

This Malaria Operational Plan has been endorsed by the President's Malaria Initiative (PMI) Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. If any further changes are made to this plan, it will be reflected in a revised posting.

PRESIDENT'S MALARIA INITIATIVE

Malaria Operational Plan – FY 09

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
 AQ – amodiaquine
 ARV – anti-retroviral therapy
 AS – artesunate
 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)
 IRS – indoor residual spraying
 IRCMM- Inter-Religious Campaign against Malaria in Mozambique
 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
 SWAp – Sector Wide Approach
 TASC3- Technical Assistance and Support Contract 3
 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. Malaria accounts for approximately 40% of all outpatient visits and 60% of pediatric hospital admissions. It is 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. More than 18.5 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 subscribes to the Roll Back Malaria Abuja Targets and the Millennium Development Goals. Malaria is considered a priority for poverty reduction and the government's 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 the MISAU and with the participation of more than 15 bilateral and multilateral agencies.

Mozambique has received a \$28 million Round 2 grant from the Global Fund to Fight AIDS, TB, 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). With 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 World Bank also is preparing a five-year credit that will go for Board approval in October 2008 and would allocate approximately \$12 million of a \$35 million health sector credit for malaria control. This credit will primarily focus on system strengthening at the national and provincial levels, with a particular emphasis on three Northern provinces. In addition, Japanese Cooperation has donated to Mozambique 600,000 long-lasting insecticide-treated nets (LLINs). Additional technical support will be mobilized through a developing bilateral cooperation between the Governments of Brasil and the United States, which is focused on strengthening malaria control in lusophone countries in Africa.

The following table shows Year 2 targets and the early implementation activities supported by PMI:

Proposed Year 2 Targets (PMI and partners)	Expected Results after 2 Years of Implementation (by March 2009)
Procure and distribute 1.7 million long-lasting insecticide-treated bed nets (LLINs), of which PMI will contribute 1 million	An integrated measles-LLIN campaign in Nampula Province will have successfully distributed 800,000 LLINs (720,000 provided by PMI) to all children less than five years. Additional campaigns for children less than five years will have been carried out in Zambézia and Inhambane Provinces (with LLINs provided by the Global Fund and UNICEF and logistical support by PMI). Approximately, 380,000 additional LLINs procured by PMI will be distributed through ANCs. This should raise percent of households with at least one ITN to approximately 50%.
Spray 502,000 houses in six districts in Zambézia Province, covering approximately 2 million persons	By February 2008, IRS was completed on-schedule in targeted areas in all 6 districts supported by PMI, covering more than 95% of approximately 584,000 targeted households (protecting an estimated population of 2.5 million).
Train and supervise health workers in prevention of malaria in pregnancy and IPTp	Training of ANC staff in the prevention and management of malaria in pregnancy is underway and should be completed in all 12 Provinces by February 2010.
Procure approximately one million treatments of artemether-lumefantrine and support roll out of revised malaria treatment policy	1.44 million treatments of AL procured with FY 07 PMI funds and distributed to health facilities. An additional 3.5 million treatments of AL are being procured with PMI funding and will be delivered in the first quarter of 2009 to coincide with the launch of new malaria treatment policy. Training of trainers in new treatment policy will be completed. Cascade training will be underway.

The Year 3 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 2008 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: During 2007, approximately 1.5 million LLINs from all sources were distributed free-of-charge through antenatal clinics (ANCs) and campaigns for children less than five years. PMI contributed 450,000 of these LLINs. An additional 48,000 LLINs were purchased using funding from President's Emergency Plan for AIDS Relief (PEPFAR) and distributed through HIV/AIDS treatment clinics and outreach services to orphans and vulnerable children (OVCs).

In October 2008, PMI will distribute 800,000 LLINs (of which PMI will supply 720,000 out of the total 1.1 million LLINs that are being procured with FY 08 funding) free-of-charge in an integrated measles vaccination-deworming-Vitamin A-LLIN campaign targeted at children less than five years in Nampula Province. The remaining 380,000 LLINs procured with FY 08 funding are due to arrive later this year and will be distributed free-of-charge to pregnant women during routine ANC visits.

In addition, another 2.8 million LLINs (of which PMI will provide approximately one million with FY 09 funding) will be distributed free-of-charge to children less than five years and pregnant

women. This should raise household ownership of at least one ITN to approximately 50% nationwide.

IRS: With FY 07 PMI funding, IRS activities were conducted in six districts in Zambézia Province, from September 2007 through February 2008, covering more than 586,000 households and 2.5 million persons. Greater than 95% of targeted houses were sprayed. Spray activities commenced again in August 2008, with a plan to more precisely target IRS to cover approximately 502,000 households in the same six districts, primarily excluding very remote villages, in which ITNs will be the primary preventive approach.

The entomology laboratories (including an insectary, dissection laboratory and ELISA laboratory) of the Instituto Nacional do Saúde (INS) of Ministério de Saúde (MISAU) is undergoing renovation and refurbishment, which should be completed by October 2008. An insectary and dissection laboratory in Zambezia Province is also being established for vector monitoring activities taking place in this Province. New equipment, supplies, and reagents for the renovated laboratory have been delivered. In addition, a three-week training course for 14 provincial-level malaria control officers, which included training in entomology, epidemiology, and program management, was conducted in May 2008, with support from WHO and PMI.

In FY 09, approximately 502,000 household (approx. 2 million persons) in the same six districts in Zambézia Province will be covered with IRS. Entomology capacity for monitoring mosquito density and insecticide resistance should be fully scaled up centrally and in Zambézia Province.

Malaria in Pregnancy: ANC's 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 in 2006 and 2007, 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 staff to harmonize service delivery at ANC and PMTCT clinics.

In FY 09, with the roll out of training activities for ANC staff, IPTp should be functionally implemented in all health facilities in all 10 provinces and city of Maputo, providing coverage with at least two doses of sulfadoxine-pyrimethamine (SP) to 50% of Mozambique's total population of pregnant women.

Malaria Diagnosis: In FY 08, a national policy for laboratory diagnosis of malaria was developed by NMCP, in collaboration with PMI and other partners. This document covers the criteria for rapid diagnostic test (RDT) use, as well as the issues that relate to quality assurance, transportation, storage, forecasting, and implementation. Training materials for laboratory diagnosis are being updated to reflect the new policy. In addition, the PMI-supported refurbishment of the national malaria reference laboratory will soon be underway.

In FY 09, training of laboratory and clinical staff in malaria diagnosis will be scaled up, with more than 80% of laboratory technicians having received refresher training in the use of malaria microscopy and/or RDTs by the end of the year.

Malaria Treatment: With Year 2 funding, PMI supported the purchase of 1.44 million treatments of artemether-lumefantrine (AL), the current second-line treatment that will become the new first-line treatment in early 2009. These treatments have already been distributed to health facilities around the country. An additional 3.5 million AL treatments are being procured by PMI and are expected to be delivered by late 2008/early 2009. These doses will be used to support the roll out of AL as the new first-line malaria treatment. PMI also supported the design and piloting of a new distribution scheme for AL and new training guidelines for health workers in the new malaria treatment policy.

In FY 09, approximately nine million treatments of AL will be procured by all partners (of which PMI will provide more than one 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 city of Maputo (covering at least 50% of fever episodes in children less than five years). PMI will also support a the pilot introduction of ACTs into the private sector.

Monitoring and Evaluation: A PMI-supported baseline Malaria Indicator Survey (MIS) was conducted during June and July 2007, which surveyed almost 6000 households. This baseline assessment showed that coverage of key interventions is 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 years with fever had received an ACT within 24 hours of onset of symptoms. Collection of information on selected malaria indicators, including malaria morbidity and mortality, also began at two sentinel sites in September 2008

In FY 09, PMI will also have six sentinel sites providing monthly data on malaria morbidity and mortality, as well as periodic data on mosquito density and selected coverage indicators. In addition, a Multiple Indicator Cluster Survey (MICS), an AIDS Indicator Survey, and a national health facility survey, all funded through other sources, will collect data on key malaria indicators. These data will provide information on progress at the midpoint of PMI implementation in Mozambique.

Budget: The FY 09 PMI budget request for Mozambique is \$19.8 million. Thirty-four percent will support scaling-up ownership and use of ITNs, 26% for IRS and vector control activities, 21% for procurement of antimalarial drugs and improved malaria case management, 1% for malaria in pregnancy activities, 4% for communication and behavior change activities, and 5% for monitoring and evaluation. Overall, 50% will be spent on commodities.

INTRODUCTION

President's Malaria Initiative

In July 2005, the United States Government announced 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% after three years of accelerated implementation in each country, which endeavors to achieve 85% coverage of 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).

Proposed funding levels are \$135 million in FY 07, \$300 million in FY 08 and FY 09, and \$500 million in FY10. The aim is to cover 15 countries by 2010. 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. The US Government is also exploring additional support to Mozambique through a developing cooperative effort with the Government of Brazil to jointly support malaria control activities in lusophone countries in Africa. This collaboration has already begun between the two governments and the Government of the Democratic Republic of São Tomé and Príncipe.

This document presents a detailed implementation plan for the third year of the PMI in Mozambique. It was developed in close 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 with the first two years of PMI funding. This plan reviews the current status of malaria burden, control policies, and interventions in Mozambique. It identifies challenges and unmet needs if the targets of the PMI are to be achieved, reviews the status of Year 1 and Year 2 activities, and provides a description of proposed Year 3 activities under PMI.

BACKGROUND

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. The PMI-supported Malaria Indicator Survey, conducted in 2007, 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 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 (Hb less than 11 gm/dl), and 11.9% and 5.1%, respectively, had severe anemia (Hb less than 8 gm/dl).

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

Plasmodium falciparum infections account for 90.0% of all malaria infections, with *P. malariae* and *P. ovale* responsible for about 9.1% and 0.9%, 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 present, *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. Presuming that malaria transmission levels are very low in urban and peri-urban Maputo, the total population at risk of malaria is approximately 19.5 million. Of this population, an estimated 3.6 million are children less than five and 900,000 women get pregnant each year.

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 years old 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 years old 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 years old 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

Preliminary results from the baseline MIS carried out in June- July 2007, at the end of the rainy season, showed that 15.8% of households had at least one 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). 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 years with fever had received an ACT within 24 hours of onset of symptoms.

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 accelerated 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 years of age 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 under 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 under 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.

SUMMARY OF PROGRESS IN YEAR TWO

1. During 2007, approximately 1.5 million long-lasting insecticide-treated nets (LLINs) from all sources were distributed free-of-charge through antenatal clinics (ANCs) and campaigns for children less than five years. PMI contributed 450,000 of these LLINs. An additional 48,000 LLINs were purchased using funding from President’s Emergency Plan for AIDS Relief (PEPFAR) and distributed through HIV/AIDS treatment clinics and outreach services to orphans and vulnerable children (OVCs);
2. In 2008, PMI has procured 1.1 million LLINs, of which 720,000 have been delivered and will be distributed free-of-charge in an integrated measles vaccination-deworming-Vitamin A-LLIN campaign targeted to children less than five years in Nampula Province in October

2008. The remaining 380,000 nets procured in 2008 will be delivered later this year and distributed free-of-charge to pregnant women during routine ANC visits.

3. IRS activities were conducted in six districts in Zambézia Province, from September 2007 through February 2008, covering more than 586,000 households or 2.5 million persons. Greater than 95% of targeted houses were sprayed. Spray activities commenced again in August 2008, with a plan to cover approximately 502,000 houses in the same six districts.
4. A three-week training course for 14 provincial-level malaria control officers, which included training in entomology, epidemiology, and program management, was conducted in May 2008, with support from WHO and PMI.
5. PMI supported the renovation and refurbishment of the entomology laboratory of the Instituto Nacional do Saúde (INS) of Ministério de Saúde (MISAU). New equipment, supplies, and reagents for the renovated laboratory have been delivered.
6. 1.44 million treatments of artemether-lumefantrine (AL), the second-line treatment for uncomplicated malaria in 2008, were procured and delivered to MISAU and subsequently distributed to health centers (the current first line treatment, artesunate-sulfadoxine-pyrimethamine, have been procured in sufficient quantities by MISAU). An additional 3.5 million AL treatments are being procured and are expected to be delivered by late 2008. These will be used to support the roll out of the new malaria treatment policy, in which AL is the new first-line malaria treatment, in early 2009. PMI also supported the design and piloting of a new distribution scheme for AL and the development of updated training guidelines for health workers in the new malaria treatment policy.
7. A national policy for laboratory diagnosis of malaria was developed by NMCP, in collaboration with PMI and other partners. This document covers the criteria for rapid diagnostic test (RDT) use, as well as the issues that relate to quality assurance, transportation, storage, forecasting, and implementation. Training materials for laboratory diagnosis are being updated to reflect the new laboratory testing policy.

EXPECTED RESULTS – YEAR THREE

At the end of Year 3 of the PMI in Mozambique (March 31, 2010), the following targets will have been achieved:

Prevention:

- Approximately 2.8 million LLINs (of which PMI will provide approximately one million) will have been distributed free-of-charge to children less than five and pregnant women (this should bring household ownership of at least one ITN to approximately 50% nationwide);

- At least 90% of houses in six districts targeted by MISAU for IRS in Zambézia Province will have been sprayed with support from PMI (approximately 502,000 houses with two million residents will be protected by IRS);
- Renovation and re-equipping of the entomology laboratories at MISAU and Zambézia and Cabo Delgado Provinces will be completed;
- IPTp will have been implemented in all health facilities in all 10 provinces and Maputo City (providing coverage with at least two doses of sulfadoxine-pyrimethamine (SP) to 50% of Mozambique's total population of pregnant women);

Diagnosis and Treatment:

- More than 80% of laboratory technicians will have received refresher training in the use of malaria microscopy and/or RDTs;
- The new malaria treatment policy will have been fully implemented and AL, the new first-line treatment for uncomplicated malaria, will be available and provided free-of-charge to children less than five years at all public and NGO health facilities;
- At least 50% of uncomplicated fever episodes in children less than five years will be treated with an ACT according to the national treatment policy;
- Pilot implementation of ACTs in private sector outlets will have been completed and plans for scale-up finalized.

INTERVENTIONS - PREVENTION

Vector Control - General

The MISAU and NMCP Strategic Plan for Rapid Expansion of the Malaria Control and Prevention Activities for 2009-2013 places considerable emphasis on integrated vector control, environmental management, and recommends IRS and universal coverage of LLINs. In principle, “these interventions may be used singly or in combination, depending upon the epidemiological setting.” ITNs are not generally targeted for districts where there are IRS operations, except for pregnant women who receive LLINs through ANC visits throughout the entire country.

Since 2002, entomological monitoring and resistance testing has not been conducted consistently due to lack of funding, despite the scaling-up of IRS activities during this period. Between 2000 and 2002, insecticide 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. These studies showed that 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 have been observed. No resistance to dichloro-diphenyl-trichloroethane (DDT) or malathion has been detected in *A. funestus*. *Anopheles*

gambiae s.s. shows a low level of pyrethroid and carbamate resistance in Maputo Province, but is fully susceptible to DDT and malathion. Carbamate resistance has been detected in *A. arabiensis* in Maputo Province. Fortunately, the *kdr* mutation in the mosquito gene, which is associated with resistance to pyrethroid insecticides and cross-resistance to DDT, has not been detected in Mozambique.

Since IRS and LLINs are priority malaria control interventions for MISAU, there is a pressing need for up-to-date entomologic information to better target the use of IRS and LLINs in the most cost-effective fashion. These data also will be helpful in evaluating the effectiveness of future interventions directed against the mosquito vector and/or parasite.

Progress to date: PMI continues to support entomological strengthening at the central level with the upgrade of the central insectary and entomology laboratories at INS, the research arm of the Ministry of Health, which should be completed by October 2008. The upgrade and re-equipment of the insectary and laboratory will support identification of malaria-infected vector mosquitoes by ELISA, PCR-based monitoring for insecticide resistance, and identification of mosquito species complexes, susceptibility bioassays and insecticide-resistance testing. PMI, in coordination with the NMCP and INS, will continue to train personnel centrally and in Zambézia Province to systematically monitor malaria vectors in support of IRS activities.

In addition, fourteen Mozambican biologists attended a WHO/PMI-supported workshop in Maputo from May to June 2008, which included basic introductory modules on entomology, epidemiology and malaria control planning. These biologists are part of the NMCP plan to improve the capacity to carry out entomologic surveillance and to support IRS operations at the provincial level. The plan is to have at least one of these biologists in each province.

The NMCP has expressed interest in expanding regional entomological monitoring capacity to support current IRS and ITNs activities. To that end, the NMCP has identified a building adjacent to a health facility in Cabo Delgado Province as a site for a regional entomology laboratory. This laboratory, with basic capacity, would support the decentralization of monitoring and surveillance. It would provide an opportunity for newly recruited and trained biologists in the northern provinces of Mozambique to perform basic entomologic monitoring which would otherwise be too costly and logistically difficult to support on a routine basis from the central laboratory in Maputo

Proposed USG Component: (\$277,500)

In FY 09, PMI will continue building entomological capacity by assisting the NMCP at the central and provincial levels. However, it will take several years before a comprehensive vector control program is established. PMI has supported building of capacity in entomologic monitoring through short-term technical assistance, refurbishing and equipping of laboratories, and provision of supplies and reagents. NMCP recently has expressed interest in long-term technical assistance, as an interim measure until the NMCP entomologists are fully trained.

The proposed activities during FY 09 are as follows:

- **Provide long-term technical assistance and capacity building in entomology at NMCP:** A Masters-level entomologist (local-hire or third-country national) will be hired through the an existing mechanism and placed at the NMCP to provide technical assistance and capacity building in entomology for two years, while NMCP staff are sent for Masters training in entomology. The cost of Masters degree training for the NMCP staff will be covered through other sources. (\$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)
- **Establish regional laboratory:** PMI will provide support the refurbishment of a entomology laboratory at the Matuge Health Facility. The laboratory will provide support to the northern provinces of Mozambique in entomological monitoring (including vector identification, seasonality variations insecticide resistance and bioassays) as part of the on-going Government of Mozambique’s ITN and IRS programs. This one-time investment is predicated on the understanding that the costs of operation, staffing, travel, and supplies will be covered by MISAU or other partners. (\$65,000)
- **TDY from CDC-Atlanta:** CDC staff to provide technical support to entomologic training and monitoring activities. (\$12,500)

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. The national ITN distribution policy, revised in 2007, focuses on universal access, estimating two nets per household. This policy continues to rely on distribution through ANCs and campaigns for children as a way of accessing approximately 60 to 70% of households. The policy states that LLINs should be distributed free-of-charge.

The primary objective of this strategy is to rapidly achieve high levels of coverage (i.e. “catch up”). Four main approaches are currently being used to scale-up LLIN coverage and will continue to be used as the policy shifts to universal coverage:

1. Sub-national campaigns targeted to children less than five, either linked to immunization or child health days or stand-alone campaigns (in areas where IRS is not carried out);
2. Routine delivery to pregnant women at first ANC visit (85% of pregnant women attend ANC at least once);
3. Home-based care packages provided to people with HIV at treatment clinics;
4. Community-based outreach services, particularly for OVCs.

It should be noted that capacity is being built in Mozambique so that all four of these approaches can be sustained once high level coverage has been achieved and the focus shifts to maintenance of coverage (so-called “Keep-up” strategy). In addition, other distribution methods, such as through military conscripts, are being considered.

In their Global Fund Round 8 proposal, which is currently under review, MISAU has requested support for the procurement and distribution of 4.68 million LLINs, which will initiate the first major push towards achieving universal coverage. To date, though, the NMCP and partners have yet to clarify how they will reach the remainder of the population, which will be necessary if universal coverage is to be achieved. In addition, the quantities of LLINs made available, so far, by the government and its partners are sufficient to cover vulnerable groups only.

Progress to date: According to provisional data from the NMCP and UNICEF shown in the table below, almost 1.5 million LLINs were distributed in 2007, more than double the numbers distributed in 2005 or 2006 (see table on next page).

PMI procured 450,000 of these LLINs. In addition, PEPFAR resources were used to procure an additional 48,000 LLINs. Of these, 448,000 LLINs have been distributed so far, as follows:

- In Zambézia Province, 120,000 LLINs were distributed by PSI; 80,000 for children less than five years through district level campaigns and 40,000 for pregnant women through ANCs.
- In Niassa Province, PMI provided 110,000 LLINs to UNICEF to support a campaign targeted to children less than five years that covered more than half of the province.
- In Cabo Delgado Province, PMI provided 170,000 LLINs to the Malaria Consortium, a UK-based NGO, to support a province-wide campaign targeted to children less than five years.
- Anti-retroviral (ARV) treatment clinics distributed 23,000 LLINs to persons with HIV/AIDS; an additional 10,000 LLINs were distributed through prevention of mother to child transmission (PMTCT) clinics.
- Fifteen thousand LLINs were distributed to orphans and vulnerable children through outreach activities by NGOs.

ITN Distribution from All Sources by Province, 2004-2007

PROVINCE	2004	2005	2006	2007
Cabo Delgado	15,430	11,225	38,513	294,051
Gaza	105,588	36,295	53,300	66,195
Inhambane	36,000	50,711	79,877	191,157
Manica	5,000	222,451	8,273	20,386
Maputo	21,189	12,858	91,890	132,346
Nampula	10,000	50,000	194,712	228,578
Niassa	0	0	62,235	161,121
Sofala	0	230,880	16,304	47,923
Tete	54,066	31,350	76,306	82,675
Zambézia	154,529	60,594	61,960	282,043
Total	401,802	706,364	683,370	1,476,475

Nampula. With LLINs provided with finances from the Global Fund Round 6 grant, campaigns targeting children less than five years also will take place in Zambézia and Inhambane Provinces later this year. Adding these to the campaigns in Niassa and Cabo Delgado in 2007 and PMI's ongoing support of LLIN distribution through ANCs, much progress has been made in the last two years towards achieving high coverage in children less than five years and pregnant women.

If one takes into account that Maputo and Gaza Provinces are primarily covered by IRS, Manica, Sofala, and Tete would remain as the only provinces that have not had a net campaign in the last three years. UNICEF will be supporting district-level campaigns in Tete, leaving an unmet need for LLINs follow-up campaigns to cover Manica and Sofala. The number of children less than five years in Manica and Sofala is 535,000.

The LLIN gap in Mozambique is based on the MISAU's revised goal of universal coverage (i.e. two LLINs per household). The most recent census listed that Mozambique has a population of 21.5 million people. Two million persons live in urban and peri-urban Maputo and are at very low risk of malaria, leaving 19.5 million persons as the population target to be covered by LLINs. If we assume approximately 4.5 persons per household, then a total of 8.67 million LLINs are needed to provide all 4.33 million households with two LLINs. In 2007, 1.5 million LLINs were distributed. In 2008 or early 2009, it is anticipated that 1.4 million LLINs will be distributed through campaigns and approximately 170,000 will be distributed through ANCs. This leaves an LLIN gap of approximately five million LLINs. USAID's contribution of more than 1 million LLINs will cover more than 20% of this gap.

Despite enormous investments in LLINs and the goal for universal coverage, the performance and durability of these products' use in real-life setting has not been systematically monitored. Up until now, product performance is extrapolated from laboratory data from the manufacturers and other laboratories. Conventionally a 3-5 year lifespan has been assumed. Monitoring of LLIN performance in real-life settings is vital to understanding the factors that lead to LLIN failure, to provide direction for suppliers to design and manufacture better products, and for planning of net replacement strategies. The Olyset® and PermaNets® distributed in combined measles-deworming-Vitamin A-LLIN campaign in Nampula in October 2008 provide an opportunity for monitoring of net longevity and durability under normal usage for up to three years.

Proposed USG Component: (\$7,235,000)

PMI, as it has during the last two years, will make a significant contribution towards covering all children less than five years and pregnant women. With PMI's support in 2009, including possible support for campaigns in Manica and Sofala, almost all areas of Mozambique will have had a LLIN campaign for children less than five within the last three years, narrowing the gap towards PMI's goals for ITN coverage. PMI will continue to support LLIN distribution through ANCs, as well.

As in the past, LLINs procured through PMI will be delivered free-of-charge to pregnant women and children less than five. In addition, PMI will continue to provide technical support to PEPFAR as it procures and distributes LLINs to persons living with HIV/AIDS through treatment clinics and to orphans and vulnerable children through outreach activities.

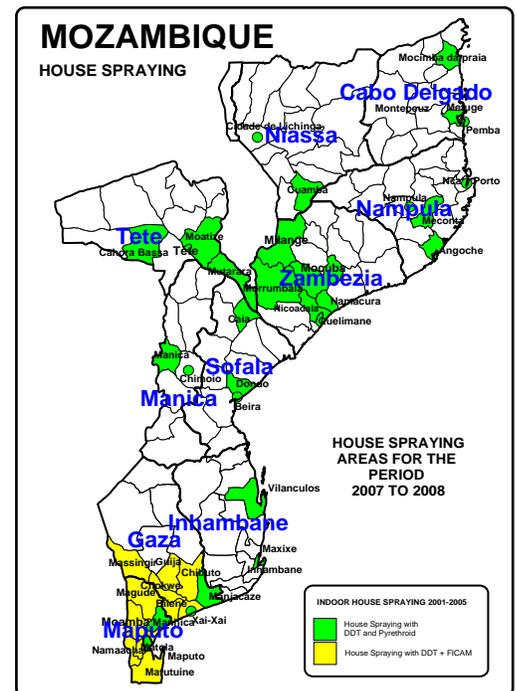
- **LLIN procurement:** Approximately 1 million LLINs will be procured and shipped, assuming cost per LLIN is approximately \$6.50 each. (\$6,600,000)
- **LLIN distribution through ANCs and child health and immunization days:** Provide support to NGOs and provincial and district health teams for management, logistics, and promotional activities related to the LLIN delivery to ANCs and for provincial- and district-level campaigns. (\$600,000)
- **LLIN longevity monitoring:** Monitor two types of LLINs distributed in a campaign for children less than five years in Nampula for durability, duration of insecticidal activity with WHO bioassays, and insecticide retention by chemical analysis over a three-year period. PSI, at no additional cost to PMI, will collect and replace LLINs from a sample of houses and will examine the physical condition of the nets. The nets will be tested for residual insecticide levels by WHO bioassays and by chemical analysis. (\$35,000)
- **“Hang-up/Keep-up” activities:** PMI, using central funds, is providing resources to the American Red Cross, who will provide support in-turn to the Mozambican Red Cross (Cruz Vermelha) to conduct “Hang-up/Keep-up” activities in selected provinces in Mozambique over the next three years. These activities include periodic house-to-house visits where Red Cross volunteers assist with the hanging of nets and encourage their regular use. (no additional cost)

Indoor Residual Spraying

Current Status, Challenges, and Needs

Indoor residual spraying remains a priority vector control intervention for MISAU in Mozambique and in the southern African region as a whole. Several neighboring countries, including the Republic of South Africa, Zimbabwe, and Zambia, have large-scale IRS programs using DDT. Indoor residual spraying is considered by the NMCP to be most appropriate in areas of higher population density, such as urban and peri-urban areas and areas of economic importance, which are estimated to include approximately 25-30% of the Mozambican population. There is also interest on the part of the NMCP to extend spraying to more rural areas and to scale up coverage to 40% of the country’s population by 2009 and 50% of the country’s population over the next five years.

MISAU has been supporting limited IRS operations in peri-urban and urban areas throughout Mozambique since the 1960’s eradication era (see map). Because these activities have suffered from a lack of financial and skilled human resources, the quality and impact of these small-scale



activities is limited, albeit largely unknown. Since 2000, the Lubombo Spatial Development Initiative (LSDI) has been supporting large-scale IRS in Maputo Province. The LSDI, a public-private 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 through the region. Strong emphasis is placed on evidence-based planning and implementation to demonstrate best practices.

LSDI first introduced IRS in 2000 in the south of Maputo Province using bendiocarb (because of high levels of *A. funestus* resistance to pyrethroids) in two spray rounds a year and was incrementally extended to protect a population of 1.1 million in seven of the eight districts of Maputo (all except Manhiça District) by 2004. Beginning in 2006, MISAU expanded coverage to include Maputo City, Matola, and Manhiça District, protecting a total of 1.9 million residents. Beginning in late 2005, DDT was re-introduced with one spraying round per year, when the Government of Mozambique withdrew its ban on DDT. Emphasis has been placed on training and supervising spray personnel and preventing leakage of insecticides from the program. Spraying begins in September/October each year and is to be completed in a three- to four-month period, prior to the start of the main malaria season. Spray personnel are recruited locally and given a 10-day training course. Many district-level health staff also are involved in the spraying effort.

LSDI has reported a significant reduction in malaria parasitemia in children aged 2-15 years old from greater than 60% prevalence to less than 4% prevalence in the south of Maputo Province, and from 69% to 33% prevalence in the north of the province.

The LSDI program received \$21.4 million in the Global Fund Round 2 in 2002, and funding continued for an additional two years. Using resources from a successful Global Fund Round 5 proposal (\$21.2 million), which only includes Mozambique, IRS was expanded by three districts (Chókwè, Guijá, and Massingir) in Gaza Province in 2007. Further expansion in subsequent years is expected to cover a population of approximately one million residents by 2009 throughout the province. DDT will be used with one spray round per year in rural areas and carbamates in two rounds per year in urban areas.

Public acceptance of IRS: Indoor residual spraying is generally very well accepted in Mozambique, although some complaints have been voiced. There are concerns that spray personnel are diluting the insecticide to allow them to profit from the sale of leftover insecticide and residents are inconvenienced when there is failure to adhere to preset schedules. These problems are more common in urban areas, and refusal rates in general are higher with DDT.

Zambézia Province IRS Activities: Based on the success of the LSDI program, MISAU conducted IRS using DDT in six districts (470,000 houses) of the highly endemic Zambézia Province in 2005-06 and 2006-07, using resources from the PROSAÚDE Common Fund (MISAU's central basket funding). The Zambézia IRS program was initiated in the provincial capital city of Quelimane and in select villages within the districts of Nicoadala and Namacurra and expanded to the districts of Mocuba, Milange, and Morumbala in 2006. Unfortunately, lack of availability of funds and insecticide delayed the start up of spraying in 2006. In addition, supervision and support from the

Provincial Health Department was limited and there was no support for insecticide resistance testing and entomological monitoring.

Progress to date: In FY 07, the NMCP requested PMI's assistance in covering these six districts in Zambézia Province. Although originally intending to fully support spray operations in three districts (Quelimane, Namacurra, and Nicuadala) and provide limited support to an additional three districts (Marrubala, Mocuba, and Milange) in the first year, provincial health authorities requested that PMI oversee spraying operations in all six districts. USAID's Vector Control Task Order, managed by Research Triangle Institute (RTI), was tasked with providing strategic, technical, operations, and management support for IRS activities in collaboration with provincial and district health offices and the NMCP.

With FY 07 funds, spraying was conducted from October 2007 through February 2008. A total of 1,190 persons were trained, including 926 spray operators, 264 support staff members, and 56 supervisors. In addition, 514 persons were recruited within sprayed villages and trained as community mobilizers. Due to an underestimation in the number of households in targeted districts, the number of households and population covered were higher than anticipated; 586,568 households were covered, representing 97.1% coverage, protecting a population of 2.5 million residents.

Procurement logistics of insecticide and spraying supplies and equipment was handled by MISAU's Central de Medicamentos e Artigos Médicos (CMAM), based on needs quantification by the NMCP. A total of 136 tons of DDT, 60 tons of ICON (lambda-cyhalothrin), and 13 tons of bendiocarb were procured and distributed by MISAU in 2006, along with 1,275 spray pumps. PMI's complementary funding procured an additional 6,650 spray pumps, 55 maintenance kits, and 1,300 personal protective equipment units (using FY 06 funds). With Global Fund support, Mozambique recently purchased and has received delivery of 900 tons of DDT, enough insecticide to last through the 2009 campaigns.

The primary insecticide used in Zambézia was DDT, consistent with NMCP's strategy of using DDT in highly populated urban and peri-urban areas. However, deltamethrin was used in towns where structures with finished or painted walls were found. Based on the latest round of spraying in Zambézia, PMI has identified insecticide management as an area in need of strengthening. In January 2008, PMI organized and supported an external assessment team to survey the DDT management system in Mozambique and recommend several areas where tightened controls would reduce the possibility of leakage. Findings indicate that, although the basic principles of sound insecticide management were followed, more stringent controls were needed to mitigate the likelihood of DDT leakage to markets. Specific recommendations include a more rigorous stock control inventory system; better security at storage facilities; regular market inspections to identify, if any, early signs of leakage; and increased supervision of distribution and reception of insecticide sachets.

In 2008, the NMCP expressed its desire to consolidate IRS in the six targeted Zambézia Province districts. Under the direction of the NMCP, and in contrast with IRS operations in 2007, spraying will be focused to target more densely populated areas (as opposed to blanket spraying). The PMI FY 08 campaign commenced in August 2008 and, over a course of three months, will cover approximately 502,000 houses (2 million residents). PMI support included hiring and training of spray personnel; operations, management, and technical support; and the procurement of pumps, spare parts, PPE, and limited supplies of pyrethroids (for areas where DDT is not indicated).

Proposed USG Component: (\$5,037,500)

PMI will support a third round of focal IRS in six districts of Zambézia Province in FY 09. Resources will be targeted to build the technical and managerial capacity of the NMCP and the provincial health authorities. For example, PMI will work closely with the NMCP in forecasting the quantity of insecticide needed in 2010 to minimize the risk of insecticide expiration. The goal will be to enable responsibility for these activities to transition back to the national and provincial authorities by 2011.

Proposed PMI FY 09 activities related to IRS include:

- **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 (two million persons) over a three-month period. (\$4,500,000)
- **Purchase equipment and supplies for the IRS operations in these six districts:** Adequate supplies of DDT and spray pumps are currently available in Mozambique to cover IRS needs through 2009. However, funds are needed to purchase pyrethroids, spare parts, and personal protective equipment for the spray operators in the six targeted districts. (\$500,000)
- **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)

Malaria in PregnancyCurrent Status, Challenges, and Needs

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

Since May 2004, the MISAU has promoted the use of IPTp for all pregnant women. At least three monthly doses of SP after quickening (the point during pregnancy when the mother detects fetal movements) are recommended because of high HIV prevalence rates. While the use of IPTp is a national policy in Mozambique, the uptake of this intervention has been limited, particularly in the Northern Provinces. Although IPTp is reportedly available 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 IPT. It remains unclear, though, why uptake has been slow, but lack of training and supervision are likely to be contributing factors.

The NMCP and Reproductive Health Unit staffs have collaborated in developing and implementing the policy. Reproductive health officials have provided training on IPTp to Provincial Coordinators

for Malaria, HIV/AIDS, and Tuberculosis, staff from NGOs, and MISAU maternal and child health nurses who provide ANC services that include prevention of mother to child transmission (PMTCT) as well as IPTp.

Assuming that pregnant women make up about 5% of the population, we can estimate that approximately 900,000 women will become pregnant in Mozambique each year. Using this figure, a total of 2.7 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 2009.

There remains an ongoing need for training of staff in those health facilities that have yet to implement IPTp and of new staff, and refresher training and supervision of all ANC staff. In addition, there is still a largely unmet need for communications and behavior change activities encouraging pregnant women to seek early antenatal care and take all three doses of SP.

MISAU is currently updating the malaria treatment guidelines. Quinine is listed in the national therapeutic guidelines as the recommended treatment for malaria in pregnant women in their first trimester. In the revised guidelines, AL will be recommended for pregnant women in their second and third trimesters.

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 PMTCT partners have begun to introduce cotrimoxazole prophylaxis for HIV-infected women, precluding the use of SP for IPTp for these women. To date, though, comprehensive guidelines to address malaria prevention in seropositive pregnant women have not been developed.

PMI and PEPFAR staff are working with the MISAU Reproductive Health Section officials to develop appropriate ANC protocols and guidelines, while PEPFAR and PMI implementing partners will assist in developing the training materials and the training and supervision of ANC providers to make sure that these two important interventions are delivered in a coordinated and complementary manner. Towards this goal, a PEPFAR-funded assessment was initiated by the non-profit organization JHPIEGO in July 2008 to determine the integration of malaria and PMTCT activities at ANCs.

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 2009. MISAU and individual Direccão Provincial de Saúde (DPS) continue to roll-out training of ANC staff, but little is known about the extent of the scale-up or the quality of service delivery. PMI and PEPFAR staff have been working to harmonize service delivery at ANC and PMTCT clinics. A desktop review of existing guidelines and training materials for malaria prevention in ANCs, as well as meetings with stakeholders, was conducted by JHPIEGO in July 2008. A survey of health facilities which have PMTCT programs and where malaria prevention activities take place will be conducted later in 2008. In addition, in an effort to assess the barriers to IPTp roll out, a module for IPTp as well as observation of service delivery will be incorporated into a national Health Facility Survey, to be conducted later in 2008. All these activities are aimed at providing an accurate situation analysis malaria prevention services for

pregnant women. Because of the delay in awarding of the TASC3 task order, training materials are only now being revised. An accelerated plan of training and supervision will be implemented early in the last quarter of 2008.

Proposed USG Component (\$150,000):

As the MISAU expands IPTp to more peripheral health facilities, support will be needed for training, re-training, and supervision of ANC staff in the prevention and management of malaria in pregnancy. In addition, training and communications materials will need to be reviewed to make sure that they reflect current policies, particularly related to IPTp, prevention of malaria in HIV-infected pregnant women, and treatment of clinical malaria during pregnancy. The government of Mozambique has already procured sufficient doses of SP to cover the needs for 2009. 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 following activities are planned for 2009:

- **LLIN distribution through ANCs:** Procure LLINs and support their free distribution through ANCs. (covered in ITN section – page 16)
- **Support training and supervision of health workers in the prevention and management of malaria in pregnancy:** This will cover the correct use of ITNs and IPTp, and the diagnosis and management of clinical malaria during pregnancy. (\$150,000)
- **Integrate malaria prevention during pregnancy with HIV services:** Delivery of ANC services will be integrated with PMTCT by linking Reproductive Health staff at MISAU with PEPFAR and PMI partners who will coordinate policy development, planning, and implementation. This will be performed mainly through the partnership with JHPIEGO, with funding from PEPFAR. (no additional resources needed)

INTERVENTIONS – CASE MANAGEMENT

Malaria diagnosis

Current Status, Challenges, and Needs

At present, malaria diagnosis in most MISAU health facilities is based on clinical grounds. Only about 20% of all malaria cases, mainly cases of severe disease treated at hospitals, are diagnosed by microscopic examination of a blood slide. Lacking any system of quality control, the accuracy of those diagnoses is unknown. RDTs were introduced as part of malaria case management in Mozambique in early 2007. INS is responsible for the training and supervision of malaria microscopists, and quality control of malaria microscopy. The most recent refresher training, conducted in February 2007, included two microscopists from each province. These laboratory technicians were trained in malaria diagnosis, including microscopy and RDTs, although the curriculum was not complete. Senior laboratory technicians from the INS and the NMCP also make

periodic supervisory visits to provincial laboratories for refresher training and quality control of microscopy and RDTs, but neither the quality nor the frequency of these visits is standardized.

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.

The “Criteria for Rapid Diagnostic Test Use in Mozambique,” approved by MISAU in early 2007, recommend that children less than five years of age in highly endemic areas with symptoms suggestive of malaria will be treated based solely on clinical findings, while older children and adults should have a diagnostic test, consistent with WHO recommendations. In areas with moderate to low prevalence of malaria, primarily the area currently covered by LSDI, the criteria recommend that all children and adults should undergo diagnostic testing before treatment is prescribed, including at the community level. However, clinicians often do not follow these criteria, mostly because they lack appropriate training and supervision. Moreover, the draft “Guidelines for Case Management in Mozambique” recommends that RDTs be used in children less than five years of age, regardless of malaria prevalence. Given these contradictory guidelines, further discussion is needed to build consensus on the appropriate role of diagnostic testing in children less than five years. This discussion has been scheduled to take place prior to the roll out of the new first-line malaria treatment in 2009.

Progress to date: A comprehensive strategic plan for laboratory diagnosis, including guidance on whether to test and recommend testing methods for each age group and epidemiologic profile was drafted with PMI technical support and approved by MISAU in 2007. At the same time, the NMCP introduced RDTs into public health facilities, and is currently expanding access to RDTs to community health workers, called Agentes Polivalentes Elementares (APEs). The role of APEs in malaria case management is described in the next section.

In 2008, PMI is purchasing approximately 80 microscopes and microscopy supply kits, which are to be distributed to provincial and district health facilities to both strengthen those facilities that currently offer malaria microscopy and expand microscopy to additional health centers where microscopy is not currently available. PMI also is refurbishing and re-equipping the national malaria reference laboratory to serve as a national training center and the headquarters for diagnostics quality control and quality assurance. PMI has not purchased RDTs in 2007 and 2008, as large quantities of RDTs were purchased using resources from the Global Fund.

FY 09 Planning: According to the Gap Analysis conducted in February 2007 by a World Bank-financed consultant, a total of \$4.5 million from different partners is available for the purchase of RDTs in 2008. Assuming a unit cost of \$0.60, these funds would be enough to purchase 7.5 million tests. PMI has chosen not to focus funding for the purchase of RDTs in FY 09, although this position is open to change. It is expected, though, that approximately 200 microscopes will be purchased by PMI, using FY 07 and FY 08 funding.

In March 2007, the Presidents of Brasil and the USA agreed to collaborate on an initiative to support and strengthen malaria control efforts in lusophone countries in Africa. This collaboration is already underway in São Tomé e Príncipe. Using FY 08 funds, PMI intended to extend this collaboration by mobilizing technical support from Brasil to strengthen the capacity of diagnostic

testing and develop an effective system for quality control of laboratory testing for malaria. We anticipate that FY 08 funds will be sufficient to continue this collaboration through 2009.

Proposed USG Component: (\$312,500)

As Mozambique implements a new malaria treatment policy, using AL as first-line treatment, diagnostic testing will become an increasingly important tool to reduce the unnecessary use of these drugs that occurs when patients are presumptively treated for malaria. PMI views strengthening capacity for diagnostic testing as an important component of good case management and will support the new policy on diagnostic testing currently under development. The roll out of this strategy will require appropriate supervision and quality control for both microscopy and RDTs. Whenever possible, laboratory strengthening activities will be integrated with similar efforts by PEPFAR and other disease control programs. Due to the delay in the award of the TASC3 procurement, resources allocated for laboratory strengthening in FY 07 and FY 08 have yet to be used. Limited additional funding will be required to support these activities through 2009.

Proposed activities during Year 3 are as follows:

- **Procure additional microscopes and microscopy supplies:** This includes 20 binocular microscopes (at \$2,500 each) and approximately 60 microscopy kits (slides, lancets, reagents, etc. for 10,000 tests each) (at \$2,500 each). (\$200,000)
- **Support training and supervision of laboratory diagnosis:** PMI will work with the NMCP and the INS to increase the quality and quantity of pre-service and in-service training, and supervisory visits for laboratory technicians and other health staff, including APEs, who are using microscopy and/or RDTs. Whenever possible, this activity will be coordinated with activities to improve laboratory diagnosis of other diseases, e.g., HIV/AIDS and tuberculosis. (\$100,000)
- **TDY from CDC-Atlanta:** CDC staff to provide technical support to laboratory strengthening activities. (\$12,500)

Pharmaceutical Management and Treatment

Current Status, Challenges, and Needs

Antimalarial treatment: In the last six years, Mozambique has undergone three changes in national malaria treatment policy. In 2002, AQ-SP was introduced as an interim first-line treatment until ACTs could be adopted. In late 2004, the policy was changed to AS-SP, with AL as the second-line therapy. In 2007, AL was chosen as the first-line treatment, and AS-AQ as second-line (primarily intended for those with hypersensitivity to AL). The 2007 change in policy was motivated by concerns regarding the efficacy of SP, which when used alone proved to have a clinical efficacy of only 83% in 2000. Quinine is the third-line drug and is also recommended for the treatment of severe malaria and malaria during the first trimester of pregnancy. This policy is now scheduled to be implemented in the first quarter of 2009, although the malaria treatment guidelines are still under revision and it remains to be determined if AS-AQ will be recommended as the second-line option. To date, AS-AQ has not been purchased by MISAU for 2009.

The NMCP also has indicated, pending final approval of new treatment policy, that artesunate rectal suppositories should be used for the emergency treatment of severe malaria in settings where intramuscular or intravenous quinine cannot be administered. The treatment guidelines recommend quinine for treatment of malaria in pregnant women during the first trimester. Previous treatment guidelines had recommended AS-AQ in second and third trimesters, but AL is expected to be recommended for these patients as part of the new treatment guidelines. The new policy and guidelines is expected to roll out in the first quarter of 2009, beginning with a training-of-trainers workshop in Maputo.

Antimalarial treatment in MISAU facilities is free of charge, although patients do have to pay a minimal fee for drugs other than antimalarials, such as paracetamol. MISAU lacks a clear policy on user fees, which often vary from one facility to another.

Malaria treatment also has been provided by APEs, community health workers, who are distributed unevenly throughout the country. The exact number of APEs working in communities is not known, but MISAU is planning on determining this in late 2008, early 2009. Historically, APEs received a six-month training, which enabled them to treat the symptoms of common illnesses, including respiratory and diarrheal diseases. Malaria is the only illness for which APEs are trained to provide curative treatment. MISAU is planning to rebuild the cadre of APEs to increase access to clinical services throughout the country. This strategy will be supported, in part, by a World Bank Health Project focused on strengthening the health service system in the three northern provinces. In addition, the scaling up of these APEs has figured prominently in the recently submitted Global Fund Round 8 proposal. This expansion will be essential, particularly in rural areas in the North of the country where access to health facilities is very limited. PEPFAR and USAID MCH and RH funds are also being made available to MISAU to launch this APE re-vitalization. APEs would have a key role in achieving PMI's goal of 85% of children less than five with suspected malaria receiving treatment with an ACT within 24 hours of the onset of symptoms.

The treatment regimens recommended by the NMCP are as follows:

Uncomplicated malaria:

First-line treatment: AL (co-formulated, each tablet contains 20 mg of artemether and 120 mg of lumefantrine). Dosing schedule (six doses over three days):

Weight	Age	Number of tablets/dose	Total number of tablets
<5 kg	<6 months old	Not recommended	
5-14.9 kg	<2 years old	1	6
15-24.9 kg	2-8 years old	2	12
25-34.9 kg	8-14 years old	3	18
≥35 kg	>14 years old	4	24

Second-line treatment: AQ-AS (co-blistered, each blister contains tablets with 67.5 mg and 25 mg (infants), 135 mg and 50mg (children), and 270 mg and 100 mg

(adults) of amodiaquine and artesunate, respectively. Dosing schedule (one daily dose over three days):

Weight	Age	Tablet dosage (AQ-AS)	Number of tablets per day (3 days)
<4.5 kg	<6 months old	Not recommended	
4.5-9 kg	6-12 months old	135/ 50 mg	½
9-18 kg	1-5 years old	135/ 50 mg	1
18-36 kg	5-13 years old	270/100 mg	1
>36 kg	>13 years old	270/100 mg	2

Third-line treatment:

Quinine: 30mg/kg/day x 7 days (adult dose: 1800 mg/day).

Severe malaria:

Quinine: 20 mg/kg (loading dose) IV followed by 10 mg/kg every 8 hours; changed to oral quinine as soon as patient can take oral medicines, for a total of seven days.

Malaria in pregnant women:

First trimester: Quinine: 10 mg/kg oral or IV per dose every 8 hours for a total of seven days.

Second and third trimesters: AL (dosing as above, proposed in revised guidelines).

Structure of the pharmaceutical management system: CMAM has primary responsibility within MISAU for supplying the national 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 for supervising the procurement, storage, and distribution of medicines and supplies.

The NMCP coordinates with CMAM on the purchase and distribution of antimalarial drugs and supplies. During the last few years, USAID's DELIVER and Supply Chain Management Strengthening (SCMS) projects have played an essential supportive role in strengthening capacity of CMAM. DELIVER and SCMS are currently responsible for renting three warehouses in Maputo to stock antimalarials at a cost of \$144,000 per year.

There are two systems for delivery of medicines in Mozambique. The most frequently used medicines are supplied through a kit system. There are three types of kits — Kit A for health centers, Kit B for health posts, and Kit C for APes. Kits are prepared by the supplier in India and delivered into the four ports (Maputo, Beira, Quelimane, and Nacala). They then are delivered to provincial warehouses, bypassing the central medical stores, and delivered through a push system to the districts and then onward to health facilities. These kits are fully financed using pooled MISAU/donor resources.

Drugs and supplies that are not contained in the kits go through what is known as the Via Classica. These commodities are delivered to one of the two central warehouses in Maputo and Beira, managed by CMAM. Those warehouses supply the three central hospitals and ten provincial warehouses. Provincial warehouses supply district warehouses, rural hospitals, general hospitals,

and provincial hospitals. District warehouses supply district hospitals, health centers, and health posts. Storage facilities at the provincial and district levels are often inadequate. This system is a “pull” system, requiring lower levels to place orders with the higher level for replenishment.

In the past, first-line antimalarial drugs have been supplied via the kit system to health centers, health posts, and APEs, while second- and third-line treatments are distributed through the Via Classica. The adoption of AL as first-line treatment poses a new challenge, as the bulkiness of the packaging of AL make it impossible for sufficient quantities of this drug to be included in the kits. A pilot, financed by PMI, is underway that will compare two possible methods for distribution of AL to health centers, health posts, and APEs: a parallel malaria kit system and a two-bin system (descriptions of these systems below). AL will be distributed to hospitals through the Via Classica.

Quantification of antimalarials: Although the NMCP uses the morbidity method to estimate antimalarial needs due to a lack of consumption data at the facility and district levels, there is an interest in collecting data and working towards a consumption-based estimation of needs in the next few years. Estimates developed by CMAM, with support of DELIVER and NMCP, for first- and second-line treatments in 2009 are based on an expected total of 8.6 million episodes of malaria to be treated in the public health system. However, full implementation of the AL will require approximately 15 million first-line treatments, the balance required for building buffer stocks at all levels. These figures take into account malaria prevalence, number of episodes per age group (from one to three), accessibility to health services, and expected impact of IRS and ITNs.

The estimated quantity of AQ-AS, the proposed second-line treatment, was calculated by NMCP presuming that 5% of the total number of expected cases treated in the public health system would require second-line treatment; a total of 430,637 treatments. PMI believes this estimate may be too high, considering the good clinical response to and acceptability of AL. According to the forecast, the need for quinine ampoules and tablets for treatment of severe malaria has been estimated at 5,765,275, or approximately 5% of the first-line treatments (which is likely an overestimate). Artesunate rectal suppositories, to be used as pre-referral drugs in health facilities without capacity to administer quinine, are to be included in Kits B and C, six and five units, respectively.

Estimated antimalarial drug needs and costs

Drug	2009 estimated need (treatments or units)	2009 cost (US\$)*
AL		
6-tablet blister	1,215,910	437,727.60
12-tablet blister	2,816,020	2,027,534.40
18-tablet blister	1,022,798	1,104,621.84
24-tablet blister	3,558,028	5,123,560.32
AS-AQ (loose tablets)		
3+3-tablet blister (50mg/153mg)	145,276	79,902
6+6-tablet blister (50mg/153mg)	92,118	96,724
12+12-tablet blister (50mg/153mg)	193,243	376,824
Quinine		
Ampoules	1,373,384	198,042
Tablets	4,391,891	121,216
SP (IPTp)		
Tablets	864,964	34,599

* Freight and distribution costs not included

According to forecasts developed by CMAM, with support of PMI, the 15 million treatments needed to allow the implementation of AL as first-line therapy is already fully funded by government and donors, including FY 07 and FY 08 PMI funds. In 2009, it is expected that a similar contribution by PMI funds will be required to contribute to the forecasted need of 8 million treatments.

Procurement: CMAM's procurement procedures appear to be compliant with international standards, enforced, and well established. CMAM is responsible for procuring antimalarials used in the public health system. The importation process in Mozambique can be long and complicated, particularly for non-government procurements. CMAM's Supply Change Management System Program, 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.

Two mechanisms are used to ensure the quality of medicines and supplies: (1) bid documents must include an certificate of origin issued by laboratories that are certified by accredited bodies acceptable to MISAU and comply with WHO certification scheme of pharmaceuticals; and (2) samples are required to be sent for testing by the National Pharmaceutical Quality Control Laboratory prior to the award of a contract. Furthermore, goods must have at least 75% of their shelf life remaining at the time of arrival in the country to be accepted.

Distribution: Kits are delivered directly to provinces by the supplier semi-annually and then distributed on a monthly basis to district warehouses, from which they are then sent out to the health centers (Kit A), health posts (Kit B), and APEs (Kit C) on a monthly basis. The last shipment of kits containing artesunate-sulfadoxine-pyrimethamine is expected to arrive in country in November 2008 and last through March 2009. The number of kits distributed to a facility each month is based on the facility's reported number of consultations in the previous month (push system).

Antimalarials by type of medicine kits

	Type of facility	Provider type	No. of consultations	No. of drugs in kit	Antimalarials in 2008 kits
Kit A	Health center	Physician	1,000	60	AS-SP
Kit B	Health post	Nurse	500	40	AS-SP, artesunate suppositories
Kit C	Community	APE	250	25	AS-SP, artesunate suppositories

In the Via Classica, warehouses and hospitals at the provincial and district levels submit requisitions to the distribution point above them on a quarterly basis. Previous health facility assessments have demonstrated that stock-outs of antimalarials delivered through the Via Classica are common.

As the first-line malaria treatment will no longer be delivered in the existing kits, an alternative stock management system has to be implemented. With the support of PMI, two AL distribution systems are being piloted in 2008: a "two-bin" pull system and an AL parallel kit push system. This

pilot is expected to provide results by the end of 2008, when one of the two systems will be chosen for implementation nationally. In the two-bin system, APEs and health post staff will receive two bins of AL. They will use medicines from one bin until the supply is exhausted, at which time he/she will request a refill. The second bin will then be used while awaiting the refill. Health centers and hospitals are to receive AL through the Via Classica.

The second option, an AL parallel kit system, kits containing AL exclusively will be packaged centrally or regionally and will be distributed from provincial warehouses to health centers, health posts, and APEs. This will require monthly usage control, so that the system has enough flexibility to allow for adjustments in AL needs. Hospitals will receive all antimalarials and health posts and health centers will receive AQ-AS and quinine through Via Classica. Implementation of the new drug policy will start in early 2009.

CMAM, with PMI and PEPFAR support, is implementing a computerized integrated drug management system, called SIGM, to improve the distribution and overall management of stock. SIGM is currently implemented in Maputo Province and is expected to be rolled-out to three other provinces by the end of 2008. Although SIGM will not yet be implemented at the district level, because of the lack of necessary infrastructure to support it (e.g., electricity, internet access), district- and health facility-level data will be entered into the system at the provincial level. The data available through SIGM will also generate more reliable consumption data, which will allow better forecasting.

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 introduction of AL as first-line treatment in early 2009, it will be necessary to monitor adverse reactions closely. PMI FY 08 funds have already been allocated to support the Center for Drug Information's efforts to monitor the roll out of AL.

Non-governmental organizations and the private sector: It appears that NGOs are not currently involved in providing treatment with ACTs, although many do work with APEs. It is believed that the 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.

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 6 sites in 2006, although the data was never analyzed. Studies assessing the current first-line treatment at these six sites are expected to be conducted in 2008, with PMI support.

Progress to date: PMI has assisted the NMCP in developing a comprehensive implementation plan, draft training materials, and a detailed quantification of the drug requirements by province for full implementation of the new malaria treatment policy. PMI also will support the pilot evaluation of the two-bin and AL parallel kit systems, which will be completed late 2008. Due to delays awarding of the TASC3 procurement, we expect that only limited additional FY 09 funding will be required to support training and supervision expenses for full implementation in 2009 and maintenance through 2010. PMI is procuring AL, using FY 08 funding, for delivery in the first quarter of 2009, in time for the launch of the new policy. Finally, PMI will be supporting an assessment, conducted jointly by PSI and the Medicines for Malaria Venture (MMV), of the availability and dispensing practices of formal and informal private sector drug sellers in Maputo, Morumbala, and Chokwé in November 2008.

Proposed USG Component: (\$3,950,000)

Ensuring prompt, effective, and safe ACT treatment to 85% of patients with clinical or laboratory-confirmed malaria in Mozambique represents a major challenge for PMI and the NMCP. The country's weak pharmaceutical management system, the introduction of laboratory diagnosis, 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. A number of steps will need to be taken if the MISAU's plan to implement the new first-line treatment with AL is to be successfully implemented. This includes continued updating guidelines, training, and communications materials; training of health workers; and educating the public about the new treatment policy.

Proposed activities during Year 3 of the PMI are as follows:

- **Procure supplies of AL:** PMI will procure approximately 2.4 million treatments of AL. (\$3,000,000)
- **Provide technical assistance for pharmaceutical management system strengthening:** Support will be provided for strengthening CMAM's capacity to manage antimalarial drugs, including covering the costs of warehousing and assembling of kits. Pharmaceutical and supply chain strengthening activities will also include end-use verification and monitoring of availability of key antimalarial commodities at the facility level. Specifically, this will entail regular supervisory visits to a random sampling of health facilities and regional warehouses to detect and trigger further action on the following critical areas: ACT (or other drug) stock-outs; expiration dates of ACTs at health facilities; leakage; anomalies in ACT use; and verifying quantification and consumption assumptions. (\$450,000)
- **Support implementation of the new malaria treatment policy:** Provide training and supervision through site visits to continue supporting the implementation of AL at provincial, district, and health facility levels. Resources will also be provided to support the comprehensive

training in malaria management, as part of pre-service training of a cadre of APEs, who will be jointly supported by PEPFAR and USAID maternal and child health and reproductive health funding. Pharmacovigilance to monitor adverse reactions to AL and other antimalarials will also be supported. (\$300,000)

- **Support communications and behavior change activities in support of the new drug policy:** As part of a comprehensive communications initiative on malaria in Mozambique, support will be provided for the implementation of communications and behavior change activities promoting early care seeking for fever and compliance with prescribed treatment, as well as introducing the public to new first-line malaria treatment. (Costs covered in Communications and Behavior Change section- page 32)
- **Design and pilot private sector interventions:** Based on planned evaluation of malaria treatment in the private sector funded with FY 07 PMI resources, pilot implementation of an initiative to strengthen malaria case management in the private sector will be supported. (\$200,000)

COMMUNICATIONS AND BEHAVIOR CHANGE

Current Status, Challenges, and Needs

According to both the NMCP and partners, malaria advocacy, prevention, and control awareness continue to be in great need. The NMCP completed their Health Communication Strategy in October 2006. However, this document has not received final approval by the Minister of Health's office. This 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 MISAU has included a section on Health Promotion and Mobilization with Community Involvement in its 2009-2013 Strategic Plan for Malaria Control. MISAU also plans to work more closely with NGOs, traditional healers, community leaders, and community-based organizations to improve local residents' knowledge and behaviors related to malaria.

NMCP has a communications officer and MISAU has a Health Education Department. Each province also has a health education and communication coordinator, who is expected to educate communities about malaria interventions and other health-related topics. These coordinators, though, are over-stretched and funding is scarce for communications activities.

To date, most communications activities carried out by NMCP have focused on a limited number of radio spots and educational programs. In areas where IRS is conducted, especially those where DDT is used, the NMCP communications officer pays a visit to sensitize the community. 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. PMI has also supported communications related to World Malaria Day.

Progress to date: Communications activities supported by PMI through TASC3 have yet to be launched because of delays in the awarding of this task order, but should scale up in the coming year. PMI provided significant support to 2008 World Malaria Day activities.

Together Against Malaria (TAM), managed by the Inter-Religious Coalition Against Malaria in Mozambique (IRCMM) with support from Adventist Development and Relief Agency and the Washington National Cathedral's Center for Global Justice and Reconciliation, has made significant progress in scaling up in its first year of implementation. Training has been provided to more than 1200 faith leaders, representing 96 different faith groups in six of ten districts Zambézia Province. TAM has formed inter-religious committees, called PIRCOMs (Programa Inter-Religioso Contra a Malaria) at the national level, and at the provincial and district levels in Zambézia Province. These PIRCOMs played a central function in coordinating training and monitoring progress. Their continued functioning will be essential to the sustainability of this intervention.

In addition, PMI support to PSI has been used to promote LLIN ownership and use. Promotional activities have been carried out in conjunction with LLIN distribution through ANCs and campaigns targeted to children less than five years.

Proposed USG Component: (\$750,000)

The success of an integrated malaria control program depends, in large part, on the understanding and acceptance of the population about the cause of malarial illnesses and its prevention and treatment, and the ability of households and communities to easily adopt new behaviors and access products and services. The development of appropriate messages that facilitate increased knowledge and result in adoption of appropriate behaviors for communities with different ethnicities and in different geographic areas will be critical for the success of the NMCP's efforts to control malaria over the coming years. TAM has shown some early success in scaling up activities in Zambézia and is set to expand to two more provinces in 2008. In preparation for the scale-up of TAM, PMI central funding to USAID's Communications for Change (C-Change) Project to support an assessment of the effect of TAM's interventions on community knowledge and behaviors related to malaria in the six original pilot districts. Further scale up is planned for FY 09. PMI's primary communications activities should scale up quickly with the recent awarding of the TASC3 procurement.

- **Expand communications and behavior change activities on malaria:** Continue to scale-up implementation of culturally-appropriate communications and behavior change activities initiated with FY 07 and FY 08 funding to increase the acceptance of and access to the key malaria interventions— ITNs, IPTp, ACTs, and IRS. This will include providing support and capacity building to RESP (Communications Department) at MISAU and Provincial Health Departments, as well as support to NGOs. Limited resources will be required in FY 09, as FY 07 and FY 08 funding has yet to be utilized. (\$200,000)

- **Promote ITN ownership and use:** Strengthen PSI communications activities for promotion of ITN ownership and use. (\$150,000)
- **Expand IRCMM’s “Together against Malaria” community mobilization activities:** Build on their first year experience with community mobilization activities on malaria in Zambézia, and their expansion to two additional provinces in FY 08, by further scaling up to additional provinces. (\$400,000)

CAPACITY BUILDING WITHIN THE NMCP

Current Status/ Challenges and Needs

The NMCP is responsible for developing policy; establishing norms; and planning, organizing, and overseeing all malaria control activities in the country. It also coordinates with key staff from the Community Health Department, the Pharmacy Department, CMAM, Epidemiology Department, and with NGOs, donors, and other partners. The NMCP staff currently consists of a Director/Medical Epidemiologist, one national IRS supervisor and one IRS officer, one entomology technician, two entomology assistants, an information technology technician, one communications officer, and one financial assistant.

At the provincial level, Provincial Coordinators are responsible for malaria control activities, as well as HIV/AIDS, tuberculosis, leprosy, and sexually transmitted infections. Since 2007, MISAU has recruited 14 provincial-level biologists, each one assigned to a specific province, with two each assigned to Zambézia and Nampula. These staff will work under the DPS and the Provincial Coordinator, assisting with management of malaria control activities within their province.

The NMCP coordinates with the Community Health Department, Child Health and Reproductive Health Sections to integrate malaria prevention and treatment into IMCI and ANC and with the Health Education Section to develop and implement communications and behavior change activities, but this coordination has been weak. These groups also have staff at provincial and district levels who help implement malaria activities. IRS activities including distribution, use, and monitoring of pesticides require close linkages with the Ministry of Agriculture staff at central, provincial, and district levels to guarantee safe pesticide use and follow-up on mitigation measures.

The NMCP staff at the central level are overstretched and in need of additional staff and training. Specifically, the NMCP has requested immediate assistance and capacity building in entomology and M&E within the national program.

Progress to date: The CDC PMI Advisor, hired in 2006, coordinates PMI activities within the strategic framework of the NMCP and has played a key role in the country’s malaria technical working group. In 2008, PMI successfully recruited a USAID Advisor, who has recently arrived in country to assume his responsibilities. As with the CDC PMI Advisor, the USAID PMI Advisor will spend part of his time working at the NMCP, to ensure close coordination between PMI and NMCP.

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 MISAU malaria control efforts funded by the Global Fund, other international donors and partners, and PMI. To reach the NMCP targets for coverage with ACTs, ITNs, IPTp, and IRS, PMI and other partners will need to support efforts to strengthen the capacity of the NMCP and other collaborating departments and sections at the central, provincial, and district levels to plan, conduct, supervise, monitor, and evaluate malaria prevention and control activities. This will require an improved working environment and communications and logistic support, as well as staff capacity building and training.

In 2009, PMI will 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 lab 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.

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. To this effect, a newly drafted 2009-2013 National Malaria Control Program Monitoring and Evaluation Plan is being reviewed 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 collected by each health facility. These aggregated data are transmitted to the district level for first aggregation, then transmitted to the provincial and national level. While considered to be the best functioning health information system in the country, it has limited capacity and there are concerns about the accuracy, completeness, and timeliness of the data.

A sentinel surveillance system based in provincial, general, and rural hospitals at five sites was established in 2003 by Management Sciences for Health with USAID funding. These sites, though, are not currently functioning because of lack of support from MISAU. In addition, clinical efficacy trials were implemented at these sites in 2006, testing AQ/SP and AS/SP. Data from this trial has never been analyzed or reported.

Limited information is available on the quality of malaria diagnosis or delivery of malaria interventions at the health facility level. The recent distribution of RDTs for malaria across the country, with little or no pre-service training on these assays, 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). With the rapid scale-up and evolution of malaria interventions in Mozambique, these maps will need to be updated regularly.

Progress to date: In late 2006, the M&E consultant for the USAID bilateral project FORTE Saude initiated a review of the M&E for the NMCP. As part of this assessment, a detailed table of indicators from the Strategic Plan for Malaria Control was developed. This assessment has resulted in a draft 2009-2013 National Malaria Prevention and Control Monitoring and Evaluation Plan, which is closely aligned with the newly drafted 2009-2013 National Malaria Control and Prevention Strategic Plan. Currently, NMCP and partners are compiling data from all surveys, operational research activities, surveillance, and service data, such as number of nets procured or distributed or number of IPTp doses administered.

PMI supported the implementation of an MIS, in June/July 2007. A total of almost 6000 households were included in the survey. Data collection and analysis are complete and this information has been a key element in the drafting of the new NMCP Strategic Plan, as well as the proposal to the Global Fund and NMCP Program Review. A table of key indicators can be found in the “Progress-Year 2” section.

In late 2007, Mozambique also conducted a pilot post-census mortality survey using verbal autopsy (called INCAM) in follow-up to the 2007 National Census with funding from PEPFAR and technical assistance from the U.S. Bureau of Census and the University of North Carolina MEASURE/Evaluation Project. The INCAM survey provided provincial, urban/rural, and sex specific estimates of the levels of HIV and malaria mortality over the twelve months prior to the Census. A representative population of approximately 1,000,000 residents in all 11 provinces was included in the INCAM survey. The pilot survey results show that the proportion of all deaths from malaria from all causes of death among children less than five ranged from 16.4% in Maputo city to 25.6 in a sample area in rural Cabo Delgado.

During 2008, the delayed TASC3 finally was awarded and an M&E specialist hired to provide technical support to NMCP and support capacity building in M&E within the NMCP. This M&E specialist is also overseeing implementation of sentinel surveillance sites. Six sites have been chosen and data collection will begin in two sites, Pemba and Chokwé, in August 2008.

The protocol for the rapid urban malaria assessment study, to determine the extent of malaria transmission that occurs in urban and peri-urban Maputo, has been approved by both CDC and MISAU ethical committees. The assessment is scheduled to take place during the next peak transmission period (between December 2008 and April 2009) with support from PMI FY 08 funding.

Proposed USG Component: (\$312,500)

Reliable and 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’s 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.

A midterm survey to assess progress on PMI is due to take place in 2009, following up from the baseline survey conducted in 2007. A UNICEF-supported MICS (Multiple Indicator Survey) survey was conducted in August 2008 and an AIDS Indicator Survey (AIS) is scheduled to start data collection in late 2008 or early 2009. In light of the plans for these surveys, which will collect some information on malaria indicators, it has been decided not to have a separate midterm MIS. Instead, PMI will provide limited support to those partners involved in the conduct of the AIS, with the goal of strengthening the capacity of this survey to collect more detailed information on key malaria indicators.

In order to strengthen the NMCP's ability to conduct surveillance on malaria morbidity and mortality as well as to monitor the status of implementation of prevention and control activities throughout the country, the PMI proposes the following activities:

- **Strengthen the malaria surveillance system:** Continue support, in close coordination with TASC3 M&E specialist and junior data manager, other partners, the INS, and the NMCP, to assess and improve the quality, accuracy, completeness, and timeliness of malaria-related surveillance data at the district, provincial, and national levels and at sentinel surveillance sites. (\$100,000)
- **Long-term technical assistance for M&E:** PMI will support the hiring of a junior staff person who will be placed within the NMCP and trained by the TASC3 M&E specialist, with the intent that he/she will take over coordination of NMCP M&E activities and will be hired by MISAU within two years. (\$50,000)
- **Support for national indicator survey(s):** PMI will contribute to the upcoming AIS to ensure collection of relevant data to monitor progress of PMI at the mid-point of implementation. (\$150,000)
- **TDYs from CDC-Atlanta:** CDC staff to provide technical assistance to M&E strengthening activities (1visit). (\$12,500)

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 Departamento de Asistencia Medica, and the Departamento do Controlo e Prevencao de Doencas sections of MISAU 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.

As of March 31, 2008, through US Government direct and indirect support, 153,175 pregnant women received HIV counseling and testing through PMTCT services and 13,657 had completed a course of ARV prophylaxis for PMTCT; 177,458 orphans and vulnerable children (OVCs) had received services; 257,795 people affected and living with HIV/AIDS had received palliative care; 189,926 Mozambicans visited counseling and testing centers and received their test results; and 59,274 individuals were on ARVs. Reaching pregnant women and people living with HIV/AIDS in rural areas continues to be a challenge.

A total of 80,000 LLINs were distributed through PSI to partners for delivery through treatment clinics to people with HIV/AIDS and to OVCs through outreach activities. Fifty thousand went to people living with HIV/AIDS while 30,000 went to OVCs.

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 HIV/AIDS services were not reaching beyond the capital, 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 years and pregnant women. In addition, persons living with HIV/AIDS are considered a population vulnerable to malaria. A few PMI- and PEPFAR-supported activities for these groups are seen as opportunities for collaboration. Specifically, at ANCs where PMTCT is being offered, IPTp and the distribution of LLINs are routinely offered, however to varying degrees depending mostly on the presence of an NGO partner. With funds from PEPFAR, an assessment will be carried out over the next few months to assess the nature and the degree of integration between HIV and malaria services for pregnant women. This assessment includes examination of national policies and guidelines and service delivery at provincial, district, and health facility levels. The assessment will provide a situation analysis of integration and will serve as the basis for addressing the training needs, which will be implemented by TASC3.

The services PEPFAR partners offer must 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. For adults living with HIV/AIDS, PMI partners will work with PEPFAR partners who provide antiretroviral therapy and/or home-based care services, to ensure access to appropriate diagnostic, treatment, and prevention options (including LLINs and educational material).

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 largely rural population in Mozambique through APEs. PEPFAR and PMI are supporting training for these APEs, both pre- and in-service, for home-based care of HIV-related illnesses and malaria. A “basic-care package”, which includes LLINs and educational material, is being supported by PEPFAR with PMI technical support. This package, in a scaled-down version, is already being distributed through clinics caring for people with HIV/AIDS, but using the APEs for this distribution is also being considered. OVCs also receive this package through PEPFAR partners at a community level.

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 is underway to assess the impact of cotrimoxazole treatment on the incidence of malaria in HIV-exposed infants. Training and supervision on diagnosis and new first-line of treatment will 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 to this population.

PEPFAR will also support the implementation of a Tracking Results Continuously (TRaC) survey later this year, which will assess attitudes and behaviors related to the use of ITNs. This survey will receive technical support from PMI. The findings from this survey will directly assist in targeting messages and educational activities to address the issues that present as barriers to ITN usage.

PMI and PEPFAR advisors and implementers will also work with CMAM to strengthen the pharmaceutical distribution system to limit stock-outs of all commodities for either program through the different services. PMI- and PEPFAR-supported laboratory-related activities also have opportunities to join forces. The NMCP has declared an interest in decentralizing reference laboratory services outside of the National Reference Laboratory for Malaria in Maputo. Laboratories are being refurbished or constructed by PEPFAR partners for decentralized tuberculosis reference diagnosis in Beira and Nampula. These laboratories could also become regional malaria diagnosis laboratories. Specifically, the newly acquired equipment (microscopes, RDTs) will be shared and training courses for technical personnel could be coordinated for these peripheral laboratories.

A PEPFAR-funded mortality survey was carried out after the 2007 National Census. The U.S. Bureau of Census and the University of North Carolina MEASURE Evaluation project have

provided technical assistance and local cost support to implement the survey and analyze the results. Other surveys being supported by either initiative, such as the national sentinel surveillance for HIV prevalence, could include malaria-specific questions and vice-versa for a PMI-supported survey.

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

The collaboration between PEPFAR and PMI will be expanded this year. Activities will focus on:

- **Ensure all at-risk groups are provided LLINs:** LLINs will be delivered through all points of service, including ANC, OVC clinic, ARV treatment sites, and home-based care. (funding provided by PEPFAR, with technical assistance from PMI)
- **Coordinate services for pregnant women:** A coordinated plan for delivering IPTp and PMTCT to pregnant women through ANC and other appropriate points of care is being developed. Training for IPTp will incorporate the recommendations of the plan.
- **Strengthen coordination of M&E activities:** Coordination of M&E activities for malaria and HIV/AIDS will be improved, whenever possible, 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:** This will initially concentrate at the reference level, but should then extend down to the point of service.

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 USAID Mozambique health staff 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 and HIV/AIDS; the CDC staff will be supervised by CDC, both technically and administratively.

Proposed USG component: (\$1,775,000)

Proposed activities during Year 3 of PMI are as follows:

- **Management of PMI.** Support two PMI staff (one USAID and one CDC) based at the USAID Mission in Maputo, 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. (\$1,775,000)

ANNEX 1

Tables

Table 2
President's Malaria Initiative— Mozambique
Planned Obligations for FY 09

Proposed Activity	Mechanism	Budget	Commodities	Description of Activity	Geographic Area
PREVENTIVE ACTIVITIES					
Vector Control					
Strengthen entomologic capacity of NMCP	RTI Vector Control	\$100,000	\$50,000	Procure needed supplies and support training and field operations	Nationwide
Provide long-term TA in entomology	RTI Vector Control	\$100,000		Support a full-time entomologist to supervise entomologic activities at NMCP.	Nationwide
Establish Regional Laboratory	RTI Vector Control	\$65,000		Refurbish and equip a regional entomology laboratory	Cabo Delgado
TDY for TA of entomology activities	CDC	\$12,500		Technical support for entomologic monitoring	Nationwide
Subtotal Vector Control		\$277,500	\$50,000		
ITNs					
Procure LLINs	PSI	\$6,600,000	\$6,600,000	Procurement of 1 million LLINs	Nationwide
LLIN distribution through ANCs and campaigns	PSI	\$600,000		Support to NGOs, DPS, and District Teams for logistics of LLIN distribution	Nationwide
Monitor LLIN durability	CDC	\$35,000		Monitor LLIN durability and effectiveness	Nampula
Subtotal ITNs		\$7,235,000	\$6,600,000		
IRS					
Support IRS in six districts of Zambézia Province	RTI Vector Control	\$4,500,000		IRS campaign in six districts of Zambézia covering 502,000 houses (2 million residents)	Zambézia Province
Procure IRS commodities	RTI Vector Control	\$500,000	\$500,000	Procure PPE, spares and pyrethroid insecticides.	Zambézia Province
Support environmental monitoring of IRS activities	TBD	\$37,500		Support for routine monitoring to ensure the safe and judicious use of insecticides	Zambézia Province
Subtotal IRS		\$5,037,500	\$500,000		
IPTp					
Training and supervision of ANC staff in malaria in pregnancy	TASC3	\$150,000		Training and supervision of health workers in prevention/treatment of malaria in pregnancy	Nationwide
Subtotal: IPT		\$150,000	\$0		
SUBTOTAL: Preventive		\$12,700,000	\$7,150,000		

Proposed Activity	Mechanism	Budget	Commodities	Description of Activity	Geographic Area
CASE MANAGEMENT					
Diagnosis					
Purchase of diagnostic supplies	TASC3	\$200,000	\$200,000	Purchase of microscopy kits, reagents, and additional microscopes, as required	Nationwide
Support training and supervision of laboratory diagnosis of malaria	TASC3	\$100,000		Pre- and in-service training and supervision in laboratory diagnosis of malaria, including quality control	Nationwide
TDY for TA of lab strengthening	CDC	\$12,500		Technical support for lab strengthening	Nationwide
Subtotal: Diagnostics		\$312,500	\$200,000		
Treatment					
Procurement of first-line drugs	DELIVER	\$3,000,000	\$3,000,000	Procure and ship 2.4 million doses of AL	Nationwide
Strengthen MISAU antimalarial drug management system	DELIVER	\$450,000		Strengthen MISAU capacity to manage antimalarial drug system and support distribution and storage of ACTs	Nationwide
Support training of health workers on treatment of malaria	TASC3 with subgrants to NGOs/FBOs	\$300,000		Support training and supervision of health workers at all levels in new malaria treatment guidelines, including training of APEs	Nationwide
Improve malaria treatment in private sector	PSI	\$200,000		Disseminate guidelines for private sector on case management. Pilot intervention in private sector	TBD
Subtotal: Treatment		\$3,950,000	\$3,000,000		
SUBTOTAL: Case Management		\$4,262,500	\$3,200,000		

Proposed Activity	Mechanism	Budget	Commodities	Description of Activity	Geographic Area
COMMUNICATIONS AND BEHAVIOR CHANGE					
Implement communications and behavior change activities	TASC3	\$200,000		Implement communications and behavior change activities promoting appropriate malaria prevention and treatment	Nationwide
Promote LLIN ownership and use	PSI	\$150,000		Promote LLIN ownership and use via mass media and community-based approaches	Nationwide
Support to NGOs to conduct community mobilization activities	IRCMM	\$400,000		Provide support to FBO consortium to mobilize communities around prevention and treatment of malaria	Zambézia, Nampula, & additional province
Subtotal BCC		\$750,000	\$0		
MONITORING AND EVALUATION					
Strengthen malaria surveillance, including sentinel sites	TASC3	\$100,000		Strengthen malaria surveillance, including sentinel sites	Nationwide and Sentinel Sites
Long-term TA for M&E	TASC3	\$50,000		Support one junior staff person to work with NMCP to develop M&E capacity of program	Central
Support to AIDS Indicator Survey	TASC3	\$150,000		Midterm data on intervention coverage	Nationwide
TDY for TA for M&E strengthening	CDC	\$12,500		Technical support to M&E strengthening activities	Nationwide
SUBTOTAL: M&E		\$312,500	\$0		
IN-COUNTRY MANAGEMENT					
In-country administrative expenses	CDC/USAID	\$1,775,000		Salaries and benefits of PMI in-country staff; office equipment and supplies; health team staff support	
SUBTOTAL: In-Country Management		\$1,775,000	\$0		
GRAND TOTAL		\$19,800,000	\$10,350,000	Percent commodities- 52.3%	

Table 3
President's Malaria Initiative – Mozambique
Year 3 (FY 09) Estimated Budget Breakdown by Intervention (\$)

Area	Commodities (%)	Other (%)	Total (\$)
Vector Control	\$50,000 (0.5)	\$227,500 (2.4)	\$277,500 (1.4)
Insecticide-treated Nets	\$6,600,000 (63.8)	\$635,000 (6.7)	\$7,235,000 (36.5)
Indoor Residual Spraying	\$500,000 (4.8)	\$4,537,500 (48.0)	\$5,037,500 (25.4)
Case Management	\$3,200,000 (30.9)	\$1,062,500 (11.2)	\$4,262,500 (21.5)
Intermittent Preventive Treatment	\$0 (0)	\$150,000 (1.6)	\$150,000 (0.8)
Monitoring and Evaluation	\$0 (0)	\$312,500 (3.3)	\$312,500 (1.6)
Communications and Behavior Change	\$0 (0)	\$750,000 (7.9)	\$750,000 (3.8)
In-Country Management	\$0 (0)	\$1,775,000 (18.8)	\$1,775,000 (9.0)
Total	\$10,350,000	\$9,450,000	\$19,800,000

Table 4
President's Malaria Initiative – Mozambique
Year 3 (FY 09) Budget Breakdown by Partner (\$)

Partner Organization	Geographic Area	Activity	Budget*
RTI Vector Control	Zambézia Province; LSDI Project area	Procurement of insecticide and IRS equipment; support to NMCP IRS activities; strengthen entomologic capabilities of NMCP	\$5, 265,000
Population Services International	Five provinces	Procurement and distribution of LLINs, Distribution of ACTs through private sector	\$7,550,000
DELIVER	Nationwide	Strengthen pharmaceutical management system, procure antimalarial drugs	\$3,450,000
TASC 3 IQC (BASSOPA Malaria) with sub-grants to NGOs/FBOs	Nationwide	Training of health workers and laboratory technicians; support to ACT implementation; communications on malaria treatment and prevention; support to sentinel sites; development of M&E plan; procurement of lab supplies	\$1,250,000
Together Against Malaria (IRCMM)	Zambézia, Nampula, and GazaProvinces	Community mobilization by Faith Leaders	\$400,000

*Staffing and administration and CDC technical assistance not included