judicious use of public health insecticides, conducted two site visits.

In September 2008, PMI supported baseline environmental monitoring in Mozambique to characterize the concentrations of DDT in the environment in the preparation of the 2009 SEA before the beginning of spray season. Soil and crop samples were collected from farming homesteads that were sprayed with DDT from September through November 2008. Sediment samples were collected from wetlands and a river. These samples were collected from Namacurra, Nicoadala, and Quelimane Districts in Zambézia Province. The analyses of these samples are being finalized. Of the 28 IRS base sites, 23 have fully functional evaporation tanks for safe handling of IRS wastewater. Tanks in the remaining five sites have recently been completed.

***Vector monitoring:*** PMI is supporting entomologic strengthening at the central level with the upgrade of the central laboratory and insectary at the National Institute of Health (INS), the research arm of the MISAU. The upgrade and re-equipment of the laboratory and insectary will support identification of mosquito species complexes, ELISA testing for malaria-infected mosquitoes, ELISA and PCR-based monitoring for insecticide resistance, susceptibility bioassays and insecticide efficacy monitoring for IRS and LLINs.

The NMCP has also expressed interest in expanding regional entomology capacity and decentralization of entomologic monitoring/surveillance, which otherwise would be too costly and logistically difficult to support on a routine basis from the central laboratory in Maputo. In 2008, the NMCP increased regional capacity with the training of 14 biologists in a WHO/PMI-supported workshop which included basic introductory modules on entomology, epidemiology and malaria control planning. These biologists have been established in the provinces with the Departamento Provincial de Saude (DPS) to support the malaria control activities at the provincial levels.

PMI has refurbished an entomology laboratory at Quelimane in Zambézia Province for entomologic activities related to the PMI-supported IRS operations in the Province. In addition, the Quelimane laboratory can serve as a regional entomology facility for entomologic activities in other provinces in central Mozambique. The NMCP also requested PMI support for expansion of entomologic capability in the northern provinces of Mozambique. To that end, PMI agreed to support, with PMI Year 3 funding, the refurbishment of a regional entomology laboratory in Cabo Delgado Province. This will provide an opportunity for the newly recruited and trained

biologists to perform basic entomologic monitoring, such as vector identification, seasonal variations, insecticide resistance and bioassays, as part of the ITN and IRS programs.

Under USAID's Vector Control Task Order, the Liverpool Associates for Tropical Health (LATH) has responsibility for conducting entomologic monitoring for PMI in Mozambique. LATH was already conducting entomologic surveillance in five of the six districts in the Zambézia Province where PMI is conducting spray operations under the Integrated Vector Control Consortium (IVCC) project. Entomologic monitoring has now been expanded to Milange District, thereby covering all six IRS districts.

Between 2000 and 2002, resistance testing was carried out at 17 localities throughout Mozambique by the NMCP in collaboration with the Medical Research Council of South Africa and the Liverpool School of Tropical Medicine. Insecticide resistance did not appear to be an operational impediment to vector control activities except in Maputo Province, where *A. funestus* populations resistant to both pyrethroids and carbamates were observed. No resistance to dichloro-diphenyl-trichloroethane (DDT) or malathion were detected in *A. funestus*. *Anopheles gambiae* s.s. showed a low level of pyrethroid and carbamate resistance in Maputo Province, but was fully susceptible to DDT and malathion. Carbamate resistance was detected in *A. arabiensis* in Maputo Province. The *kdr* mutation in the mosquito gene, which is associated with resistance to pyrethroid insecticides and cross-resistance to DDT, was not detected in Mozambique. However, resistance testing has not been carried on a regular basis since 2002.

In March 2009, the MISAU initiated resistance testing for DDT, lambda-cyhalothrin, bendiocarb and deltamethrin in three provinces, with technical assistance from PMI. About two hundred WHO insecticide resistance assays were carried out from the sentinel sites in northern, central and southern Mozambique. MISAU is currently analyzing these data.

#### Progress to date

In FY 08, the spray campaign in the six districts in Zambézia was conducted on time, from August to November 2008, prior to the start of the rainy season. A total of 1,151 local residents were trained as spray operators, team leaders, locality coordinators, locality supervisors, district supervisors and warehouse keepers. In addition, 141 persons were recruited and trained in community mobilization. A total of 412,923 structures were sprayed, representing 95.7% coverage of the structures visited in the targeted districts. An estimated 1,457,142 residents were protected, including 612,004 children less than five. IRS was generally well accepted, with only a 4.3% refusal rate in the targeted areas.

A total of 144 tons of DDT and 4 tons of deltamethrin were procured and distributed by the Ministry of Health in 2008. PMI procured an additional 700 spray pumps, 100 maintenance kits and 1,200 units of personal protective equipment. However, towards the end of the spray operations in Mocuba, Quelimane and Nicosadala, an anticipated delivery of DDT was delayed resulting in a stock-out. Therefore, only 435,550 houses were visited, instead of the original target of 502,391 structures. The houses that were not visited/sprayed were in the more urban parts of these districts and, therefore, at lower overall risk of malaria transmission.

Based on the recommendations 2008 PMI-supported external assessment of the DDT management system, a number of environmental safeguard measures and tighter controls to reduce DDT leakage were adopted. Construction of 23 evaporation tanks in all six districts has been completed. In addition, five of the six districts now have a storage facility and operations office for safe storage and management of IRS operations. In Quelimane, the central storage facility and operations office will be used for the FY 09 spray activities, with plans for construction of a similar facility before the 2010 spray season.

The 2009 IRS campaign in Zambézia Province was officially launched in July. The remaining stock of DDT is only sufficient to cover Mocuba District. Lambda-cyhalothrin will be used in the other five districts. MISAU currently has 60 tons of DDT in Quelimane warehouse and 20 tons of lambda-cyhalothrin.

PMI has worked with the DPS, MICOA and the Ministry of Agriculture (MINAGRI) to form a provincial and district-level team to monitor environmental compliance and spray quality standards. To mitigate the likelihood of DDT leakage, these teams visit local markets and make unscheduled stock inspections of all operational base stores. In addition DPS, MICOA and MINAGRI personnel participated in environmental monitoring activities in September 2008 for the pre-IRS operations during which 350 samples from soil, crops, food and sediment were collected. These samples were sent to Kenya for DDT trace analysis. Results are pending.

A logistics plan for the management of DDT waste water and IRS-related material from the six IRS districts has been developed. DDT waste water has been collected and secured in tanks and transported to district center bases in the health centers. The waste water is then emptied into the evaporation tanks. Once the evaporation process is complete, the residual powder will be collected and stored in the Quelimane central warehouse until the end of the 2009 spray season. In addition, all IRS-related material (PPEs and other contaminated equipment) from six districts was collected and is being stored in the central warehouse in Quelimane. All waste material from 2008/2009 spray operations will be disposed of at a certified incineration facility in South Africa.

The refurbishment of the laboratory in Quelimane, located on the premises of the DPS Medical Stores, has been completed and it is operational. In collaboration with the DPS, the insectary will be set up for insecticide resistance monitoring and to monitor IRS insecticide efficacy. The laboratory/insectary is currently supported by one biologist from the Instituto Nacional de Saúde and two malaria technicians from the DPS. One of the biologists, trained in 2008, is currently working with the DPS and will participate in the IRS and entomologic monitoring activities.

In Zambézia, a total of 23 sentinel entomology sites have been set up, 21 of which are in the IRS regions. Two sentinel sites are from an adjoining non-IRS district and will be used for comparison. At each sentinel site, six houses were selected and one window trap installed in each house, a total of 138 traps. A household member has been trained to remove the mosquitoes on a daily basis into collection jars. All specimen jars are collected monthly, and preliminary species identification is made at the Quelimane laboratory. The material is sent to the University of Durban, South Africa for PCR species identification and for ELISA determination of infection rates. In the future, when the INS laboratory refurbishment is completed, the material could be processed in Maputo.

Insecticide resistance testing was carried out on adult mosquitoes from indoor resting collections from unsprayed houses in all districts of Zambézia Province, except Nacamurra, Nioadala and Quelimane. In these three districts the IRS activities had begun and numbers of mosquitoes collected were too low to perform the WHO resistance assay. The WHO assay was conducted for DDT and where there were sufficient numbers of mosquitoes, deltamethrin was also tested. No DDT resistance or deltamethrin was observed in any districts for *An. gambiae* or *An. funestus*. Baseline mosquito species density and infectivity data indicates that the main malaria transmission is from July to March. Testing for malaria infection also indicated that both *An. gambiae s.s* and *An. funestus s.s* are actively involved in malaria transmission in the region.

The refurbishment of the INS Maputo laboratory, scheduled for October 2008, was delayed due to the MISAU plans to move the laboratories out of the MISAU headquarters building. However, a new site for the laboratories was not identified and MISAU have postponed plans for the relocation for at least two years. Therefore, PMI has agreed to partially refurbish of the INS laboratories in their current location, starting in July. The building, identified by the NMCP for the Pemba regional entomology laboratory in Cabo Delgado Province, was found to be structurally defective. The plans have, therefore, been modified to set up the laboratory in three insulated containers instead and are pending MISAU and PMI approval.

Proposed Year 4 USG Component: (\$8,509,600)

PMI will support a fourth round of focal IRS in six districts of Zambézia Province in Year 4. Resources will be targeted to build the technical and managerial capacity of the NMCP and the provincial health authorities. PMI will work closely with the NMCP in forecasting the quantity of insecticide needed in 2010 to ensure that the required quantities will be available. The goal will be to enable responsibility for these activities to transition back to the national and provincial authorities by 2011.

The proposed activities for PMI Year 4 are as follows:

- **Support training, operations, and supervision of IRS activities in six districts of Zambézia Province:** This will include hiring and training nearly 1,100 spray personnel, who will spray approximately 502,000 houses (covering two million residents) over a three-month period. (\$7,500,000)
- **Purchase equipment and supplies for the IRS operations in these six districts:** Procurement of adequate supplies of pyrethroid, personal protective equipment, and spray equipment spare parts. (\$750,000)
- **Environmental monitoring:** Support will be provided for routine monitoring of IRS field activities, to ensure that environmental and human health mitigation measures are adequately addressed. (\$37,500)
- **Provide long-term technical assistance and capacity building in entomology at NMCP:** Support for a second year of a Masters-level entomologist (local-hire or third-country national) who will work at the NMCP to provide technical assistance and

capacity building in entomology. This position will fill a gap while a NMCP staff person is sent for Masters training in entomology. The cost of this training will be covered with PMI Year 3 funding. (\$100,000)

- **Support entomologic monitoring at central and provincial levels:** PMI will procure needed supplies and reagents for entomologic monitoring and insecticide-resistance testing, and support additional training of local staff. (\$100,000)
- **TDY and supplies from CDC-Atlanta:** CDC staff to provide technical support to entomologic training and monitoring activities, including support for specific reagents and other laboratory diagnostic materials. (\$22,100)

## Malaria in Pregnancy

### Current Status, Challenges, and Needs

According to the PMI-supported 2007 MIS, attendance at ANCs in Mozambique is relatively high, with 84% of pregnant women attending at least twice during their pregnancy. These visits, though, tend to take place late in pregnancy. ANC attendance rates are lower in rural areas. There have been anecdotal reports that free distribution of ITNs has increased ANC attendance.

Since May 2006, the MISAU has promoted the use of IPTp for all pregnant women. At least three monthly doses of SP after quickening are recommended because of high HIV prevalence. While the use of IPTp is national policy in Mozambique, its uptake has been limited, particularly in the Northern provinces. Although IPTp is reportedly provided in almost all health facilities throughout Mozambique, data from the 2007 MIS demonstrated that only 16.2% percent of women with a completed pregnancy in the previous two years had received two doses of IPTp. It remains unclear, though, why uptake has been slow. Analysis of qualitative and quantitative data from the 2008 Health Facility Survey is underway and may shed some light on this.

Assuming that pregnant women make up about 5% of the population, we can estimate that approximately 1.1 million women will become pregnant in 2010. Using this figure, a total of 3.3 million treatments will be required if each woman is to receive three doses of IPTp. The NMCP reports that there are sufficient quantities of SP available to meet all needs through 2010. MISAU is updating the malaria treatment guidelines in anticipation of the roll out of AL as the new first-line treatment of uncomplicated malaria. In the revised guidelines, AL will be recommended for pregnant women in their second and third trimesters and oral quinine for malaria in pregnant women in their first trimester.

In Mozambique, many pregnant women are also HIV-positive and are learning their serologic status when they present for ANC services. Seropositive women are referred to HIV Day Hospitals for CD4 testing and enrollment in antiretroviral therapy, as appropriate. Many of the PEPFAR Prevention of Mother-to-Child Transmission (PMTCT) partners have introduced cotrimoxazole prophylaxis for HIV-infected women, precluding the use of SP for IPTp for these women. To date, though, comprehensive guidelines for preventing malaria in HIV seropositive pregnant women have not been finalized.

The NMCP and National Maternal and Child Health (MCH) Program staff have collaborated in developing the IPTp policy. Limited training has been provided on IPTp to national and provincial MISAU staff, staff from NGOs, and some maternal and child health nurses. However, this training has been insufficient, poorly coordinated, and lacks adequate follow-up supervision.

A PEPFAR-funded assessment carried out in 2008, on integration of PMTCT and IPTp, found little investment had been made to strengthen the communication channels within MISAU and among partners to sustain a high-quality integration of HIV/AIDS, malaria, and maternal-child health programs. This has resulted in a failure to provide integrated care at ANCs. Approaches to support integration of PMTCT and IPTp into MCH services include:

- a. Using national guidelines for the care of pregnant women in all health centers.
- b. Standardizing and updating record keeping forms to capture the necessary information required to generate relevant maternal and neonatal health data.
- c. Offering comprehensive training to nurses who work on child-maternal health.
- d. Giving regular technical support and supervision.
- e. Ensuring that there are sufficient and qualified human resources.
- f. Guaranteeing availability and regular control of necessary medications and reagents.
- g. Strengthening communication and coordination among the different sectors involved in the care of pregnant women.

USG-funded PMI, MCH, reproductive health, and PEPFAR partners will continue to work with the MISAU MCH program to support the development and implementation of a comprehensive ANC package for pregnant women, consisting of anemia, syphilis, and HIV testing; provision of iron, folic acid, Vitamin A, de-worming, IPTp and LLINs; PMTCT services; and health education and counseling on breastfeeding, nutrition, HIV and hygiene.

#### Progress to date

ANCs continue to be a primary route for distribution of free LLINs to pregnant women (refer to ITN section for more details). Sufficient SP has been purchased by MISAU to cover IPTp needs through 2010. In an effort to assess the barriers to IPTp roll out, a module for IPTp as well as observation of service delivery was incorporated into a national Health Facility Survey, conducted in December 2008. Results of this evaluation are expected in the third quarter of 2009. Additionally, one of the tasks for the revitalized APEs will be to assure appropriate referral for IPTp in pregnant women seeking care at the community level.

PMI, MCH, reproductive health and PEPFAR partners have been working to harmonize service delivery in ANC clinics through the development and implementation of an integrated ANC package of care. An accelerated plan of training and supervision of this package of care will be implemented in 2009 with USG support. In addition, communications and behavior change activities promoting early antenatal care and adherence with all three doses of SP have not been implemented nationally and messaging has not been standardized.

Proposed Year 4 USG Component (\$350,000):

PMI supports provision of comprehensive ANC services to pregnant women and continuing communications and community mobilization activities to educate pregnant women on the importance of early antenatal care, taking all doses of SP, and sleeping under an ITN every night. The government of Mozambique has already procured sufficient doses of SP to cover the needs through 2010. Distribution of ITNs to pregnant women through ANCs will continue to be an important intervention for providing protection from malaria to pregnant women and their newborn children.

The proposed activities for PMI Year 4 are as follows:

- **LLIN distribution through ANCs:** Procure LLINs and support their free distribution through ANCs. (covered in ITN section, see page 13)
- **Support training and supervision of health workers:** Provide pre- and in-service training and supervision to MCH nurses in a comprehensive package of ANC care to include anemia, syphilis, and HIV testing; provision of iron, folic acid, Vitamin A, de-worming, IPTp and ITNs; PMTCT services; and health education and counseling on breastfeeding, nutrition, HIV and hygiene. (\$350,000)
- **Communications and community mobilization:** Support development and dissemination of malaria prevention messages encouraging pregnant women to seek early antenatal care, take all doses of SP, and sleep under an ITN every night. (covered in Communications section, see page 32)

## **INTERVENTIONS – CASE MANAGEMENT**

### **Malaria diagnosis**

#### Current Status, Challenges, and Needs

Historically, malaria diagnosis in most MISAU health facilities was based on clinical grounds. Only about 20% of all malaria cases are diagnosed by microscopic examination of a blood slide. INS has been responsible for the training and supervision of malaria microscopists, and quality control of malaria microscopy, but this system is barely functional. The most recent refresher training was conducted in February 2007 and included two microscopists from each province. These laboratory technicians were trained in malaria diagnosis, including microscopy and RDTs, although the curriculum was incomplete.

Senior laboratory technicians from the INS and the NMCP used to make occasional supervisory visits to provincial laboratories for refresher training and quality control of microscopy, but the content of these supervisory visits was not standardized and no such visits have been carried out for some time.



The Secção de Laboratórios (Laboratory Section) of MISAU is responsible for evaluating laboratory equipment and reagent needs and for the training of staff in the use of new equipment. There has been little coordination, though, between the Secção de Laboratórios, NMCP, and CMAM (which is responsible for distributing laboratory supplies), so the needs of laboratories are unknown.

RDTs were introduced as part of malaria case management in Mozambique in early 2007, but standardized case management guidelines were not developed and only some technicians received training in the performance of these tests, raising serious concerns about the quality of this testing. The distribution of RDTs is the responsibility of CMAM, but there has been no forecasting or adequate quantification of the need. Neither is there a specific plan for distribution. As a result, large stocks of RDTs remain in warehouses, likely to expire before they are distributed. At the same time, stock-outs at peripheral levels also have been reported.

In 2007, MISAU approved the “Criteria for Rapid Diagnostic Test Use in Mozambique.” These guidelines recommend that, in highly endemic areas, children less than five with symptoms suggestive of malaria will be treated based on clinical findings. Older children and adults with suspected malaria should have a diagnostic test and only those testing positive should be provided treatment. In areas with moderate to low prevalence of malaria, primarily Maputo and surroundings, the criteria recommend that all children and adults should undergo diagnostic testing before treatment is prescribed, including at the community level. Little is known about compliance with these criteria, but it is suspected that health workers do not follow these guidelines, particularly since many of them never received training on the use of RDTs.

With the launch of the new malaria case management policy, the policy for diagnostic testing for malaria is also being revised. The draft “Guidelines for Case Management in Mozambique” recommends that persons of all ages and from all parts of the country who are suspected of having malaria receive a diagnostic test for malaria before prescribing treatment. This policy will be applied at all levels of care, including care provided by APEs. RDTs will be the preferred test for primary diagnosis of malaria. Microscopy is to be reserved for suspected treatment failures, diagnosis of severe febrile illness, and cases referred from lower levels of care.

#### Progress to date

A comprehensive strategic plan for malaria laboratory diagnosis is being finalized with PMI technical support. This will cover procedures for training of laboratory technicians, quality control of malaria microscopy and RDTs, and quality assurance of laboratory testing procedures. For QA/QC activities, the proposed plan would develop “centers of excellence” in each province that would have the responsibility for supervision, training, and QA/QC of all laboratories in their catchment area.

The NMCP, with support from PMI and other partners, is finalizing a standardized curriculum for in-service training of health workers, which includes training in the performance and interpretation of RDTs. In addition, a comprehensive curriculum for pre-service training of APEs, which includes training in the use of RDTs, is in the late stages of development by the MCH Department of MISAU, with the support of PMI and USAID.

PMI is currently launching a national malaria laboratory assessment which will provide information on the needs for equipment and supplies at all 186 public sector laboratories in Mozambique. PMI already has purchased 80 microscopes and microscopy supply kits with FY 07 support, which will be distributed by the NMCP to provincial and district health facilities based on the results of this laboratory survey.

Refurbishment and re-equipping of the national malaria reference laboratory was delayed by a Ministerial decision to move all laboratories out of the MISAU headquarters. This decision, though, was subsequently reversed until plans for construction of a separate national reference laboratory can be realized. Therefore, the refurbishment of the current malaria reference laboratory facility will proceed in the coming months.

***FY 10 Planning:*** With the impending launch of the new malaria treatment policy, including the expectation that all cases of malaria will be confirmed with a diagnostic test, there is a need to rapidly finalize the malaria laboratory policy and guidelines and quickly train all laboratory staff and clinicians in the proper use of RDTs.

Although CMAM has responsibility for procurement of RDTs, the most recent tender for RDTs was developed by the NMCP. The test kits will be received, warehoused, and transported by CMAM and their provincial and district counterparts. PMI supported the development of a forecast and distribution strategy for future consignments of RDTs. This plan took into account the four million RDTs included in the Global Fund Round 9 proposal submitted in June 2009.

According to the forecast, 2010 needs for RDTs are 9.5 million tests. However, filling the pipeline to ensure an uninterrupted supply of RDTs through the supply chain would require a total of 16,400,000 kits. This estimate assumes that 20% of fevers will be confirmed with microscopy and 80% confirmed with an RDT. Currently, there are about 900,000 test kits in stock at CMAM which will expire in December 2009. The quantification, therefore, did take this stock into account. The NMCP has funding to procure about four million kits. If adherence to the new guidelines is high, though, stocks of RDTs will not be sufficient. There is some concern, though, that uptake of RDTs will be slower than projected, which could result in an overstock of RDTs, which could expire before they can be used.

Plans for a supervision and QA/QC system for both microscopy and RDTs are in the early stages of development. At lower level facilities, testing with RDTs will be done by the clinicians and supervision of their performance of these tests will be integrated within clinical supervision activities. For facilities with laboratories, supervision of RDT and microscopy performance will be provided by the planned “centers of excellence.” Clinical supervision at the facility level also should include monitoring of the use of diagnostic testing, to ensure that clinicians are ordering the test appropriately and utilizing the results when prescribing treatment.

Proposed Year 4 USG Component: (\$3,562,100)

In Year 4, PMI will support the continued strengthening of diagnostic laboratories at all levels, through procurement of necessary commodities, refresher training, supervision, and QA/QC of diagnostic testing.

The proposed activities for PMI Year 4 are as follows:

- **Procure additional microscopes, RDTs, and laboratory supplies:** Support will be provided to procure approximately 3 million RDTs plus additional microscopes and microscopy kits. The quantities of microscopes and kits will be informed by the results of the national laboratory assessment, which will soon be carried out. (\$3,000,000)
- **Support training and supervision of laboratory diagnosis:** Support will be provided for training and integrated supervision of laboratory staff in the conduct of malaria microscopy and RDTs. This activity will be coordinated with activities to improve laboratory diagnosis of other diseases, e.g., HIV/AIDS and tuberculosis. (\$500,000)
- **Provide technical assistance on development of policies and guidelines:** PMI will provide technical assistance to the NMCP and INS for updating of appropriate policies, guidelines, training materials, standard operating procedures, and job aides on diagnostic testing of malaria. (\$50,000)
- **TDY from CDC-Atlanta:** CDC staff to provide technical support to NMCP and INS laboratory strengthening activities. (\$12,100)

### **Case Management**

#### **Current Status, Challenges, and Needs**

***Malaria treatment:*** Because of concerns about resistance to SP, a new malaria treatment policy was developed in 2007, which replaced AS-SP with AL as first line treatment. This new policy, though, was not launched until mid-2009, beginning with a training-of-trainers workshop in Maputo and subsequent cascade training at provincial and district levels. Along with AL, AS-AQ was chosen as second-line (primarily intended for those with hypersensitivity to AL). Quinine remains the recommended treatment of severe malaria and for treatment of pregnant women during the first trimester. This policy also recommends artesunate rectal suppositories for pre-referral treatment of severe malaria in settings where intramuscular or intravenous quinine cannot be administered. Included in this policy is a new recommendation that patients of all ages undergo confirmatory diagnostic testing, either microscopy or RDT, before treatment is given.

Malaria treatment will continue to be available, free-of-charge through all public health facilities and by APEs. Previously, there was a large cadre of APEs that received a six-month training on the management of common illnesses, including malaria, and respiratory and diarrheal diseases. Many of them, though, have not received refresher training or supervision and there has been significant attrition. Currently, it is estimated that there are no more than 1,500 APEs distributed unevenly throughout the country.

MISAU--with support from USAID, the World Bank, and other partners-- has developed a comprehensive, costed plan for rebuilding this cadre of APEs. Implementation of this plan is about to be launched with support from the World Bank Health Project, PEPFAR, and USAID health funding. A total of 2340 new APEs are expected to be undergo a four-month training

program over the next five years at a cost ranging from \$9,000,000 to \$32,000,000 per year. Training of APEs will include the new malaria case management guidelines, including the use of RDTs. This expansion, if successful, will greatly improve access to malaria case management, particularly in rural areas in the north of the country where access to health facilities is limited.

***Structure of the pharmaceutical management system:*** CMAM has primary responsibility within MISAU for supplying the public health system with medicines and medical supplies, including all malaria-related drugs and supplies other than ITNs. Along with NMCP, CMAM has responsibility for forecasting needs and supervising the procurement, storage, and distribution of medicines and supplies.

The current distribution system in Mozambique uses two separate logistics systems. The more commonly used essential medicines are supplied through a kit system. Currently, there are three types of kits — Kit A for health centers, Kit B for health posts, and Kit C for APEs. Kits are procured through an international wholesaler, prepared by the supplier at a facility in India, and then delivered biannually to each of the four main ports in Mozambique: Maputo, Beira, Quelimane, and Nacala. Kits are delivered to provincial warehouses, bypassing the central medical stores, pushed to the districts, and then to health facilities and APEs. These kits are fully financed using pooled MISAU/donor resources.

The second channel of distribution is called Via Classica. Commodities are delivered to one of the two central warehouses in Maputo and Beira, which in turn supply the three central hospitals and ten provincial warehouses. Each of the ten provincial warehouses supply the district warehouses, rural hospitals, general hospitals, and provincial hospitals. Unlike the kit system, Via Classica uses a pull system, requiring health facilities to place orders with the higher levels for replenishment. Inaccurate forecasting, multiple changes in national malaria treatment policy and inadequate storage space, particularly at CMAM, have resulted in many problems with the management of malaria treatments through the Via Classica.

In the past, first-line malaria treatment had been supplied in the kits to health centers, health posts, and APEs, while second- and third-line treatments were distributed through the Via Classica. The adoption of AL as first-line treatment poses a new challenge, as the bulkiness of its packaging make it impossible for sufficient quantities of this drug to be included in the kits. A pilot assessment designed to determine delivery preferences for the new first-line treatment, financed by PMI, was completed in early 2009 and results favored the use of a parallel AL kit system, where antimalarials are packaged in separate kits and distributed to health centers, health posts, and APEs in the same manner as the original drug kit. AL will be distributed to hospitals through the Via Classica.

It should be noted that, as of May 2009, it has been projected that there was only enough AS-SP in stock at provincial warehouses to last approximately 2.1 months. This generated concerns regarding potential stock outs of ACTs in Mozambique if implementation of the new first-line was delayed beyond the planned launch of July 2009.

***Quantification of malaria treatments:*** Estimates of needs were provided by the NMCP based on historical data captured from the 2007 census and from aggregated data collected weekly at the

provincial level in the form of the Boletim Epidemiologico de Semana. As is common, assumptions made for antimalarial drug forecasting and quantification included several variables. Specifically, estimates for 2010 consumption are based on an expected total of approximately 9.3 million episodes of malaria to be treated in the public health system (see table below).

#### Estimated antimalarial drug needs and costs

<b>Treatment</b>	<b>2010 estimated needs (treatments or units)</b>	<b>Cost (US\$)*</b>
<i><b>AL</b></i>		
6x1 tablet blister	2,792,640	1,033,277
6x2 tablet blister	1,350,240	999,178
6x3 tablet blister	1,224,480	1,359,173
6x4 tablet blister	3,992,160	5,589,024
<b>Total</b>	<b>9,359,520</b>	<b>8,980,652</b>
<i><b>AS-AQ</b></i>		
3+3 tablet blister (50mg/153mg)	265,340	145,937
6+6 tablet blister (50mg/153mg)	47,000	49,350
12+12 tablet blister (50mg/153mg)	145,000	282,750
<b>Total</b>	<b>457,340</b>	<b>478,037</b>
<i><b>Quinine</b></i>		
Ampoules	4,194,837	587,277
Tablets ( <i>not treatments</i> )	6,648,141	183,489
<i><b>SP (for IPTp)</b></i>		
Tablets	11,814,189	236,284

\* Freight and distribution costs not included

The new requirement for confirmatory testing of all patients before malaria treatment is provided poses two additional challenges. It will eventually result in a significant decrease in the requirements for AL, although the magnitude of that decrease will be difficult to predict prior to implementation and will grow over time. Second, a logistics system for distributing the RDT kits will need to be developed, as these test kits will not be in either the drug kits or the AL kits.

A number of parameters were considered when developing the quantification for AL, including the maximum and minimum buffer stock levels required at different levels, the time needed to transport drugs through the system, and the relatively shorter shelf-life of AL compared to other non-artemisinin malaria treatments. This quantification also takes into account differences in malaria prevalence by province and age group, accessibility to health services, and expected impact of IRS and ITNs in malaria transmission. The incidence of non-malaria fevers (suspected to be malaria), however, was not considered a variable and remained constant for purposes of the quantification calculations. Finally, the estimates factor in a sustained decrease in consumption of AL as RDTs are scaled-up, but it was assumed some patients would not get tested with an RDT but still be treated for a clinical diagnosis of malaria.

Annual requirements for AS-AQ, the second-line treatment, were calculated with the presumption that 5% of the total number of expected malaria cases treated in the public health system would require second-line therapy, or about 457,340 treatments. Given the evidence supporting both a strong clinical response and good tolerability of AL, however, PMI continues to believe this estimate is high. Estimates for parenteral quinine for severe disease and artesunate suppositories for pre-referral treatment were projected to account for 1% of all malaria cases. Artesunate rectal suppositories are to be included in the drug kits. Using the 2007 census data, it also was estimated that 5.2% of the population would be pregnant next year and 85% of those would receive SP. Forecasted requirements for AL, AS-AQ, quinine, and SP are listed in the table above.

PMI has supported the procurement of AL with both FY08 and FY09 funds, although some of these drugs have been used to replenish stocks of AL that is currently being used as second-line treatment and to fill buffer stocks at provincial warehouses, as the country prepared itself for the launch of the new policy.

Approximately 4.9 million treatments of AL are currently available as stock on hand (as of April 2009). CMAM received an additional 6.5 million treatments in mid-2009 (1.9 million treatments supported by PMI and 4.6 million treatments supported by the Global Fund through UNITAID). Because part of this stock will be used to create the requisite buffer stock, 9.4 million treatments of AL are needed for 2010 to keep up with demand and maintain stocks within acceptable levels.

**Procurement:** Bearing responsibility for the procurement of all essential drugs and devices for the public sector, CMAM issues international tenders typically twice annually. CMAM's Supply Chain Management System, developed with the support of PEPFAR, has step-by-step instructions to facilitate this process and prevent unnecessary delays. This system helps expedite the importation process for drug procured with support of PMI.

As part of ongoing QA/QC, proper bid documentation accepted by CMAM must meet criteria issued by MISAU that includes certificates of origin for each consignment issued by recognized laboratories, in compliance with WHO prequalification scheme of pharmaceuticals. Additionally, lot sampling is required and samples sent for verification by the National Pharmaceutical Quality Control laboratory prior to award of a contract. Furthermore, goods must have at least 75% of their shelf-life remaining upon arrival in port for the consignment to be accepted. While vendors must also demonstrate adherence to good manufacturing practices in order to be considered acceptable to respond to a tender, requirements for compliance with either WHO and/or a stringent regulatory authority are not enforced.

In May 2009, CMAM issued a tender for malaria drugs, which included co-blistered AS-AQ (but not AL). Future tenders, though, will be for fixed-dosed (co-formulated) AS-AQ. This raises some concerns, as there is only one fixed-dose formulation currently pre-qualified by WHO and CMAM has stated that it will not exclude other manufacturers of fixed-dose AS-AQ.

**Distribution:** Distribution of essential drugs in Mozambique remains particularly challenging, especially from the central to the provincial levels. The main warehouse facilities at the central level have included ADIL, the main warehouse in Maputo, operated by CMAM, and two satellite

warehouses, Zimpeto, which is located in Maputo and has absorbed some of the overflow stock from ADIL, and a warehouse in Beira. For the last few years, USAID's DELIVER Project, with support from PMI, and PEPFAR's Supply Chain Management Strengthening Project have supported the strengthening of the capacity at CMAM, which included the costs of the Zimpeto and the Beira warehouses.

Recently, both the ADIL and Beira warehouse facilities have been over capacity because of inadequate procurement, inventory, and distribution management. Transportation of commodities, including antimalarials, which should occur quarterly, has been unpredictable because of the lack of trucks and fuel and poor inventory management. This has resulted in stockpiling of essential medicines at the central level and stock outs at more peripheral levels. In late 2008, urgent assistance was required from PMI to move seven 40-foot containers of AL from ADIL to the Beira warehouse, which had recently been overhauled with the support of PEPFAR. PMI also provided support for distribution of this AL from the Beira warehouse to lower-level facilities.

PMI and PEPFAR also are supporting improvement of CMAM's capacity to manage stock at the central and provincial warehouses. The goal is to generate more reliable consumption data which will enable more informed forecasting and better inventory management. However, challenges surrounding full implementation of the system are still to be resolved.

***Pharmacovigilance:*** The pharmacovigilance system in Mozambique was implemented by the Center for Drug Information, based at the Universidad Eduardo Mondlane, in collaboration with disease control programs (including NMCP), to monitor the safety of all drugs, particularly those that have been newly introduced. Current pharmacovigilance activities for malaria are limited due primarily to lack of resources. With the new malaria treatment guidelines roll-out in mid-2009, there is a need for AL adverse reaction monitoring, although considerable numbers of persons have already been exposed to AL as second-line treatment. The FY08 MOP did allocate funds to the support of the Center for Drug Information's efforts to monitor the roll-out of AL and while funds were not allocated in either of the subsequent two MOPs for pharmacovigilance, the pipeline from those activities should be sufficient to continue AL monitoring in 2010.

***Non-governmental organizations and the private sector:*** It appears that NGOs are not currently involved in providing treatment with ACTs in Mozambique, although many do work with APes. It is believed that use of the formal private sector for malaria treatment of children in Mozambique is uncommon and concentrated primarily in urban areas, where most private health facilities and pharmacies operate. The number of informal drug sellers is thought to be low, but this has not been systematically assessed. Private pharmacies are regulated by the Pharmacy Department and must be registered with the MISAU in order to operate.

Pharmacies are not allowed, by Mozambican statute, to dispense antimalarials without a prescription. PSI conducted a survey in private pharmacies in Maputo City in 2007, which looked at the availability of antimalarials and prescribers' reported treatment practices for malaria. This survey showed that AL was not available in private pharmacies in Maputo, but artemisinin derivatives were available and sometimes prescribed as monotherapy. PMI, PSI, and the Medicines for Malaria Venture (MMV) were planning an evaluation of the availability and

dispensing practices of formal and informal private sector drug sellers in Maputo, Morumbala, and Chokwé in 2008, but this study did not take place.

***Antimalarial drug efficacy:*** Between 1998 and 2001, a series of 28-day *in vivo* drug efficacy studies of chloroquine, AQ, and SP monotherapies were conducted in Manhiça, using the WHO standardized protocol. Researchers reported clinical and parasitological failure rates of 80% for chloroquine, 26% for AQ, and 21% for SP. Studies from 2003 at two sites in the LSDI Project area showed failure rates of 9% and 12% with SP monotherapy and 2% and 4% with AS-SP. Drug efficacy studies were conducted by INS in six sites in 2006, although results from these studies have never been released. The protocol for testing the new first-line antimalarial policy is under revision and studies at the six sites are expected to be conducted during the next year.

### Progress to date

PMI procured 3,548,360 treatments of AL, using FY 08 and FY 09 funding. Two shipments have been received in March and June 2009. Some of the March shipment was used to replenish the buffer stocks for AL at provincial warehouses. The remainder will be used for the launch of the new malaria treatment policy. PMI also supported the development of a comprehensive implementation plan and training materials for the implementation of this new policy, which began in mid-2009.

In collaboration with the Clinton Foundation, PMI supported a workshop to forecast and quantify requirements for malaria treatments. These included each of the four presentations of AL, three dosing presentations of AS-AQ, oral and parenteral quinine, artesunate rectal suppositories, and SP. PMI also supported the forecasting and quantification needs of RDTs, taking into account the percentage of suspected malaria cases that will be confirmed by microscopy and RDT.

In anticipation of this policy launch, PMI also funded a pilot evaluation of two different systems for distributing AL to health facilities and APEs in Zambezia and Niassa Provinces in October to December 2008. This pilot, which compared a parallel kit to a “two-bin” pull system, was conducted in collaboration with the CMAM staff, who were also involved in the design and implementation of the pilot. Qualitative and quantitative data was collected from 39 health facilities, 11 community health workers, eight district stores, and two provincial warehouses.

Preliminary findings from this pilot showed fewer stock outs of AL with the parallel kit system, as opposed to the two-bin system. The results of this assessment also suggested that it would be more cost-effective to assemble the AL kits centrally and then distribute them to the provincial level. Based on these recommendations, capacity to assemble these kits has been established at the Maputo and Beira warehouses. PMI is supporting the procurement of kitting materials and boxes. Assembly of these kits will start prior to the launch of the new treatment guidelines.

Continued technical support from PMI has been provided to CMAM to improve the storage, distribution, and logistics surrounding RDTs. PMI collaborated with PEPFAR to support the integration of RDTs for malaria into the Rapid Tests Logistics Management system and continues to provide technical assistance to CMAM and NMCP in the development of an immediate and a longer-term RDT distribution strategy.



Proposed Year 4 USG Component: (\$8,230,000)

Ensuring prompt, effective, and safe ACT treatment to 85% of patients with laboratory-confirmed malaria in Mozambique represents a major challenge for PMI and NMCP. The country's weak pharmaceutical management system, the introduction of mandatory laboratory confirmation for all age groups, the change in national treatment policy, the short shelf-life of ACTs, and the need for behavioral change of patients and health workers all pose major bottlenecks to achieving this goal. If Mozambique is to make progress on the treatment of malaria, action to address all these bottlenecks will be required.

The proposed activities for PMI Year 4 are as follows:

- **Procure malaria treatments:** PMI will procure AL to fill gaps in needs of first-line treatment, as well as intravenous and oral quinine for severe malaria, and pre-referral rectal artesunate. Exact quantities of each antimalarial will depend on specific needs at the time of procurement, but it is estimated that funds available in FY 10 would be sufficient to procure approximately six million treatments of AL. (\$6,000,000)
- **Provide technical assistance to strengthen antimalarial supply chain and overall pharmaceutical management system:** Support will be provided for strengthening CMAM's capacity to forecast and manage antimalarial drugs through improved logistics management capacity and continued assessments of warehousing inventory management, as well as strengthening storage and distribution capability especially at the central level. Support will focus on completion of the implementation of the new malaria treatment policy, maintenance of provincial kitting capacity, and effective distribution of RDTs. Pharmaceutical and supply chain strengthening activities will also include the end-use verification exercise to better monitor the availability of key malaria drugs and commodities at the facility level. (\$500,000)
- **Support refresher training and supervision of clinical staff:** PMI plans to support refresher training and supervision of health workers at all levels of the public sector to ensure that health workers are managing patients in line with the new guidelines. These activities will be carried out in close coordination with the NMCP, provincial and district health teams, and other partners. (\$730,000)
- **Provide pre-service training of APEs:** Funding will support the NMCP's goal of increasing the number of APEs as a means of improving access to malaria case management at the community level. PMI support will leverage additional support from PEPFAR, USAID MCH funding, the World Bank, and other donors. APE training will cover malaria case management and the use of RDTs, as well as malaria prevention messaging. (\$1,000,000)
- **Support communications and behavior change activities in support of the new drug policy:** As part of a comprehensive communications strategy on malaria, support will be provided for the implementation of communications and behavior change activities promoting early care seeking for fever and introducing the public to new first-line malaria

treatment, as well as promoting adherence to the new treatment. (Costs covered in Communications and Behavior Change section- page 32)

## **COMMUNICATIONS AND BEHAVIOR CHANGE**

### Current Status, Challenges, and Needs

Although progress has been made in some areas, communications and behavior change related to malaria prevention and control continue to be a significant gap in the malaria control in Mozambique. NMCP developed a draft Health Communication Strategy in October 2006, but it has yet to receive final approval from the Minister of Health and has not been used to guide communications and behavior change activities on malaria. The draft strategy has three major malaria communication themes:

- Case management of malaria, including preventive treatment of pregnant women
- Indoor residual spraying
- ITNs ownership and correct use

In addition to the Health Communication Strategy, the NMCP has included a section on Health Promotion and Mobilization with Community Involvement in its 2009-2014 Strategic Plan. Although the NMCP has a communications officer who is responsible for coordinating communications activities for malaria, their role to-date has been limited.

MISAU recently appointed a new Director for its Health Promotion Department in an effort to revitalize health communication activities on all public health issues. The Director has begun a review and revision of the national Health Communications Strategy which will coordinate all communications and behavior change activities within MISAU and with all health partners in Mozambique.

At the provincial level, a health education and communication coordinator is responsible for educating communities about malaria interventions and other health-related topics. These coordinators, though, are over-stretched and funding is limited.

To date, communications activities carried out by NMCP have been limited to a small number of radio spots and educational programs. In areas where IRS is conducted, the NMCP Communications Officer pays a visit to sensitize the community prior to the initiation of spray activities. This usually involves discussions with local community leaders, community gatherings and accompanying sprayers to homes to interact directly with community members. Similarly, in areas where ITN campaigns are planned, community sensitization activities are carried out prior to the distribution to ensure high participation.

### Progress to date

Together Against Malaria (TAM), managed by the Inter-Religious Coalition Against Malaria in Mozambique, has now expanded its activities to Zambézia, Nampula, and Sofala Provinces, with

plans to expand to Inhambane Province later this year. Training has been provided to almost 5300 faith leaders in 21 districts of the three provinces. TAM has formed inter-religious committees, called PIRCOMs (Programa Inter-Religioso Contra a Malaria) at the national, provincial, and district (n=24) levels. These PIRCOMs play a central function in coordinating training and monitoring progress of TAM activities. The national PIRCOM currently is going through the necessary steps to register as a non-governmental organization in Mozambique. TAM also recently launched a small grants program to support activities carried out by the District PIRCOMs.

PMI has provided technical assistance to the Health Education Unit to support the revitalization of MISAU health communications and promotions activities, including the development of a health communications strategy for MISAU. PMI also has supported mass media campaigns in conjunction with LLIN distribution campaigns and dissemination of printed materials to health facilities that promote LLIN ownership and use. Community mobilization activities also have been carried out each year prior to the launch of PMI-supported IRS activities in Zambézia Province.

Unfortunately, PMI-supported communications and behavior change activities have been limited both in their content, primarily focusing on ITNs and IRS, and in their geographic coverage. Coordination of messaging and implementation of these activities also has been deficient. National-scale communications activities which had been included in previous operational plans have not yet been realized.

With support from PMI core funding, an external assessment of communications and behavior change activities for malaria in Mozambique was carried out in May and June 2009. Preliminary findings of this assessment pointed to the need for more standardized messaging and better coordination at all levels of communications and behavior change activities. Some of the recommendations of this assessment are:

- Establish a National Malaria Communication Technical Group to coordinate and plan the implementation of the country's malaria communication strategy;
- Implement a national malaria branding strategy;
- Develop a standardized training curriculum for the broadcast media;
- Train District Level Health Officers in community outreach and mobilization methodologies to reduce community resistance to IRS;
- Enhance the TAM PIRCOM training curriculum.

Proposed USG Component: (\$1,000,000)

Based on progress to date and the recommendations of the external evaluation of malaria communications activities in Mozambique, PMI will shift its support for communication and behavior change, including fully scaling-up TAM's community mobilization activities and increasing the emphasis on coordination of messaging and implementation of existing communication and behavior change activities. PMI will also continue to support the strengthening of MISAU's Health Education Department, including their role in coordinating all communications and behavior change activities on health.

The proposed activities for PMI Year 4 are as follows:

- **Coordinate and scale up communications and behavior change activities:** As communications activities are scaled-up, PMI will focus greater attention on improving coordination of messaging and delivery at central, provincial, and district levels. This will include providing support and capacity building to the Health Education Department at MISAU and Provincial Health Departments. (\$250,000)
- **Promote ITN ownership and use:** Strengthen communications and behavior change activities for promotion of ITN ownership and use. (costs covered in ITN section)
- **Expand community mobilization activities by faith leaders:** Support is provided to expand community mobilization activities around malaria throughout the country. (\$750,000)

## CAPACITY BUILDING WITHIN THE NMCP

### Current Status/ Challenges and Needs

The NMCP is responsible for developing policy, establishing norms, and planning, organizing, and coordinating all malaria control activities in the country. Additional responsibilities include: periodic assessment of impact of malaria control, development of training materials on malaria case management for health workers at all levels, mobilizing internal and external funds for malaria control activities, malaria awareness promotion and advocacy, and operational research. NMCP staff currently consists of a Director/Medical Epidemiologist, a medical doctor, a national IRS supervisor (biologist), an additional biologist for IRS activities, a biologist dedicated to entomology, two entomology assistants, an information technology technician, a health communications officer (anthropologist), and an administrative assistant. The NMCP currently lacks both an entomologist and an M&E Advisor.

At the provincial level, the implementation and coordination of the health services are the responsibility of the DPS, specifically the Provincial Medical Chief. The Provincial Malaria Officer, a biologist by training, reports directly to the Provincial Medical Chief and oversees all malaria control activities in the province, with a focus on vector control and monitoring and evaluation activities. At a district level, the responsibility for coordination and implementation falls to the district health team.

### Progress to date

PMI is building capacity for malaria control at a number of levels. Within the NMCP, PMI is supporting the hiring of an entomologist and an M&E advisor on a time-limited basis, to support these key functions of the NMCP until permanent staff can undergo be trained. In addition, PMI country advisors and implementing partners have provided technical and implementation support to the NMCP on a range of issues including development of policies on malaria case management, strategies for ITN scale-up and M&E, and curricula for training of health workers.

PMI also assisted the NMCP with forecasting of malaria treatments and commodities and planning of ITN distribution campaigns.

Beyond the NMCP, significant support has been provided by PMI to CMAM and provincial medical stores for strengthening of procurement, distribution, and monitoring of consumption of malaria treatments and commodities, although major challenges remain in all these areas. PMI also has coordinated closely with MICOA staff at central, provincial, and district levels to guarantee safe pesticide use and follow-up on mitigation measures, which included support for an assessment of insecticide management. In addition, the National Malaria Reference Laboratory, entomology laboratory and insectary at INS are being refurbished and re-equipped with support from PMI.

At the provincial level, PMI has been strengthening capacity at the DPS in Zambézia Province to implement IRS activities and conduct entomologic monitoring, including the establishment of a provincial entomology laboratory and insectary. In addition, PMI will be identifying an entomologist who will be placed at the NMCP for the next two to three years, to coordinate all vector control activities, until a MOH staff person can finish his/her training in entomology.

Proposed USG Component: (Costs covered in vector control and M&E sections)

Strong and effective leadership by the NMCP will be critical to the success of the Mozambique's malaria control efforts. To reach the NMCP targets, continued support will be need to strengthen its capacity and that of other collaborating departments at the central, provincial, and district levels to plan, conduct, supervise, monitor, and evaluate malaria prevention and control activities.

In 2010, PMI will continue to provide long-term technical assistance in entomology and M&E in support of the NMCP at the national level. In addition, training on specific entomology topics needed for IRS for some of the provincial-level biologists will be scheduled once the refurbished central entomology laboratory is complete. PMI will also explore the possibility of using an existing scholarship mechanism at USAID Mozambique to send one NMCP staff person for Master's level training in entomology or public health.

## **MONITORING AND EVALUATION OF MALARIA CONTROL ACTIVITIES**

### Current Status, Challenges, and Needs

Strengthening M&E capabilities, within the context of other M&E systems in MISAU, is a high priority for NMCP and its partners. This is reflected in a newly drafted 2010-2014 NMCP Monitoring and Evaluation Plan currently under review by MISAU.

For routine surveillance, clinical and laboratory-confirmed malaria cases are included in the reporting system of notifiable diseases managed by the Departamento de Epidemiologia. All public health facilities are expected to report on the number of malaria cases, clinical and laboratory-confirmed, on a weekly basis. These data are transmitted to the provincial and then

national level, although this does not always occur regularly. In addition, monthly and quarterly data on malaria morbidity and mortality are aggregated separately by each health facility. These data are transmitted to the district level, collated, and transmitted to the provincial and national level. While considered to be the best functioning health information system in the country, there are concerns about the accuracy, completeness, and timeliness of the data.

Limited information is available on the quality of service delivery at the health facility level. The recent distribution of RDTs for malaria across the country, with little or no pre-service training, raises questions about what impact this will have on case reports.

UNICEF maintains maps with the coverage of malaria control interventions nationwide (particularly ITNs and IRS), which is based solely on input data (i.e. number of LLINs distributed, number of houses sprayed). With the rapid scale-up and evolution of malaria interventions in Mozambique, these maps need to be updated regularly.

#### Progress to date

In April 2009, a final draft of the 2010-2014 National Malaria Control and Prevention Strategic Plan was developed. Currently, the NMCP and partners are working on the 2010-2014 National Malaria Prevention and Control Monitoring and Evaluation Plan, which is closely aligned with the newly drafted Strategic Plan.

The PMI-supported baseline MIS was conducted in June/July 2007. The survey demonstrated that coverage of key PMI interventions was low. Only 15.8% of households had at least one ITN, and 7.3% of pregnant women and 6.7% of children less than five had slept under an ITN the previous night. Only 4.5% of children less than five with fever had received an ACT within 24 hours of onset of symptoms.

In December 2008, NMCP, in collaboration with PMI and WHO, conducted a national health facility survey to evaluate malaria case management and IPTp use. Results are not yet available. Two epidemiological sentinel sites have been operating since December 2008. Information on selected malaria indicators has been collected. However, there have been issues with the quality and timeliness of these data. Technical assistance to these sites has been increased to address these deficiencies.

A total of 21 entomological sentinel sites have been established in the six districts with PMI IRS activities, and data on indicators such as vector density, species composition and insecticide susceptibility are being collected. Live adult mosquitoes resting on house walls are also collected and tested for insecticide resistance. This testing indicates that local *An. gambiae* and *An. funestus* population in all six Districts show no evidence of resistance to DDT, lambda-cyhalothrin, deltamethrin, and bendiocarb.

In November 2008, PMI provided partial financial support to an anemia and parasitemia survey, co-funded with the Bill and Melinda Gates Foundation, in the six districts in Zambézia Province where PMI initiated IRS activities in 2007. The results showed a malaria prevalence of 22 percent using RDTs. This represented a 38 percent decline in estimated malaria prevalence when

compared with results of a similar survey carried out in 2007 by the Innovative Vector Control Consortium.

After the successful LLIN distribution campaign in Nampula Province in October 2008, the Mozambican Red Cross (CVM), with support from the American Red Cross, conducted a door-to-door survey to evaluate post-campaign keep-up and hang-up of LLINs. Volunteers visited 204,749 (59%) of the 347,462 households in the targets districts. Fifty-five percent of households visited possessed at least one ITN and 49% reported having an ITN hanging the night before the visit. Overall, 47% and 46% of children and pregnant women slept under an ITN the night before the visit.

A facility-based rapid urban malaria assessment was conducted in April 2009 in urban, peri-urban, and rural zones of Maputo to determine what proportion of patients with fever or history of fever had laboratory-confirmed malaria and collect information on recent travel outside Maputo. Preliminary results demonstrate that the proportion of febrile Maputo residents with no travel outside the city in the previous three months who tested positive for malaria by RDT was 7.7%, 15.7%, and 24.8% in urban, peri-urban, rural health facilities, respectively. The results demonstrate that malaria transmission continues to occur within Maputo city limits, especially in the rural areas.

Proposed Year 4 USG Component: (\$1,212,100)

Well-functioning malaria surveillance and health information systems are crucial for monitoring trends in malaria morbidity and mortality, estimating coverage of key interventions, and guiding the NMCP implementation of control measures. The existing surveillance system continues to be weak and does not meet all the needs of the MISAU or the NMCP. Efforts to improve malaria surveillance in Mozambique should complement those of other disease control programs, such as HIV/AIDS and tuberculosis, by strengthening the MISAU notifiable disease system.

In FY10, PMI will support a comprehensive malaria module in the upcoming 2011 DHS survey, to assess the status and impact of PMI implementation in Mozambique. The results of this survey compared to the MIS 2007 will provide estimates of the impact of PMI activities.

The proposed activities for PMI Year 4 are as follows:

- **Strengthen the malaria surveillance system:** Continue support, in close coordination with the NMCP, INS, and other partners, to assess and improve the quality, accuracy, completeness, timeliness, and use of national malaria surveillance and sentinel surveillance site data. (\$150,000)
- **Long-term technical assistance for M&E:** PMI will continue to support the hiring of a junior staff person placed within the NMCP, who will coordinate NMCP M&E activities. (\$50,000)

- **Support for malaria module of DHS:** PMI will provide support for an MIS or contribute to a comprehensive malaria module in a DHS to ensure a collection of relevant data to monitor the status and impact of PMI implementation. (\$1,000,000)
- **TDYs from CDC-Atlanta:** CDC staff to provide technical assistance to M&E strengthening activities (1visit). (\$12,100)

## **HIV/AIDS AND MALARIA**

### Current Status, Challenges, and Needs

The HIV sentinel surveillance performed in 2007 among pregnant women between the ages of 16 to 49 found the national average of HIV prevalence to be 16%. The Northern provinces had the lowest prevalence at 9%, while the southern provinces had the highest prevalence at 21%. Based on these data, a projected 3.2 million people are living with HIV/AIDS in Mozambique. These data also suggest that in most parts of the country the epidemic may have reached a plateau.

The Mozambique National AIDS Council, together with the newly organized Direcção Nacional de Assistência Médica and the Direcção Nacional de Saúde Pública are leading the national response through the implementation of the National Strategic Plan to Fight HIV/AIDS (PEN II, 2005—2009). Mozambique's five-year national HIV/AIDS strategy, "Defesa de Vida", focuses on scaling-up prevention, care and treatment services taking into account the current state of programs and human capacity, trends in the HIV/AIDS epidemic, and the national and international resources being made available to assist in the fight against HIV/AIDS. The US Government inter-agency team for PEPFAR is supporting the scale-up of activities for prevention, care and treatment within the context of the national strategy. The NAC has started the process of developing the PEN III (2010-2014).

As of September 30, 2009, through US Government direct and indirect support, 437,427 pregnant women will have received HIV counseling and testing through PMTCT services and 51,271 will have completed a course of ARV prophylaxis for PMTCT; 113,058 orphans and vulnerable children (OVCs) will have received services; 523,136 people affected and living with HIV/AIDS will have received palliative care; 709,128 Mozambicans will have visited counseling and testing centers and received their test results; and 158,277 (including from PMTC sites) individuals will be on ART. Reaching pregnant women and people living with HIV/AIDS in rural areas continues to be a challenge.

PEPFAR, with procurement and distribution support from PMI, has procured 201,000 LLINs for OVC, PLWHA and the armed forces. A total of 173,561 LLINs were distributed to Provincial Directorates and NGO partners for delivery to PLWHA and OVCs, through treatment clinics to people with HIV/AIDS, and to OVCs through outreach activities.

Mozambique's national response to HIV/AIDS has progressed considerably but still suffers from inadequate infrastructure, a scarcity of skilled human resources, and the limitations of the



MISAU management systems. These limitations have meant that many of HIV/AIDS services were not reaching beyond Maputo. This is gradually changing with more partners establishing care and treatment and PMTCT services throughout the country.

***Linkages and Areas for Collaboration between PMI and PEPFAR:*** The target populations of PMI and PEPFAR overlap for children less than five and pregnant women. In addition, persons living with HIV/AIDS are considered a population vulnerable to malaria. PMI and PEPFAR-supported activities for these groups provide opportunities for collaboration. At ANCs where PMTCT is being offered, IPTp and the distribution of LLINs are routinely offered. However, this linkage varies depending mostly on the presence of an NGO partner.

To assess the quality and extent of this linkage, a PEPFAR-supported assessment of services for pregnant women at health facilities was carried out in two phases. In July 2008, this assessment focused on central level facilities associated with MoH in Gaza and Maputo provinces. The second phase was carried out in January 2009 in Sofala and Nampula Provinces to assess the nature and the degree of integration between HIV and malaria services for pregnant women. This assessment included an examination of policies and guidelines and service delivery at provincial, district, and health facility levels. Its results are outlined in the Malaria in Pregnancy section.

The services PEPFAR partners offer should also include access to diagnostic testing for malaria and malaria treatment for clients who present with symptoms consistent with malaria. For all these activities, PMI partners involved in the procurement and distribution of SP for IPTp, LLINs, RDTs and AL will work with PEPFAR partners supporting ANC services for planning, training and logistics to procure these commodities.

Policies for the malaria interventions need to be clearly defined and the guidelines for training and implementation need to be established by the NMCP. PEPFAR partners involved in the drafting of guidelines for training on the treatment of HIV-related opportunistic infections, or for training maternal and child health nurses (who perform counseling and testing, PMTCT, and testing for sexually transmitted diseases, among other activities) will have the technical support from PMI for the malaria specific topics.

MISAU is advocating for greater access to health services for the rural population in Mozambique through APEs. PEPFAR has provided significant FY 09 funding to support the training of the first cadre of APEs, which will be supplemented with PMI Year 3 funding.

Technical support from PMI also is needed to improve case management of malaria in HIV-exposed infants and HIV-infected young children. A public health evaluation to assess the impact of cotrimoxazole treatment on the incidence of malaria in HIV-exposed infants was canceled because protocol was not approved by the ethical committee. Training and supervision on diagnosis and new first-line of treatment will start in a couple of months and include pediatric staff in hospitals and health centers where children living with HIV/AIDS are seen. This along with PMI technical support to the PEPFAR partners, who support training for pediatric staff, will facilitate the delivery of appropriate case management and preventive measures.

PEPFAR supported the implementation of a survey to assess behavioral barriers to ITN usage, which will be carried out later this year in Nampula and Zambézia Provinces. This survey has received technical support from PMI. The findings from this survey will directly assist in targeting messages to address the issues that present as barriers to ITN usage.

PMI and PEPFAR advisors and implementers have also provided extensive support to CMAM to strengthen the pharmaceutical distribution system. This support has included technical assistance with forecasting and quantification and logistical support for drug distribution. There also are opportunities for joint support for laboratory strengthening. Specifically, the newly acquired microscopes can be used for diagnosis of both malaria and tuberculosis. In addition, training and supervision of laboratory staff should be coordinated, as many of these staff are responsible for diagnostic testing of malaria, tuberculosis, and HIV.

A PEPFAR-funded mortality survey was carried out after the 2007 National Census. PMI has provided technical assistance and local cost support to implement the survey and analyze the results. The upcoming AIDS Indicator Survey will include questions on ITN ownership and use of IPTp during pregnancy.

Proposed USG component: (Costs covered in diagnosis, treatment, and M&E sections)

The proposed activities for PMI Year 4 are as follows:

- **Coordinate services for pregnant women:** A coordinated plan for delivering IPTp and PMTCT to pregnant women through ANC services and other appropriate points of care is being finalized and will soon be implemented. Training for IPTp will, whenever possible, be integrated within a broader training on ANC services.
- **Strengthen coordination of M&E activities:** Coordination of M&E activities for malaria and HIV/AIDS has improved and will be expanded, including utilizing opportunities for collecting data on both diseases when surveys or assessments are conducted (integrating some malaria-specific questions into HIV surveys, and vice versa).
- **Joint strengthening of clinical laboratories:** PMI and PEPFAR are supporting the development of a unified plan for strengthening of laboratory services.

## IN-COUNTRY STAFFING AND MANAGEMENT

Two senior technical advisors on malaria oversee PMI in Mozambique, one representing CDC and one representing USAID. Both PMI advisors are part of a single inter-agency team led by the USAID Mission Director, and work with the USAID Mozambique Health Team to oversee all technical and managerial aspects of the PMI in Mozambique. This includes finalizing details of the project design, implementing malaria prevention and treatment activities, M&E of outcomes and impact, and reporting of results. The PMI advisors collaborate daily with the NMCP to support policy development, planning, and coordination of activities. All technical

activities will be undertaken in close coordination with the MISAU/NMCP and other partners, including WHO, UNICEF, the Global Fund, World Bank, and the private sector.

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

PMI staff members will report to the USAID Team Leader for Health; the CDC staff will be supervised by CDC, both technically and administratively.

With the scaling-up of existing PMI activities and the infusion of significantly greater funding for PMI provided in this operational plan, additional administrative support is needed. A Foreign Service National (FSN) Activity Manager will be recruited to support the PMI team with the management of PMI activities in Mozambique.

Proposed USG component: (\$1,850,000)

The proposed activities for PMI Year 4 are as follows:

- **Management of PMI:** Support two senior technical PMI staff (one USAID and one CDC) based at the USAID Mission in Maputo and one mid-level FSN project manager PMI staff, including all work-related expenses (e.g., travel, supplies, etc.), and mission-based expenditures, including USAID mission expenses incurred in the direct implementation of PMI activities. (\$1,850,000)

**ANNEX 1**

**Tables**



**Table 2**  
**President's Malaria Initiative— Mozambique**  
**Planned Obligations for FY 10**

Proposed Activity	Mechanism	Budget	Commodities	Geographical area	Description
<b>ITNs</b>					
Procure LLINs	TBD	11,750,000	11,750,000	Nationwide	Procurement of two million LLINs
Support LLIN distribution through ANCs and campaigns	TBD	1,500,000	0	Nationwide	Support for LLIN distribution through ANCs and universal coverage campaigns
Monitor LLIN durability	CDC	35,000	0	Nampula	Continued monitoring of LLIN durability
<b>SUBTOTAL ITNs</b>		<b>13,285,000</b>	<b>11,750,000</b>		
<b>IRS</b>					
Support IRS in six districts of Zambezia province	IRS IQC	7,500,000	0	Zambézia	IRS campaign in six districts of Zambezia covering 502,000 houses (two million residents)
Procure IRS commodities	IRS IQC	750,000	750,000	Zambézia	Procurement of PPEs, spares and insecticide
Support environmental monitoring of IRS activities	EMCAB	37,500	0	Zambézia	Support for routine monitoring to ensure safe and judicious use of insecticides
Strengthen entomologic capacity of NMCP	IRS IQC	100,000	0	Nationwide	Procurement of needed supplies and support for training and field operations
Provide long-term technical assistance in entomology	IRS IQC	100,000	0	Nationwide	Support for full-time staff to supervise entomology activities at NMCP
Support for entomologic activities	CDC	22,100	0	Nationwide	TDY support for entomology activities and support for procurement of laboratory supplies
<b>SUBTOTAL IRS</b>		<b>8,509,600</b>	<b>750,000</b>		
<b>Malaria in Pregnancy</b>					
Support training and supervision of ANC staff in MIP	MCHIP	300,000	0	Nationwide	Integrated training/supervision of ANC workers in prevention of malaria in pregnancy
Support updating of policy, guidelines, and training materials	BASSOPA	50,000	0	Nationwide	Support for updating policy, guidelines and training materials
<b>SUBTOTAL MIP</b>		<b>350,000</b>	<b>0</b>		

Proposed Activity	Mechanism	Budget	Commodities	Geographical area	Description
<b>Diagnosis</b>					
Procure diagnostic supplies	DELIVER	3,000,000	3,000,000	Nationwide	Purchase of RDTs, microscopy kits, reagents and additional microscopes
Support training and supervision of laboratory diagnosis of malaria	TBD	500,000	0	Nationwide	In-service training and supervision in laboratory diagnosis of malaria, including quality control
Support diagnostic policy and curriculum development	BASSOPA	50,000	0	Nationwide	Provide technical assistance for diagnostic policy and curriculum development
Provide technical assistance for laboratory strengthening	CDC	12,100	0	Nationwide	TDY for support of laboratory strengthening activities
<b>SUBTOTAL Diagnosis</b>		<b>3,562,100</b>	<b>3,000,000</b>		
<b>Case Management</b>					
Procure antimalarials	DELIVER	6,000,000	6,000,000	Nationwide	Procurement and shipment of antimalarials
Strengthen MISAU antimalarial drug management system	DELIVER	500,000	0	Nationwide	Strengthen MISAU capacity to manage antimalarial drugs and support distribution of ACTs
Support refresher training and supervision of clinical staff	TBD	730,000	0	Nationwide	Support training and supervision of health workers at all levels in malaria case management
Provide pre-service training of APEs	TBD	1,000,000	0	Nationwide	Support malaria component of pre-service training for APEs
<b>SUBTOTAL Case Mgmt</b>		<b>8,230,000</b>	<b>6,000,000</b>		
<b>Communications and Behavior Change</b>					
Develop messages and coordinate communication activities	BASSOPA	250,000	0	Nationwide	Development of messages and coordination of communication and behavior change activities
Promote LLIN ownership and use	TBD	0	0	Nationwide	Promotion of LLIN ownership and use via mass media and community-based approaches (costs included under ITNs section)
Support NGOs to conduct community mobilization activities	TBD	750,000	0	Nationwide	Support to NGOs to mobilize communities around prevention and treatment of malaria
<b>SUBTOTAL BCC</b>		<b>1,000,000</b>	<b>0</b>		

Proposed Activity	Mechanism	Budget	Commodities	Geographical area	Description
<b>Monitoring and Evaluation</b>					
Strengthen malaria surveillance, including sentinel sites	BASSOPA	150,000	0	Nationwide	Strengthening of malaria surveillance including sentinel sites
Provide long-term technical assistance for monitoring and evaluation	BASSOPA	50,000	0	Nationwide	Support for full-time staff to supervise monitoring and evaluation activities at NMCP
Support comprehensive malaria component in upcoming DHS	TBD	1,000,000	0	Nationwide	Support for an end-line survey to determine progress on PMI indicators
Provide technical assistance on monitoring and evaluation	CDC	12,100	0	Nationwide	TDY for support of monitoring and evaluation activities
<b>SUBTOTAL M&amp;E</b>		<b>1,212,100</b>	<b>0</b>		
<b>In-country Staffing and Administration</b>					
Support in-country administrative expenses	CDC/USAID	1,850,000	0	Nationwide	Staffing and general administrative support for PMI
<b>SUBTOTAL Staff &amp; Admin</b>		<b>1,850,000</b>	<b>0</b>		
<b>TOTAL</b>		<b>37,998,800</b>	<b>21,500,000</b>	<b>Percent Commodities: 57%</b>	



**Table 3**  
**President's Malaria Initiative – Mozambique**  
**Year 4 (FY 10) Estimated Budget Breakdown by Intervention (\$)**

<b>Area</b>	<b>Commodities</b>	<b>Other</b>	<b>Total (%)</b>
Insecticide-treated Nets	\$11,750,000	\$1,535,000	\$13,285,000 (35)
Indoor Residual Spraying	\$750,000	\$7,759,600	\$8,509,600 (22)
Malaria in Pregnancy	\$0	\$350,000	\$350,000 (1)
Diagnosis	\$3,000,000	\$562,100	\$3,562,100 (9)
Case Management	\$6,000,000	\$2,230,000	\$8,230,000 (22)
Communications and Behavior Change	\$0	\$1,000,000	\$1,000,000 (3)
Monitoring and Evaluation	\$0	\$1,212,100	1,212,100 (3)
In-Country Management	\$0	\$1,850,000	\$1,850,000 (5)
<b>Total</b>	<b>\$21,500,000</b>	<b>\$16,498,800</b>	<b>\$37,998,800</b>

**Table 4**  
**President's Malaria Initiative – Mozambique**  
**Year 4 (FY 10) Budget Breakdown by Partner (\$)**

<b>Partner Organization</b>	<b>Geographic Area</b>	<b>Activity</b>	<b>Budget*</b>
IRS IQC Global Task Order	Zambézia Province	Procurement of IRS equipment; support to IRS activities; strengthen entomologic capabilities of NMCP	\$8,450,000
IRG	Zambézia Province	Support environmental monitoring of IRS activities	\$37,500
TBD	Nationwide	Procurement and distribution of LLINs through ANC and campagins	\$13,250,000
MCHIP	Nationwide	Training and Supervision in Malaria in Pregnancy	\$300,000
DELIVER	Nationwide	Strengthen pharmaceutical management system, procure antimalarial drugs and RDTs	\$9,500,000
TBD	Nationwide	Training and supervision in laboratory diagnosis	\$500,000
BASSOPA Malaria!	Nationwide	Support for development of policies and guidelines in malaria in pregnancy and diagnosis; communications on malaria support to sentinel sites and M&E capacity building	\$550,000
TBD	Nationwide	Training and supervision in malaria case management	\$730,000
TBD	Nationwide	Pre-Service Training of APEs	\$1,000,000
TBD	Nationwide	Community mobilization by NGOs/FBOs	\$750,000
TBD	Nationwide	Support Malaria Indicator Survey or DHS	\$1,000,000

\*Staffing and administration and CDC technical assistance not included