

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

UGANDA

Malaria Operational Plan (MOP)

FY 2008

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ABBREVIATIONS

ACT	artemisinin-based combination therapy
AED	Academy for Educational Development
AL	artemether-lumefantrine
ANC	antenatal care
AQ	amodiaquine
AS	artesunate
BCC	behavior change communication
CBOs	community based organizations
CDC	Centers for Disease Control and Prevention
CDD	community drug distributors
CPHL	Central Public Health Laboratory
CSO	community service organizations
DANIDA	Danish International Development Agency
DDT	dichloro-diphenyl-trichloroethane
DFID	United Kingdom Department of International Development
DHS	Demographic and Health Survey
DOT	directly observed treatment
DRH	Division of Reproductive Health
DSS	demographic surveillance system
EARN	East Africa Roll Back Malaria Network
ESR	epidemic surveillance and response
FANC	focused antenatal care
FBOs	faith-based organizations
GFATM or Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GOU	Government of Uganda
HBMF	home-based management of fever
HIPC	Highly Indebted Poor Countries
HMIS	health management information system
HPC	Health Partners in Communication
HSSP	health sector strategic plan
IDI	Infectious Disease Institute
IDP	internally displaced person
IEC	information, education and communication
IMCI	integrated management of childhood illnesses
IPTp	intermittent preventive treatment in pregnancy
IRS	indoor residual spraying
ITN	insecticide-treated net
JICA	Japanese International Cooperation Agency
JSI	John Snow International
JUMP	Joint Uganda Malaria Program
LLIN	long-lasting insecticide-treated net
MEMS	Monitoring and Evaluation Management Systems
MERG	Monitoring and Evaluation Reference Group
MoFPED	Ministry of Finance, Planning and Economic Development
MOH	Ministry of Health
NDA	National Drug Authority
NGO	non-governmental organization
NMCP	National Malaria Control Program

NMS	National Medical Stores
PAF	Poverty Action Fund
PEPFAR	President's Emergency Plan for HIV/AIDS Relief
PMTCT	prevention of mother to child transmission (of HIV)
RBM	Roll Back Malaria
RDT	rapid diagnostic test
RH	Reproductive Health
RTI	Research Triangle Institute
SP	sulfadoxine-pyrimethamine
UCSF	University of California, San Francisco
UDHS	Uganda Demographic and Health Survey
UMSP	Uganda Malaria Surveillance Project
UNICEF	United Nations Children's Fund
UPHOLD	Uganda Program for Human and Holistic Development
USAID	United States Agency for International Development
USG	United States Government
VCU	Vector Control Unit
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

EXECUTIVE SUMMARY
UGANDA
YEAR 3

In June 2005, the United States Government announced that Uganda had been selected to be included in a five year, \$1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions in high burden countries in sub-Saharan Africa. The goal of the President’s Malaria Initiative (PMI) is to reduce malaria-related mortality by 50% in vulnerable groups—children under five, and pregnant women. This will be accomplished by achieving 85% coverage of these groups with four key interventions: indoor residual spraying (IRS), insecticide-treated mosquito nets (ITNs), intermittent preventive treatment of malaria in pregnancy (IPTp), and artemisinin-based combination therapy (ACT).

Malaria is responsible for more illness and death than any other disease in Uganda. Nearly all of Uganda’s residents are exposed to medium or high levels of transmission. As such, the burden of malaria can be felt throughout the health care system. One-quarter to one-half of all outpatient visits to health care facilities are due to malaria. Children under five are most affected by malaria, which causes half of inpatient pediatric deaths.

The 2006 Demographic and Health Survey (DHS) contains the most current information on national coverage of malaria indicators in Uganda and serves as the PMI baseline. According to the DHS, household ownership of at least one ITN remains low at 16% and usage among children under five and pregnant women is even lower at 10%. Although antenatal clinic attendance is high, only 18% of attendees completed the recommended two-dose regimen of IPTp . The DHS also reported that, of the more than 40% of children presenting with fever in the two weeks preceding the survey, only 29% had taken an antimalarial drug the same or next day.

Uganda is the recipient of two malaria grants from the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). The Global Fund Round Two grant has dispersed \$21 million of Uganda’s approved \$23 million mainly for the procurement and distribution of ITNs. Uganda’s Round Four grant, of which \$79 million of its approved \$89 million has been dispersed, funded the procurement and implementation of ACTs. Uganda has requested additional funds through Round 7 for scaling-up ITN procurement and distribution.

The following table outlines some of PMI’s accomplishments in Year 2:

Proposed year one targets (PMI and Partners)	Expected status
IRS in seven epidemic-prone and endemic districts in Uganda targeting 600,000 households	PMI sprayed 121,000 households in the epidemic-prone districts of Kabale and Kanuagu. In partnership with WHO and DFID, PMI sprayed almost 200,000 households in IDP camps in Kitgum and Padar and is currently spraying IDP camps in the adjacent districts of Amuru and Gulu. Over 85% of targeted households were sprayed. In January, 2008, PMI will spray the highly endemic district of Apac.
Distribution of 1.1 million free ITNs to pregnant women and children under five	PMI distributed over 580,000 free LLINs to pregnant women and children under five in partnership with Malaria No More. PMI has also distributed over 230,000 additional LLINs through ANC clinics.

Provide training in focused-antenatal care to increase IPTp uptake	Sufficient stocks of SP are in country. PMI supported the development and distribution of 3,000 wall charts and gestational wheels through health mentors during support-supervision visits to health facilities.
Train and provide supportive supervision to health workers implementing the new ACT drug policy	6,191 health workers received on-the-job training on ACTs and 1,204 health workers were assessed for appropriate clinical management of malaria patients.

PMI/Uganda will build and expand on its programs and successes in the first two years. In July 2007, a planning team comprised of representatives from USAID, the Centers for Disease Control and Prevention, and the Uganda National Malaria Control Programme (NMCP) conducted stakeholder interviews to determine the progress, identify emerging challenges and opportunities, and ultimately develop the Year 3 plan. PMI will continue to support existing NMCP strategies and plans and coordinate with international and national partners to complement funding and efforts. The following activities will be supported in FY08:

Indoor residual spraying

The PMI will support an IRS strategy that prevents malaria outbreaks in epidemic-prone regions, IDP camps, and endemic districts while continuing to build the capacity of the Ministry of Health to manage and conduct IRS campaigns. In Year 1, PMI sprayed over 100,000 households in the Kabale district. In Year 2, PMI significantly expanded IRS to cover seven districts, both in the epidemic-prone southwest and the highly endemic conflict-ridden north. To date, the IRS campaign and associated activities has covered 600,000 households and trained over 1,500 local spray personnel.

Building on experience from the first two years, PMI will support spraying in the low elevation areas of three epidemic-prone districts (Kabale, Kanunugu, and Rukungiri). In May of 2008, PMI will spray approximately 33,000 households in nine subcounties in Kabale, 50,000 households in nine subcounties in Kanugu, and 50,000 households in nine subcounties in Rukungiri. PMI will spray a second round in the northern conflict districts of Kitgum, Gulu, Pader, Amoro, Apac, and Lira in early 2008, covering over 330,000 households. Finally, PMI will expand its spraying efforts to include 350,000 households in the neighboring northern districts of Kokolo, Amolatar, Kabermaido, Amuria, and Soroti. PMI expects to achieve at least 85% coverage of the 800,000 households targeted for spraying.

Insecticide-treated nets:

With the support of PMI and other donors, Uganda has made considerable progress in scaling-up prevention and treatment activities. Since 2006, 725,000 free long-lasting ITNs have been distributed by PMI to children under-five, pregnant women and people living with HIV/AIDS; by the end of September, another 102,000 nets will have been distributed. These LLINs have been distributed through both antenatal clinics and community-based organizations and as part of a mass campaign in partnership with Malaria No More and the Global Fund. To complement increasing net ownership, PMI also funded the development and airing of radio talk show programs to raise awareness about ITNs and proper usage.

In Year 3, PMI will procure 750,000 LLINs for free distribution to target populations through mass campaigns, faith-based and community-based organization partnerships, and antenatal clinics. To strengthen the private sector, PMI will continue to develop local net manufacturing capacities and increase the Uganda Bureau of Standards' ability to monitor net quality. To address the challenge of improper usage of nets, PMI will continue to support mass media and community mobilization strategies to increase awareness of the need to use ITNs correctly and consistently. As a result of these combined efforts, it is expected that PMI will increase the percentage of children under five and pregnant women sleeping under an ITNs will rise to 40%.

Intermittent preventive treatment of pregnant women):

Although IPTp has been national policy since 1998, the 2006 DHS found that only 18% of women received two doses of sulfadoxine-pyrimethamine (SP). To increase the uptake of IPTp, Years 1 and 2 of PMI supported the development and distribution of 3,000 wall charts and gestational wheels to health mentors during support-supervision visits to health facilities. In 2007, PMI supported a nationwide information, education and communication campaign to increase awareness of the importance of IPTp during pregnancy and improve attendance at antenatal clinics. PMI will provide supportive supervision to antenatal care workers and registers to improve record keeping in antenatal clinics. Safe water will be provided so that women can take SP under direct observation at the clinics. PMI expects to increase the percentage of pregnant women receiving two doses of SP to 40% in Year 3

Case management:

Diagnosis: Diagnostic capacity in Uganda remains weak due to inadequate training for laboratory technicians and a shortage of equipment, supplies and human resources for laboratory services. During Year 2, PMI began to support a comprehensive diagnostic training program for laboratory technicians and health care workers in malaria microscopy. PMI will continue to fund this program in Year 3 and will also train teams of health care workers and technicians on malaria diagnosis in 96 health centres nationwide.

Pharmaceutical Management: As in many other African countries, poor pharmaceutical management continues to hinder the distribution and administration of ACTs. In Years 1 and 2, PMI supported technical assistance to implement the new ACT drug policy. As a result, Uganda was able to rapidly distribute an emergency order of three million treatments of ACTs and improve the quantification of ACT needs to regularize ordering. In Year 3, PMI will continue to provide technical assistance to update the quantification of ACTs and other key antimalarials. PMI will also provide support to the NMCP to establish and implement a computerized malaria commodities information acquisition system that provides accurate, reliable, and timely information on use and availability of malaria medicines at the district, regional, and national level.

Treatment: Over the last two years, Uganda successfully implemented ACTs with PMI support. In Year 2, PMI assisted NMCP staff to conduct supportive supervision in 48 districts. A total of 6,191 health workers from 1,730 health facilities received on-the-job training. Clinical management was assessed from the perspective of both providers and patients: 1,204 health workers were assessed for knowledge of clinical management of malaria, and 1,077 clients completed exit interviews on perception of service delivery. Finally, PMI supported the development and distribution of 6,000 job aids to 40 districts.

In Year 3, PMI will help the Ugandan NMCP begin the transition to community-based distribution of ACTs. To support this transition, PMI will provide funding for the training, supportive supervision and incentives for community drug distributors. Meanwhile, PMI is continuing to provide supportive supervision of health care workers and help train private providers on the new drug policy. To address severe malaria cases, PMI will procure antimalarial drugs for the treatment of severe malaria and train personnel in their use. To improve diagnostic capacity and pharmacovigilance nationwide, PMI will continue to train laboratory technicians and provide technical assistance to the National Drug Authority to improve post-market surveillance of ACTs. At the end of Year 3, it is expected that 40% of children under five with fever will receive antimalarial drugs within a day of developing a fever.

Epidemic Response and Surveillance:

PMI will provide technical assistance to improve the NMCP's ability to detect and respond to epidemics in the fifteen epidemic-prone districts in Uganda in Year 3. This includes support for the investigation of suspected outbreaks and coordinated response through WHO. PMI will also fund the procurement of commodities such as ITNs to enable the NMCP to respond effectively to an outbreak.

Monitoring and Evaluation (M&E):

PMI includes a strong monitoring and evaluation component to measure progress against project goal and targets, and help identify and correct problems in program implementation. In Years 1 and 2, PMI helped strengthen the network of sentinel sites and supported a demographic surveillance site to monitor the progress of malaria interventions.

The Year 3 M&E plan includes support for a Malaria Indicator Survey to track mid-term progress towards PMI goals. PMI will continue to provide support for Iganga demographic surveillance system site, and maintain the 14 existing sentinel sites to measure malaria-related mortality. The monitoring and evaluation plan will be coordinated with the NMCP, Global Fund, and other partners to ensure resource-sharing and standardize data collection and reporting.

Building NCMP Capacity:

In Years 1 and 2, PMI technical advisors provided assistance to the NMCP to aid in planning, monitoring and evaluation and policy development. In Year 3, PMI will begin to provide direct support to the NMCP. This will include the provision of equipment and computers and part time seconded staff in the areas of entomology and monitoring and evaluation, as well as support for the supervision of district programs.

Budget:

The FY 2008 PMI budget for Uganda is \$22 million. Of this amount, 39% will be used for IRS, 26% will support the procurement and distribution of ITNs/LLINs, 4% will be spent on IPTp, 14% on diagnosis and malaria treatment, 8% for M&E and 40% overall will be allocated toward the purchase of commodities.

THE PRESIDENT'S MALARIA INITIATIVE

In June 2005, the United States Government (USG) announced a new five-year, \$1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa. The goal of this initiative is to reduce malaria-related mortality by 50%. This will be achieved by reaching 85% coverage of the most vulnerable groups: children under five years of age, pregnant women, and people living with HIV/AIDS, with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACT), indoor residual spraying (IRS), intermittent preventive treatment for malaria in pregnancy (IPTp) and long-lasting insecticide-treated nets (LLINs).

The President's Malaria Initiative (PMI) began in three countries in 2006 (Angola, Tanzania, and Uganda). In 2007, four countries were added (Malawi, Mozambique, Senegal, and Rwanda). In 2008, eight additional countries (Benin, Ethiopia (Oromia Region), Ghana, Kenya, Liberia, Madagascar, Mali, and Zambia) were added to reach a total of 15 countries with PMI funding. Funding began with \$30 million in Fiscal Year (FY) 06 for the initial three countries, \$135 million in FY07, will increase to \$300 million in FY08 and FY09, and reach \$500 million by FY10.

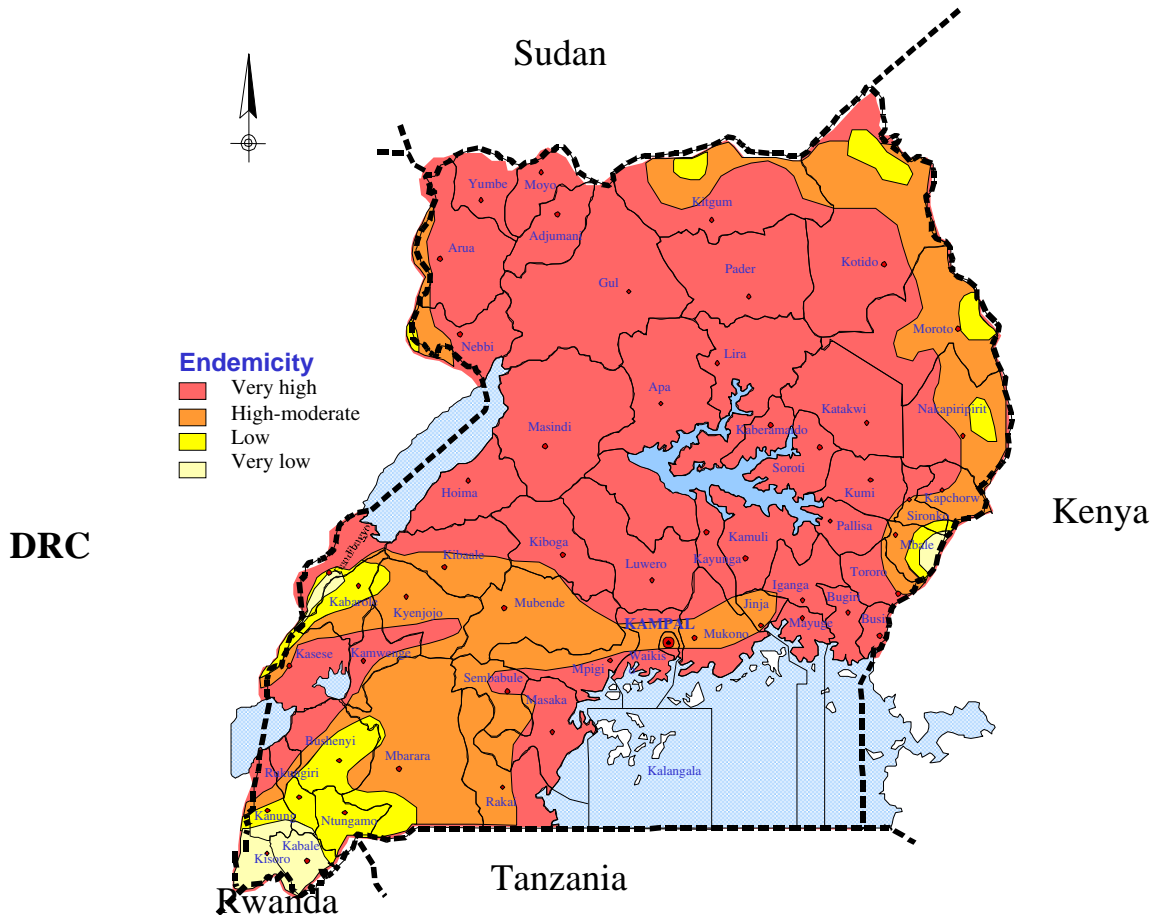
In implementing this Initiative, the USG is committed to working closely with host governments and within existing national malaria control strategies and plans. Efforts will be coordinated with other national and international partners, including the Global Funds to Fight AIDS, Tuberculosis, and Malaria (Global Fund), United Nations Children's Fund (UNICEF), Roll Back Malaria (RBM), and non-governmental and private sector organizations to ensure that investments are complementary and RBM and Millennium Development Goals can be achieved.

This document, developed in collaboration with the Government of Uganda and other stakeholders, presents a detailed implementation plan for the third year of the PMI in Uganda. It briefly reviews the status of malaria control policies and existing interventions supported by all partners in Uganda, identifies challenges and unmet needs to reach the targets of the PMI, and provides a description of proposed Year 3 (FY08) PMI activities.

MALARIA SITUATION IN UGANDA

In most parts of Uganda, temperature and rainfall are sufficient to allow a stable, year round (perennial) malaria transmission at high levels with relatively little seasonal variability. Malaria ranks as the number one reported disease, causing high morbidity and high economic and social impact. It is estimated that a single case of malaria in Uganda costs a sum equivalent to ten working days. Malaria is highly endemic in 95% of the country, representing approximately 90% of the population of 29.4 million. The remaining 5% consists of seasonal epidemic-prone malaria transmission areas in the highlands of the southwest, midwest, and along the eastern border with Kenya and northeastern border of Sudan, and represents approximately 10% of the population.

MALARIA ENDEMICITY IN UGANDA



Clinically-diagnosed malaria is the leading cause of morbidity and mortality; it accounts for 30-50% of outpatient visits at health facilities, 15-20% of all hospital admissions, and 9-14% of all hospital deaths. Nearly half of hospital in-patient deaths among children under five years of age are attributed to clinical malaria. A significant percentage of deaths occur at home and are not reported by the facility-based Health Management Information System (HMIS). The National Malaria Control Program (NMCP) estimates that the total number of fever cases for all ages was approximately 60 million in 2005. Based on epidemiological estimates, children under five years suffer from three episodes of malaria per year, and older children and adults suffer from two episodes per year. Of these cases, approximately 12 million were treated in the public and not-for-profit sector.

Epidemiology of Malaria in Uganda

Malaria Vectors: The most common vectors are *Anopheles gambiae s.l.* and *Anopheles funestus* with *A. gambiae* being the dominant species in most places. Only during the short dry seasons when permanent water bodies often are the most common breeding sites and in higher altitude areas is *A. funestus* found more frequently. *Anopheles gambiae s.l.* and *An. Funestus*, are both highly endophagic and endophilic (feed and rest indoors) making ITNs and IRS a viable strategy.

Parasite Species: Although all four species of the parasite exist in Uganda, *Plasmodium falciparum* is responsible for 90-98% of all malaria cases. This parasite has shown increasing

resistance to both chloroquine and sulfadoxine pyremethamine (SP) when used separately as single therapy and more recently as a combination. Both *P. vivax* and *P. ovale* are rare and do not exceed 1-1.5% of malaria cases.

NATIONAL MALARIA CONTROL PLAN

The National Malaria Control Strategy 2005/06-2009/10 has recently been finalized. The vision of the NMCP as stated in this strategic plan is that by 2010, malaria will no longer be the major cause of illness and death in Uganda and families will have universal access to malaria prevention as well as treatment. The goal is to control and prevent malaria morbidity and mortality so as to minimize related social ill effects and economic losses attributable to malaria in the country.

The 2005-2010 objectives are:

- To go to scale nationally with a package of effective and appropriate core interventions that promote positive behaviour change and prevent and treat malaria; and
- To achieve rapid and sustainable high coverage levels for this intervention package.

The core interventions include:

- Malaria prevention through ITNs with special emphasis on LLINs in highly-endemic areas;
- IRS with focus on low and epidemic-prone areas (prevention of malaria epidemics) and environmental management where this is feasible and effective;
- Universal access to ACT and improved diagnosis as well as severe malaria management;
- Emphasis on treatment and prevention of malaria in pregnancy including IPTp;
- Intensive information, education and communication (IEC) efforts and social mobilization at all levels;
- Integration of malaria control into a balanced health system development with emphasis on human resource development; and
- Strong monitoring, evaluation, and operational research to monitor progress, evaluate impact, and continuously improve interventions.

The above overall objectives will be achieved by setting priorities and applying the following principles:

- Focus on a rapid increase of coverage with preventive measures involving all sectors of society;
- Complement prevention efforts by early provision of highly effective antimalarial combination therapy to affected populations and improve management of severe cases at all levels of health care;
- Ensure that high quality clinical and parasitological diagnosis is used to guide appropriate treatment with an effective antimalarial;
- Package these interventions so that all aspects of malaria control are simultaneously and comprehensively addressed;
- Emphasize communication for behavioural impact and community empowerment;
- Achieve impact among most vulnerable groups such as young children and pregnant women (highly endemic areas);
- Target particularly the economically disadvantaged (poor) or difficult to reach populations (internally displaced persons, nomads, etc.), and people living with HIV/AIDS with free or highly subsidized interventions;
- Continue to build a strong partnership involving all sectors and stakeholders including communities;

- Achieve maximum synergy between malaria control and health system development as well as other programmes within the Health Sector Strategic Plan II;
- Apply an evidence based approach to the further development and improvement of malaria control interventions; and
- Document progress and use successes to secure resources for the future.

Uganda has several policy and strategy documents that support treatment and prevention of malaria including: Malaria in Pregnancy Control (2000); Home Based Management of Fever (2005); Policy and Strategy for Insecticide Treated Nets (2006); The Use of ACTs at the Community Level (Implementation Guidelines for the HBMF Strategy second edition: 2006); Management of Uncomplicated Malaria, a Practical Guide for Health Workers, 3rd Edition, (2005), and the Policy and Strategy for Indoor Residual Spraying (2006).

PMI fully supports the Ministry of Health (MOH)/ National Malaria Control Program (NMCP) guidance on implementation of malaria control activities through a broad RBM partnership which includes all sectors of society and which is based on the three ones: **one strategic plan** under which all partners work and contribute, **one coordination mechanism** to ensure maximum synergy and avoidance of duplications, and **one M&E plan** to measure progress and assess the impact. The MOH through the NMCP has the leading role in the coordination of efforts with an improved Interagency Coordination Committee and its Technical Working Groups as the major tool.

Overview of the Health System

The formal health system in Uganda is stratified into the following categories: hospitals (at the district, regional, and national levels), health center IV (at the health sub-district level), health center III (at the sub-county level), and health center II (at the parish level). In each of districts, the Director of District Health Services is responsible for overseeing all facilities in the district, including those operated by not-for-profit organizations (mainly FBOs) and the private sector. Some of these responsibilities are delegated to the health sub-districts which form the lower level of health services management. According to the 2002 health facility survey, 41% of hospitals, 5% of health center IVs, 18% of health center IIIs, and 24% of health center IIs are operated by NGOs.

Private-for-profit services for provision of medicines such as pharmacies and drug shops, play an important role in the delivery of health services. Traditional and complementary medicine practitioners are also an active segment of the health system and their importance varies regionally and with respect to the diseases they treat. Although not physical structures, the health center I is recognized as the community level which provides health services through volunteers and is increasingly organized as a “village health team.”

Lack or inadequacy of human resources at health facilities has been a critical factor in the poor quality of health service delivery. Recently, however, approximately 2,900 health workers were recruited into the system, increasing the proportion of approved posts filled with trained staff from 33% to 68%.¹ According to the Resource Inventory of 2004, a total of 27,500 health workers were employed and 9,100 of these were in the not-for-profit private sector. In spite of this progress, further qualified staff is needed, particularly in the area of laboratory diagnosis.

The sources of financing for the health sector include the central government budget (counting development partner budget support); conditional as well as unconditional grants to districts, local government and parastatal entities; project support through development partners; private not-for-profit agencies; private firms and households (through insurance); and patient out-of-pocket

¹ HSSP II Volume I, MoH 2005

contributions. The proportion of health spending within the Government of Uganda (GOU) budget (i.e. includes budget support but not project support) increased from 7.6% in financial year 2000/01 to 10.3% in 2004/05. This translates into \$8.30 per capita spending by government and donors. This is only a small part of the estimated \$28 per capita health expenditure for 2003/04 - the rest of which comes from the private sector and patient out-of-pocket spending.² The amount needed to adequately fund the implementation of the Uganda Minimal Health Care Package is estimated at \$30-40 per capita, an increase in the health budget to at least 15%.

MAJOR PARTNERS IN MALARIA CONTROL

Coordination and Communication among Health Partners

Since 2000, a sector wide approach (SWAp) which includes budget support has been operational in Uganda. Most of the development partners including the United Kingdom Department for International Development, the World Bank, Danish International Development Agency, the Swedish International Development Agency, Irish Aid, the United Nations Children's Fund, the World Health Organization, Norway, Italian Cooperation, Japan and the African Development Bank channel their aid through the SWAp.

Another external source of financing is from the Global Fund to Fight AIDS, TB and Malaria (the Global Fund). Uganda has received two Global Fund grants to support malaria control and prevention programs, with approved funding amounts of \$89,643,448.00. The Round Two Phase One Global Fund grant for \$23 million (of which \$21,054,781 has been disbursed) contributes to scaling up of the home-based management of fever program (HBMF) to all districts in the country, and organization of a first round of free ITN distribution and net re-treatment. Because of problems with the implementation of Round Two Phase One, Phase Two was not approved.

The \$66 million Round Four Phase One grant has allowed Uganda to introduce ACTs at health facility levels and provides a sustained ACT supply until 2009. This grant initially faced problems in early September 2005 resulting in the temporary suspension of all of the grants, pending reorganization of the project management unit. However, as of August 2007, \$52,735,606 has been dispersed. A proposal for Round Seven Phase One was submitted July 4, 2007 with a request to support LLINs to achieve national coverage over a five year period of time, and a proposal for Round Four Phase Two was submitted in August 2007 to request the roll-out of rapid diagnostic testing (RDTs) in 21 districts.

Another source of external financing for the GOU are UNICEF and the World Health Organization (WHO), which are expected to contribute about \$500,000 annually. UNICEF contributed 237,000 LLINs in 2005/6, 300,000 LLINs in 2006/7 and is anticipated to contribute 500,000 LLINs in 2007/8.

USG partners and agencies in Uganda

USAID/Uganda has a long history of support to the malaria program in Uganda, and has also been the largest bilateral donor for malaria since 2000. USAID/Uganda's implementing partners in malaria activities include John Snow International (JSI), Johns Hopkins University Communications for Change Project (JHU/CCP), the Academy for Educational Development (AED) implementing the Netmark*plus* Project, and the Research Triangle Institute (RTI). USAID/Uganda also has sub-grantee relationships to the Malaria Consortium under both the JSI/UPHOLD Project and the JHU/CCP AFFORD Project. In 2000, CDC and USAID began a collaborative activity to strengthen technical capacity within the NMCP. Jointly, the two agencies

² Ministry of Finance, Health Financing Strategy 2002/03 – 2012/13

provided a malaria technical expert to the GOU to move the GOU's malaria programs forward. CDC has also supported U.S.-based organizations that work with Makerere University to conduct operational research and to strengthen its capacity.

GOALS AND TARGETS OF PRESIDENT'S MALARIA INITIATIVE

The goal of PMI is to reduce malaria-related mortality by 50% by the end of 2010. Results are based on the projection that all development partners in Uganda (Global Fund, UNICEF, WHO, other donors) are able to fully contribute to the plan. By the end of 2010, the PMI will assist Uganda in achieving the following targets among at-risk populations for malaria:

1. >90% of households with a pregnant woman and/or children under five will own at least one ITN;
2. 85% of children under five will have slept under an ITN the previous night;
3. 85% of households will own at least one ITN;
4. 85% of children under five with suspected malaria have received treatment with an antimalarial drug in accordance with national malaria treatment policies within 24 hours of the onset of their symptoms;
5. 85% of pregnant women will have slept under an ITN the previous night;
6. 85% of pregnant women will have received two or more doses of IPT during their pregnancies;
7. 85% of houses targeted for IRS will have been sprayed; and
8. 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 6 months

CURRENT STATUS OF MALARIA INDICATORS

The following table shows the baseline figures for the major PMI indicators, as estimated by the 2006 Uganda Demographic and health Survey:

Recent Estimates of Malaria Indicators: 2006 Uganda DHS	
Indicator	Estimate
Proportion of children under five years old with fever in the last two weeks who received treatment with an antimalarial according to national policy within 24 hours of onset of fever	29%
Proportion of children under five years old with fever in the last two weeks who received treatment with ACTs within 24 hours of onset fever.	1.1%
Proportion of households with at least one ITN	15.9%
Proportion of children under five years old who slept under an ITN the previous night.	21.6%
Proportion of pregnant women who slept under an ITN the previous night.	10.1%
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years	NA
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months (source Activity Reports)	98.7%

EXPECTED RESULTS – YEAR THREE

By the end of Year Three of PMI in Uganda (31 March 2009), the following targets will have been achieved:

Prevention:

- Approximately 1.5 million LLINs/ITNs will be distributed by partners (of which PMI will contribute 750,000) to pregnant women and children under five years old to increase national household ownership of ITNs from 16% to 40%.
- Continued support for a mass media and community-based IEC/BCC campaign will raise the percent of children under five and pregnant women who have slept under a net from 10% to 40%.
- At least 85% of houses in geographic areas targeted for IRS in thirteen districts during Year Three will be sprayed. 795,000 houses are targeted, and at least 675,750 should be sprayed protecting an estimated three million people.

Case Management:

- Improved diagnostics, supportive supervision, and capacity development of the National Medical Stores (NMS) and the National Drug Authority (NDA) for better forecasting, quantification, distribution, and quality assurance will increase the number of health facilities administering ACTs to 70% nationwide.
- Uganda's home-based management of fever program using ACTs will be expanded and the number of children under five who receive antimalarial treatment within 24 hours of onset of fever will increase from 29% (1% for Coartem) to 40%.
- Focused antenatal care (FANC) will be strengthened to increase the proportion of women receiving two or more doses of IPTp from 16.6% to 40%.

INTERVENTION - PREVENTION

Indoor Residual Spraying

Progress to Date, Challenges and Needs

The Uganda National Malaria Control Strategic Plan 2005/6-2009/10 emphasizes IRS as one of the major malaria prevention and control interventions in the country. Uganda aims to establish and sustain a system of annual, high quality IRS services that cover at least 85% of all targeted structures in areas of unstable transmission (epidemic-prone) while piloting and potentially scaling up IRS in stable malaria transmission areas. IRS is also implemented in other settings where it has been shown to be feasible, including internally displaced persons (IDP) and refugee camps. The NMCP strategic plan states that IRS will initially be concentrated in epidemic-prone areas, serving as active prevention of epidemics. Mapping of local transmission patterns will be done, in order to focus spraying in these areas.

The PMI strategy in Uganda is complementary in that it supports IRS in the highest transmission areas, particularly endemic areas, where it is expected to have the greatest impact on malaria transmission. The major focus for IRS in Uganda is to build implementation capacity in the public sector in areas selected for IRS intervention while establishing a robust system to plan, implement, manage, and monitor and evaluate the interventions. This process will involve a broad partnership, including donors, the MOH, the scientific community, civil society, and the private sector.

In FY06, PMI supported the NMCP with a large-scale IRS campaign in the epidemic-prone highland district of Kabale. In its first year, the program targeted 103,000 households in the district and was highly successful, with 98% coverage of houses and total a population of 480,000 protected.

Because of high coverage, remarkable public acceptance, and lessons learned, the NMCP was keen on expansion and conducting larger-scale, well-targeted, evidence-based timely IRS

campaigns in both unstable and stable transmission areas, including IDP settings. Therefore, in its second year, PMI supported a selective spraying in Kabale (second round) and Kanungu (first round) districts targeting only high risk sub counties. Case data was used to determine households in high transmission areas (only part of the district has transmission). From January-March 2007, these households and areas below an altitude of 1200 m were treated, resulting in approximately 70% coverage of all houses in each of these two districts. Above 1200m there is an absence of breeding sites (and vectors) which did not justify spraying.

During the 2007 IRS campaign, 466 spray operators and supervisors in Kabale were retrained and 460 and 1118 were newly trained in Kanungu and Kitgum districts respectively. It is anticipated that these individuals will be able to implement future rounds of spraying in this part of the country, further reducing costs.

Summary of IRS in the Districts of Kabale and Kanungu, 2007

Key IRS Indicators	Kabale 2 nd Round	Kanungu 1 st Round	Total
Period of operation	Jan-Feb'07	Feb-Mar'07	
Number of Sub counties sprayed (total)	18 (20)	9 (11)	27 (31)
Total target houses found	78,020	44,799	122,819
Structures fully sprayed	65,601	40,048	105,649
Structures partially sprayed	10,483	5,273	15,756
Total structures sprayed (%)	76,084(97.5)	45,321 (100)	121,405(98.7)
Total population protected	364,784	191,399	556,183
Number of children under 5 protected	60,698	36,222	96,920
Number of pregnant women protected	6,022	5,580	11,602

Since the introduction of IRS in Kabale (2 rounds) and Kanungu (1 round), there has been a demonstrable decline in malaria-related hospital admissions and outpatient attendance. In the Kanungu district which received one round of selective spraying, the number of confirmed malaria cases declined. With only one year of data post-IRS, further data collection and analysis is needed to confirm if IRS was the primary cause of these decreases.

As part of IRS expansion, IDP camps in the northern Uganda districts of Kitgum and Pader were targeted in May-July 2007. This exercise will continue in the adjoining districts of Amoro and Gulu in the coming months. This activity was jointly funded, with DFID/WHO providing the insecticide for the program.

Summary of IRS coverage rates in Kitgum and Pader Districts (May-August 2007)

Houses targeted	Houses Sprayed	Population Protected	Pregnant Women Protected	Children under five Protected
88,849	84,007 (95%)	371,846	14,709	86,811
109,136	107,274 (98%)	418,216	22,870	108,650

With FY07 funds, IRS will also be supported in the highly endemic district of Apac. Changes in seasonal rainfall patterns delayed the original planned time of IRS from July-August 2007 to January, 2008.

The synthetic pyrethroid “lambda-cyhalothrin” wettable powder formulation (ICON 10% WP[®]) is the currently registered insecticide of choice for IRS in Uganda and was used in the initial PMI- supported IRS rounds in Kabale, Kanungu, and the northern districts. However for epidemiological reasons, operational feasibility and cost effectiveness, the NMCP feel that use

of longer acting residual insecticides such as DDT and/or ICON 10% CS (capsule suspension formulation) would be more cost-effective. It is thought to be more cost effective because procurement costs are less, and only one IRS round is needed per year. However, the cost of putting appropriate conditions in place to ensure safe utilization of DDT may offset these gains.

In December 2006, the Uganda MOH received approval from the National Environment Management Authority to use DDT for IRS pending the implementation of various conditions to mitigate its potential negative impact. Currently the NMCP is working on fulfilling those requirements. PMI also contracted the Research Triangle Institute (RTI) to prepare an IRS Supplemental Environmental Assessment for DDT use in IRS in Uganda, as required by US law. If this document recommends DDT and it is approved by the USG and all GOU requirements are met, PMI will begin using DDT. This is not anticipated to happen before January 2009.

In the meantime, and if other issues prevent the use of DDT, the NMCP is also considering the use of a new longer-acting formulation of lambda-cyhalothrin (ICON 10% CS[®]). Studies indicate that ICON[®] 10% CS is very effective on a wide range of sprayable surfaces for malaria prevention and control at the dosage of 20-30 mg/M² AL, with expected maximum residual activity of 3-6 months. It has also been reported that this product is very effective for mud walls and thatched surfaces.

In 2006, PMI established insecticide resistance monitoring to IRS in Kabale with a training course on the use of the bottle bioassay for mosquito insecticide resistance testing. The planned entomological activities for 2007 include a training course and meeting between CDC, Uganda Virus Research Institute, NMCP, Vector Control Unit, and RTI to coordinate, discuss, and review technology for monitoring transmission rates in Apac. This is intended to enhance Uganda's capacity in entomology to conduct monitoring and evaluation (M&E) related to IRS and includes such topics as estimation of vector density, infectivity, entomological inoculation rates, vector susceptibility, vector behavior change and quality assurance of IRS treatment. As a result, the NMCP intends to monitor the level of susceptibility of malaria vectors to the insecticides scheduled for use in 2008, 2010, and 2012. These insecticide resistance studies will be undertaken in selected sentinel sites. The NMCP is also considering rotating insecticides to slow the development of resistance.

The NMCP recognizes that IEC and social mobilization for IRS play a significant role in the success of its IRS programs. Based on prior experience, the NMCP believes that IEC/BCC through radio and community meetings is critical for the success of IRS and that involvement of local leaders (formal and informal) is important.

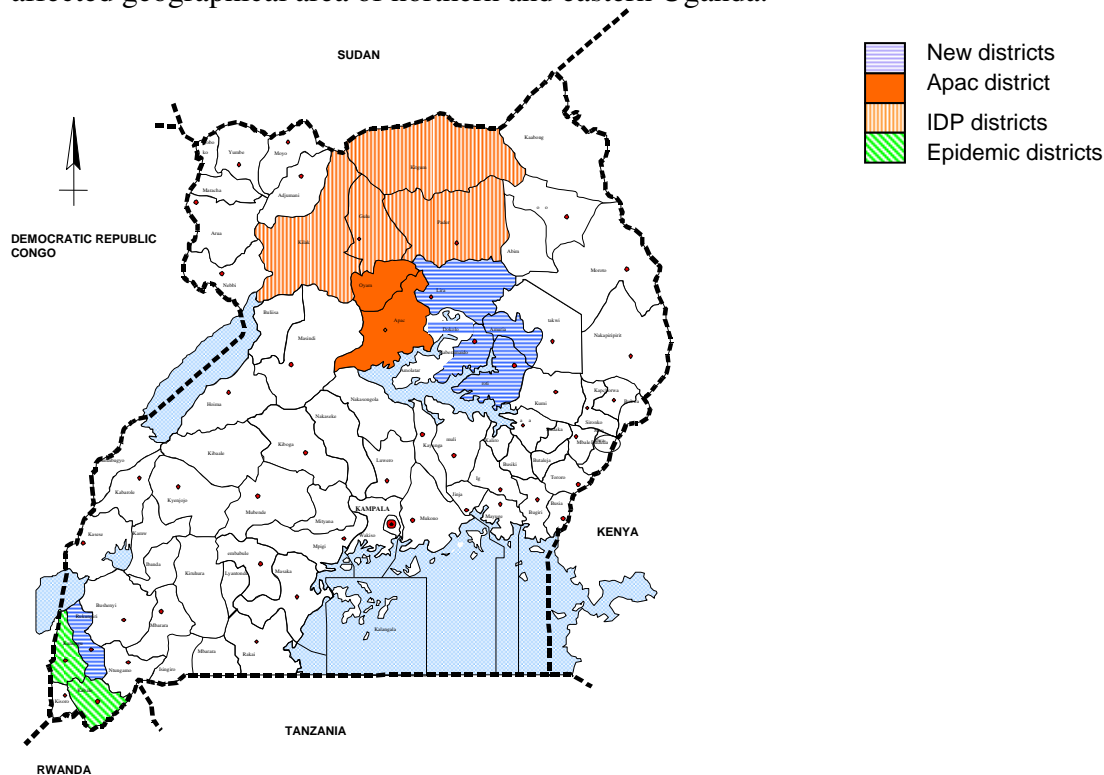
IRS Needs in FY08:

The MOH has requested assistance to develop a Ugandan IRS program capable of training, organizing, and supporting the 'phased-in' IRS expansion to 15 districts over the next three years. Specific assistance will be provided to purchase insecticide, spray pumps, spare parts, and personal protection equipment, and to rent vehicles and storage facilities. The NMCP also requests assistance for IRS planning, personnel management, environmental and human health safety and logistics management, including forecasting and procurement of insecticide, on-the-job training of spray personnel, and mapping and stratification of areas for IRS.

For FY08, the PMI Uganda technical team, in consultation with the NMCP, proposes that IRS support be given to both endemic and epidemic sites. The strategy is to conduct selective IRS in epidemic-prone districts and blanket spraying in endemic districts and IDP settings.

In the north, IDP camps in Kitgum, Pader, Gulu, and Amoro Districts (approximately 330,000 structures) will receive a second round of IRS in early 2008. This will cover the entire district

including all IDP camps, urban areas and newly settled villages. During the same period, all households in Lira, Dokolo and Amolatar Districts³ (180,000 households), which adjoins Apac, will also be targeted for a first round of spraying. Kabermaido, Amuria and Soroti, other highly endemic districts adjacent to Lira and Dokolo, will also be sprayed from January-March, 2008 (25,000, 45,000 and 75,000 households respectively). This covers a very large and highly affected geographical area of northern and eastern Uganda.



In May-June of 2008, targeted IRS is planned nine sub counties of Kabale District (35,000 households: Bukinda, Kashambya, Rwanucucu, Kamuwezi, Maziba Kamuganguzi, Rubaya and Butanda and Buhara), where malaria remains endemic. It is anticipated that across the border in Rwanda, PMI will also implement IRS in the border districts. Similarly, only the sub counties of Kanungu where malaria is endemic, will be targeted for IRS in 2008 (Kanyantorogo, Kihiihi, Kayonza, Mpungu, Kanungu T/C, Rugeyo, Kirima, Kambuga and Nyamirama). Rukungiri District (50,000 households) will be added as a site in FY08 for targeted spraying of the sub counties of Buyanja, Kebisoni, Bugangari, Buhunga, Bwambara, Kagunga, Nyakagyeme, Ruhinda and Rukungiri TC (50,000 households) where transmission is highest.

This dispersion of IRS activity across Uganda will create more of a national program by rolling out the activity in several regions of the country. ICON 10% CS will be used in the FY08 targeted sites since DDT is unlikely to be approved by that time.

The IRS program also includes IEC/BCC activities to ensure that household members understand and comply with spray teams.

To support the expansion of IRS, the IRS contractor will have to rapidly scale-up its support to each district, which includes managing a close partnership with districts and MOH/NMCP during the process. The IRS contractor will also support entomological monitoring of IRS. This

³ In 2007, Uganda was re-districted, breaking apart the 56 districts into 81 districts. What was previously Lira district is now Lira, Dokolo and Amolatar districts, but represent the same geographical area and the same household estimate.

includes developing a plan for the timing, number and projected size of baseline and post-IRS vector collections, the types of data that will be collected during the analysis of the specimens, and the recording and analysis of the data. The contractor will also assist the NMCP and the District Vector Control Officer in providing supportive supervision for monitoring.

Proposed year three activities (\$8,520,000/approx. 795,000 households):

1. *Support second round of spraying in four IDP districts in northern Uganda:* The PMI will support the second round of spraying in IDP camps, urban areas and newly settled villages in Pader, Kitgum, Gulu and Amoro districts of northern Uganda. (\$2,000,000)
2. *Support one round of IRS in six highly endemic districts:* PMI will assist NMCP/MOH to conduct one round of IRS in Lira, Dokolo and Amolatar districts in northern Uganda and three additional districts categorized as highly endemic in eastern Uganda, namely Kabermaido, Amuria and Soroti. (\$4,400,000)
3. *Support a third round of targeted IRS in Kabale and Kanungu District:* The PMI will assist with a third round of IRS in 9 sub counties affected by malaria in Kabale (approximately 35,000 of households) and 6 sub counties in Kanungu district covering approximately 75,000 of households. (\$800,000)
4. *Support one round of targeted IRS in Rukungiri District:* The PMI will conduct one round of spraying in this highland area, which has both high transmission and epidemic-prone transmission. It is estimated that nine sub counties in the district fall within a malaria risk zone. (\$750,000)
5. *Support entomologic monitoring and evaluation:* PMI will support the IRS baseline and post intervention entomologic surveillance and conduct susceptibility, bio assays and vector bionomic studies related to IRS (\$70,000)
6. *Support the MOH in IEC/BCC/community mobilization:* Continue IEC/BCC activities specific to IRS, and support campaigns to mobilize and educate communities on what IRS is, its benefits and risks, and proper procedures for safety and community participation. (\$500,000)

Insecticide-Treated Nets

Progress to Date, Challenges and Needs

Long-lasting insecticide treated bednets (LLINs) remain one of NMCP's key intervention strategies. Based on the 2006 DHS, the percentage of children under five and pregnant women who sleep regularly under ITNs remains low. Only 9.7% of under fives and 10.1% of pregnant women slept under ITNs the previous night and national household coverage (households owning one or more ITNs) is 15.9%. Ownership varies by geographic region. In the north, where there have been major efforts to distribute ITNs, ITN ownership was found to be the highest at 28%, while the Central regions were the lowest at 8.4%.

Net Distribution Strategies:

Uganda currently has a four- pronged strategy for ITN distribution:

- Free distribution through antenatal(ANC)/expanded program on immunization (EPI) clinics
- Free distribution to vulnerable groups through campaigns

- Subsidization of LLINs for sale by the private sector (will not be continued under PMI)
- Support the development of the private sector for sale of LLINs

Distribution of free LLINs through ANC/EPI Clinics

The NMCP, through the support of AFFORD, has been providing LLINs to pregnant women through ANC clinics in 24 districts in northern Uganda. As of June 2007, over 171,235 LLINs had been distributed in the north in the last year and it is expected that by September, an additional 100,000 will have been distributed, all of which are PMI-funded. ANC workers have also been trained to both explain the need for a LLIN and to demonstrate its proper use. There has been interest by the NMCP in expanding this strategy to more districts.

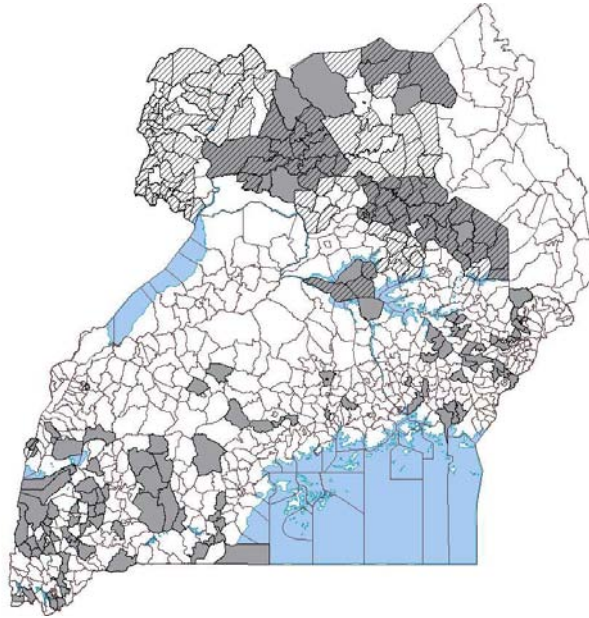
Mass sensitization and distribution campaigns

Mass campaigns are a distribution strategy recently employed by the NMCP. In 2006-2007, the NMCP using Global Fund Round Two funds, in partnership with PMI and Malaria No More distributed over 2.4 million LLINs to pregnant women and children under five using this approach. 1.8 million LLINs were provided through the Global Fund Round Two, 232,000 from PMI, and 360,000 from Malaria No More. Specific sub-counties in over 80 districts received LLINs. In 13 districts, all pregnant women and children under five now own a LLIN. PMI and Malaria No More LLINs were distributed in over 26 districts and included the new BASF Interceptor® LLINs as well as Permantet®. The campaign process was as follows: district sensitization of key district officials, training of volunteer community medicine distributors (CMDs), registration of beneficiaries (i.e. pregnant women and children under five), distribution of LLINs to registered beneficiaries, collection of reports completed by district officials, and follow-up by CMDs a week later to ensure that the nets were properly hung.

Because of the success of this campaign, the NMCP has submitted a Global Fund Round Seven application to use this approach to distribute LLINs to all pregnant women and children under five in Uganda. In the year 2008/2009, the application proposes to distribute more than 4.2 million LLINs to pregnant women and children under five nationally that do not yet have a LLIN. This estimate assumes that PMI will provide 300,000 LLINs for distribution through mass campaigns, as was done in 2007. In subsequent years, the NMCP plans to focus on providing LLINs to children under one and pregnant women. Given the strength of the application, it is hopeful that it will be approved for funding. If it is, those LLINs will begin to arrive during the operational year of the FY09 Uganda MOP.

As part of this campaign approach, PMI supported the development of an LLIN NGO net facility to provide free LLINs to CBOs for distribution to pregnant women and children under five in selected districts. This approach helped engage CBOs in the distribution of LLINs, especially in hard to reach areas. In 2007, 20 NGOs were selected to provide 60,000 LLINs to targeted groups in their communities. Another call for applications from NGOs is currently out to distribute another 60,000 LLINs in the same manner.

Total PMI LLIN distribution, Dec. 2005-Aug. 2007



Source; CDC/NMCP/MOH Uganda

Subsidized LLINs

Through the AFFORD program, PMI has been supporting the sale of 70,000 LLINs annually at a highly subsidized price through the private sector. These LLINs have mainly been targeted to urban areas and are sold for approximately \$3 USD. There has been a request for the PMI to expand this to peri-urban areas; however, given the new focus on free LLIN through mass campaigns to vulnerable populations, this approach is no longer a viable way to achieve rapid scale-up and will no longer be funded by PMI.

Private sector support

While mass campaigns can rapidly scale-up net ownership and effectively target vulnerable populations, Uganda wants to ensure that the private sector market for both subsidized and unsubsidized ITNs remains vibrant and viable to ensure a constant supply of LLINs. The country has created demand for highly-subsidized ITNs in the commercial sector. Currently, the commercial for-profit sector sells approximately 700,000 ITNs per year in urban centers such as Kampala, and LLINs comprise 60% of nets sold by these partners. In areas where the population possesses a reasonable income level and ITN commercial viability is demonstrable, subsidized and socially-marketed ITNs are being used to encourage the commercial sector to enter the market. As a result of this approach, the number of private ITN distributors in Uganda has risen from one to eight over the last five years. PMI continued to provide funding to Netmarkplus in FY07 to increase the supply of ITNs in the private sector by supporting local manufacturers to produce bundled ITNs and to launch a local stitching factory. To increase demand for ITNs, PMI, through Netmarkplus, supported a marketing campaign for branded LLINs in the urban areas.

As the private sector net market has grown, so has the availability of inexpensive and substandard nets. These nets are much cheaper than LLINs but they are untreated, of poor quality, and less effective. The GOU has no means to ensure the quality of these nets and to regulate their sale. In FY07, PMI provided funding to improve the National Bureau of Standard's capacity to regulate this market through the provision of equipment and the development of standards.

Net re-treatment

Considering that many untreated nets have already been distributed, it is important that these nets are regularly retreated with an insecticide (ideally a long-lasting insecticide) to improve their efficacy against malaria. Since 2004, an annual retreatment campaign has been conducted in 29 districts, covering about one-third of the existing non-ITN nets. In FY06, and FY07, PMI has

supported two retreatment campaigns which treated 500,000 and 200,000 ITNs respectively in 32 districts. The most recent retreatment campaign is using KO-tab 1,2,3 to ensure that these nets were long-lasting. While this has been an effective strategy to ensure that the nets available were insecticide-treated, this strategy is no longer necessary since the majority of nets distributed in Uganda are now LLINs and the old untreated nets are likely nearing the end of their 3-4 year lifespan.

Projected ITN need

The NMCP has calculated its LLIN gap to achieve 100% coverage of pregnant women and children under five as part of the Global Fund Round 7 application. It assumed that the PMI will provide 300,000 LLINs annually. The Global Fund Round 7 grant would provide 4,000,000 more. This will diminish the need for procurement of LLINs by PMI in FY09 if this proposal is approved.

Global Fund Round Seven Table of Projected Need of LLINs ('000)

A	Year	2007/8	2008/9	2009/10	2010/11
B	LLINs supplied from PMI and other donors (assumes PMI provides 300K nets per year)	3,600	1,200	800	900
C	Current number of ITNs in Uganda (those less than 3 yrs old)	4,900	5,700	5,700	3,000
D	LLINs needed to cover children under five	2,800	2,800	3,400	3,800
E	LLINs needed to cover pregnant women	600	1,200	1,400	1,500
F	Total Net Need (assuming PMI provided 300K per year) (Sum of Rows D+E)	3,400	4,000	4,800	5,300
G	LLINs requested in Global Fund Round 7	0	4,200	2,900	5,500

Information, Education, and Communication (IEC) for ITNs

Low net utilization rates shows that there is a great need for a comprehensive and sustained national IEC/BCC campaigns on the correct and consistent use of ITNs. In FY06 and FY07, PMI supported an IEC/BCC campaign around ITNs. As described above, AFFORD has provided NMCP IEC materials to distribute to CMDs on the correct and consistent use of LLINs, developed a series of radio spots discussing ITNs, and distributed 300,000 of the “Everyday Health Matters” newsletter on malaria. Netmarkplus has focused on a marketing strategy for private sector LLINs which includes the popular “Squito” cartoon strip, road shows, mobile promotion units and brand specific campaigns. While these efforts have been positive, there is a need to harmonize messages across partners and with the MOH. Also, the campaigns need to not only raise awareness about ITNs, which is high in Uganda, but also address behavior change so that ITNs are used correctly and consistently.

Needs in FY08

In 2008 there will be a gap of 3.4 million LLINs to cover pregnant women and children under five. PMI will fill part of this need by distributing approximately free 750,000 LLINs through ANC clinics in the north and through mass campaigns. Continued support will be provided to private sector to ensure that LLINs remain available in the marketplace. Also, since net ownership is increasing but usage is not, emphasis will be placed on BCC to increase the correct and consistent use of LLINs in Uganda.

Proposed Year Three Activities (\$5,750,000):

1. *Procure and distribute free LLINs through ANC clinics in Northern Uganda:* PMI will continue to procure and distribute LLINs through ANC clinics to target pregnant women. Approximately 357,000 LLINs in 24 districts will be distributed. (\$2,320,000)
2. *Procure and distribute LLINs through mass campaigns and the net facility:* PMI will continue to provide approximately 400,000 free LLINs to pregnant women and children under five through mass campaigns. LLINs will also be provided through the LLIN net facility to pregnant women and children under five through NGOs in districts with low LLIN coverage. (\$2,600,000)
3. *Support of the private sector for ITNs and monitoring net distribution:* PMI will continue to support development of the private sector net market and implement a program to expand ITN distribution to open markets in rural and peri-urban areas targeting vulnerable populations (e.g. pregnant women and children under five). Specifically, support will emphasize increased quality control by building capacity within the Uganda Bureau of Standards, and strengthening local net manufacturing capacity in Uganda. It is expected that this will be the last year of funding for this activity. (\$450,000)
4. *Continue IEC on correct and consistent use of LLINs:* PMI will continue to support behavior change at community level and mass media activities to ensure that the LLINs are correctly and consistently used. (\$380,000)

Intermittent Preventive Treatment

Progress to Date/Challenges and Needs:

The policy for IPT for pregnant women was adopted in 1998 to cover all of Uganda's districts. This policy is included in the Reproductive Health Unit (RHU)'s focused antenatal care policy and within the NMCP strategy. A focal person is responsible for malaria in pregnancy-related activities and works closely with the RHU. Both the NMCP and the RHU are responsible for the training, support supervision, monitoring and evaluation, operational research and provision of IPT services at health facilities and in the community.

Although the policy has been in place for over nine years, the 2006 DHS data indicate that only 16.2% of pregnant women receive two doses of IPT and only 36.6% of pregnant women receive just one. Given that 85% of women have at least two visits to the ANC and that the median first ANC visit to the clinic is at 5.5 months, IPTp rates should be much higher. There are several reasons for the low IPTp rates, which include: 1) intermittent drug supply with frequent stock outs of SP, 2) lack of sufficient personnel and registers to keep accurate records, 3) women preferentially attending ANC clinics of perceived higher quality which result in overburdening the system and thereby a reduction in services provided, 4) poor morale among the overwhelmed staff, 5) pregnant women presenting for the first time too late to take a second dose of SP, 6) lack of basic clean drinking water and cups for directly observed treatment of IPT, 7) the perception by some women that taking drugs during pregnancy may cause harm to the baby, 8) a poorly written policy which calls for only two doses of IPTp as opposed to monthly doses after quickening.

A change in policy may help Uganda increase its IPTp uptake. Currently the Uganda policy guidelines recommend that women receive at least two doses of IPT in the second and third trimester at least one month apart. Monthly SP dosing may also be easier to implement programmatically than two-dose IPTp. The current guidelines result in confusion on the part of health providers as to when to provide IPT, and missed opportunities when a woman comes to the clinic twice in the same trimester. There is no evidence that more than three treatments with SP in

the second and third trimesters is harmful to the mother or fetus. Experience from Malawi showed that a change in policy to monthly doses instead of just two doses increased complete SP IPTp coverage to 79%. Thus, a change in Uganda's policy as listed below may result in an increase in SP IPTp coverage and may be a more successful intervention programmatically than 2-dose SP. A monthly IPT policy would implement the following:

1. Provide every woman with a dose of SP/Fansidar at every ANC visit after quickening.
2. Women who do not know their HIV status should receive at least three doses of SP IPTp.
3. Women who are HIV-infected should receive daily septrin, and should not receive SP IPTp.
4. Women who are HIV-negative should receive at least two doses of SP IPTp.
5. There is no harm in giving four or five doses of SP IPTp, for those women who come in for monthly ANC visits.
6. Women can receive SP IPTp through the last week of pregnancy without risk to the mother or baby, and in fact, both benefit from additional dosing.
7. SP IPTp should not be given if SP was given in the prior four weeks.

PMI support to Malaria in Pregnancy

Utilizing FY06 resources, PMI facilitated the adoption and printing of focused-antenatal care (FANC) training manuals, supported a FANC training for health workers, ensured adequate requisitioning of SP from medical stores, and supported an MOH IEC nationwide advocacy plan for IPT. With FY07 funds, the PMI plans to conduct national FANC training for the private sector and NGO health workers on IPTp to complement the public sector trainings, continue to strengthen IPTp through ANC clinics in Northern Uganda, and continue to support the MOH IEC district advocacy plan.

In FY07 PMI is strengthening and supporting FANC training and improved IPTp at ANC clinics, by integrating it with PMTCT, and through directly observed treatment at the community level in all areas of the country including Northern Uganda. Activities to promote IPT include advocacy, training, supportive supervision, and other activities related to the NMCP IPT strategy. The data collection unit of MOH is also being strengthened to improve collection and analysis of IPT uptake data at the district level.

Proposed Year Three Activities (\$850,000):

1. *Discussions with MOH to revise national SP IPTp guidelines:* In Uganda, the current two-dose SP IPTp strategy given in the second and third trimester may be contributing to low coverage of this important intervention. PMI will support a review of the Uganda SP IPTp guidelines. (\$25,000)
2. *Integrate supportive supervision at the district level to ANC health workers:* To build on the trainings performed using FY06 and FY07 resources, PMI will provide support for integrated supervision for ANC care front line health workers (with emphasis on IPTp, ITNs and appropriate case management of pregnant mothers). (\$450,000)
3. *Provide safe water and cups:* One remediable factor that has limited the ability of women in Uganda to take SP as a directly observed treatment has been the lack of clean water and cups at the respective points of service. PMI will provide the commodities and training necessary to enable the provision of safe water in an attempt to remove this as a barrier of IPTp uptake. (\$150,000)

4. *Support IEC/BCC:* PMI will build on the lessons learned from prior work and provide continued support to the health education units of districts, in collaboration with the NMCP, to conduct community level advocacy on IPTp in order to encourage pregnant mothers to attend ANC and complete their two IPTp doses. (\$175,000)
5. *Provide ANC registers:* The PMI will support the printing of ANC registers to help track IPTp and other ANC indicators. PMI’s assistance will hopefully act as a positive catalyst to ensure the full package of service are monitored effectively to help guide programmatic decision making, including the essential IPTp intervention. (\$50,000)

INTERVENTION - TREATMENT

Malaria Case Management

Progress to Date, Challenges and Needs

One of the objectives in the National Malaria Strategic Plan is to ensure access by everyone to ACTs, including those accessing treatment through the commercial sector. To achieve this goal, in 2004, the MOH endorsed ACTs as the first line treatment for uncomplicated malaria. First-line treatment is artemether-lumefantrine (AL – brand name: Coartem®), and artesunate-amodiaquine as an alternative. Since then, the MOH sensitized leaders and the general population and trained over 30,000 health workers. The Global Fund Round Four proposal approved for \$66 million is estimated to cover the needs for the public sector, private non-profit facilities, and home-based management of fever (HMBF) program for the period 2005 to 2010. The first consignment of ACTs arrived in country in January 2006.

In April 2007, PMI helped the National Medical Stores to update their quantification for AL for uncomplicated malaria using population age structure, population growth rate, and estimated number of clinical malaria cases per age group (see table below). Future quantifications will need to be based on consumption data as soon as this information becomes available.

Schedule of ACT shipments

Source	2006	2007	2008	2009
GF Round 4	15.5 million	22 million	22 million	20 million
PMI	130,000	0	0	0

Based on the above table, there appears to be sufficient funding for ACTs through at least 2009.

National Medical Stores manages the procurement and supply of essential medicines and health supplies for the public sector while Joint Management Stores manages similar activities for the not-for-profit private sector. During the last year, the supply system for ACTs has been changed from a push to a pull system. Instead of receiving standard drug kits quantities according to the number of patients reported in the previous three months, districts, and health sub-districts now order based on actual demand from the essential drugs and commodities list. Delivery to districts is made at two-monthly intervals and the costs are charged against a credit line (Essential Drug Account). Funds available for essential medicines, vaccines and supplies have increased from \$ 0.80 to \$1.50 per person per year, but still fall short of the \$3.50 needed to successfully implement the Minimum Health Care Package. In 2000, previously existing cost-sharing at government health facilities was abolished and all treatment and medicines now are free of charge.

Despite adequate supply of ACTs, there remain anecdotal reports of shortages, stockouts, and even some overstocks of the drugs in public and private facilities. This is due to a variety of factors including delays in customs clearance and quality testing, problems in the existing “pull”

distribution system, lack of a computerized logistic management information system, and lack of storage at the district level requiring drugs to be pre-packaged at the national medical stores for all health facilities in the country. In addition, there needs to be further support for supervision of health providers in the use of ACTs.

The National Drug Authority (NDA) and the Uganda National Bureau of Standards (UNBS) play a key role in the setting of standards and control of quality and safety in the health sector. The NDA's capacity to test all drugs entering the country in the public and private sector has significantly improved in recent years and the organization is also establishing a reporting system for adverse drug events.

There are over 300 licensed pharmacies and about 4,000 unlicensed drug shops throughout Uganda that provide a range of antimalarial remedies, including AL at very high prices (between \$5 and \$10 per treatment). About half or more of malaria patients seek care first through the private sector. The NMCP plans to introduce AL into both the formal and informal drug markets beginning in 2008, if possible. Prior to the roll-out, the NDA needs to reclassify AL from a prescription only to an over-the-counter medicine. To help with the new program, Medicines for Malaria Venture is conducting a study of private sector drug seeking behavior. In addition, PMI trained 2,870 private sector providers on the new NMCP malaria policy and developed and distributed job aides on ACT treatment. Many more private sector providers need to be trained in the new NMCP policy. More importantly, the NMCP needs to take actions to make ACTs affordable through the private sector, and combat counterfeit drugs and monotherapies. Once a low-priced AL is readily available, the NMCP needs to create public demand for this highly effective antimalarial.

The second objective of the NMCP is to ensure the prompt treatment of children under five by providing ACTs through its HBMF program. To achieve this target, the MOH is implementing the HBMF strategy through CMDs. In April 2007, the NMCP changed its treatment policy for HBMF from pre-packaged chloroquine and SP to ACTs (AL) due to increasing drug resistance. With commodity and other support from PMI, WHO initially piloted the use of AL in HBMF in three districts. PMI is also supporting an evaluation of community ACT provision in one district. Results from the WHO pilot districts indicate that there are some problems with the change in treatment schedule for the new drugs, continued problems with providing incentives to CMDs, and issues surrounding packaging for age groups (there are two formulations for the under-five age group).

The NMCP had planned to roll out the new HBMF program nationwide beginning in June 2007, but there have been delays in completing work in the WHO pilot districts. The Global Fund Round Four grant includes training of CMDs for about 75% of the country as well as some funding for supervision. As a result, the nationwide rollout of community ACTs through the HBMF program will not begin until late 2007 or early 2008. PMI helped the NMS develop a three-phase roll out strategy that will take approximately one year to implement. Support is needed to retrain about one quarter of the CMDs, address the issues of incentives for CMDs, conduct supportive supervision, collect drug consumption data to accurately quantify commodity needs, and to closely monitor the use of ACTs in the community.

The NMCP is also working to improve the treatment of severe malaria and has recently developed treatment guidelines for severe malaria. In addition, PMI helped the NMCP to quantify the needs for four severe and pre-referral malaria drugs as summarized in the table below. This quantification was done based on the assumption that 5% of patients are expected to contract severe malaria. At present there is not sufficient donor funding available to fully meet these requirements.

Projected Need for Severe and Pre-Referral Malaria Drugs

Item	2008 need	Estimated cost
Artemether injection 20 mg/ml (5-24 kg)	715,202	\$472,033
Artemether injection 80 mg/ml	482,972	\$463,653
Quinine injection 600mg	1,113,864	\$33,415
Quinine sulphate 300mg tablets	7,506,691	\$225,200
Total Cost		\$1,194,301

In addition to provision of the drugs, health workers need to be trained, staff at referral health facilities need supervision, job aids need to be developed, and there should be improved quantification of these commodities based on consumption data.

Pharmacovigilance

The pharmacovigilance system in Uganda is not well developed. Based on the WHO model, the NDA has designed a generic form to collect passive reporting data on all medicines; however, this system only reports limited numbers of adverse drug reactions. In 2005, the Uganda Malaria Surveillance Project (UMSP) began a pharmacovigilance project focused on antimalarial treatments provided at health facilities and within the community. In order to roll out an improved system, the NDA will require additional training, supervision, and community sensitization. Also, adverse event reports will need to be collected, analyzed, and acted upon.

Beginning in August 2007, UMSP will pilot a pharmacovigilance system developed with input from the NDA and other stakeholders at the UMSP sentinel site in Jinja. The site will collect data from the community, public and private sector, using enhanced passive reporting of adverse events associated with antimalarial drugs. Health care workers and key community members will be trained on the importance of pharmacovigilance, recognition of adverse events, and methods of reporting. The NDA's form for reporting adverse drug reactions will collect data from the public and private health facilities, and a specialized form will be used to collect information from the community. UMSP will collect and analyze adverse event reports and will report to the NDA and other stakeholders. In 2007, PMI will expand activities to include active population-based surveillance for adverse reactions to antimalarial drugs in Jinja. A census of the catchment population will be done and then one parish will be actively followed to assess the safety of antimalarial drugs. In addition, a pregnancy register will be developed which will monitor drug exposure and safety in pregnancy.

Quality control of antimalarials

The NDA is charged with ensuring the quality of antimalarials through registration of pre-marketed medicines, inspection of factories which manufacture anti-malarial drugs, licensing of drug outlets, and post-marketing surveillance. PMI provided equipment (e.g., a high performance liquid chromatography machine, mini-labs, etc), technical assistance, training, and other support to improve the pre-market inspection of antimalarials and to help establish four sentinel post-marketing surveillance sites. Additional support is needed to increase the number of post-marketing sites, expand the pre-marketing quality assurance program, and further build the capacity of the NDA.

Needs in FY08

Ensuring prompt, effective, and safe treatment with ACTs to 85% of patients with malaria in Uganda will represent a major challenge for the NMCP. During the third year of implementation, PMI will help introduce severe malaria and pre-referral malaria drugs, assist the NMCP to roll out

and monitor the new ACT-based HBMF program, and further strengthen the pharmaceutical management system. In addition, PMI will continue to support the development of a pharmacovigilance system and further build the capacity of the NDA to undertake its regulatory responsibilities.

Proposed year three activities (\$2,580,000):

1. *Expansion of the new ACT-based HBMF program:* PMI will help the NMCP expand its new ACT-based HBMF program by supporting training, supportive supervision, and comprehensive monitoring of drug distribution activities. Funding will also be provided to the CMD network, including t-shirts and other incentives, quarterly meetings to discuss progress and update skills, and job aids. The number of districts that the HBMF will be expanded to is still under discussion. (\$500,000)
2. *Integrated health worker supervision:* The PMI will continue to provide supportive supervision to health workers providing malaria care and treatment at the district level. This will include refresher trainings for health workers and training on supervision for district health management teams and NMCP managers. (\$200,000)
3. *Promotion of the NMCP's malaria treatment policy in the private sector:* PMI will continue its work to sensitize and train private drug sellers and practitioners in both the formal and informal sectors on the NMCP's new malaria treatment guidelines, including the use of ACTs, the elimination of ineffective antimalarials and monotherapies. (\$150,000)
4. *Procurement of severe and pre-referral antimalarials:* PMI will procure severe and pre-referral anti-malarial drugs to fill approximately 54% of the national shortfall in these medications. PMI will also support the introduction of these drugs in the health system (health facility levels II, III and IV) through training, supportive supervision, the design of job aids for severe malaria, and monitoring of consumption data.(\$650,000)
5. *Training on the use of severe malaria drugs:* PMI will provide training to health care workers in hospitals and high level facilities on the proper use of severe malaria drugs. Trainings may also be provided to lower level health workers on the use of pre-referral drugs. (\$300,000)
6. *Pharmaceutical supply chain management:* PMI will provide technical assistance to help NMS update the quantification of ACTs and other key antimalarials based ideally on consumption data. PMI will also provide further support to the NMCP to establish and implement its computerized malaria commodities information acquisition system that will be used to provide accurate, reliable, and timely information on use and availability of malaria medicines at the district, regional, and national level. In addition, PMI will provide further support for rational drug use in health facilities and further build the capacity of NMS. (\$380,000)
7. *Pharmacovigilance:* PMI will help NDA and its partner, UMSP, to establish a viable pharmacovigilance system. Support will be provided for training, sensitization, supportive supervision, adverse effects data collection and analysis, and sensitization. (\$200,000)
8. *Quality assurance of antimalarials:* PMI will help NDA improve its pre-marketing quality control of antimalarials entering the country, expand its sentinel sites for post-marketing

drug surveillance, and further build its capacity to fulfill its regulatory functions.
(*\$200,000*)

Malaria Diagnosis

Progress to Date, Challenges, and Needs:

Most malaria diagnoses in health facilities in Uganda are based on symptoms and not microscopy. However it is well established that malaria cannot be diagnosed with certainty on clinical criteria alone. In the areas of low to moderate transmission improper diagnosis results in children often being treated for malaria when they have a fever, when the likelihood of malaria may be extremely low. Thus without laboratory diagnostic capacity of malaria it is very likely that the child that presents with a fever but without malaria may not be treated with appropriate life saving antibiotics or other supportive health care measures. With this scenario, ACTs will be used unnecessarily adding to the financial cost of the program and the pressure on the drug will increase. This may also result in unnecessary stock outs of ACTs.

Ultimately diagnosing clinical malaria falsely inflates the malaria-attributable mortality rate. Proper treatment should be given for proper diagnosis and malaria diagnosis is reliant on laboratory conformation. To ensure the proper use of antimalarial drugs and reduce the unnecessary use of these drugs that occurs when patients are presumptively-treated for malaria, accurate laboratory diagnosis is critical.

At the sub-county level, the health center level III is the lowest level in the health delivery system with a laboratory and is supposed to offer basic laboratory tests. Laboratory personnel in health center III are not required to have university training or a certificate, often rely on on-the-job-training, and do not have the academic foundation necessary for a proper slide reading.

Although in 2006 PEPFAR funded 35% of the national requirements of microscopes, a large deficit still remains. Only 346 of the 901 health center IIIs have functional laboratories – i.e. with microscopes and laboratory personnel. The Central Public Health Laboratory (CPHL) is mandated to coordinate, monitor, and supervise all the health center III and IV level laboratories but is grossly understaffed, with only three people and limited resources.

In August 2007, the NMCP adopted new recommendations for use of rapid diagnostic tests (RDT). A new policy document entitled “Policy Guidelines on the use of Rapid Diagnostic Tests in Malaria Management” is currently in circulation as well as the trainer’s guide, “Rapid Diagnostic Tests in Malaria Management.” The NMCP policy recommends use of RDTs in all health center II and IIIs where there is no microscope or microscopist. In February, 2007 a meeting of policy stakeholders resolved that:

- Hospitals, health center IVs IIIs that have microscopes and microscopists will use microscopy for malaria diagnosis.
- Health center IIs and IIIs that do not have microscopes or microscopists will use RDTs.
- HRP2 type RDTs will be used in Uganda.

The NMCP has received funding to purchase and do training in RDTs under the Global Fund Round Four, Phase one and two funding. RDTs may be introduced into health center III low transmission, epidemic-prone areas as early as 2008. The NMCP is planning to do a feasibility study of diagnosis with RDTs and training of personnel in six districts. They plan to later expand to 21 districts (out of 81).

At the health centre III level, there is high variability among laboratory personnel in the reading of slides. In FY07, PMI is supporting the JUMP training program - an integrated comprehensive health centre IV and III training for laboratory personnel, clinicians, mid-wives, nurses and data managers. The training is to increase laboratory skills, improve expertise in clinical management of fever in both uncomplicated and severe malaria, and ensure good communication between team members. In this innovative model, the training of both laboratory personnel and clinicians together should improve not only diagnosis, but proper care as well. Currently, many clinicians lack confidence in the diagnostic results, which leads them to disregard lab findings. By also training data managers, record keeping for malaria surveillance and reporting to the HMIS will improve. The NMCP and CPHL act as advisors to the JUMP steering committee.

The JUMP training is not scaled to the national level, but serves to meet part of the large gap in laboratory training needs in areas with high PMI interventions (there are >900 health center III laboratories). The training will take place at the 14 existing sentinel sites, using a training of trainers model, and will then be rolled out to an additional 98 health center III laboratories. With this intensive integrated training, and adequate supportive supervision from mobile teams, both the reliability and sustainability of laboratory diagnosis should be increased. The involvement of local institutions as implementing partners and as advisors to the process increases the cost, but also increases the chances for sustainability and expansion outside of PMI. Later evaluation of this program and that of RDTs at the health center III level will help determine the most appropriate and feasible plan for national scale up of improved diagnostics.

Proposed Year Three Activities (\$450,000):

1. Comprehensive training in diagnostic capacity: PMI will support the scale-up of the JUMP integrated training of clinicians and laboratory technicians on malaria diagnosis and treatment. PMI, in collaboration with the MOH and CPHL, will develop laboratory capacity for malaria diagnosis by supporting comprehensive training in malaria microscopy and rapid diagnostic tests for health centers IV and III. In FY08, 14 sentinel sites, using a train the trainers model, will train, provide oversight, and support seven health centre III labs each for a total of 98 health center III laboratories with trained technicians. This activity will complement the proposed NMCP plan for scaling up RDTs, increase accurate diagnosis and treatment of malaria, improve the quality and consistency of data coming into the sentinel sites and the HMIS system, and ensure that antimalarial drugs are used appropriately. Mobile teams will monitor and provide supportive supervision of trained personnel. (\$450,000)

INTERVENTION - EPIDEMIC RESPONSE

Epidemic Surveillance and Response

Progress to Date, Challenges, and Needs:

Epidemic malaria transmission occurs in 15 districts in the southwest and eastern regions of Uganda. While the NMCP includes early detection and rapid containment of malaria epidemics as one of its objectives, existing systems for epidemic detection and response are generally weak and poorly organized. Epidemic control and containment are the primary responsibility of the NMCP. Although thresholds for what is considered to be an epidemic were established five or six years ago for each district, the current understanding of appropriate response is limited, and districts are not abiding by previous epidemic control recommendations. The MOH lacks adequate funding to support this activity.

Guidelines exist for epidemic response and containment, but there is inconsistent implementation. This is due in part to the reliance on the HMIS system which is burdened with delays, and because

most districts still use non-electronic means of communicating. Factors contributing to the problem include: 1) reporting of increased numbers of cases may be slow to reach the district and national level, 2) analysis of the reports by the district and national level may be delayed, 3) once an epidemic is suspected, there may be lack of funding for fuel, available personnel and diagnostic capacity (RDTs, microscopy), and 4) there isn't a surge capacity in commodities to respond with a strong intervention (drugs, ITNs, IRS).

Districts report health information, including cases and deaths due to clinical malaria, on a weekly basis through the routine HMIS system. However, compilation of data, analysis, and availability of information for decision making is generally quite delayed. The CPHL also feed information into the MOH surveillance systems. This results at times in high reported rates of malaria from districts which are never investigated. Without investigation, an appropriate response cannot be mounted and epidemics are not likely to be contained quickly and effectively.

Proposed Year Three activities (\$150,000):

1. *Develop the epidemic surveillance and response in 15 epidemic-prone districts by:*

- updating and re-establishing the MOH guidelines for the epidemic threshold and appropriate investigation and response using WHO guidelines;
- training in epidemic control in the 15 epidemic-prone districts (three training sessions); and
- providing some support for commodities and transport for outbreak investigation and response (including diagnostic support through RDTs or microscopy, stockpiling of supplies and equipment, and community IEC for rapid responses). (\$150,000)

MONITORING AND EVALUATION

Progress to Date, Challenges and Needs

PMI and the NMCP support the principle of the "Three Ones," which promote: one national coordinating committee, one national malaria control plan and one national M&E plan. PMI collaborates on all aspects of the M&E program. PMI will coordinate its monitoring and evaluation activities with those of the NMCP and other partners to ensure as much uniformity as possible.

The monitoring and evaluation gaps in the malaria control program in Uganda are significant. In 2006 emphasis was placed on assessing the deficits in the program and efforts are underway to introduce measures agreed by the M&E working group with oversight from HPAC. Lack of critical human resources with only one part-time M&E staff member and no statistician has resulted in the inability of the NMCP to conduct analysis of HMIS, HBMF, or monitor LLIN, IRS and ACT impact. There is no M&E strategy or policy yet in existence, however the M&E Technical Working Group will assist in its writing this year.

Outcome and Impact Evaluation

The PMI evaluation plan is based on estimates of outcomes (intervention coverage) and impact (morbidity and mortality) at baseline, mid-point and after five years. Estimates of outcomes (intervention coverage of ACTs, ITNs, IPTp and IRS) are provided by household surveys that estimate standard Roll Back Malaria indicators. For PMI purposes, baseline for intervention coverage and mortality was estimated from the 2006 Uganda DHS. Verbal autopsies were also added to this survey to provide estimates of malaria-specific mortality based on all deaths to children who died at age less than five years in the three years prior to interview. Coverage will be estimated at midpoint using the Malaria Indicator Surveys (MIS) in 2008. Impact on mortality and morbidity will be followed through sentinel site health facilities and mortality will again be

estimated for a nationally representative sample in the 2011 Uganda DHS which will also include verbal autopsies for deaths to children under age five-years.

Three of the major surveys in the PMI Uganda monitoring and evaluation plan are:

- The 2006 Uganda DHS: The final results were released in August 2007 and provide the baseline data for PMI in Uganda.
- The 2007 Uganda Service Provision Assessment (SPA) Health Facility Survey: This will be used to assess the availability and quality of health services.
- A Malaria Indicator Survey (MIS): This is planned for the end of 2008 or beginning of 2009 (after the rainy season) marking the mid-point of the PMI project in Uganda.

Verbal Autopsy Survey and Validation Study

PMI supported the Uganda Bureau of Statistics to conduct a verbal autopsy survey as a follow-on to the 2006 DHS. This survey will provide estimates of causes of mortality and malaria-attributable mortality for deaths to children under five years old that were reported for the three years prior to the 2006 DHS. Information was collected on 724 deaths, among which 80 were stillbirths. The new WHO core standard verbal autopsy tool was used. Next steps are to finalize the data cleaning exercise and develop the report structure and tabulation scheme and then disseminate the findings. This work should be completed by the end of 2007.

In FY06, PMI supported a study to validate verbal autopsy procedures in different epidemiological settings in Uganda because the sensitivity of verbal autopsy for establishing malaria-associated mortality may vary according to the proportion of deaths due to malaria. Hospital medical records were used as the 'gold standard' and the positive predictive value of the verbal autopsy procedures were compared with these at each site. The performance of the verbal autopsy procedures for ascertaining malaria-associated mortality, mortality associated with febrile illness, and all-cause mortality were assessed. Use of physician review for interpreting verbal autopsy questionnaire data will also be evaluated, and the precision of physician review upon repeat testing will be determined. The verbal autopsy validation study has been approved by the IRB both at the CDC and Makerere University.

Sentinel site surveillance activities

Sentinel Sites were first established by UMSP and the MOH in 2001 to determine the efficacy and safety of antimalarial drugs in epidemiologically different sites. Through support from PMI and the MOH, the number of sentinel sites has now expanded to 14, and they have developed the capacity to monitor and collect high quality data on malaria indicators. The sites are located in eight districts (Kabale, Kanungu, Arua, Kyenjojo, Tororo, Mubende, Apac, and Jinja). Data is collected on several indicators reflecting malaria morbidity and mortality from outpatient departments, maternity clinics, and inpatient wards, including:

- total number of patients seen per month
- number of patients diagnosed with malaria
- number of patients treated for malaria
- number of patients with blood smear done
- proportion of patients with a malaria positive blood smears

UMSP also collects data on treatment practices of health care workers and prescription of antimalarials. FY07 funds from PMI will strengthen and expand surveillance activities at the existing sentinel sites. As part of the expansion, data will be collected at the hospitals in the districts with sentinel sites to capture inpatient data on morbidity and mortality. In addition, an

electronic data management system is being established at the sentinel sites to improve the quality, quantity, and efficiency of data collection, and to further support Uganda's HMIS.

Uganda Service Provision Assessment, 2007

This assessment is a nationwide facility-based survey designed to collect information on the availability and quality of reproductive and child health care, infectious disease (malaria TB and HIV/AIDS) services provided to Ugandan men, women and children. It is currently underway in September 2007, sampling 630 public, private and not-for-profit health facilities throughout the country. The sample of facilities will be designed to allow for national and regional conclusions on key indicators. The survey will be completed in late 2007, and results disseminated in early 2008.

A sound understanding of the situation and factors responsible for the weaknesses or strengths of health facilities to provide efficient and appropriate service is critical in the management of malaria. The survey will gather information on quality of care provided to malaria patients in areas of diagnosis, treatment, counseling, and education. The information generated from the survey will serve as a situational analysis/base line and will help improve services.

Establishment of a national electronic database tracking system to monitor ITN distribution

In 2007, PMI collaborated with PEPFAR to launch a project with the NMCP to develop and implement an electronic database for tracking ITNs that enter Uganda. This collaborative project has developed a composite database tool with various sources of relevant information. The database harmonizes the reporting requirements of the NMCP, Ministry of Health, and also the Health Sector Strategic Plan 2005-2010. The central database itself was designed to be flexible enough to address prospective future needs and is prepared to link with multiple relational databases for HIV/AIDS and other diseases, as well as interventions. The database and its corresponding digital map is an integrated approach to streamline all relevant malaria-related activities within the country to conform to standard indicators, monitor ITN partner activities, and coordinate future ITN distributions to fill coverage gaps in specific sub-counties.

The Ugandan HMIS is the best nationwide tool for monitoring epidemiological factors. Through the strengthening of its reporting and diagnostics, the HMIS section of the database will be expanded to include more impact indicators that can help monitor intervention program efficacy. Information currently used from HMIS for informational markers include:

- the number of outpatient clinical malaria cases per district (with reports from over 90% of health facilities)
- proportions of malaria-positive blood tests
- malaria-attributed morbidity

The HMIS data will be disseminated to health facilities in the 2007 national ITN database annual report.

Monitoring and Evaluation Management Services (MEMS)

The MEMS project serves as the central data collection point for compilation of project information and dissemination for all partners. This project helps with quarterly and annual reporting as per PMI requirements.

Proposed Year Three Activities: (\$1,650,000)

1. *Malaria Indicator Survey*: As part of the evaluation of PMI a MIS will be done at the mid-point of PMI implementation (2008) (\$1,000,000).
2. *Strengthen sentinel site surveillance*: The existing 14 sites will continue to be strengthened to provide quality data on malaria morbidity and mortality. Electronic data management systems will be established in at least one site per district that will target both the health centers IVs and hospitals in the district. Health staff will be trained in these systems and in quality data collection. Each site will receive supportive supervision three times a year, will receive assistance with internal quality control systems for health facility laboratories, and external quality assurance for laboratory diagnosis of malaria. (\$300,000)
3. *Strengthen the Iganga DSS site*: In year three, PMI will focus on strengthening the Makerere University DSS site in Iganga, which may provide opportunities to better understand all-cause mortality and malaria related mortality. From the Verbal Autopsy Survey, the child mortality rate in the Iganga site was much lower than the expected national rate, indicating that some death cases (probably in newborns) have been missed. The main areas of verbal autopsy work include: (a) the introduction of a new household survey instrument which includes a birth history questionnaire for all women in the household, and a new baseline validation study; (b) revision of VA/SA tools based on the new WHO tool; (c) introduction of revised and updated coding forms for entering mortality cause (which is based on physicians judgment) to clarify better diagnoses that were confusing (i.e. acute febrile illness, unspecified acute febrile illness, malaria etc)). (\$100,000).
4. *Program monitoring and tracking system development*: Support for developing databases for NMCP to track programmatic progresses in key malaria intervention areas (HMIS data on ITN coverage, IRS coverage and quality improvement). Assist NGOs with community monitoring and tracking of ITN distribution and utilization. (\$150,000).
5. *Continue support for MEMS*: The MEMS project serves as the central data collection point to analyze PMI progress towards the goals and allow for rapid reporting of results (\$100,000).

CAPACITY BUILDING AND SUPPORT TO THE NMCP

The M&E unit of the NMCP lacks critical human resource capacity, a malaria M&E plan, and equipment (computers and accessories, scanners, and photocopiers) to operate the unit. Currently there is no mechanism in place at the malaria control program to evaluate large-scale malaria interventions.

Proposed Year Three Activities (\$100,000):

In year three, the PMI will provide support for the NMCP. This will include seconded staff to provide M&E support and entomological support as well as support for equipment and other supplies (\$100,000).

PRIVATE SECTOR PARTNERSHIPS

In FY07, PMI partnered with Malaria No More to distribute over 500,000 LLINs to pregnant women and children under five in select districts. Other private sector donors such as Barclays of Uganda and United Way also donated a few thousand LLINs to the campaign.

In the future, the PMI will continue to foster such private sector partnerships. Other potential opportunities include continuing to work with private sector drug distributors to ensure that ACTs are distributed appropriately (see Case Management section), and that local net manufacturers prosper in Uganda (see ITN section).

STAFFING AND ADMINISTRATION

Two senior technical advisors on malaria oversee PMI in Uganda, one representing CDC, and one representing USAID. In addition, two more FSNs will be hired by USAID to support management of PMI activities. All PMI staff members will be part of a single inter-agency team led by the USAID Mission Director. The PMI team shares responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies, and supervising day-to-day activities. Candidates for new positions will be evaluated and/or interviewed jointly by USAID and CDC, and both agencies will be involved in hiring decisions, with the final decision made by the hiring agency.

The two senior technical advisors together with the FSNs will work together to oversee all technical and administrative aspects of the PMI in Uganda, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, and reporting of results. All staff members will report to the USAID Mission Director or his/her designee; the CDC staff will be supervised by CDC, both technically and administratively. All technical activities will be undertaken in close coordination with the MoH/NMCP and other national and international partners, including the WHO, UNICEF, the Global Fund, the World Bank and private stakeholders.

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 (\$1,950,000).

APPENDICES

**Table 1: President's Malaria Initiative – Uganda
Year 3 (FY08) Timeline of Activities**

ACTIVITY	2007	2008											
	SEP-DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Planning													
MOP development and approval													
Micro planning of PMI interventions													
IRS and ITNs distribution planning													
Logistics													
Purchase insecticides and IRS equipments													
Purchase LLINs etc													
Purchase severe malaria drugs													
Purchase microscopes, equipment, chemicals & other supplies													
IEC/BCC													
IEC/ Social mobilization campaigns for IRS													
IEC ITN use													
IEC IPT													
IEC ACT													
IEC on Pharmacovigilance													
Training													
Entomology training													
Training spray squads													
Training on the use of severe malaria drugs													
IPT training for health workers													
Training private sector on ACT													
Training CDDs on HBMF with ACT													
Training lab technicians on malaria diagnosis													

ACTIVITY	2007	2008											
	SEP-DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Services													
IRS in endemic districts													
IRS IDP districts													
IRS epidemic districts													
Free LLINs distribution-ANC													
LLINs distribution- net facility & mass campaign													
Improve private sector ITNs and UNBS capacity to monitor net quality													
IPT ANC/PMTCP													
Epidemic investigation/ response													
Support NMS's supply chain management													
Implement mini-lab, training and quality assurance of ACT and pharmacovigilance													
Support supervision													
Integrated supportive supervision for health workers and ANC workers													
Continued support for phased scale-up of HBMF													
Supervision to CDDs involved in c-ACT													
Monitoring & evaluation													
IRS environmental monitoring													
Base line and post entomological surveys/mapping													
Monitor adverse reactions to AMDs													
Malaria Indicator Survey													
Strengthen and expand sentinel sites													

ACTIVITY	2007	2008											
	SEP-DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Support for Iganga DSS													
Support for ESR system													
Capacity building support to NMCP													
IRS epidemiological monitoring													
Program monitoring & tracking system development													
PMI reporting & data collection													
Staffing													
Hire two PMI FSNs													

TABLE 2: PMI - Uganda FY 2008 Budget and Activity Table

Proposed Activity	Mechanism	Budget	Commodities	Geographic area	Description of Activity
IRS*					
Support for IRS in northern conflict districts	IRS IQC	\$2,000,000	\$825,000	Kitgum, Gulu, Padar, & Amoro	Continued rounds of spraying in 4 northern districts
Support for one round of IRS in six endemic districts	IRS IQC	\$4,400,000	\$2,650,000	Lira, Dokolo, Amolatar, Kabermaido, Amuria and Soroti	Expansion of spraying to Lira and Kabermaido districts
Support third round of targeted IRS in epidemic-prone districts of Kabale and Kanungu	IRS IQC	\$800,000	\$325,000	Kabale, 9 sub counties and Kanungu, 9 sub counties	Support for IRS in select high transmission areas in epidemic-prone districts Kabale est. 35,000 HH- Kanungu, est. 50,000 HH)
Support for targeted IRS in epidemic - prone district of Rukungiri	IRS IQC	\$750,000	\$450,000	Rukungiri district, 9 sub counties	Support for IRS in select high transmission areas in epidemic-prone Rukungiri district (est. 50,000 HH)
Entomologic monitoring and evaluation	IVM IQC	\$70,000	\$25,000	All sprayed districts	Continue support for IRS entomologic surveillance and conduct susceptibility, bio assays and vector bionomic studies
Support the MOH in IEC/BCC/community mobilization for IRS	IRS IQC	\$500,000		All sprayed districts	Continue IEC/BCC activities specific for IRS and campaigns to mobilize and educate communities.
<i>subtotal*</i>		<i>\$8,520,000</i>	<i>\$4,275,000</i>		

ITNs					
Procurement and distribution of free LLINs through ANC clinics in the north	AFFORD	\$2,320,000	\$1,785,000	Northern Uganda	Procurement and distribution of approx. 357,000 LLINs for distribution through ANC clinics in the north
Procurement and distribution of LLINs through the LLIN net facility and mass campaigns	AFFORD	\$2,600,000	\$2,000,000	National	Procurement & distribution of approximately 400,000 LLINs for distribution through mass campaigns and NGO/CBO to pregnant women and children under five
Support to the private sector ITN market	Netmarkplus	\$450,000		National	Support to ITN private sector outlets, the UNBS to monitor quality of ITNs, and support to local ITN manufacturers
IEC/BCC for ITN use	AFFORD	\$380,000		National	Support for campaign to encourage the correct and consistent use of ITNs
<i>subtotal</i>		<i>\$5,750,000</i>	<i>\$3,785,000</i>		
IPTp					
IPT policy development	New RFA ⁴	\$25,000		National	Initiate dialogue with national stakeholders on IPT policy revision
Integrated supportive supervision for ANC workers	NUMAT	\$150,000		Northern Uganda	Provide supportive supervision at the district level to ANC health workers
	New RFA	\$300,000		Southern Uganda	
Provision of safe water at ANC clinics	NUMAT	\$50,000	\$25,000	Northern Uganda	Provision of safer water

⁴ All references to “New RFA” refer to the same one RFA that will be competed.

	New RFA	\$100,000	\$75,000	Southern Uganda	vessels and cups to aid DOT of IPTp
IEC/BCC on the importance of IPTp	NUMAT	\$75,000		Northern Uganda	National IEC/BCC campaign to increase demand for IPTp
	New RFA	\$100,000		Southern Uganda	
Provision of ANC registers	NUMAT	\$20,000		Northern Uganda	Print ANC registers to help track IPTp
	New RFA	\$30,000		Southern Uganda	
<i>subtotal</i>		<i>\$850,000</i>	<i>\$100,000</i>		
Case Management					
Expansion of new HBMF program with ACTs	NUMAT	\$200,000		Northern Uganda	Provide support for scale-up of HBMF with ACTs: training, supervision, and motivation of CMDs
	New RFA	\$300,000		Southern Uganda	
Integrated health worker supervision and training	NUMAT	\$75,000		Northern Uganda	Continued training and supervision on the proper use of ACTs
	New RFA	\$125,000		Southern Uganda	
NMCP policy in private sector	AFFORD	\$150,000		National	Continued training for private sector drug outlets on the use of ACTs
Procurement of severe and pre-referral malaria drugs	DELIVER TO 3	\$650,000	\$650,000	National	Procure approximately 54% of the severe drug need for Uganda
Training on the use of severe malaria drugs	New RFA	\$300,000		National	Provide training to health care workers on the proper use of severe malaria drugs
Pharmaceutical supply chain management	SPS	\$380,000		National	Pharmaceutical management including LMIS, quantification , stock management system , inventory control, capacity building, study of warehouse facilities, phasing out of Cq/sp
Pharmacovigilance	USP	\$100,000		select districts	Support to NDA and

	CDC/UCSF	\$100,000			USCF/UMSP for pharmacovigilance
Quality assurance of antimalarials	USP	\$200,000		National	Support to NDA to conduct pre- and post market surveillance on the ACT drug quality
Strengthen malaria diagnostic capacity	New RFA (to IDI)	\$100,000		National	Continued support to provide a comprehensive diagnostic training to facilities with microscopy
	CDC/UCSF	\$350,000			
<i>Subtotal</i>		<i>\$3,030,000</i>	<i>\$650,000</i>		
Epidemic Surveillance and Response					
Support for epidemic surveillance and response	WHO	\$150,000		Epidemic-prone districts	strengthen system to detect epidemics and respond in 15 districts
<i>Subtotal</i>		<i>\$150,000</i>			
Monitoring and Evaluation					
Malaria Indicator Survey (MIS)	Measure/DHS	\$1,000,000		National	Conduct malaria indicator survey in 2008
Strengthen and expand sentinel sites	CDC/UCSF	\$300,000		14 sites in Uganda	Collect and monitor hospital and outpatient data on malaria-related cases and fatalities
Support for Iganga DSS	New RFA	\$100,000		Iganga	Support DSS to collect malaria-related mortality data
Program monitoring and tracking system development	New RFA	\$150,000		National	Develop databases for NMCP to track programmatic progress in key malaria intervention areas (e.g. ITN tracking database)
Continued support to MEMS	MEMS	\$100,000		National	Information collection, dissemination, and reporting

Capacity building support to NMCP	New RFA	\$100,000		National	Seconded staff, equipment & supportive supervision
<i>subtotal</i>		<i>\$1,750,000</i>			
Staffing and Administration					
CDC /USAID Management	USAID	\$1,850,000			
TDY	CDC	\$100,000			
<i>subtotal</i>		<i>\$1,950,000</i>			
GRAND TOTAL		<i>\$22,000,000</i>			

* \$500,000 from FY07 funding will be used to support this spraying

**Uganda – Year 3 Targets
Assumptions and Estimated Year 3 Coverage Levels**

EXPECTED RESULTS – YEAR THREE

Prevention:

- Approximately 1.5 million LLINs/ITNs will be distributed by partners (of which PMI will contribute 750,000) to pregnant women and children under five years old to increase national household ownership of ITNs from 15.9% to 40%.
- Continued support for a mass media and community-based IEC/BCC campaign will raise the percent of children under five and pregnant women who have slept under a net from 10.1% to 40%.
- At least 85% of houses in geographic areas targeted for IRS in 13 districts during Year 3 will be sprayed.

Case Management:

- PMI will continue to support the use of ACTs in health facilities with improved diagnostics, supportive supervision, and capacity development of NMS and NDA for better forecasting, quantification, distribution, and quality assurance. These efforts, plus other donor contributions of ACTs will increase the number of health facilities using ACTs to 60%.
- PMI will assist the implementation of Uganda’s home-based management of fever program using ACTs increasing the number of children under five who receive antimalarial treatment within 24 hours of onset of fever from 29% (1.1% for Coartem) to 40%.
- Focused antenatal care (FANC) will be strengthened to increase the proportion of women receiving two or more doses of IPTp from 16.6% to 40%.

Other:

- A nationwide IEC/BCC campaign will be conducted to support year round usage of LLINs/ITNs, attendance at ANC clinics to receive at least 2 treatment doses of SP for IPTp, and increased prompt treatment-seeking behavior through mass media and community outreach efforts.

Assumptions:

Population of country (estimated):	29,378,000
Pregnant women:	4% of total population = 1,469,000 pregnant women
Infants (children <1):	3% of population = 881,340 infants
Children <5 years:	20% of population = 6,022,000 children under five
Number of Households:	5,875,600

Average number of malaria-like illnesses per year and costs per treatment of AL-LUM

<u>Illnesses</u>	<u>Total Cost</u>
Children under five (\$.45/ treatment)	3 episodes per year \$8,130,297
Older children (\$1.00/ treatment)	2 episodes per year \$11,751,200
Adults (\$1.35/treatment)	1 episode per year \$23,796,180

Number of nets estimated in country: 4,920,600.00

Cost to reach 85% coverage of all children under five and pregnant women under five (assuming \$7.00 per net): \$17,995,894

Cost of spraying a household with an average of 5-6 inhabitants

Average size of house 200 M ² (new district)	\$15.00
Average size of house 200 M ² (previously sprayed district)	\$10.00
Average size of house 80 M ² (IDP district)	\$6.00

Intervention area	Annual Needs to achieve 100% coverage	Needs for 100% coverage nationwide over five years	Needs for 85% coverage nationwide over five years	Needs to achieve PMI year 3 target	Year 3 contribution
IPTp (number of SP doses needed)	No of pregnant women x 2 treatments per women	No of pregnant women x 2 treatments per women x 5 years	No of pregnant women x 2 treatments per women x 5 years *85 %	Target:60% of pregnant women receive 2 doses of IPT=	
	2,938,000	14,690,000	12,486,500	881,400	No SP needed; provide support for FANC
LLINS (see ITN section)	4,800,000.00	17,800,000	15,130,000	Target: 60% of pregnant women and children under five own a net	1.5 million LLINs will be distributed from all donors, of which 750,000 are from PMI.

ACTs in Children under five	No of children u5 x 3 episodes per year	No of children u5 x 3 episodes per year x 5 years	No of children u5 x 3 episodes per year x 5 years x 85%	Target: 60 percent of children are treated within 24 hours	
	18,067,326	90,336,630	76,786,136	8,130,297	The Global Fund is procuring sufficient ACTs for country
ACTs in children between 5-12 yrs	No of older children x 2 episodes per year	No of older children x 2 episodes per year x 5 years	No of older children x 2 episodes per year x 5 years x 85%	Target: 60% of children receive ACTs	
	11,751,200	58,756,000	49,942,600		Global fund is procuring sufficient ACTs for country
IRS for 15 districts	Number of houses targeted to be spraying in 15 districts	No of households to be sprayed X 5 years	No of households to be sprayed X 5 years 85%	Target for year three	PMI is providing total support
	1,000,000	5,000,000	4,250,000	795,000	

Table 4**President's Malaria Initiative – Uganda
Year 3 (FY08) Budget Breakdown by Intervention (\$000)**

Program Area	Commodities \$ (%)	Other \$ (%)	Total \$
Indoor Residual Spraying	\$4,275 (50%)	\$4,245 (50%)	\$8,520
Insecticide-treated Nets	\$3,785 (66%)	\$1,965 (34%)	\$5,750
Intermittent Preventive Treatment	\$100 (12%)	\$750 (88%)	\$850
Case Management	\$650 (21%)	\$2,380 (79%)	\$3,030
Epidemic Surveillance and Response	\$0	\$150(100%)	\$150
Monitoring and Evaluation	\$0	\$1,750 (100%)	\$1,750
Staffing and Administration	\$0	\$1,950 (100%)	\$1,950
Total	\$8,810 (40%)	\$13,190 (60%)	\$22,000

Table 5
Year 2 (FY 2008) Budget by Partner (\$(\$000))

Partner Organization	Geographic Area	Activity	Budget
IRS IQC (RTI)	Kitgum, Gulu, Padar, Amoro, Lira, Dokolo, Amolatar, Kabermaido, Amuria, Soroti, Kabale, Kanungu, and Rukungiri	Conduct IRS in 13 epidemic and endemic districts in Uganda	\$8,450
IVM IQC (RTI)	All sprayed districts	Continue support for IRS entomological surveillance and conduct susceptibility, bio assays and vector bionomic studies	\$70
AFFORD (JHU/CCP)	Nationwide	Procure and distribute 750,000 LLINs through ANC clinics and mass campaigns; train private sector providers in ACT use	\$5,450
New RFA (TBD)	Southern Uganda (areas not covered by NUMAT)	Support HBMF scale-up; supportive supervision for health workers; training on the use of severe malaria drugs; sub grants to local Ugandan organizations; support for IPT; support to the NMCP	\$1,730
NUMAT (JSI)	Northern Uganda	Support for HBMF scale-up; supportive supervision for health workers; support for IPTp	\$570
World Health Organization (WHO)	Surveillance	Expand and strengthen the national epidemic surveillance system	\$150
Netmarkplus	Nationwide	Support for the private sector net market	\$450
CDC/USCF	Nationwide	Train laboratory technicians. Support quality assurance/quality control system for malaria diagnostics. Procure microscopes/laboratory consumables; Support UMSP for sentinel site surveillance	\$750
SPS	Nationwide	Continue to provide support to strengthen pharmaceutical management systems	\$380
DELIVER TO 3	Nationwide	Procure drugs for severe malaria	\$650
United States Pharmacopeia (USP) DQI	Nationwide	Support drug quality control, and improve pharmacovigilance	\$300
Measure/DHS	Nationwide	Conduct a Malaria Indicator Survey	\$1,000
MEMS	Nationwide	Support the data collection and reporting for PMI	\$100
CDC	Nationwide	Staffing, TDYs and entomological monitoring	\$650
USAID	Nationwide	Staffing and Administration costs	\$1,300
Total			\$22,000