



# THE PRESIDENT'S MALARIA INITIATIVE

Seventh Annual Report to Congress April 2013



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# THE PRESIDENT'S MALARIA INITIATIVE

**Seventh Annual Report to Congress | April 2013**



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## Executive Summary

*"The United States will join with our allies to eradicate such extreme poverty in the next two decades ... by saving the world's children from preventable deaths ..."*

— President Barack Obama, State of the Union, February 12, 2013

The past decade has seen unprecedented progress in malaria control efforts in most sub-Saharan African countries. As countries have scaled up insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS), improved diagnostic tests and highly effective antimalarial drugs, mortality in children under five years of age has fallen dramatically. It is now clear that the cumulative efforts and funding by the President's Malaria Initiative (PMI), national governments, The Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund), the World Bank and many other donors are working: The risk of malaria is declining. According to the World Health Organization's (WHO's)

*2012 World Malaria Report*, the estimated annual number of global malaria deaths has fallen by more than one-third – from about 985,000 in 2000 to about 660,000 in 2010.

The U.S. Government's financial and technical contributions have played a major role in this remarkable progress. However, gaps in resources remain. If progress is to be sustained, committed efforts must continue. The theme for World Malaria Day 2013, and for the years leading up to the 2015 target date for the Millennium Development Goals, is "Invest in the future. Defeat malaria." To this end, PMI and partners continue to build on investments in malaria control and

prevention and respond to challenges, such as antimalarial drug resistance, insecticide resistance and weak malaria case surveillance.

### SAVING LIVES

Since PMI's launch in 2005, impressive gains in malaria control have been documented in PMI focus countries. To date, 12 of the original 15 PMI focus countries have data from paired nationwide surveys that were conducted since PMI activities began. All 12 countries have documented a decline in mortality rates among children under five years of age. These declines have ranged from 16 percent in **Malawi** to 50 percent in **Rwanda** (see Figure 1).

Although multiple factors are probably influencing the decline in under-five mortality rates, there is growing evidence that the scale-up of malaria prevention and treatment measures across sub-Saharan Africa is playing a major role in these unprecedented reductions in childhood mortality. PMI is carefully measuring the contribution of malaria control efforts to declines in mortality in PMI focus countries. Three impact evaluations have been completed to date in mainland Tanzania, Malawi and Angola. Six additional evaluations were started in fiscal year (FY) 2012. By 2015, evaluations will have been carried out in all 15 original PMI focus countries.

- The findings of the mainland **Tanzania** impact evaluation – which documented a 45 percent reduction in all-cause mortality among children under five between 2000 and 2010, due in large part to the scale-up of malaria control interventions, have been further supported by the findings of the 2012 Tanzania Malaria Indicator Survey. A 47 percent reduction in malaria prevalence was detected, from 18 percent in 2008 to 10 percent in 2012.
- In **Malawi**, malaria control interventions have achieved sufficient coverage to reduce malaria morbidity and mortality.

Nationwide household surveys spanning the decade 2000–2010 show that all-cause mortality among children under five years of age fell by 41 percent. Not all reductions in child mortality are due to malaria interventions. However, mortality declines were greater in areas with higher risk of malaria. This strongly suggests that a major part of the decline was due to malaria control measures instituted by the Government of Malawi.

- In **Angola**, under-five mortality also declined, but the coverage of malaria control interventions was too low to have caused this decline. Angola has, however, made considerable strides in increasing population coverage of malaria prevention and treatment measures since it emerged from a 25-year-long civil war in 2002 that left much of the country's health infrastructure severely damaged.

### SCALING UP MALARIA CONTROL INTERVENTIONS

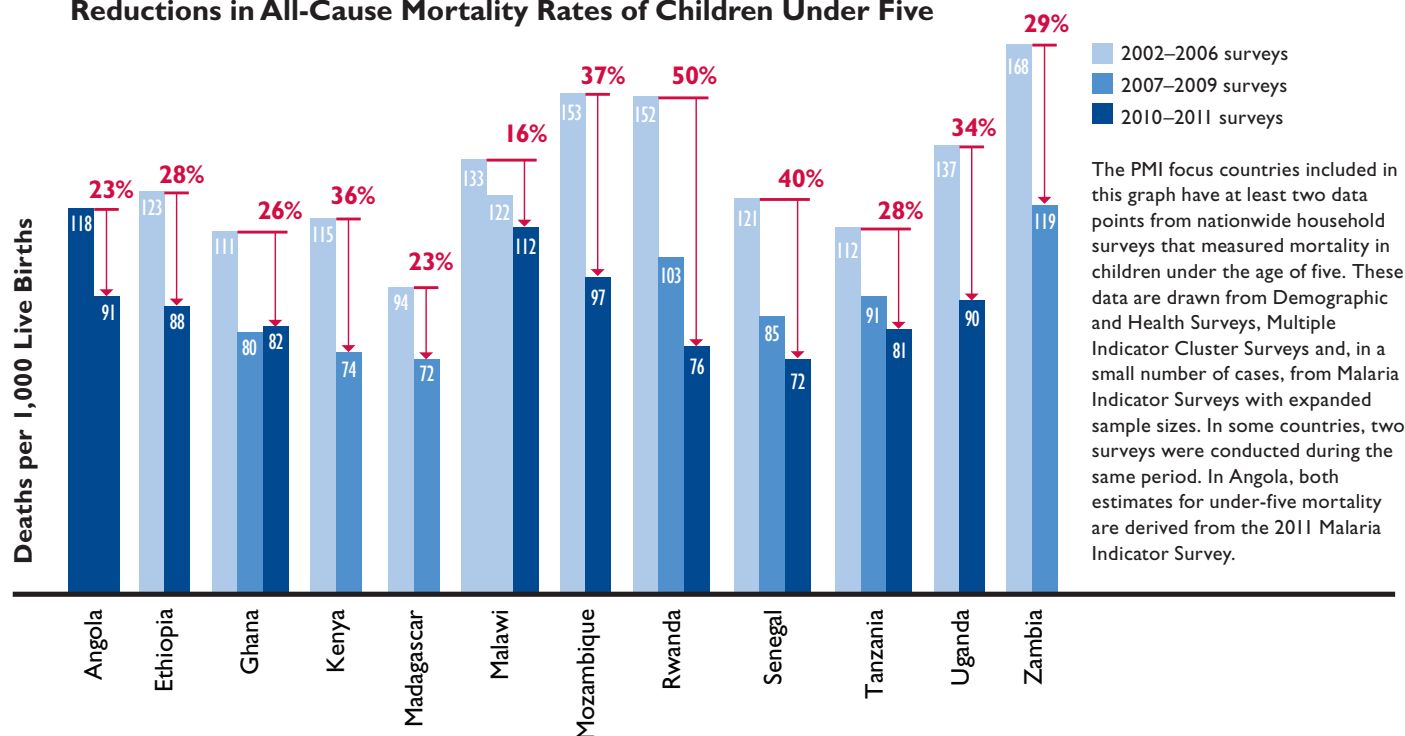
Since PMI's inception, the efforts of national governments, together with PMI, The Global Fund, the World Bank, the U.K. Department for International Development (DFID) and many other donors, have resulted in a massive scale-up of malaria prevention and treatment measures across PMI focus countries

(see PMI Contributions at a Glance). In FY 2012 alone, PMI:

- Protected over 30 million residents by spraying more than 7 million houses with insecticides
- Procured more than 21 million long-lasting ITNs
- Procured more than 4 million sulfadoxine-pyrimethamine (SP) treatments for intermittent preventive treatment for pregnant women (IPTp)
- Trained more than 27,000 health workers in IPTp
- Procured more than 72 million treatments of artemisinin-based combination therapy (ACT) and over 28 million rapid diagnostic tests (RDTs)
- Trained more than 39,000 health workers in treatment of malaria with ACTs and more than 28,000 health workers in laboratory diagnosis of malaria

In addition, PMI helped distribute more than 10 million long-lasting ITNs that had been procured by other partners, highlighting the well-established and productive col-

**FIGURE I**  
**Reductions in All-Cause Mortality Rates of Children Under Five**





PMI CONTRIBUTIONS AT A GLANCE								
Indicator <sup>1</sup>	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)	Year 6 (FY 2011) <sup>2</sup>	Year 7 (FY 2012)	Cumulative
People protected by IRS (houses sprayed)	2,097,056 (414,456)	18,827,709 (4,353,747)	25,157,408 (6,101,271)	26,965,164 (6,656,524)	27,199,063 (6,693,218)	28,344,173 (7,004,903)	30,297,000 (7,127,040)	N/A <sup>3</sup>
ITNs procured	1,047,393	5,210,432	6,481,827	15,160,302	18,592,039	23,174,496	21,407,129	82,743,618 (62,133,406 distributed)
ITNs procured by other donors and distributed with PMI support	—	369,900	1,287,624	2,966,011	11,728,674	19,307,756	10,927,791	42,834,823
SP treatments procured	—	583,333	1,784,999	1,657,998	6,264,752	4,701,162	4,493,217	18,287,462 (13,455,244 distributed) <sup>4</sup>
Health workers trained in IPTp <sup>5</sup>	1,994	3,153	12,557	14,015	14,146	28,872	27,348	N/A <sup>6</sup>
RDTs procured	1,004,875	2,082,600	2,429,000	6,254,000	13,340,910	14,572,510	28,957,905	62,539,290 (38,019,883 distributed) <sup>4</sup>
Health workers trained in malaria diagnosis (RDTs and/or microscopy)	—	1,370	1,663	2,856	17,335	34,740	28,210	N/A <sup>6</sup>
ACT treatments procured	1,229,550	8,851,820	22,354,139	21,833,155	41,048,295	38,588,220	72,345,860	189,168,489 (136,330,819 distributed) <sup>4</sup>
ACT treatments procured by other donors and distributed with PMI support	—	8,709,140	112,330	8,855,401	3,536,554	6,993,809	950,239	28,092,273
Health workers trained in treatment with ACTs	8,344	20,864	35,397	41,273	36,458	42,183	39,797	N/A <sup>6</sup>

<sup>1</sup> The data reported in this table are up-to-date as of September 30, 2012, and include all PMI focus countries and the Greater Mekong Subregion. In addition, during FY 2012, the U.S. Government provided support for malaria prevention and control activities in other countries. For data by country, see Appendix 2.

<sup>2</sup> For Year 6, PMI transitioned from a calendar year to a fiscal year reporting schedule.

<sup>3</sup> A cumulative count of people protected by IRS is not provided because most areas are sprayed on more than one occasion.

<sup>4</sup> Amount was distributed to health facilities.

<sup>5</sup> These figures include health workers who were trained in focused antenatal care in Rwanda, where IPTp is not national policy.

<sup>6</sup> A cumulative count of individual health workers trained is not provided because some health workers were trained on more than one occasion.

laboration between PMI and other donors. In all PMI focus countries in Africa and the Greater Mekong Subregion, PMI supported health systems strengthening and capacity building, with a particular focus on pharmaceutical management, laboratory diagnosis, vector control and monitoring and evaluation (M&E).

These contributions, together with those of other partners, have led to dramatic improvements in the coverage of malaria control interventions in PMI focus countries. In countries where at least two comparable nationwide household surveys have been conducted since PMI activities were launched:

- Household ownership of at least one ITN increased from an average\* of 36 to 60 percent (see Figure 2).
- Usage of an ITN the night before the survey increased from an average\* of 22 to 43 percent for children under five years.

- Usage of an ITN the night before the survey more than doubled from an average\* of 19 to 44 percent for pregnant women.
- The proportion of pregnant women who received two or more doses of IPTp for the prevention of malaria increased from an average\* of 15 to 29 percent.

In addition to these improvements in ITN and IPTp coverage, PMI has continued to support IRS activities on an unprecedented scale; in FY 2012, more than 90 percent of houses targeted were successfully sprayed. This protected more than 30 million people in 16 countries. As a result of PMI's support for ITNs, IPTp and IRS, a large proportion of at-risk populations in PMI focus countries is now benefiting from highly effective malaria prevention measures. Furthermore, PMI has prioritized scaling up effective case management in all 19 focus countries in sub-Saharan Africa. Due to the weak health systems in many African countries, progress has been slower than with other malaria prevention and control interventions. Nonetheless,

RDTs and ACTs are now widely available in health facilities and at the community level throughout PMI focus countries.

## LEVERAGING PARTNERSHIPS FOR MALARIA CONTROL

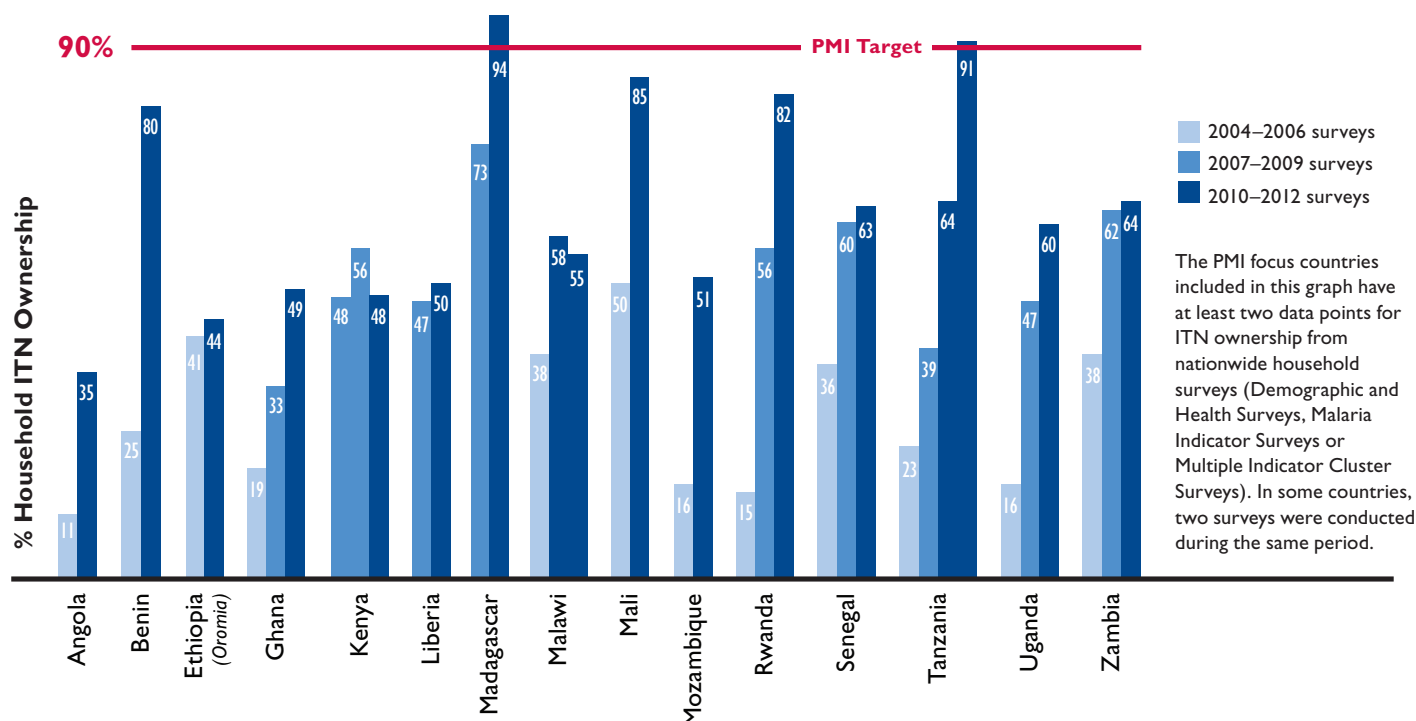
PMI coordinates its activities with a wide range of partner organizations, including national malaria control programs (NMCPs); multilateral and bilateral institutions, such as WHO, the United Nations Children's Fund (UNICEF), the World Bank, The Global Fund and DFID; private foundations, such as the Bill & Melinda Gates Foundation, William J. Clinton Foundation and UN Foundation; and numerous nonprofit and faith-based organizations. For example:

- PMI supported the Roll Back Malaria Harmonization Working Group to help six African countries (**Benin, Burkina Faso, Chad, Ethiopia, Niger and Zambia**) prepare their malaria proposals for the Global Fund's Transitional Funding

\* defined as the median of the percent coverage



**FIGURE 2**  
**Increasing ITN Ownership**



Mechanism – all of which were successfully funded.

- PMI and DFID continued to collaborate closely in **Zambia**, where DFID has channeled funds through PMI for the procurement of commodities. In addition, PMI and DFID initiated discussions to develop partnerships in an additional four PMI focus countries (**Kenya, Malawi, Rwanda and Uganda**).

- Peace Corps volunteers in 14 PMI focus countries assisted with malaria control activities in FY 2012.
- To date, PMI has supported malaria activities through more than 200 nonprofit organizations, approximately one-third of which are faith based. These groups often have strong and highly effective bases of operations in underserved rural areas, where the burden of malaria is greatest.
- The ExxonMobil Foundation provided \$500,000 to support PMI objectives in **Angola**, bringing its total contributions to PMI to \$4.5 million since 2006. The foundation's support is for the scale-up of ACTs and IPTp through subgrants to nongovernmental and faith-based organizations in eight provinces where government health infrastructure is weak.
- In **Liberia**, PMI implemented IRS activities in partnership with the steel company Arcelor Mittal, which protected more than 5,900 residents in Grand Bassa and Nimba Counties. PMI provided training together with insecticides and spray tanks, while Arcelor Mittal covered the costs of spray personnel and operational expenses for the campaign.

## PROMOTING RESEARCH AND INNOVATION

Research to support malaria control efforts and reduce the burden of malaria has been a high priority of the U.S. Government for many years. The U.S. Government malaria research effort involves the U.S. Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) of the Department of Health and Human Services, the Naval Medical Research Center (NMRC) and the Walter Reed Army Institute of Research (WRAIR) of the U.S. Department of Defense (DOD) and the U.S. Agency for International Development (USAID).

While USAID does not directly conduct malaria research, it invested approximately \$11 million in FY 2012 to support the development of new antimalarial drugs and malaria vaccines. USAID support of drug development has led to the approval and use of new treatments for malaria.

PMI uses operational research to help guide its program investments, make policy recommendations to NMCPs, and target interventions to increase their cost-effectiveness. This research focuses on program-relevant questions, complementing the more upstream vaccine and drug development work



A health worker in Uganda holds up ACT treatments.

Credit: Bonnie Gillespie,  
Voices for a Malaria-Free Future

## ►► PMI External Evaluation: Acting Upon Recommendations

In 2011, PMI commissioned an external evaluation of the first five years (FYs 2006–2010) of PMI's activities and performance. The evaluation report affirmed that PMI's planning, implementation, partnerships and funding have been key to global efforts to combat malaria. It stated that "[PMI] quickly re-oriented a problematic U.S. Government malaria program, took it to a large scale quickly, efficiently and effectively complemented the larger global malaria program, and contributed to the apparent reduction in child mortality." In addition, the evaluation team made policy and technical recommendations to guide programmatic improvements in the coming years. During FY 2012, PMI took specific steps to address the evaluation's recommendations, including:

- Conducting country-specific reviews of IRS investments with the involvement of external vector control experts to ensure PMI's resources maximize program effectiveness and achieve high results
- Establishing an interagency malaria in pregnancy working group to address operational and behavioral constraints to improving IPTp rates and other malaria in pregnancy interventions
- Hiring a PMI Operational Research Coordinator to oversee and provide leadership for the PMI operational research agenda, and designating a CDC Operational Research Lead to help coordinate the PMI operational research implemented by CDC

More details about PMI's response to the evaluation's recommendations regarding IRS, malaria in pregnancy and operations research are presented in this annual report. The full report and PMI's management response are available on the PMI website at [http://pmi.gov/news/pressreleases/pmi\\_audit.html](http://pmi.gov/news/pressreleases/pmi_audit.html).

funded by NIH, DOD and USAID. PMI supports operational research studies on topics such as mosquito net durability; the effectiveness of combining interventions such as IRS and ITNs; and looking forward, the effect of insecticide resistance on ITN effectiveness, better use of diagnostics for accurate malaria treatment and the effectiveness of preventive treatment during pregnancy in an environment of increasing drug resistance.

Examples of PMI-supported operational research include:

- An assessment of the physical and insecticidal longevity of ITNs in eight PMI focus countries (**Angola, Benin, Kenya, Malawi, Mozambique, Rwanda, Senegal and Zambia**) indicated that many nets do not last the expected three years due to loss of physical integrity and will need to be replaced more frequently than anticipated to maintain high coverage.
- A study in **Zanzibar**, where the prevalence of malaria parasites has fallen to very low levels, showed that only 3 out of every 1,000 pregnant women who did not receive preventive treatment had evidence of placental malaria. This information will help the Ministry of Health decide whether it can discontinue its IPTp program.
- An evaluation of the effectiveness of door-to-door visits to promote ITN hang-up and usage in **Uganda** found no added benefit from the follow-up visits,

suggesting that such visits may only be cost-effective in certain settings, such as communities without an established mosquito net culture.

### STRENGTHENING HEALTH SYSTEMS AND BUILDING NATIONAL CAPACITY

PMI supports the strengthening of the overall capacity of health systems, both indirectly and directly. Reducing the burden of malaria in highly-endemic countries, where malaria typically accounts for 30 to 40 percent of outpatient visits and hospital admissions, enables overstretched health workers to concentrate on managing other childhood illnesses. In addition to providing support to malaria-specific activities, such as entomological monitoring and IRS, PMI helps build national capacity in a variety of cross-cutting areas that benefit both malaria and other health programs. This support includes strengthening supply chain management, laboratory diagnosis and M&E systems. In FY 2012, PMI efforts to strengthen health systems included:

- Building a cadre of ministry of health staff with technical skills in the collection, analysis and interpretation of data for decision-making and epidemiologic investigations through support to the CDC's Field Epidemiology and Laboratory Training Program in **Angola, Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Rwanda, Tanzania, Uganda, Zimbabwe and the Greater Mekong Subregion (Burma)**

- Supporting supervision and training of health workers at all levels of the health system, including in the community
- Providing funds for strengthening supply chain management systems to ensure an uninterrupted supply of commodities (e.g., diagnostic tests and drugs) and to protect their quality and safety
- Collaborating with NMCPs and other partners to strengthen laboratory diagnosis of malaria and improve the overall quality of health care
- Supporting drug and insecticide-resistance monitoring systems

PMI also fosters country ownership by carrying out annual planning visits with NMCPs and their partners to collaboratively develop annual PMI Malaria Operational Plans that directly support national malaria control strategies and priorities.

### CHALLENGES

In spite of the progress that has been documented in malaria control in Africa over the past 5 to 10 years, technical challenges remain, such as sustaining high ITN coverage, improving correct diagnosis and treatment of malaria and achieving IPTp coverage targets. The gains made thus far are fragile, and the global malaria partnership must remain vigilant to potential threats, such as:

- **Antimalarial Drug and Insecticide Resistance:** Resistance to artemisinin drugs has not yet

been documented in sub-Saharan Africa, but if this were to emerge and spread, it would represent a major setback for malaria control efforts on the continent. Resistance of the mosquito vector of malaria to pyrethroid insecticides, which are widely used for IRS and are the only recommended insecticides for ITNs, is already being reported from multiple sites in Africa. PMI, therefore, supports NMCPs to conduct regular monitoring and assessment of impact of both antimalarial drug and insecticide resistance. In addition, PMI is looking at other approaches, such as rotation of insecticides used for IRS, to delay the development of further resistance to pyrethroid insecticides and prolong their effectiveness on ITNs.

- **Malaria Case Surveillance:** With the rapid progress in increasing coverage of key interventions and reducing the malaria burden, malaria transmission patterns are changing. Yet tracking progress is a major challenge as malaria surveillance systems may detect only a small percentage of the true number of cases. Therefore, better monitoring of cases and improving data on diagnostics and case management is critical. Stronger malaria surveillance systems are also needed to enable a timely and effective malaria response in endemic regions and to identify and contain outbreaks. PMI invests in strengthening facility-based routine information systems across PMI focus countries.
- **Funding for Malaria Control:** Due to the worldwide economic recession, global support for malaria control has peaked and now seems to be leveling off. The \$30 million increase in PMI funding from the U.S. Congress in FY 2012 and the announcement of a substantial increase in malaria support from the British Government through DFID will help meet some of the needs, but malaria control is a long-term challenge, and sustained external donor support will be critical to NMCPs' continued progress.

PMI is working together with other partners to overcome these and other challenges in program implementation. To defeat malaria, we must continue to invest in the malaria prevention and treatment interventions that have enabled the important gains thus far.

**FIGURE 3**  
**PMI-Supported Malaria Programs**



In addition, USAID provides malaria funding to Burkina Faso, Burundi and South Sudan in Africa and the regional Amazon Malaria Initiative in Latin America (which includes Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru and Suriname).

### *The President's Malaria Initiative* .....

In his 2013 State of the Union Address, President Barack Obama stated that "... the United States will join with our allies to eradicate such extreme poverty in the next two decades ... by saving the world's children from preventable deaths ..." Malaria is a major cause of childhood mortality in Africa, thus its prevention and control – which are a key focus of U.S. Government foreign assistance – contribute to the President's vision. PMI's goal is to reduce the burden of malaria and thereby help promote development on the African continent.

PMI, which was launched in June 2005 by President George W. Bush, represented a major five-year (FYs 2006–2010), \$1.265 billion expansion of U.S. Government resources for malaria control. The Initiative is led by USAID and implemented together with the CDC. Based on the 2008 Lantos-Hyde United States Leadership against HIV/AIDS, Tuberculosis, and Malaria Act, which authorized a further increase of up to \$5 billion in PMI funding for five more years, PMI's goal was broadened to achieve Africa-wide impact by halving the burden of malaria in 70 percent of at-risk populations in sub-Saharan Africa, i.e., approximately 450 million people. PMI includes 19 focus countries in Africa and 1 regional program in the Greater Mekong Subregion of Southeast Asia (see Figure 3).

PMI's efforts to reduce malaria mortality directly contribute to the goal to end preventable child deaths as articulated by the 2012 Call to Action and reaffirmed by A Promise Renewed, a joint global effort led by UNICEF and endorsed by the U.S. Government. In many sub-Saharan African countries, up to a third of pediatric outpatient visits and admissions are due to malaria. Reducing the level of malaria transmission has the dual effect of preventing mild cases of malaria from progressing to severe disease and death while unburdening the health system, so health workers can focus their time and energy on other important childhood illnesses, such as pneumonia, diarrhea and malnutrition.





## CHAPTER

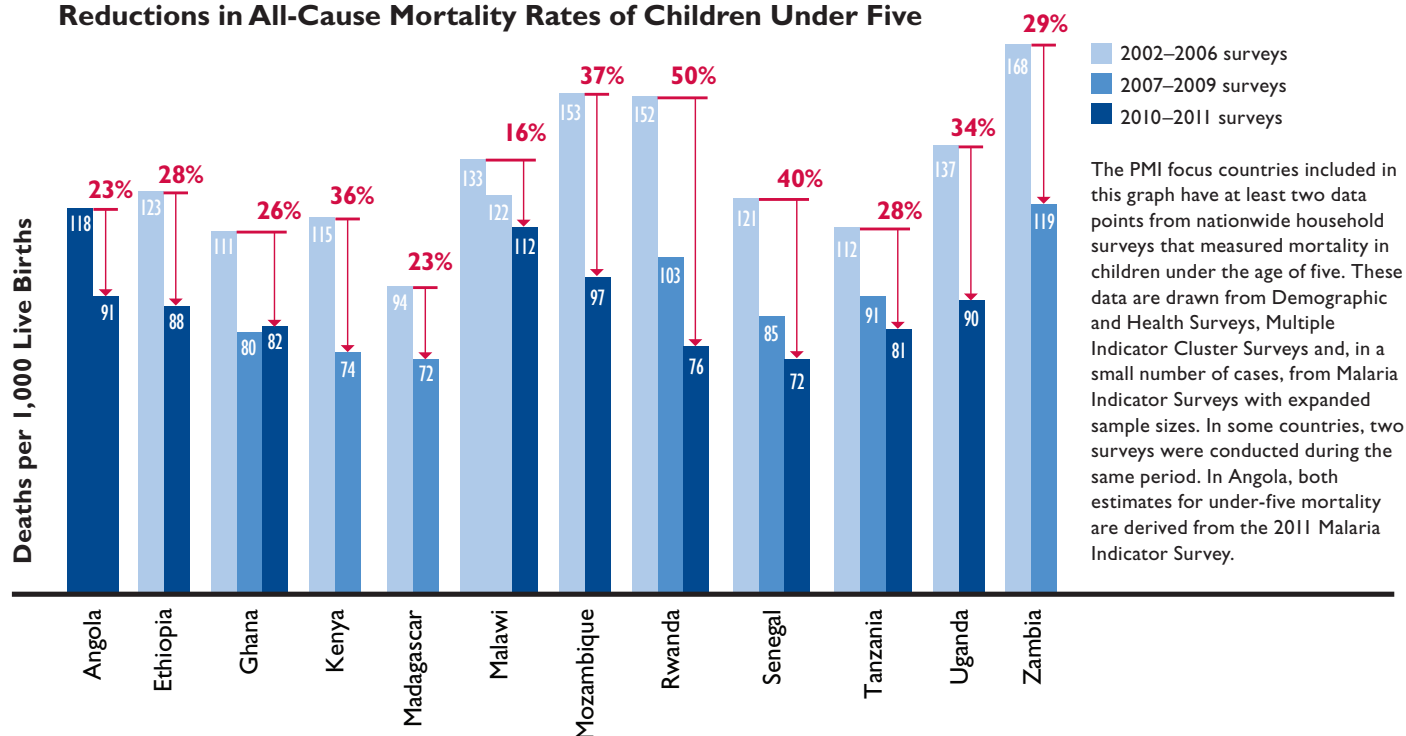
# Outcomes and Impact

The unprecedented scale-up of malaria prevention and treatment interventions over the past 10 years in sub-Saharan Africa is having a major impact on malaria illnesses and deaths. According to the World Health Organization's (WHO's) *2012 World Malaria Report*, the estimated annual number of global malaria deaths has fallen by more than one-third – from about 985,000 in 2000 to about 660,000 in 2010. The President's Malaria Initiative (PMI) is working with Roll Back Malaria (RBM) partners to assess the contribution of malaria control efforts to declines in under-five mortality in PMI focus countries. Three impact evaluations have been completed to date – in mainland **Tanzania, Malawi** and **Angola** – and six additional evaluations were started in fiscal year (FY) 2012. By 2015, evaluations will have been carried out in all 15 original PMI focus countries.

### HIGHLIGHTS

- Mortality rates among children under five years of age in 12 PMI focus countries with two or more nationwide household surveys that measured mortality have shown declines ranging from 16 percent (Malawi) to 50 percent (Rwanda).
- An RBM Partnership impact evaluation in Malawi, in which PMI played a leading role, provides evidence that malaria control interventions strongly contributed to the 41 percent reduction between 2000 and 2010 in mortality among children under five years of age.
- In Angola, the impact evaluation showed that under-five mortality declined, but the coverage of malaria control interventions was too low to have caused this decline. Angola has, however, made considerable strides in scaling up malaria control measures since it emerged from a 25-year-long civil war in 2002.
- The 2012 nationwide household survey in mainland Tanzania confirms the progress in malaria control reported in the PMI impact evaluation completed last year. Household ownership of at least one ITN increased from 39 percent in 2008 to 91 percent, and malaria prevalence fell even further from 18 percent in 2008 to just 10 percent.

**FIGURE I**  
**Reductions in All-Cause Mortality Rates of Children Under Five**



### IMPACT IN PMI FOCUS COUNTRIES

Since accurate records on deaths are not kept in most countries in sub-Saharan Africa, the best way to monitor changes in overall child mortality rates is through nationwide household surveys, which are usually carried out every three to five years. To date, a total of 12 of the original 15 PMI focus countries have data from paired nationwide surveys. The first of these surveys was conducted around the time PMI began

activities in those 12 countries; the second, a follow-up survey, was conducted between 2008 and 2012. In all 12 countries, there has been a reduction in mortality rates in children under five years of age. The decline in under-five mortality rates ranged from 16 percent (**Malawi**) to 50 percent (**Rwanda**) (see Figure 1). PMI is participating in in-depth impact evaluations to ascertain the contribution of malaria control efforts to these declines in mortality, and there are

strong indications that a substantial portion of these declines is due to malaria control.

### MEASURING PROGRESS: PMI IMPACT EVALUATIONS

During FY 2011 and FY 2012, PMI worked with national malaria control programs (NMCPs) and international and in-country partners to complete impact evaluations of malaria control efforts in mainland **Tanzania**, **Malawi** and **Angola**. Similar evalua-

### How PMI Evaluates Health Impact of Malaria Control Efforts

Due to the lack of malaria-specific mortality data in PMI focus countries and because malaria contributes to child mortality both directly and indirectly, PMI's impact evaluation uses all-cause child mortality to measure the impact of malaria interventions. This approach is recommended by the RBM Monitoring and Evaluation Reference Group, a working group of internationally recognized scientists and public health workers, and consists of four steps:

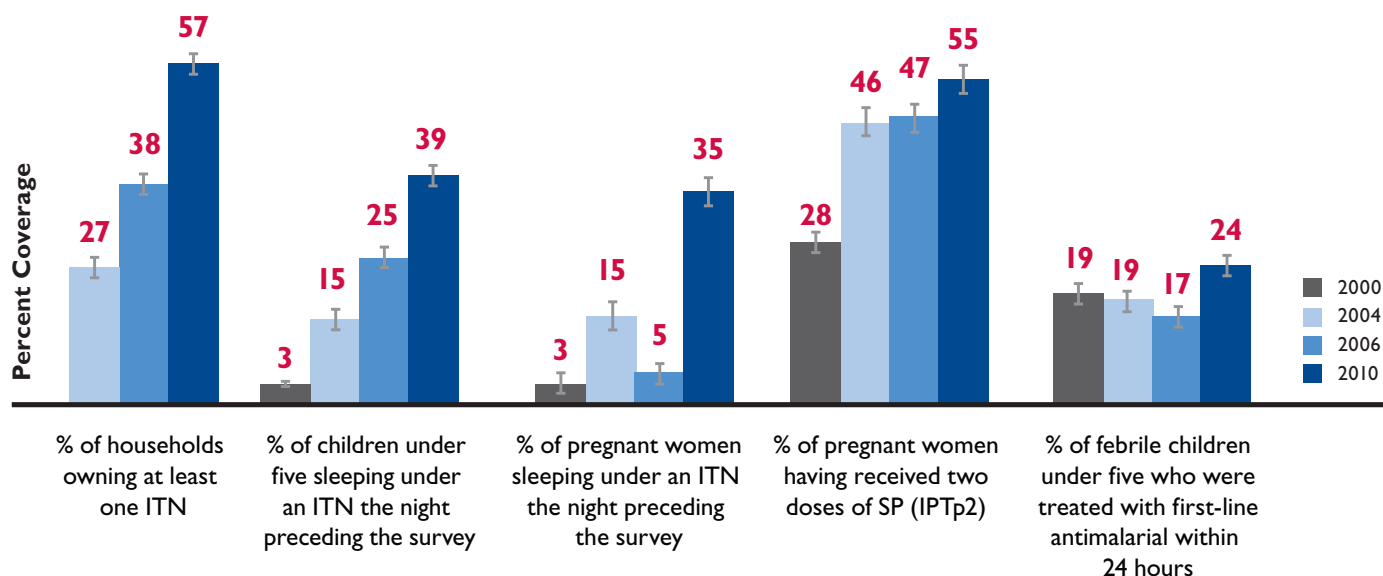
1. Determine if all-cause under-five mortality has declined.
2. Assess whether malaria control interventions have increased to a level at which impact can be expected.
3. Determine if malaria morbidity (i.e., malaria parasitemia or severe anemia) has fallen.
4. Examine if alternate explanations (e.g., improvements in immunizations, declines in rainfall) for the mortality reduction exist.

If the first three conditions are met and no other explanation for the reduction in all-cause under-five mortality can be identified, or the fall in mortality can only be partially explained by other factors, then it is reasonable to conclude that malaria control interventions resulted in the reduction in all-cause child mortality.

PMI ensures that evaluations are conducted in close coordination with national and international partners. In addition to working with NMCPs, PMI coordinates with members of the RBM Partnership, including WHO; the United Nations Children's Fund; The Global Fund to Fight AIDS, Tuberculosis and Malaria and nongovernmental organizations. Local research institutions and scientists are engaged wherever possible. PMI impact evaluations do not attempt to attribute impact to any specific intervention or organization. Rather, the emphasis is on the overall impact that has been achieved by the NMCP and its partners over the preceding decade.

FIGURE 2

## Coverage of Malaria Control Interventions in Malawi (2000–2010)



tions were initiated in FY 2012 in **Ethiopia, Mozambique, Rwanda, Senegal, Uganda** and **Zanzibar**, and results will be available in FY 2013. The approach used builds on the methods of the original impact evaluation in Tanzania.

## MALAWI IMPACT EVALUATION

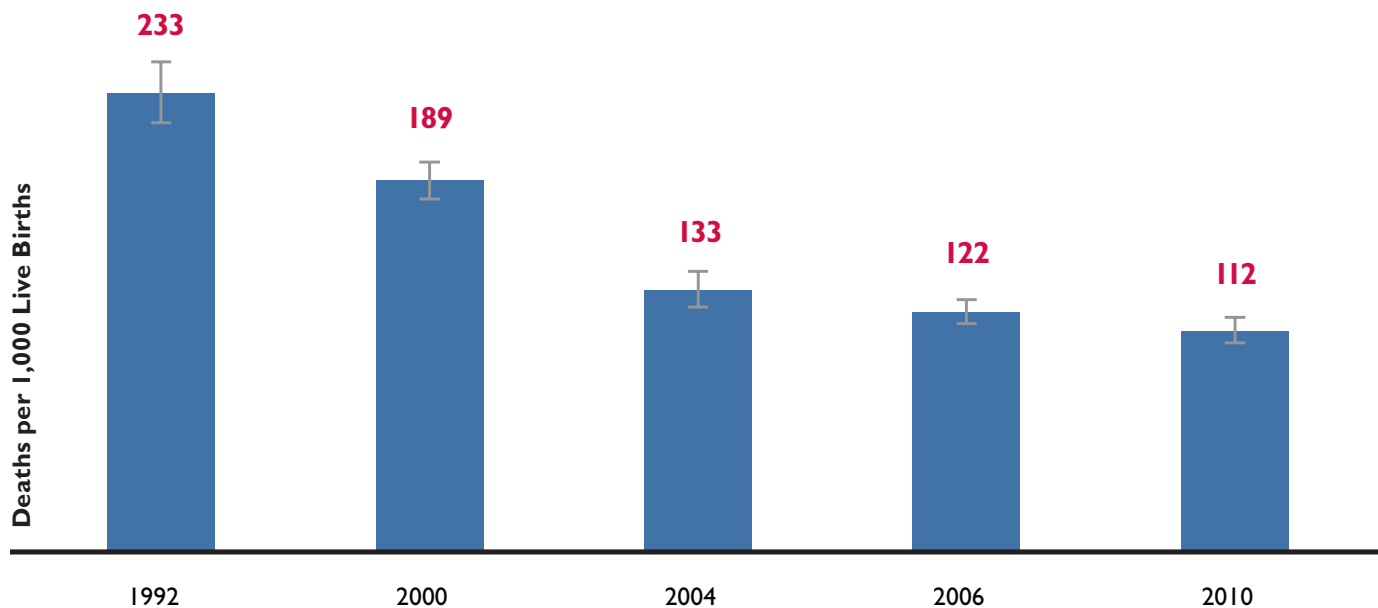
Malaria is highly endemic in Malawi: 98 percent of the population is at risk of infection. Until recently, one-third of all outpatient visits and 40 percent of all hospital admissions of children under five

were associated with malaria. The burden of malaria has strained the limited resources of the health care system. Fortunately, under the leadership of the NMCP and with support from donors, such as PMI, The Global Fund and others, a robust and far-reaching malaria control program has been implemented since 2000. Malawi has now reached an important milestone in its fight against the disease: Malaria control interventions have achieved sufficient coverage to reduce malaria morbidity and mortality.

Malawi's insecticide-treated mosquito net (ITN) distribution strategy has evolved from a small-scale social marketing program to one that ensures provision of free ITNs through antenatal care and Expanded Program for Immunization clinics nationwide. As a result, household ownership of ITNs doubled from 27 percent in 2004 to 57 percent in 2010 (see Figure 2). Malawi was the first country in sub-Saharan Africa to implement intermittent preventive treatment for pregnant women (IPTp), and it has now emerged as one of the top countries for

FIGURE 3

## All-Cause Under-Five Mortality in Malawi (1992–2010)





coverage with two doses of sulfadoxine-pyrimethamine (SP). During 2000–2010, IPTp2 coverage increased from 29 to 55 percent.

Two key indicators of the impact of malaria control – malaria parasitemia and severe anemia in children under five years of age – have shown declines. Recent survey results show that malaria parasite prevalence declined in children 6–59 months old, falling from 43 percent in 2010 to 28 percent in 2012. In the age group most at risk for malaria symptoms, children 6–23 months old, the prevalence of severe anemia has declined by more than one-third – from 20 to 13 percent.

Successive nationwide household surveys spanning the decade of 2000–2010 show that all-cause mortality of children under five years of age dropped by 41 percent in Malawi (see Figure 3). Although not all decreases in all-cause under-five mortality are due to malaria interventions, mortality declines were greater in areas with higher risk of malaria. This strongly suggests that a major part of the decline was due to the Government of Malawi’s malaria control measures. Furthermore, the Lives Saved Tool, a mathematical model, conservatively estimates that the scale-up of malaria control interventions (specifically ITNs and IPTp) between 2000 and 2010 prevented at least 21,600 deaths of children under five years of age.

### ANGOLA IMPACT EVALUATION

In 2002, Angola emerged from a devastating 25-year civil war that left much of the coun-

try’s infrastructure damaged or destroyed. Following the signing of the peace accords, there was a progressive expansion of the health care system and a broad increase in donor investment in health programs, including malaria. In spite of this, as late as 2005, artemisinin-based combination therapies, IPTp and ITNs were only beginning to be introduced.

Over the period of 2006–2011, malaria interventions were introduced and scaled up in Angola (see Figure 4). By 2011, household ownership of at least one ITN reached 35 percent, and about one-quarter of children under five and of pregnant women reported using an ITN. Coverage with two doses of SP (IPTp2) was 18 percent, and treatment of febrile children with a first-line antimalarial within 24 hours was 12 percent. Malaria parasite prevalence in the rainy season in children under five years of age showed a 36 percent relative decline from 21 to 14 percent over the period of 2006–2011. Severe anemia was only 4 percent in 2006 and did not change substantially by 2011. Although coverage of malaria prevention and treatment measures improved, coverage did not reach levels that would be expected to produce a substantial impact at the national level.

All-cause under-five mortality declined by 21 percent, from 117 deaths per 1,000 live births in the period prior to malaria control intervention scale-up (2003–2005) to 92 deaths per 1,000 live births (2009–2011). At a subnational level, the greatest reductions in all-cause under-five mortality were

observed in the region with higher risk of malaria (see Figure 5). In 2006, household ownership of at least one ITN in the higher malaria risk region was 51 percent compared to the national ITN household ownership level of 27 percent.

### MEASURING IMPACT: AN UPDATE ON TANZANIA

The findings of the mainland Tanzania impact evaluation – which documented a 45 percent reduction in all-cause mortality among children under five between 2000 and 2010, due in part to the scale-up of malaria control interventions – have been further supported by the findings of the 2012 Tanzania Malaria Indicator Survey. A 47 percent reduction in malaria prevalence was detected (using rapid diagnostic tests [RDTs]), from 18 percent in 2008 to 10 percent in 2012. In the Kagera Region, an area with high malaria prevalence and intensive malaria control efforts, including the scale-up of indoor residual spraying, malaria prevalence fell from 41 to just 8 percent over the period of 2007–2012. In 2012, the presence of at least one ITN in households at a national level was 91 percent, compared to less than 40 percent in 2008. This dramatic progress in malaria control in mainland Tanzania illustrates how a well-managed and well-funded program can achieve measurable results in a relatively short timeframe. Still, progress is often fragile, and control efforts may need to be continued for years before most countries in sub-Saharan Africa will be able to plan for malaria elimination.

**FIGURE 4**  
**Coverage of Malaria Control Interventions in Angola (2006–2011)**

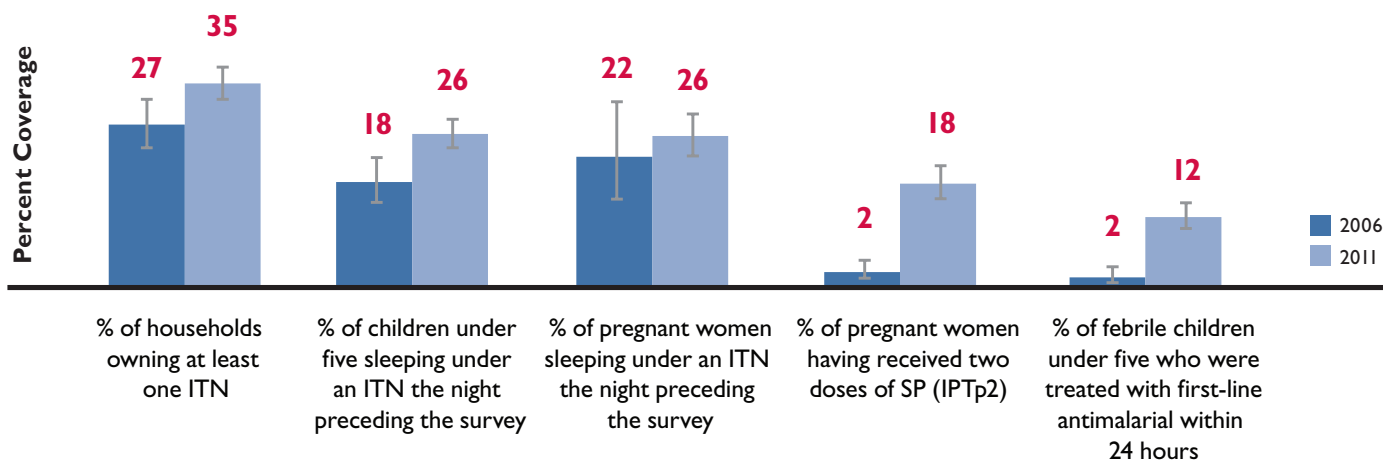
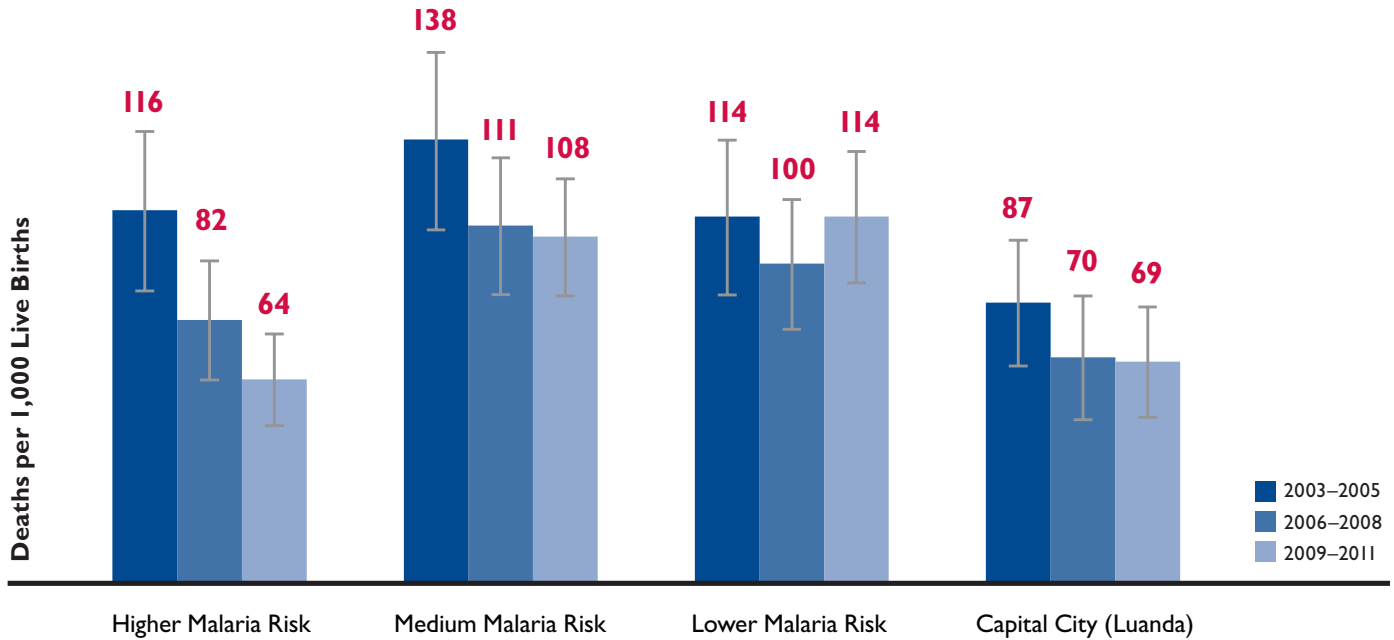


FIGURE 5

All-Cause Under-Five Mortality in Angola, by Malaria Epidemiologic Region (2003–2011)



LOOKING FORWARD

Evidence from in-depth evaluations of impact in Malawi and mainland Tanzania further confirms that scaling up malaria interventions has a substantial impact on reducing mortality among children under five years of age. Over the next few years, PMI will continue to support impact

evaluations in its focus countries; by 2015, evaluations will have been carried out in all 15 original PMI focus countries. Each evaluation advances our understanding of health program evaluation at the national level. To ensure that the impact evaluations are scientifically rigorous and their findings are broadly accepted, PMI teams at the U.S.

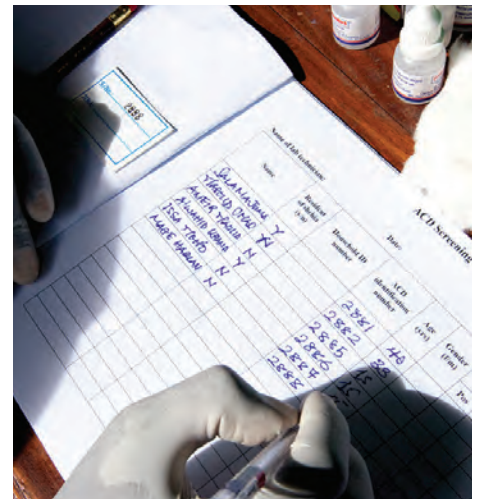
Agency for International Development and the U.S. Centers for Disease Control and Prevention have engaged partners, such as The Global Fund, RBM and a contingent of internationally recognized malaria scientists, in this effort.

Strengthening Routine Information Systems

In most sub-Saharan African countries, a major challenge in assessing the impact of malaria control interventions on malaria burden is the lack of quality routine malaria data (e.g., number of confirmed malaria cases, number of patients with malaria admitted to hospitals). For this reason, PMI is continuing to invest in improving the abilities of NMCPs to collect health facility data on malaria cases and deaths. In countries where there are strengthened facility data collection systems, such as Rwanda, Zambia and Zanzibar, PMI continues to invest in the capacity building of NMCP personnel, data quality assessments and use and dissemination of the data. Since 2006, PMI has invested over \$18 million to support the strengthening of country monitoring and evaluation, routine systems and capacity. Some of the activities PMI supports are:

1. Assessments of information systems
2. Quality improvement of data collection and analysis
3. Training workshops and technical assistance for NMCP personnel
4. Development of databases and networks for storing and processing routine data

In addition to such direct country investments, PMI is working to leverage resources from other donor partners and initiatives, including The Global Fund to Fight AIDS, Tuberculosis and Malaria, the World Bank, U. K. Department for International Development, the Bill & Melinda Gates Foundation and the U.S. President's Emergency Plan for AIDS Relief. As a member of the RBM Monitoring and Evaluation Reference Group, PMI is also leading coordination efforts between partners who are working on routine systems strengthening activities.



In Tanzania, a clinician notes RDT results and treatment given when test results are positive. Accurate record keeping is essential to good disease surveillance.

Credit: Maggie Hallahan Photography





Maggie Halldan Photography

## CHAPTER 2

# Malaria Prevention

The tools to prevent malaria transmission are both cost-effective and technically proven. These measures include insecticide-treated mosquito nets (ITNs), indoor residual spraying (IRS) with insecticides and intermittent preventive treatment for pregnant women (IPTp).

## Prevention – Insecticide-Treated Mosquito Nets

Long-lasting ITNs, which have a pyrethroid insecticide incorporated within or bound to the netting fibers during the manufacturing process, are the primary means for malaria prevention worldwide. High ownership and

use of ITNs reduces all-cause mortality in children under five by about 20 percent and malarial infections among children under five and pregnant women by up to 50 percent. These community-wide results

### PMI ITN SUMMARY

Indicator <sup>1</sup>	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)	Year 6 (FY 2011) <sup>2</sup>	Year 7 (FY 2012)	Cumulative <sup>3</sup>
ITNs procured	1,047,393	5,210,432	6,481,827	15,160,302	18,592,039	23,174,496	21,407,129	82,743,618 procured (62,133,406 distributed)
ITNs procured by other donors and distributed with PMI support	—	369,900	1,287,624	2,966,011	11,728,674	19,307,756	10,927,791	42,834,823 distributed

<sup>1</sup> The data reported in this table are up-to-date as of September 30, 2012, and include all 19 PMI focus countries and the Greater Mekong Subregion. For data by country, see Appendix 2.

<sup>2</sup> For Year 6, PMI transitioned from a calendar year to a fiscal year reporting schedule.

<sup>3</sup> The cumulative count of ITNs procured and distributed takes into account the three-month overlap between Year 5 (covering the 2010 calendar year) and Year 6 (covering the 2011 fiscal year).



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