

This Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2015 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



PRESIDENT'S MALARIA INITIATIVE



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Benin

Malaria Operational Plan FY 2015

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ACRONYMS AND ABBREVIATIONS

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
ARM3	Accelerating the Reduction of Malaria Morbidity and Mortality project
AS/AQ	Artesunate-amodiaquine
BCC	Behavioral change communication
CAME	Central Medical Stores
CDC	Centers for Disease Control and Prevention
CHW	Community health worker
CREC	<i>Centre de Recherche Entomologique de Cotonou</i>
DHS	Demographic and Health Survey
DNSP	National Directorate of Public Health
DSME	National Directorate for Maternal and Child Health
EPI	Expanded program on immunization
ETAT	Emergency triage assessment and treatment
EUV	End-use verification survey
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GHI	Global Health Initiative
GOB	Government of Benin
HMIS	Health management information system
HSS	Health systems strengthening
iCCM	Integrated community case management
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated net
LLIN	Long-lasting insecticide-treated net
LMIS	Logistics Management and Information System
M&E	Monitoring and evaluation
MIP	Malaria in pregnancy
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria operational plan
NMCP	National Malaria Control Program
NGO	Non-governmental organization
OP	Organophosphate
OR	Operational research
PCV	Peace Corps Volunteer
PMI	President's Malaria Initiative
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SIAPS	System for Improved Pharmaceutical Services
SP	Sulfadoxine-pyrimethamine
UNICEF	United Nations Children's Fund

USAID	United States Agency for International Development
USG	United States Government
USP PQM	United States Pharmacopeia Pharmaceutical Quality Management
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

EXECUTIVE SUMMARY

Malaria prevention and control are major foreign assistance objectives of the U.S. Government (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI) to reduce the burden of disease and promote healthy communities and families around the world. The President's Malaria Initiative (PMI) is a core component of the GHI, along with HIV/AIDS, tuberculosis, maternal and child health, family planning and reproductive health, nutrition, and neglected tropical diseases.

PMI was launched in June 2005 as a 5-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI was extended and the goal of PMI was adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. Programming of PMI activities follows the core principles of GHI: encouraging country ownership and investing in country-led plans and health systems; increasing impact and efficiency through strategic coordination and programmatic integration; strengthening and leveraging key partnerships, multilateral organizations, and private contributions; implementing a woman- and girl-centered approach; improving monitoring and evaluation; and promoting research and innovation.

Fiscal Year (FY) 2008 was the first year Benin received PMI funding. Malaria is endemic nationwide in Benin and is a major cause of morbidity and mortality. It is reported to account for 40% of outpatient consultations and 25% of all hospital admissions. With 37% of the population living below the poverty line and a per capita annual income of only \$750, malaria places an enormous economic strain on Benin's development. According to the World Bank, households in Benin spend approximately one quarter of their annual income on the prevention and treatment of malaria¹. The most recent Demographic and Health Survey (DHS), conducted from December 2011 to March 2012, showed significant improvements in several key indicators compared to the last DHS of 2006. In particular, household ownership of at least one insecticide-treated net (ITN) rose from 25% in 2006 to 80% in 2012, utilization of ITNs by children under five rose from 20% to 70%, and the proportion of pregnant women receiving at least two doses of intermittent preventive treatment for pregnant women (IPTp) with sulfadoxine-pyrimethamine (SP) increased from 3% to 23%.

The Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) awarded two malaria grants to Benin that are operational through June 2015. Catholic Relief Services (CRS) was approved for a transitional funding mechanism (TFM) for \$7,050,000 to implement malaria case management in 14 health zones. Africare was approved for a Phase 2 proposal for \$37.5 million to procure 85% of the long-lasting insecticide-treated nets (LLINs) for distribution during the nationwide campaign scheduled for 2014. The World Health Organization (WHO), the United Nations Children's Fund (UNICEF), and other national and international partners continue to support the scaling up of malaria prevention and control measures in Benin.

This FY 2015 Malaria Operational Plan (MOP) is based on progress and results to date, as well as input received from the National Malaria Control Program (NMCP) and its partners during a PMI planning visit in June 2014. The activities that PMI is proposing complement the contributions of other partners

¹World Bank July 2014

<http://web.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/IDA/0,,contentMDK:22311109~menuPK:4754051~pagePK:51236175~piPK:437394~theSitePK:73154,00.html>

and directly support the NMCP's strategic plan. To achieve PMI's goals and targets in Benin, the following major activities will be supported with FY 2015 funding at a proposed \$16.5 million level. Key accomplishments over the past year are summarized, as well.

Insecticide-treated nets (ITNs): The NMCP's Strategic Plan's (2011-2015) promotes the provision of LLINs through two main delivery channels: universal coverage campaigns every three years and routine service delivery. During FY 2014, PMI procured 740,000 LLINs, which will be delivered through antenatal care (ANC) and expanded program on immunization (EPI) services offered in public health facilities. The next universal coverage campaign begins in August 2014. In addition to providing 680,000 nets for the campaign, PMI will also contribute resources to assist with campaign implementation, including moving nets to storage at the distribution points. Using FY 2015 resources, PMI will procure and deliver 730,000 LLINs to health facilities for routine distribution to pregnant women and children under five years of age. PMI will also support activities that promote correct and consistent use of LLINs.

Indoor residual spraying (IRS): IRS is a key intervention for malaria prevention in combination with other vector control activities such as LLINs. Historically, PMI has been the only donor supporting IRS in Benin, focusing spraying in the past few years in the northern department of Atacora, where malaria transmission lasts for four to six months and one round of IRS is therefore sufficient. In 2014, a total of nine communes were sprayed, covering approximately 254,072 structures and protecting 789,883 people. In collaboration with PMI and in-country partners, Benin received a one-time WHO grant to support the NMCP to fully lead the IRS campaign in one of the target communes. This grant, as well as PMI's capacity building efforts for IRS since IRS was first launched, will allow responsibilities to be incrementally transitioned to the Government of Benin, with the vision of transitioning all or nearly all responsibility for implementation of IRS to the government over the next three years. With FY 2015 funding, PMI will support the NMCP to cover between 180,000 to 250,000 structures in Atacora Department with IRS using a long-lasting organophosphate insecticide while continuing to build local capacity within the Government of Benin structures (e.g. the NMCP, the *Centre de Recherche Entomologique de Cotonou* (CREC), and intermediary and periphery-level Ministry of Health (MOH) counterparts). PMI will continue to monitor vector insecticide resistance to ensure efficacy of insecticide selection and will support an operational research study to evaluate the cost-effectiveness of integrating IRS and LLIN control activities.

Malaria in pregnancy (MIP): The national guidelines for IPTp are under revision to align with the new WHO standards of monthly SP treatment beginning early in the second trimester of pregnancy up until delivery. During the last 12 months, PMI and the NMCP trained 1,043 health workers nationwide on the new WHO standards. The official revision is anticipated by the end of 2014, following completion of the universal LLIN campaign. During the last 12 months, PMI procured more than 1 million treatments of SP, distributed 500,000 LLINs to ANC clinics, and trained 1,043 health workers in order to enhance the provision of effective MIP services in public health facilities in Benin. According to the DHS 2012, 58% of all pregnant women receive four or more ANC visits, yet IPTp 2 coverage was only 23%, which corroborates with data from the 2013 Routine Malaria Surveillance bulletins. Given this low SP coverage, PMI will reinforce behavior change training and messaging to improve the demand for IPTp services and improve service delivery performance among health workers in the public and private sectors. PMI will also continue to support formal policy revision to reflect the current WHO recommendations of monthly SP for pregnant women starting early in the second trimester.

Case management: The 2011 NMCP case management guidelines recommend universal diagnostic testing for malaria by all health workers, including those at the community level. PMI continues to support a comprehensive diagnostics and treatment strengthening program that involves the training of health workers and laboratory technicians, the implementation of a quality control and quality assurance system, strengthening supervision to ensure that health workers follow clinical practice guidelines, and provision of diagnostic and treatment commodities such as rapid diagnostic tests (RDTs) and artemisinin-based combination therapies (ACTs). To date, most government health workers have been trained to diagnose and treat malaria. To maintain this progress, PMI is supporting the NMCP to establish a strategic plan for planning and monitoring both pre- and in-service training for health workers nationwide. Scaling up training for private sector health care providers and CHWs in use of RDTs as part of integrated community case management (iCCM) is still underway.

With FY 2015 funding, PMI will strengthen its strategy to improve coverage, frequency, and effectiveness of supervision nationwide in coordination with national efforts. PMI will also double (from five to 10) the number of zones supported through local organizations to strengthen iCCM delivery. PMI will procure approximately 2 million RDTs and 1.5 million ACTs to fill estimated needs during calendar year 2016. In addition, FY 2015 funding will increase support for facility and health zone level case management performance improvement and comprehensive quality assurance approaches to improve compliance with case management standards and norms nationwide, through integrated malaria supervision, including monitoring of malaria diagnostics, maintenance of microscopes, on-the-job training, and quality control of case management at health facility community levels. Finally, with FY 2015 funding, PMI will work to ensure there is appropriate supervision to ensure the reliability and consistency of health information data from microscopy and RDT use in health facilities and at the community level.

PMI is supporting the NMCP, health zones, and Central Medical Stores (CAME) Supply Chain Management (SCM) to prevent commodity stockout and overstock by strengthening implementation of the Malaria Logistics Management Information System (LMIS). PMI support has included training of personnel, assistance for supervision, provision of software and hardware for management of information, and technical assistance to help address new or outstanding issues. With this assistance, the NMCP initiated the first quantification-based estimate of malaria commodity needs from consumption data in February 2014. PMI has identified two key issues that are currently being resolved: the quality and completeness of the consumption data report, and the legal authority for CAME to contract with the *Dépot Répartiteur de Zone* (DRZ). With FY 2015 funding, PMI will continue to help support a more efficient and responsive logistics and supply chain management system in line with recommendations from the recent national supply chain assessment. Additionally, working with the national drug regulatory authority, PMI will support surveillance and quality testing of antimalarial drugs sampled from the private market place in-country to monitor for substandard, poor quality, and counterfeit products.

Monitoring and Evaluation (M&E): PMI has contributed to strengthening Benin's M&E systems, and the number of health facilities reporting timely and complete data to the health management information system (HMIS) has significantly increased. In past years, PMI has supported two national-level household surveys to provide information on key malaria indicators (the 2006 and 2012 Demographic Health Surveys). In 2009 and 2013, nationally representative health facility surveys were conducted to assess the quality of malaria management. Following multiple evaluations, support for the five sentinel surveillance sites was discontinued in 2014. With FY 2015 funding, PMI is committed to providing

technical guidance and financial support to strengthening the quality of routine malaria data collected, and continuing to help build the NMCP's capacity to monitor and evaluate variations in morbidity and mortality and their relevance for ongoing programmatic activities.

Operational Research (OR): Since the beginning of PMI in Benin, implementation of multiple OR studies has been supported, focused mainly around vector control strategies. Findings from these studies have helped evaluate the efficacy of non-pyrethroid IRS insecticides on malaria transmission and morbidity; identified the colorimetric test as an accurate and easier alternative to the cone bioassay for assessing when to replace a net; and assessed the serviceable life of a net to inform the timing of distribution and replacement. During the past 12 months, PMI supported a study to demonstrate the feasibility of using dried tube specimens for field monitoring of RDT quality. With FY 2015 funding, PMI will conduct a study to evaluate the cost-effectiveness of integrating IRS and LLIN control activities.

Behavior change communication (BCC): The NMCP is developing a new integrated communication plan that will include strategies for advocacy, BCC, and social mobilization. As part of the process, PMI supported a literature review to identify barriers to the use of IPTp and LLINs. The findings are being used as the basis for this new strategy and include, for example, increasing community engagement and upgrading BCC skills of health workers. Strong PMI support also led to the revitalization of the National Malaria Communications Working Group, which is responsible for reviewing the technical content of all BCC messages pertaining to malaria and will play a key role in developing an updated integrated communication plan. Over the past year, PMI supported a multi-pronged approach to reach the maximum number of beneficiaries using mass media, banners, messaging through community health workers, interpersonal communication in health centers, community events, the involvement of opinion leaders, and social marketing. With FY 2015 funding, PMI will support the national dissemination and training of the updated integrated communication strategy. Emphasis will be placed on the application of the strategy by local community health organizations and the MOH. With heightened concern over and concrete evidence surfacing regarding availability of counterfeit ACTs in the marketplace in Benin, special communication campaigns will target urban populations who may be more likely to purchase these counterfeit malaria medicines.

Health systems strengthening/capacity building: Despite progress shown in malaria indicators as evidenced by 2012 DHS data, the NMCP continues to face major challenges in coordinating malaria control activities. Among them are the lack of adequate human resource capacity, both in the number of staff and their skill set to plan, manage, and coordinate a comprehensive malaria program; the collection, management, and use of health information for M&E and surveillance purposes; and the management of the health commodities supply chain, which is especially weak at the periphery, resulting in stockouts and expired drugs and RDTs. To support the NMCP in addressing these challenges, PMI invested in the training of several key NMCP staff; supported the development of Technical Working Group (TWG) teams; supported the NMCP in conducting an evaluation of the existing HMIS; and supported the NMCP and CAME by reviewing current plans, training staff in areas of weakness, and assisting in the development of better tracking tools, including use of mobile phone technologies at the community level for monitoring commodity stocks. With FY 2015 funding, PMI will continue to provide support for the NMCP staff. However, PMI will refine its strategic approach to capacity building of the NMCP by tailoring support based on recommendations coming from the planned assessment of the NMCP's organizational capacity. Support will continue for the malaria technical working groups, NMCP staff

attendance at malaria conferences and workshops, and provision of basic office equipment to facilitate effective routine management of the malaria program.

STRATEGY

INTRODUCTION

The President's Malaria Initiative (PMI) is a core component of the Global Health Initiative (GHI), along with HIV/AIDS, and tuberculosis. PMI was launched in June 2005 as a 5-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. With passage of the 2008 Lantos-Hyde Act, funding for PMI has now been extended and the goal of PMI has been expanded to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by continuing to scale up coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS).

Fiscal Year (FY) 2008 was the first year of PMI funding in Benin. Large-scale implementation of ACTs and IPTp began in Benin in 2007 and has progressed rapidly with support from PMI and other partners. Rapid diagnostic tests (RDTs), ACTs, and IPTp are now available and being used in public health facilities nationwide; and millions of long-lasting ITNs have been distributed with the last nationwide distribution campaign completed in 2014.

This FY 2015 Malaria Operational Plan (MOP) presents a detailed implementation plan for Benin, based on the National Malaria Control Program's (NMCP's) five-year strategic plan (2011 – 2015). It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The activities that PMI is proposing to support fit in well with the NMCP strategy and build on investments made by PMI and other partners, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This document briefly reviews the current status of malaria control policies and interventions in Benin, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities to be implemented with FY 2015 funding.

MALARIA SITUATION IN BENIN

According to the most recent national annual health statistics report of 2011 from the MOH, malaria is the leading cause of mortality among children under five and the leading cause of morbidity among adults in Benin. The World Health Organization (WHO) estimated that, per 100,000 population (all ages) in 2012, there were about 800 malaria hospital admissions and 23 malaria deaths². The 2012 DHS measured parasitemia prevalence in children under five at 28%, although there is no comparison for 2006. Trends for admissions and deaths have steadily increased over the past four years, although this trend might reflect data quality issues. WHO estimated that the number of malaria deaths in children 1–59 months old was about 10,000 in the year 2000 and about 9,000 in the year 2010.³ Results from Benin's two most recent DHSs revealed a substantial decrease in the prevalence of anemia (malaria likely being a major cause) among children 6–59 months old: from 78% in 2006 (25% mild, 46% moderate, and 8% severe) to 58% in 2012 (26% mild, 29% moderate, and 3% severe).

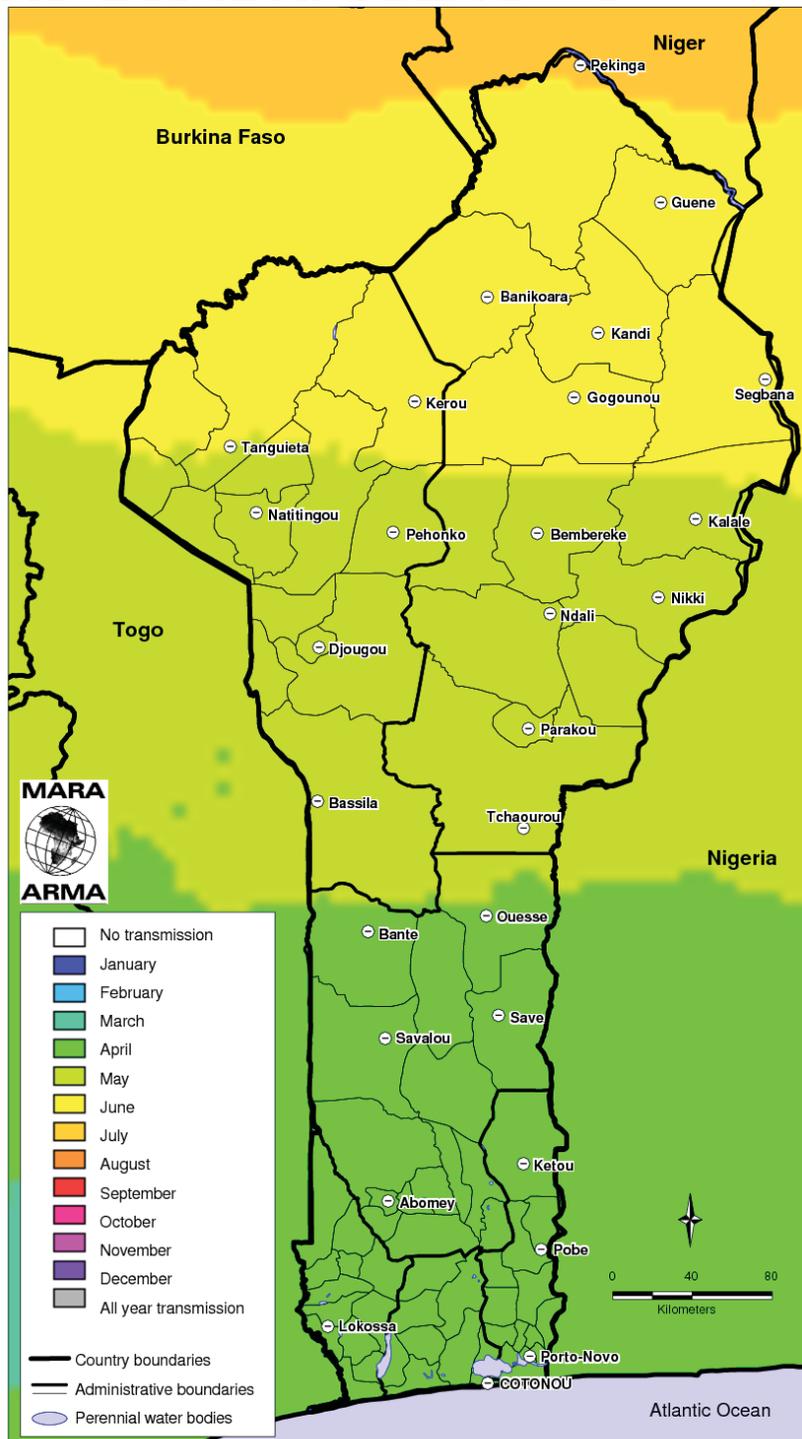
²World Malaria Report 2013, page 106

³Lui et al. Lancet 2012;379(9832):2151–61

Malaria transmission in Benin is stable but influenced by several factors such as vector species, geography, climate, and hydrography. The primary malaria vector in Benin is *Anopheles gambiae s.s.*, and secondary vectors are important in certain circumstances. For example, the widespread distribution and continuous breeding of *An. gambiae s.l.* in the south, and more seasonal breeding in the north, results in an endemic transmission pattern nationwide, with three distinct regions. In the coastal region of Benin, which has many lakes and lagoons, there are two vectors: *An. melas* and *An. gambiae s.l.* In the area above the coastal region, malaria is holoendemic, and *An. gambiae s.l.* is the vector. Finally, in northern Benin, malaria is normally seasonal, with a dry season (November to June) and a rainy season (July to October) during which malaria rates are highest. Recent entomological monitoring in 2012, and again in 2013⁴, confirmed the presence of insecticide resistance to carbamates among mosquito vector populations on the eastern side of one department where IRS is planned.

⁴Africa Indoor Residual Spraying project. November 2012. *Semi-Annual Report, April-September 2012*. Bethesda, MD. Africa IRS project, Abt Associates Inc.

Figure 1. Benin: First month of malaria transmission season



This map is a product of the MARA/ARMA collaboration (<http://www.mara.org.za>). July 2001, Medical Research Council, PO Box 17120, Congella, 4013, Durban, South Africa
 CORE FUNDERS of MARA/ARMA: International Development Research Centre, Canada (IDRC); The Wellcome Trust UK; South African Medical Research Council (MRC);
 Swiss Tropical Institute, Multilateral Initiative on Malaria (MIM) / Special Programme for Research & Training in Tropical Diseases (TDR), Roll Back Malaria (RBM).
 Malaria seasonality model: Tanser, F. et al. 2000. Paper in preparation. Topographical data: African Data Sampler, WRI, http://www.igc.org/wri/sdis/maps/ads/ads_idx.htm.

COUNTRY HEALTH SYSTEM DELIVERY STRUCTURE AND MOH ORGANIZATION

Administratively, Benin is divided into 12 departments (average of 650,000 population per department), 77 communes, 546 *arrondissements*, and 3,747 villages. There are three metropolitan areas: Cotonou, Porto Novo, and Parakou. Benin's public health system fits within the administrative structure with a total of six health departments, which pair administrative departments, and health zones, which pair an average of 2–3 communes with a population ranging from 84,000–492,000. There are three levels in Benin's pyramidal health system structure:

- Central: The MOH and its central Directorates, including the Directorate of Public Health to which the National Malaria Control Program directly reports. There is one National Referral Hospital (*Centre National Hospitalier Universitaire*);
- Intermediate: The six Departmental Health Directorates, including a NMCP cell of dedicated staff and the corresponding six Departmental Referral Hospitals (*Centres Hospitaliers Départementaux*); and
- Peripheral: There are 34 health zones, including the following levels of clinical facilities in decreasing order of capacity: Zonal Hospitals (*Hôpitaux de Zone*); Commune Health Centers (*Centre de Santé de la Commune*), which includes inpatient services; accredited private health facilities; Community Health Centers (*Centres de Santé d'Arrondissement*); and village health units including Community Health Workers (CHWs).

In Benin, the private health sector is diverse and quickly growing. More than half of the country's population is estimated to receive health care services from the private sector. Approximately 25% of all health providers (approximately 18,000 people) are employed in the private sector. However, according to a recent 2013 private sector health services assessment, the vast majority of the private sector (an estimated 90%) is unlicensed, mainly due to an arduous accreditation process and low perceived benefits. Efforts are underway to reform the registration process to better align private providers' practice with national norms and standards. Other prominent types of private providers include traditional practitioners, licensed pharmacists, and informal drug vendors.

There are an estimated 12,500 CHWs nationwide, one-third of whom are female. National directives establish a minimum primary education requirement and residency in the community of service for all CHWs. The directives also set requirements for two types of CHWs: CHWs responsible for health promotion who reside in communities within five kilometers of a health facility; and CHWs who provide basic essential health services, including integrated community case management (iCCM), and reside in communities more than five km from a health center (see Treatment section for further information). According to a national mapping exercise conducted in late 2013, approximately 5,000 CHWs treat children for confirmed malaria, but only 1,500 of them have been trained to treat children for malaria, pneumonia, diarrhea, and malnutrition. These CHWs typically serve 30 households and receive a performance-based stipend of \$15-\$25 per month through the local government, with financial support from donors, including UNICEF, USAID, and other partners such as Africare and CRS. In November 2013, a national community health forum was held to review the roles and services, qualifications, supervision, and performance incentives. The final recommendations of this event were still pending at the time of the FY 2015 MOP preparation.

UPDATES IN MOP STRATEGY

The following updates are noted in regards to the FY 2015 strategy:

- Midterm review of the 2011-2015 national malaria strategic plan is underway; by the end of 2014, the NMCP plans to update and extend the strategic plan through 2018 to coincide with the period of the National Health Plan.
- The national IPTp guidelines are being revised to align with the new WHO standards of monthly treatments starting early in the second trimester up until delivery.
- The first national community health policy is being developed in response to recommendations emerging from the community health forum in regards to professionalization, service package, supervision, and motivation of community health providers. The new policy is anticipated to be adopted in early 2015.
- Performance-based financing now includes purchase of simple and severe malaria cases treated as per national norms in addition to malaria in pregnancy services of IPTp and LLIN.
- Data collection started for the 2014 Multiple Indicators Cluster Survey (MICS) in Benin; results are anticipated in late 2014.

NATIONAL MALARIA CONTROL PLAN AND STRATEGY

Benin's National Strategic Plan for malaria was written in 2011 to cover the period 2011–2015. With the changes during the last two years in malaria epidemiology, malaria control strategies, and the political and donor environments, the NMCP embarked on an update in 2012. The revised strategic plan was originally scheduled for ratification in April 2013, but this deadline has been delayed. The plan states a long term vision to achieve a “Benin without malaria,” and the goal is “to reduce Benin's malaria burden to a level that it will no longer be a roadblock to national socio-economic development.” The strategic plan states its objective as follows: “By 2030, malaria will have been controlled and the trends in its incidence will have been reversed.”

In order to achieve the objective of this strategy, priorities will continue to include:

- Preventive measures proven to be effective at the individual and community levels, e.g., sleeping under a LLIN, IRS with long-lasting insecticides, other anti-vector measures that reduce the contact between humans and mosquitoes, and the prevention of malaria among pregnant women;
- Early diagnosis and treatment with efficacious drugs for all cases of malaria, including those at the community level;
- Surveillance and M&E of interventions to ensure that trustworthy strategic information is available;
- Operational research that will improve program performance;
- Capacity building and post-training follow-up for appropriate program implementation;
- Advocacy and behavior change communication; and
- Reinforcing partnerships to mobilize resources for malaria eradication.

Other supporting elements in the strategy include the following items:

Prevention

1. Integrated vector control: This approach will target both adult mosquitoes and larvae, when appropriate, with WHO Pesticide Evaluation Scheme (WHOPES)-approved insecticides, applying environmentally sound practices of using indoor residual spraying, larviciding and

universal LLIN coverage of the at-risk population. The resistance of known vectors to insecticides will be rigorously and routinely monitored.

2. Prevention of malaria in pregnancy (MIP): This includes universal LLIN distribution and use, IPTp with sulfadoxine-pyrimethamine (SP) during antenatal visits, beginning with the second trimester and continuing up until delivery.
3. Prevention among specific groups, such as those with sickle-cell anemia and immigrants without immunity.

Diagnosis and Clinical management

1. Diagnosis: This includes confirmation by either microscopy or RDT prior to treatment. These guidelines will be rigorously applied for every suspected case of malaria at all levels of care and in the community. The proof of a positive microscopy or RDT result will be required prior to the administration of an ACT.
2. Treatment: Artemether-lumefantrine and artesunate-amodiaquine are the first-line ACTs used for all cases of uncomplicated malaria, including cases at the community level. The use of oral artemisinin monotherapy is strictly forbidden by WHO, a rule which Benin's MOH has adopted. For the treatment of uncomplicated malaria in pregnancy, oral quinine is recommended during the first trimester, while ACTs are recommended beginning with the second trimester. The use of rectal artesunate prior to referring a patient to the next level of care, if practical and acceptable, is recommended at the community level. Severe malaria is considered life-threatening, and its diagnosis should be confirmed. It should be managed at appropriately equipped health facilities and by trained and competent health professionals. The use of parenteral artesunate as first drug choice for severe malaria is recommended; parenteral quinine is advised if artesunate is not available. As soon as the patient stabilizes, treatment should shift to oral medications.
3. Surveillance and pharmacovigilance: The sensitivity of malaria to recommended drugs will be monitored and cases of resistance should be reported and investigated.
4. Private sector collaboration: This will be expanded to ensure that the growing number of private health care providers align their diagnostic and therapeutic practices with national policies. This is strategically important due to the growing numbers of private clinics and practitioners who provide services to Benin's growing middle class.

Management of epidemics and complex humanitarian emergencies

The emergence of epidemics should be carefully monitored especially when large population movements occur and the movement is from a non-endemic or low-endemic zone to an area of high exposure to malaria. To identify this type of distinction, it will be necessary to establish an epidemic threshold(s) and to monitor some indicator of epidemiologic variation. The increased incidence of malnutrition may be associated with lower immunity and increased vulnerability.

Advocacy, behavior change communication, and social mobilization

Behavior change is essential for the increased uptake of healthy behaviors related to the prevention of malaria. Social mobilization is a key requirement for successful malaria control, from the implementation of universal LLIN distribution campaigns to the acceptance of new behaviors by households, health workers, and health personnel. Advocacy to garner political support and additional resources is necessary for the maintenance of programs.

Health systems strengthening and capacity building

The NMCP's strategic plan focuses on the following building blocks of the health system: better governance; adequate human resources in terms of quantity, technical competence, and managerial capacity; financial resource mobilization; sound supply chain management; and partnerships, both public-private and international donor or technical partnerships.

Supply chain management

The NMCP is committed to working with the National Directorate for Pharmacy and Laboratories to ensure regulatory functions and compliance on malaria-related issues. Close coordination with the Central Medical Stores (CAME) is necessary for ensuring malaria medicines, products, and supplies are available to those who need them at the right time and in the right quantities. Different tools, including the Logistics Management and Information System (LMIS), end-use verification (EUV) survey, joint supervision visits, and weekly monitoring summaries, are used to improve supply chain management.

Malaria surveillance and health information systems

The Routine Malaria Information System (RMIS) was designed to detect epidemics and to serve as a barometer of efficacy of current malaria interventions in reducing the national malaria burden. The NMCP uses the Roll Back Malaria/WHO-recommended indicators for monitoring national malaria programs. The strategic plan will be evaluated using accepted international norms and methodologies. The DHS and other surveys have been used to evaluate achievement of the strategic plan's targets and will continue to be used in the future. Operational research will be employed to test promising innovations that could help accelerate the achievement of national targets in access, coverage, utilization, and impact.

INTEGRATION, COLLABORATION AND COORDINATION

Benin's malaria stakeholders include government, civil society, the private sector, academia, and external donors. The MOH's NMCP, a unit of the National Directorate for Public Health (*Direction Nationale de la Santé Publique*), is the government's recognized entity to ensure coordination and supervision of the country's malaria policy and program. Various civil society organizations act as implementing partners of the NMCP, especially at the community level and in remote areas where the MOH has little or no presence. Academia's role is to provide technical assistance and training. The private sector is represented by private clinics, individual service providers, commercial establishments, and vendors of goods and services that are used in malaria programs. PMI and the Global Fund are the principal donors to the NMCP, and the African Development Bank and World Bank provide district-focused results-based financing.

Relationships between the malaria stakeholders listed above are collegial and collaborative, and have been that way for several years. There continues to be adequate mechanisms in place to resolve issues of mutual concern and to encourage information-sharing and harmonization of strategies and actions among Benin's malaria donors:

1. **NMCP as a hub for communication and coordination.** The NMCP is the designated hub for coordination of malaria activities in Benin. The NMCP hosts five technical working groups. Members volunteer their time to the working groups, based on their expertise and needs. Every year, the NMCP holds a *Plan Intégré du Travail Annuel* (PITA) workshop to harmonize stakeholders' annual plans. This is meant to foster mutual information-sharing early in the planning

process and ensure better coordination. However, the use of the PITA has not been maximized as gaps in the information provided by partners limit its usefulness as the principal reference document for malaria planning each year.

2. **Roll Back Malaria (RBM) Network.** The NMCP acts as the convener of the RBM network in Benin. Most of the monthly meetings scheduled during the year took place as planned. The NMCP Coordinator is the chair. All stakeholders present are given the opportunity to report on their malaria activities during the previous month. This local RBM network is closely linked to the West Africa RBM Network and the global RBM Network based in Geneva. Technical working groups have met several times to work on pending issues with supply chain and M&E.
3. **The Country Coordinating Mechanism (CCM) for the Global Fund.** The CCM is an in-country group with the dual responsibilities of shepherding proposals to the Global Fund Secretariat in Geneva and providing oversight to the successful achievement of objectives of approved proposals. USAID/Benin serves as a permanent member of the CCM and is actively involved in the Malaria Working Group and in the Strategic Oversight Committee.
4. **The *Partenaires Techniques et Financiers (PTF)*.** The members of this group meet monthly and have quarterly retreats with the Minister of Health. They comprise the major external donors to Benin's health sector, with the exception of China, which imports large amounts of ACTs. While the group's interests extend beyond malaria, the group has been very supportive of health program-related reforms, such as PMI's support to the CAME. USAID/Benin now serves as the Vice-Chair for the next two years.
5. **One-on-one coordination meetings.** These types of meetings are still the mainstay of coordination efforts in Benin. However, they are time-consuming and are disadvantageous to those partners that are based up-country and do not have offices in Cotonou.
6. **The Malaria Operational Planning (MOP) exercise.** The week-long annual visit of colleagues from the U.S. Centers for Disease Control and Prevention (CDC)/Atlanta and USAID/Washington is an excellent opportunity for sharing information, lessons learned, and experiences. The debates in the meetings, the group work, and presentations provide additional insights that enrich the PMI MOP. The MOP exercise for the Fiscal Year 2015 was held from June 9–17, 2014.

PMI GOALS AND TARGETS

The goal of PMI is to reduce malaria-associated mortality by 70% compared to pre-Initiative levels in the 15 original PMI countries and to reduce malaria-associated mortality by 50% in new countries added to PMI in FY 2011. By the end of 2015, PMI will assist Benin to achieve the following targets in populations at risk for malaria:

- >90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been protected by IRS;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and

- 85% of children under five with suspected or confirmed malaria will have received treatment with ACTs within 24 hours of onset of their symptoms.

PROGRESS ON COVERAGE/IMPACT INDICATORS

The table below shows that progress has been made for most malaria indicators in Benin, as measured by two DHSs (2006 and 2012). Estimates from the 2006 DHS, which was conducted from August–November 2006 (approximating the duration of the short rainy season), serve as the baseline indicators for Benin. The 2012 DHS was conducted from December 2011–March 2012 (covering the dry season).

Household ownership of at least one ITN rose from 25% in 2006 to 80% in 2012, following mass distribution campaigns in 2007 and 2011. Utilization of ITNs by children under five rose from 20% in 2006 to 70% in 2012. Similar trends in utilization were observed with pregnant women.

The proportion of pregnant women receiving at least two doses of IPTp with sulfadoxine-pyrimethamine (SP) from any source increased from 3% in 2006 to 23% in 2012. Comparing the proportion of children with fever who received prompt treatment with an ACT in the 2006 and 2012 surveys is difficult given the introduction of RDTs in 2011 and the diagnostic guidelines mandating treatment being given only to patients with a positive test. In 2012, 17% of children under five who had a fever in the last two weeks received a diagnostic test, 7% of whom received an ACT within 24 hours.

The proportion of women of childbearing age with any anemia (<11 g/dL) declined from 61% to 41% between 2006 and 2012. Similarly, prevalence of any anemia among children 6–59 months decreased from 78% in 2006 to 58% in 2012; with severe anemia (<8 g/dL) decreasing from 16% to 7%. The prevalence of parasitemia in children under five was 28% in 2012, although there are no comparison data from 2006.

Table A. Key Malaria Indicators in Benin

Indicator	2006 DHS	2012 DHS
% Households with an ITN	25	80
% General population who slept under an ITN the previous night	NA	63
% Children under five who slept under an ITN the previous night	20	70
% Pregnant women who slept under an ITN the previous night	20	75
% Households with an ITN or sprayed within previous 12 months	NA	80
% Women who received two or more doses of IPTp* during their last pregnancy in the last two years	3	23
% Children under five with fever in the last two weeks who received a diagnostic test	NA	17
% Children under five with fever in the last two weeks who received treatment with an ACT within 24 hours of onset of fever	<1	7
% Women of childbearing age with anemia (<11 g/dL)	61	41
% Children 6–59 months with severe anemia (<8 g/dL)	16	7
% Children under five with parasitemia (<i>P. falciparum</i>)	NA	28

*In 2006 this measure was from any source: ANC or elsewhere. In 2012, only includes SP/Fansidar sourced from ANC.

OTHER RELEVANT EVIDENCE ON PROGRESS

There are other indications that PMI is making progress in Benin. According to the DHS, from the pre-PMI period of 2001–2006 to the PMI scale-up period from 2006–2012, all-cause under-five mortality has decreased. Due to under-reporting of deaths in the 2012 DHS, it is unclear precisely how much mortality has declined, but the reduction is between 13 and 44%. In a recent baseline survey for a USAID-funded operational research project through the Child Survival and Health Grants Program in the commune of Sémé-Kpodji (a mixed peri-urban and rural commune near Cotonou), demand for ITNs was reportedly high. Mothers confronted the survey team to demand that more ITNs be sent to the commune for vulnerable mothers and babies.

The high levels of knowledge of malaria among various groups have been due to behavior change campaigns supported by various malaria projects, including PMI. However, even beyond the campaigns, the media in Benin have been very supportive of the dissemination of malaria information. There are weekly programs using various media channels. Over the years, radio outlets – whether religious, commercial or community – have complemented other media in disseminating information on malaria prevention. Benin’s print media, considered the liveliest in West Africa, also contributed to informing the public on malaria prevention.

CHALLENGES, OPPORTUNITIES, AND THREATS

Challenges

Malaria is a major burden on the population's health and economy in Benin. The 2012 DHS showed some progress in controlling the disease, but much more remains to be done before the objective of near-zero deaths due to malaria is achieved by 2015. Benin, like most developing countries, is plagued by the following challenges: (1) an acute health worker crisis, both in terms of quantity and the quality of the services that health workers provide; (2) weak leadership and management skills of national, departmental, and district supervisors; (3) a national policy environment that has not given health the appropriate level of priority in budget allocations (e.g., the 2014 proportion of the national budget allocated to health was 6.8%, well below the recommended target of 15% for sub-Saharan Africa, to which Benin subscribed in the Abuja Declaration of 2001); (4) a Health Management Information System (HMIS) that is still developing protocols and methodologies, especially in routine monitoring and data quality; and (5) incomplete implementation of national policies and treatment protocols.

The supply chain in Benin remains weak. Although Benin has completed its first quantification-based estimates using consumption data, critical obstacles remain in its pharmaceutical management system including: lack of formal agreements and poor communication between key supply chain partners and the NMCP; inadequate LMIS monitoring and supervision and tracking systems; and the need for software upgrades in Medistock. In addition, there is no system in place to track the distribution of free commodities, which contributes to poor data quality, shortages, stockouts, and overstocks.

Although Benin is a small country, it is culturally diverse and linguistically complex, making communication of concepts and directives difficult, costly and time-consuming to implement. This is compounded by a large illiterate segment of the population: six out of ten adult women have never been to school. Implementing behavior change strategies at different levels requires effort and time. Changes in health workers' attitudes to RDTs are finally being observed, but getting to this point has required more time and investments in training and supervision. Also, as the Benin health system realizes the increased need and demand for RDTs because of the national policy to test all suspected cases, it presents a challenge to sufficiently procure and supply RDTs at all supply chain levels and to have adequate numbers of CHWs trained as well.

Other challenges include a growing private sector that needs to be more engaged in malaria control and a growing urban population with little access to organized health services.

Finally, the understaffed and overstretched NMCP has led to challenges in partner coordination. The last staff recruitment conducted in 2012 – 2013 did not result in the hiring of additional staff. A recent NMCP capacity assessment confirmed that staff is overworked, with a number of competing priorities and key post vacancies. For example, the malaria strategic plan will need to be revised before the end of 2015, but the NMCP is consumed with planning for the 2014 mass distribution of LLINs. During the MOP visit, it was unclear whether the NMCP had started working on the new Global Fund Concept Note for continued funding after June 2015. The NMCP needs to better coordinate and leverage the capacity of all donors and stakeholders.

Opportunities

Despite the above challenges, Benin has made substantial progress in the past few years. Changes in the health management information system (HMIS) data collection and the NMCP's management of IRS spraying in a district commune represent challenges that have become opportunities for the NMCP. The

upcoming revisions to Benin's new five-year NMCP strategy provides further opportunity for the advancement of malaria control, enabling Benin to align activities with global RBM priorities. There is a strong, collaborative partnership between the MOH and donors, which constitutes a solid platform for the elimination of malaria as a public health problem in Benin as well as the scale-up of high impact community health interventions as evidenced by the November 2013 Community Health Forum and the MOH/WHO/UNICEF/USAID partnership to scale-up integrated community case management.

Decentralization of public sector health services is finally being embraced by the MOH as a vehicle for accelerating coverage of malaria interventions and the reach other programs. This has started to generate opportunities for collaboration beyond the central level. At the health zone and department levels, donors have collaborative arrangements around local health issues that give communities a voice. Decentralization also expands the pool of human resources that could be mobilized for behavior change and universal LLIN distribution campaigns.

The increased involvement of the private sector constitutes a major opportunity, especially because there are more households entering the middle class each year. With the launching of the PMI-supported private sector component in March 2013, more businesses are enthusiastically embracing malaria control in Benin. A major delegation from the Bank of Africa attended the launch and declared that it makes good business sense for commercial enterprises to assist employees and their families to be protected against malaria, HIV/AIDS, tuberculosis, and other preventable infections. In addition, with the existence of the *Coalition des Entreprises Béninoises et Associations Privées Contre le SIDA, la Tuberculose, et le Paludisme* (CEBAC-STP), Benin hosts one of the first business coalitions in the Africa region to fight the three priority diseases, a key player in promoting public-private partnership against HIV, TB and malaria in the country. The increased involvement of the private sector constitutes a major opportunity, particularly in regards to urban coverage. Under the Accelerating the Reduction of Malaria Morbidity and Mortality project (ARM3) private sector component, 21 corporate institutions embraced malaria prevention activities including the social marketing of ITNs. In the past 12 months, 241 private facilities have registered with the MOH and an additional 35 are newly contributing service figures into the national Routine Malaria Information System.

Performance-based financing, funded by the World Bank, the *Coopération Technique Belge*, the Global Fund, and the GAVI Alliance, has been in place since 2010 in 13 health zones and will be scaled up to all 34 health zones by the end of 2014. A number of malaria services are compensated under this approach including numbers of pregnant women receiving two or more doses of SP, pregnant women receiving an LLIN, and pregnant women and children treated for uncomplicated and severe malaria. Supportive supervision visits and availability of essential drugs including antimalarials and SP are also compensated.

Benin has started to prepare its 2016-2018 update of the national malaria control strategy and is designing its first new model Global Fund malaria proposal as the current transition funding ends in June 2015. This provides an opportunity to reframe priorities based on strengths, opportunities, and resources available to Benin, including future strategies for IRS and training and maintaining performance of health providers.

During the past year, NMCP staff have focused their attention on the national policy of providing free malaria services and commodities. The Minister of Health, Professor Dorothée Kinde-Gazard, a malariologist, authorized external monitoring visits and made field visits on her own to observe

the application of the policy. The resulting recommendations, which were closely observed by partners, centered on the reimbursement from the national budget of malaria products and services incurred by health facilities. The NMCP was designated to verify the documents submitted prior to payment. A related issue that was focused on was the National Health Insurance System (*Régime d'Assurance Maladie Universelle* or RAMU), which had a “soft” launch using *mutuelles*, a form of community-based health insurance scheme. Once fully functional, the RAMU aims to assure universal health coverage in Benin.

Threats

Weak leadership, management, and governance capacity within the NMCP and other MOH units represents a constant threat to the effectiveness and sustainability of malaria interventions. The national program managers who demonstrate technical and managerial competence are quickly recruited by international agencies and consulting firms. Currently, another threat to the NMCP has emerged; after a peak in 2010, there has been a gradual reduction in external financial resources for malaria. In 2011, the World Bank decided to shift its assistance for Benin’s health sector to a performance-based funding arrangement with a limited number of health zones. The Global Fund has already reduced its contributions to the malaria program and has postponed any new proposals to 2014 under its new funding mechanism.

To ensure that activities undertaken by PMI continue beyond its period of support, the transfer of knowledge, capacity, and responsibilities to a strong NMCP and other government staff is vital. In 2014, PMI will conduct a risk assessment covering the NMCP’s organizational, operational, and human resource capacity as well as review progress towards the 2009 institutional capacity assessment recommendations. This critical review is a key step towards direct government-to-government funding and capacity building as well as an important leveraging point for negotiating transformational conditions to address identified weaknesses.

Aside from political and program issues, insecticide resistance threatens two of the four PMI interventions (ITNs and IRS). Resistance to pyrethroids, used on ITNs, has been shown to reduce impact of IRS and LLINs⁵. Additionally, widespread vector resistance to two of the other three approved classes of IRS insecticides has emerged (see IRS entomology monitoring section). The presence of insecticide resistance to organochlorines, pyrethroids, and carbamates will be addressed through IRS insecticide rotation to organophosphates. Unfortunately, when organophosphate resistance appears (a likely outcome given its use in cotton cultivation), there is no current WHOPES-recommended alternative for further rotation.

⁵N’Guessan *et al.* Reduced efficacy of insecticide-treated nets and indoor residual spraying for malaria control in pyrethroid resistance area, Benin. *Emerg Infect Dis* 2007 <http://www.cdc.gov/EID/content/13/2/199.htm>

OPERATIONAL PLAN

PREVENTION

Insecticide-treated nets (ITN)

NMCP/PMI objectives

According to the national strategy (2011-2015) the NMCP's objective is to achieve 100% coverage of the entire population, with all residents sleeping under an ITN by the end of 2015. The plan to achieve this coverage includes: (i) triennial mass distribution, providing free nets to all population groups (defined as one long-lasting insecticide-treated net for every two people) nationwide; and (ii) routine distribution of ITNs to pregnant women through ANC, children under five years of age through immunization clinic services, and to school children through primary and secondary schools. Social marketing is a complementary activity that contributes to the main distribution strategies.

Progress since PMI was launched

Since being launched in 2008, PMI has purchased and distributed approximately 4.5 million ITNs, of which 4 million were made available for routine distribution and the remainder for social marketing and universal coverage campaigns. Approximately 5.3 million ITNs were distributed during the last universal coverage campaign in 2011. These nets were provided using Global Fund resources primarily, with a portion obtained using World Bank Booster funds, while PMI contributed 150,000 nets. PMI provided support for behavior change activities around the importance of using and maintaining ITNs as part of its broader BCC strategy, especially targeting the household level.

PMI has supported longitudinal studies on ITN durability, the results of which have now been combined with information from seven other PMI countries. The data show variability in life expectancy among different brands of ITNs, however, a decision on what the programmatic implication may be has yet to be determined.

The 2012 DHS found that a majority of all households (80%) owned at least one ITN, and that 70% of children under five years of age and 75% of pregnant women reported that they had slept under an ITN the previous night. These data confirm significant progress in terms of ITN ownership and use since the baseline in 2006, when ownership and usage were less than 25%.

Progress in the last 12 months

During the last 12 months, PMI procured and distributed 740,000 ITNs for routine services. A small number of these nets were used for social marketing in peri-urban settings with 1,000 nets socially-marketed by two non-governmental organizations and 5,500 nets distributed through private clinics. Currently M&E tools to monitor facility distribution and social marketing are limited to register books and do not provide consumption data. PMI is advocating for the use of standardized pharmacy registers that can be used for tracking LMIS and consumption data.

The third national universal net campaign, initially planned for July 2014, was pushed to September 2014 to allow for sufficient preparation time. At the time of writing of the MOP, the household registration was underway and the national distribution of some 5.9 million nets scheduled for the end of September 2014. In support of the campaign, PMI is contributing 680,000 ITNs (procurement,

warehousing, and distribution costs), and supporting training of both health facility and community health workers to communicate messages about continued use of ITNs throughout the year. Further, PMI has worked closely with the planning and coordination committees as well as the organization of external technical assistance. A post-campaign evaluation of campaign coverage and correct net use is planned for October and November 2014.

A PMI-funded Peace Corps activity supported LLIN distribution in response to identified local community needs. During implementation of this activity, substantial gaps in LLIN availability were reported as a result of the suspension of routine distribution of nets for several months following the 2011 campaign, coverage gaps during the campaign, and shorter than expected net durability. Using some of the excess nets available from the distribution suspension, Peace Corps/Benin developed a temporary parallel system to provide nets to households to improve malaria prevention activities. In January 2014, the Peace Corps conducted a needs assessment survey among 10,000 secondary school students across 75 communities where gaps were observed following the 2011 campaign. These communities were located across all 12 departments of Benin. About 80% of the participating students reported the need for at least one net. Survey results were shared with the NMCP who then authorized the distribution of 14,000 nets to identified households. As this distribution took place a few months prior to the 2014 mass campaign, Peace Corps is collaborating with the health zones and local authorities to avoid duplication and unnecessary overlap. Following an assessment of this activity, future supplemental distribution will be implemented as needed taking into account the results of the post-campaign evaluation

Finally, PMI continued to support and strengthen entomological monitoring and evaluation of PMI vector control interventions in partnership with the *Centre de Recherche Entomologique de Cotonou* (CREC). An OR activity (further detailed in the OR section) to track ITN loss is ongoing, with first results already announced.

Table B. ITN Gap Analysis for 2014-2016

Calendar Year	2014	2015	2016
Total Targeted Population	10,341,308	10,711,527	11,095,000
Routine Distribution Needs			
ANC	406,848	431,567	473,313
EPI	279,008	296,602	315,098
Schools (no PMI contribution)	0	633,421	654,007
<i>Estimated total need for routine channels</i>	685,856	1,361,590	1,442,418
Mass Distribution Needs			
Universal Coverage	5,745,171	0	0
<i>Estimated total need for mass distribution</i>	5,745,171	0	0
Total Routine and Mass ITN Needs (B)	6,431,027	1,361,590	1,442,418
Partner Contributions			
PMI	1,420,000	800,000	730,000
Global Fund	5,425,272	0	0
Government of Benin	75,000	75,000	100,000
Carryover ITNs	0	489,245	2,654
Total ITNs Available (A)	6,920,272	1,364,245	832,654
(Gap) or surplus (A-B)	489,245	2,655	(609,764)

Assumptions: The entire population is at risk; pregnant women represent 5.2% of the population; children less than one represent 4% of the population, and school children in grades 2 and 7 represent 6% of the population. Routine distribution needs assume a 100% ANC and vaccination attendance.

Plan and justification

PMI will procure and ensure distribution of ITNs for pregnant women and for children receiving EPI services. The PMI contribution will meet approximately 86% of the need for these two routine distribution channels. In addition, PMI resources will be used for communication activities that support improved compliance for year-round ITN usage. Although the NMCP strategy includes utilization of school-based distribution given primary school gross attendance rates are high in Benin (ranging from 70-79% according to DHSs in 2006 and 2012), PMI will not contribute nets to the school-based distribution scheme with FY 2015 funding due to competing needs. The NMCP plans to obtain nets to cover the remaining gap for the 2016 calendar year from the Global Fund as well as via a contribution from the GOB.

Proposed activities with FY 2015 funding (\$3,300,000)

1. *Procure and distribute LLINs*: Procure and distribute 730,000 LLINs to facilities for routine distribution to pregnant women and children under five through ANC and EPI services (\$3,300,000).

Indoor Residual Spraying

NMCP/PMI objectives

Benin's National Strategic Plan (2011-2015) includes IRS as a key intervention for malaria prevention in combination with other vector control strategies. The NMCP goal calls for scale-up of IRS, however, resources for expansion are lacking. PMI is the only donor currently supporting IRS in Benin. The current IRS strategy is to transfer spraying responsibility and campaign ownership to the NMCP and other local partners as part of a larger strategy to build IRS capacity in the country and to invest in the Government of Benin.

Progress since PMI was launched

Spraying began in 2008 in the Ouémé Department located in the south. However, the malaria transmission season in that region outlasted the duration of the IRS insecticidal effect, resulting in sub-optimal impact. Therefore, after three rounds of spraying in Ouémé, IRS operations were moved to the northern department of Atacora, where the transmission season was deemed shorter. Entomological monitoring in 2012⁶ confirmed the presence of insecticide resistance to carbamates among mosquito vector populations collected on the eastern side of Atacora (Table C), prompting the switch from carbamates to organophosphates.

Table C. Carbamate susceptibility of *An. gambiae s.l.* populations collected in IRS districts, 2010 - 2012: % mortality (number tested)

IRS District	October 2010	July 2012	October 2012
Tanguiéta	95(95)	63(82)	63(106)
Natitingou	97(92)	62(84)	
Kouandé	98(42)	79(74)	79(90)
Matéri	98(94)	59(29)	59(73)
Pehunco	95(83)		79(101)

To date, a total of four rounds of IRS have been completed in Atacora. Table D summarizes PMI's annual IRS activities. Recent entomologic surveillance now shows that transmission in Atacora lasts more than four months. It is permanent, but high, between June to November (6 months). The residual effect of previously used insecticides lasts up to 4 months. PMI expects that the longer-lasting pirimiphos methyl formulation used this year will adequately cover the transmission season.

⁶Centre de Recherche Entomologique de Cotonou. 2012. Entomological Monitoring-Evaluation in the districts of Atacora 6 months after indoor residual spraying, Benin, West Africa.CREC/PMI/Abt-2012

Table D. IRS Coverage, 2008 - 2015

	Number of Communes Sprayed	Department	Insecticide Used	Number of Structures Sprayed	Coverage Rate	Population Protected
2008	9	Ouémé	carbamate	142,813	94%	521,698
2009	9	Ouémé	carbamate	156,223	99%	512,491
2010	9	Ouémé	carbamate	166,910	99%	636,448
2010	9	Ouémé	carbamate	200,036	99%	623,904
2011	7	Atacora	carbamate	145,247	96%	426,232
2012	9	Atacora	carbamate	210,380	94%	652,777
2013	9	Atacora	organophosphate (5 communes) carbamate (4 communes)	228,951	95%	694,729
2014	9	Atacora	Longer-lasting organophosphate	254,072	95%	789,883
2015	9	Atacora	Longer-lasting organophosphate	180,000 - 250,000**		

NA = not available

**Represents projected target

In regards to in-country IRS capacity building, a pool of experienced IRS experts has emerged as a result of PMI support. PMI has supported CREC to offer work, study, and research opportunities to National University in Abomey – Calavi graduate students. The scaling up CREC’s IRS/malaria unit, organized to implement the PMI-supported entomology/IRS M&E work plan, has provided field research opportunities to many qualified students. The program has seen a steady stream of post-graduate public health students, working on PMI-related data collection, while at the same time writing papers and building national IRS experience. This relationship has given rise to an estimated 34 graduate-level scientists with strong malaria control experience. There are 26 graduates with or pursuing masters degrees and six doctoral-level degrees⁷ (including staff from NMCP) with malaria control experience, including direct experience in IRS; these experts have published 26 articles in referred journals.⁸ In addition, students and persons trained by CREC have graduated to assume visible and productive roles in ongoing malaria prevention and control in Benin and in multiple sectors of the work force.

Progress in the last 12 months

The May 2014 IRS campaign in Atacora covered 254,072 structures and protected 789,883 people. PMI is committed to building national IRS capacity. During 2014, a one-time WHO mentoring grant⁹ to support NMCP/IRS capacity building, written collaboratively by the NMCP, PMI, and other IRS stakeholders, was funded. The \$50,000 award enabled three senior NMCP IRS managers to gain a year-long, mentored experience in setting up, operationalizing, and managing IRS. In addition to day-to-day

⁷Centre for Entomologic Research of Cotonou (CREC). Contribution of PMI to strengthening the research and training capacity of CREC. Ministry of Health, Benin report 2014.

⁸Ministry of Health 2014. CREC’s Scientific publications supported by PMI/USAID (2010-2014). Center for Entomologic Research (CREC)

⁹TDR Training and fellowship opportunities: <http://www.who.int/tdr/grants/empowerment/en/index.html>. Short-term grant proposal for knowledge management to help improve malaria control in Benin. “Strengthening the National Malaria Control Program (PNLP), Ministry of Health (MOH), Bénin capacity to conduct indoor residual spraying (IRS) for malaria control. Awarded January, 2014.

partnering between the grant recipients and PMI's implementing partner, the program included the creation of work plans by the NMCP for managing all aspect of the 2014 IRS program in one commune of the PMI IRS target area. The resulting IRS network provided for greater NMCP confidence, comprehensive on-the-job training, a vision for independent NMCP management of IRS, and a strong technical support structure during the spray season. Although the NMCP encountered some challenges due to lack of adequate staff (for example the Monitoring and Evaluation Specialist has left the position), the NMCP successfully managed IRS operations in the commune of Tanguieta, one of the nine IRS communes in Atacora.

Plan and justification

In an effort to build on these achievements in capacity building, the NMCP, CREC, and PMI and its IRS implementing partner are now considering ways to establish a more formal national IRS partnership. At this stage, the exact roles that the NMCP, CREC, MOH Department, health zone technical managers, and PMI will play are still under discussion. PMI is committed to ensuring that the quality of IRS implementation and environmental oversight remain strong as leadership, management, and implementation responsibilities are transitioned to Benin counterparts. In October 2014, lessons learned from annual spray campaigns and mentoring will be discussed with the NMCP and partners to initiate dialogue and forge a strategic approach and detailed planning, including clarification of roles of each partner. A revised strategic partnership proposal will be discussed at the next MOP team visit.

Proposed activities with FY 2015 funding (\$4,153,000)

1. *IRS implementation:* PMI plans to support one round of spray operations, using a long-lasting organophosphate insecticide formulation, to cover between 180,000 to 250,000 structures in the Atacora Department. Support includes the cost of equipment and insecticide procurement, planning, community mobilization, spraying implementation, and environmental compliance. Within this activity, PMI will continue to build IRS capacity among Benin counterparts through mentoring new graduate students and those that have previously benefited from basic mentoring and potentially sub-contracting activities (\$4,000,000).
2. *Entomological monitoring:* PMI will support entomological monitoring at 11 sentinel sites. In Atacora, PMI will support insecticide resistance monitoring in four sites (Natitingou, Tanguieta, Kouande, and Pehunco). Insecticide resistance monitoring will also be measured in a control site in Copargo, which borders Donga Department. PMI will support efforts to measure mosquito population dynamics and malaria transmission and evolution of vector resistance and resistance mechanisms as baseline data for potential expansion of IRS in six sites outside of Atacora (Adjohoun in Ouémé Department; Pobe in Plateau Department; Ouidah in Atlantique Department; Dassa in Collines Department; Parakou in Borgou Department, and Kandi in Alibori Department). (\$120,000).
3. *Vector control supplies:* Equipment and replacement supplies for traps, sprays, and landing catches, storage of specimens, and related laboratory supplies will be procured by CDC and sent to Benin for entomological monitoring activities. (\$9,000).
4. *Technical assistance:* An entomologist from CDC will provide a total of two technical assistance visits. One TDY will be to provide continued technical assistance through supervision and training related to entomology/IRS M&E, specifically: strategic planning with CREC and NMCP around issues related to the application of vector-insecticide resistance results to IRS

plans; programmatic planning with CREC/NMCP following results from the PMI/Benin LLIN tracking study; and to conduct additional training in expanded measurement of LLIN surface insecticide levels by means of CDC colorimetric fast test methods. The second TDY is requested to further develop strategic plans for the National IRS Partnership. (\$24,000).

Malaria in pregnancy (MIP)

NMCP/PMI objectives

The national malaria strategy (2011-2015) for MIP, which was developed by the NMCP in collaboration with the DSME, has four components: (i) free distribution of SP for the intermittent preventive treatment of pregnant women (IPTp); (ii) free distribution of ITNs during first contact with ANC; (iii) provision of iron/folate, and; (iv) administering of oral quinine during the first trimester and ACTs in the second and third trimesters for treatment of uncomplicated malaria, and use of quinine during all trimesters for treatment of severe malaria. Pregnant women who are HIV-positive are treated following standard WHO guidelines.

There have been a number of efforts to align the national IPTp guidelines with the new WHO standard to provide monthly observed SP/Fansidar® treatments starting early in the 2nd trimester of pregnancy up to the time of delivery. In late 2012, the NMCP organized a harmonization workshop which resulted in a general agreement that the national malaria guidelines should be revised in line with the new standard; while there was clear buy-in to extend administration of SP up until delivery, there has been some resistance to increasing the number of treatments, in part due to the low two-dose coverage as well as safety concerns within some members of the local medical community. While the issues were being debated within the Ministry, the NMCP revised the MIP training plan to include the revised standard to state three or more doses during pregnancy and up until delivery. At the time of writing the MOP, it was indicated that progress has been made and that the revised new standard would be made to the case management guidelines by the end of 2014. Currently, the NMCP target is that by the end of 2015, 100% of pregnant women will have received a full course of IPTp (as per the national guidelines).

Progress since PMI was launched

Since the launch of PMI in Benin in 2008, PMI procured approximately 5 million SP treatments for IPTp, trained 1,077 health workers on MIP, and reached more than 3.5 million people with communication messages promoting IPTp uptake and nightly use of ITNs for the prevention of malaria in pregnancy.

Results from the 2012 DHS show that 86% of pregnant women make at least one ANC visit, and 81% of pregnant women make two or more ANC visits. Attendance rates are higher in urban areas than in rural areas (91% versus 82%); however, there is only a marginal difference between rates of IPTp2 coverage between urban and rural areas (24% versus 22%, respectively). Despite the high ANC attendance rates, the DHS shows that pregnant women receiving two doses of SP during their last pregnancy in the last two years was only 23%. This rate, although a significant increase from the 2006 DHS (3%), is far below the PMI and NMCP targets of 85% and 100% respectively.

Routine ANC distribution of LLINs is functioning well and PMI to date has been able to provide all LLINs in Benin since the program started in 2008. The 2012 DHS showed a high rate of ITN use among pregnant women (75%), compared with 20% in 2006.

In 2012, PMI conducted a rapid assessment of barriers to IPTp in two health zones in Benin. While the findings indicated that the unavailability of SP at the time of an ANC visit was the primary cause of low IPTp coverage, it also pointed to service delivery barriers, including perceived negative consequences of taking SP during pregnancy by both health workers and mothers, and poor quality of reception and organization of ANC consultations. Long-lasting insecticide-treated nets and SP were being provided free of charge in conformity with national guidelines at the time of the study. Several social barriers were also identified and are reported in the Behavior Change Communications (BCC) section of this document.

Progress in the last 12 months

During the last 12 months, PMI procured 1,050,000 treatments of SP, which covers almost 100% of the nationwide need. Of the 740,000 LLINs that PMI procured and distributed for routine service delivery, over 400,000 will be targeted for ANC. A total of 740,000 LLINs have been ordered for 2015, and 431,000 of these will be made available for pregnant women through distribution at ANC clinics.

In March 2013, PMI supported the NMCP to update the MIP training module (including the interpersonal communications module) to reflect the anticipated revised IPTp standard. PMI trained over 1,043 health workers in 28 health zones in public and private facilities (from April 2013 to March 2014) in MIP and facilitated supervision.

Table E. SP Gap Analysis for 2014-2016

SP Needs and Contributions	2014	2015	2016
Estimated population	10,376,473	10,747,951	11,132,728
Total number of pregnant women targeted at ANC	490,178	507,726	525,903
Total SP needs (B)	1,470,534	1,523,179	1,577,709
SP from PMI	1,050,000	1,050,000	1,072,222
SP from other sources (Government)	222,536	0	0
Total SP procurement planned (A)	1,272,536	1,050,000	1,072,222
Carryover	0	0	0
(Gap) or surplus in SP (A-B)	(197,998)	(473,179)	(505,487)

Assumptions: Pregnant women are estimated to be approximately 5.2% of the population. Target for ANC attendance (i.e., IPTp 3) is 100% in 2014, 2015, and 2016. The NMCP bases SP needs on 3 doses for each of the 100% of pregnant woman attending ANC.

Plan and justification

PMI will continue to support activities aimed at enhancing the provision of effective MIP services in both public and accredited private health facilities in Benin. To that end, PMI will procure enough SP treatments and LLINs to cover 100% of the estimated needs nationwide for ANC service delivery. Additionally, PMI will continue to support BCC training and messaging to improve the demand for ANC services and understanding of the benefits of IPTp among community members and health workers. PMI will support laboratory diagnosis and appropriate treatment of malaria to reinforce the implementation of MIP services, including supervision of IPTp service delivery along with other aspects of effective case management, and promotion of ITN use.

Proposed activities with FY 2015 funding (\$443,000)

1. *Procure SP*: PMI will procure 1,072,222 SP treatments to contribute to the national supply for both public and private facilities (\$193,000).
2. *Support for supervision and refresher training in IPTp*: PMI will provide support for integrated on-site supervision of health workers and refresher training to ensure correct practices regarding IPTp uptake and promotion of the prevention of malaria in pregnancy. Quality improvement activities will be supported that facilitate provider-initiated SP monthly to all pregnant women starting early in the second trimester and up to delivery, closing the gap between SP1 and SP3+, through better record keeping, coaching, and supervision. PMI will review progress achieved in zones with performance-based incentives in place for LLINs and SP for pregnant women to better determine how it can reinforce these efforts. (\$250,000).

CASE MANAGEMENT

Diagnosis

NMCP/PMI objectives

The National Malaria Strategic Plan (2011–2015) recommends free universal diagnostic testing for all patients with suspected malaria using microscopy or RDT. This national policy follows WHO guidelines and standards. The practice of this policy is reinforced at the health facility and at the community levels in public, private, and faith-based facilities. Specific national strategy objectives include providing a microscopy or RDT diagnosis for:

- 100% of suspected cases in public health units
- 100% of suspected cases in selected private health clinics
- 100% of suspected cases in communities served by trained community health workers

Early malaria diagnosis with microscopy or RDTs followed by prompt, appropriate treatment is critical for effective case management. Treatment decisions should be based on test results. The current malaria policy includes the use of RDTs throughout the health system but access to RDTs and microscopy continues to be a challenge, particularly at the peripheral level where RDTs are often the only diagnostic tool. In late 2013, the NMCP began to systematically increase the available stock of RDTs and the number of CHWs trained to use them. Roughly 2,000 of the 12,500 CHWs have been trained to use RDTs during the past year, including 1,200 in zones supported by PMI. Training on RDTs to the remaining CHWs is covered with current Global Fund resources and expected to take place only after

the 2014 universal LLIN campaign. However, at the national level, there are still relatively few CHWs who can perform RDTs.

Additional challenges exist to achieving 100% testing of suspect cases. To avoid stockouts of RDTs, better estimates of RDT need and LMIS consumption data are needed. A health facility survey in a nationally representative sample of 60 public and private health centers in October 2013 showed that only 37% of health facilities had an adequate stock of RDTs (operationally defined as at least 25 non-expired RDTs). Also, the national guidelines for free RDT use only apply to the public health sector and more than half of the country's population is estimated to receive health care services from the private sector.

The NMCP estimates a current inventory of 683 microscopes in health facilities; of these, 226 are not functional. The NMCP estimates a remaining unmet need of 40 microscopes to cover departmental hospitals, health zones, and communal health centers through 2015. The need for microscopes is defined by the NMCP as a minimum of two microscopes for every departmental and health zone hospital and one microscope for every commune health center. In 2009, the World Bank purchased 10 microscopes. Since 2008, PMI has purchased 80 microscopes and will buy another 15 in 2015. In addition, another 15 microscopes are currently needed just for training. There are no current plans to create a bank of slides for microscopy training or RDT lot testing.

PMI continues to support a comprehensive diagnostic strengthening program that involves the training of clinicians and laboratory technicians, the implementation of a quality assurance and quality control system, and strengthening supervision to ensure that health workers follow clinical practice guidelines. Despite progress in improving laboratory worker skills and diagnostic performance, efforts need to be maintained in training and formative supervision for health providers. PMI is placing an emphasis on the regular collection and reporting of reasonably valid monitoring data to assess key health facility indicators that measure the availability of commodities (e.g. RDTs), the appropriate use of diagnostic testing and antimalarials, and the frequency of supervisory visits for health workers. It is not clear, however, if this information is being consistently gathered throughout the entire health information system. Therefore it is critical that PMI ensure that implementing partners include specific elements in their work plan to address the improvement of health information data.

Progress since PMI was launched

Since 2008, PMI has worked to build laboratory diagnostic capacity by strengthening staff expertise through training and supervision, as well as purchasing 80 microscopes and other laboratory equipment and supplies. To help monitor adherence and practice of the national policy on providing malaria diagnosis, PMI has supported two health facility surveys (2009 and 2013) and continues to collect routine surveillance data on malaria indicators.

In February 2011, the NMCP updated Benin's malaria case management guidelines to recommend universal diagnostic testing for malaria. Following this new policy, PMI heavily supported increased training, supervision, and assistance to increase clinical staff's awareness and practice of the new national policy and guidelines.

Recent quarterly data from the Routine Malaria Information System (RMIS) suggest progress in universal diagnostic testing, showing that 82% of reported malaria cases for children under the age of five were confirmed by laboratory testing. However, the most recent DHS found that only 17% of

children under the age of five with a fever were tested. This discrepancy suggests additional work is needed in monitoring and reporting diagnostic practices.

A project report of last year's supervision and health facility data showed that 88% of the 94 health facilities included in the latest round of outreach training support and supervision (OTSS) visits were capable of performing biological diagnosis of malaria (either microscopy or RDT). This same report found that 80% of suspected malaria cases (all ages) had received microscopy or RDT testing. Although this reporting is from a quarterly report and not from a representative sample of facilities, it is an indication of some improvement when compared with similarly collected data from 2013 showing only 37% of suspected cases received laboratory testing. However, preliminary results from the 2013 PMI-supported Health Facility Survey (HFS), a nationally representative sample of 60 health facilities, showed that only 55% of facilities had the capacity to perform either RDTs or microscopy (93% of hospitals and 53% of non-hospital facilities). The much lower result from the HFS may be a more accurate indication of the country as a whole but not where project activities are involved.

Progress in the last 12 months

In the last 12 months, PMI has provided 1.7 million RDTs and basic materials for the maintenance and repair of microscopes. According to recent program reporting, during the past year, semi-annual or quarterly supervision visits to maintain and improve quality microscopy and RDT diagnoses were conducted in 118 facilities (90% were public and 10% were private). Semi-annual supervision was conducted at 72 facilities and quarterly at 46 other facilities. At 564 other health facilities, integrated supervision was conducted at least once, and in the majority of these health zones a second supervisory visit was completed. In contrast, preliminary results from the HFS showed that just slightly more than half (56%) of the health workers interviewed at the 60 health facilities reported receiving formal training on RDT use.

Program reporting noted that 24 OTSS supervisors were retrained in malaria diagnostics and new malaria guidelines, 224 health workers were retrained in malaria diagnostics and case management during OTSS visits, and 36 laboratory technicians participated in a five-day malaria microscopy refresher training. Recently, 28 laboratory technicians were newly trained in microscopy and RDTs, 27 new laboratory supervisors were trained in OTSS, and 106 copies of the malaria laboratory standard operating procedures were printed and disseminated to 95 public and 11 private laboratories.

Over the past five years, PMI Benin has been positioning for national scale-up of RDT use among CHWs. It has been a slower process than anticipated with more major work required to procure sufficient quantities of RDTs for CHW use. It was only in early 2014 that CHWs were trained and equipped to use RDTs and that roll-out to date has been limited to PMI- and UNICEF-supported CHWs. Since March 2014, PMI has trained a total of 1,214 CHWs in RDT use. In the first three months after training, 1,600 children were seen, 1,476 RDTs performed (379 negative and 1,097 positive), and 1082 cases of uncomplicated malaria treated and 254 severe malaria cases referred. PMI remains committed to quality diagnostics monitoring; however, the implementation scale is still relatively small in Benin at this stage.

RDT gap analysis

The estimated need for RDTs for 2016 is 3,466,426. The projected need includes the private sector, public health facilities, and community-level needs. With FY 2015 funding, PMI will purchase two million RDTs to cover most of the country's gap. In 2016, existing microscopy capacity will be reinforced in hospitals and larger health facilities.

Table F. RDT Gap Analysis for 2014–2016

Year	2014	2015	2016
Total estimated RDT need base on consumption data (B)	5,841,311	6,184,917	5,566,426
GOB and Donors' Stated Commitments	Government of Benin	100,000	100,000
	Global Fund/RCC FM/Africare	402,096	342,506
	Global Fund/Round 7/CRS	300,773	495,158
	USG/PMI	1,500,000	1,700,000
	UNICEF	64,320	40,680
	World Bank	1,060,000	2,238,000
Carryover RDTs	0	0	0
Total RDTs available (A)	3,427,189	4,916,344	2,304,000
(Gap) or surplus (A-B)	(2,414,122)	(1,268,573)	(3,262,426)

Assumptions: Gap analysis data based on RDT consumption estimates provided by the NMCP. The coverage rate is estimated at 85% in 2014 and 100% in 2015. The need goes down in 2016 because of the predicted reduced vector presence and the impact of quality diagnostic trainings (both contributing to an estimated 10% reduction in RDT needs).

Plan and justification

With the scaling up of CHWs who are trained to administer RDTs and ACT in 10 health zones, PMI's plan with FY 2015 funding is to help meet the need for additional RDTs at the community and at the health facility level. PMI will also take stock of the diagnostic and quality assurance needs to ensure sufficient diagnostic capacity at the health zone and health facility levels. Quality assurance will be supported by integrated supervision of health workers (see Treatment section).

Proposed activities with FY 2015 funding (\$1,378,000)

1. *Procure rapid diagnostic tests (RDTs):* The estimated need for RDTs for calendar year 2016 is 5,566,426 RDTs. With FY 2015 funds, PMI plans to procure two million RDTs. However, recognizing the estimated needs for RDTs (and other commodities such as ACTs) are imprecise, PMI will remain flexible about purchasing commodities and might reprogram some of the funds to purchase more or less RDTs and ACTs, depending on ongoing assessments. PMI will work with the NCMP and other partners to clarify the true need, better understand RDT usage patterns, and ensure that supplies do not exceed demand (\$1,066,000).

2. *Support supervision and strengthening of malaria diagnostic activities:* This activity focuses primarily on laboratory workers. Training is provided during supervision visits with feedback given directly and individually to workers, emphasizing implementing policies and standard operating procedures, microscope maintenance, and quality control of slides/RDTs. There will be a focus on enhanced outreach training to improve the skills of health workers and to support supervision that improves the national malaria Quality Assurance /Quality Control (QA/QC) program for laboratory and clinical health workers. Existing microscopy capacity will be reinforced in hospitals and health facilities. (\$300,000).
3. *Technical assistance for diagnostics:* With the scaling up of CHWs trained to administer RDTs and ACTs in 10 health zones, additional attention will be given to the performance of CHWs in administering RDTs. A CDC advisor with field and laboratory expertise will provide technical assistance for microscopy and RDT quality assurance at facility and community levels (\$12,000).

Treatment

NMCP/PMI objectives

In July 2012, the Minister of Health directed the NMCP to achieve five bold malaria targets to be achieved by December 2012, two of which were related to malaria treatment: (1) At least 80% of all children with fever receive appropriate care within 24 hours; (2) At least 80% of all clients receive correct case management of uncomplicated and severe malaria. Further, to ensure that norms are adhered to, PMI strives to support the NMCP to achieve the following performance targets:

- At least 90% of health workers nationwide with malaria-related responsibilities are provided supervision at least once every three months.
- At least 90% of patients (all ages) needing an antimalarial (tested, or suspected and no test available) receive an effective treatment as per national guidelines.
- At least 90% of patients (all ages) tested negative for malaria are not provided an antimalarial.

The first-line treatment for uncomplicated malaria is artemether-lumefantrine (AL) for the general population. Artesunate-amodiaquine (AS-AQ) is recommended for infants under six months of age. The guidelines recommend treatment of severe malaria with quinine. For pregnant women, the recommended treatment depends on gestational age. For uncomplicated malaria during the first trimester, quinine is recommended; ACTs are the drugs of choice during the second and third trimesters. Quinine is recommended regardless of gestational age for severe malaria in pregnancy. Severe cases identified in peripheral sites should be referred to a facility with inpatient capacity. Injectable artesunate or artesunate suppositories are recommended for pre-referral treatment of severe malaria.

The free malaria treatment policy for children under five and pregnant women was launched in October 2011. This is now largely in place in public clinics and increasingly in hospitals with the introduction of performance-based financing, which remunerates facilities and providers for providing treatment for confirmed uncomplicated and severe malaria cases. However, the reimbursement process is slow, and many facilities complain of limited funds available for the renewal of ACT stocks.

Implementation of the free treatment policy in the formal private sector environment has proven very challenging given the important revenue generated by malaria treatment. Access to these low-cost or

free ACTs for private sector providers is difficult, as most providers are for-profit and unable to conform to the free malaria treatment policy. Application of the policy for community treatment has been delayed with the slow introduction of RDTs and training for the CHWs, as only confirmed treated cases are exempt from payment.

Artemisinin-based combination therapies are received at the central drug warehouse (CAME) and distributed to health zone drug warehouses nationwide. Facility level stockouts are frequent due to the fragile supply chain (see Pharmaceutical Management section for further discussion).

Progress since PMI was launched

Approximately 7.5 million ACT treatments were procured in multiple shipments from 2008 to 2013. To date, most government health staff and a limited number of CHWs have been trained to diagnose and treat malaria as per the 2011 revised guidelines. PMI has also supported refresher training and supportive supervision of 1,500 health facility workers in integrated management of childhood illness (IMCI) across all 34 health zones nationwide. These workers have been trained to manage uncomplicated malaria cases confirmed with RDTs and to refer children with severe malaria or other undiagnosed fever. National guidelines for community health exist, but a community health policy is under development following a 2013 community health forum to clarify roles and responsibilities as well as packages of services to be provided by CHWs.

By 2013, a total of 542 private sector health providers had been trained in the new malaria case management guidelines. To this end, PMI developed four training modules including a training manual, participating nurse's and doctor's manuals, and an orientation manual for pharmacists.

Progress in the last 12 months

Over the past year, PMI has supported efforts to improve health worker adherence to national malaria case management guidelines, which recommend laboratory confirmation of all suspected malaria cases. Altogether, 573 public sector health workers were trained on malaria case management, 1,214 CHWs were trained to use RDTs, and 99 hospital clinicians were trained on emergency triage protocols for severely ill children, including those with malaria. Supervision was supported in 28 of Benin's 34 health zones, and training on complementary quality improvement efforts (the improvement collaborative approach) was provided to staff in 17 health centers. In addition, PMI procured 1.5 million ACTs.

To transfer resources to the health zones for malaria performance improvement (through supervision, quality assurance, and training), PMI's implementing partner established MOUs to reimburse malaria supervision activities in 28 of the 34 health zones nationwide. In the past 12 months, 534 sites received integrated malaria supervision for IPTp and case management through this support. The role of the six Health Departments in the review implementation of agreed plans has been promising, and some of the health zones attribute their success to performance-based financing, as they are able to provide support to providers to reinforce confirmatory testing of suspected cases. A few health zones have been less enthusiastic about the support and slow to implement their action plans and reimbursement claims. PMI is exploring opportunities to leverage performance-based financing to achieve efficient, full national scale malaria quality assurance and improvement efforts.

Although PMI and other partners have supported a substantial amount of training and supervision, health worker performance still needs improvement. Preliminary results of a PMI-supported national survey of outpatient health facilities found that only 56% of health workers had at least one supervision

visit in the past six months, not all patients with suspected malaria were tested, and patients with severe malaria often did not receive pre-referral treatment according to national guidelines. However, this same survey of a nationally representative sample did show that nearly all patients (87%) who tested positive were given antimalarials, and only 2% of sampled children who tested negative for malaria were given antimalarials. These estimates are very near to the stated NMCP treatment targets.

In the past 12 months, PMI support has expanded Emergency Triage Assessment and Treatment (ETAT) implementation from 12 to 25 hospitals with the aim of improving case management for severe malaria. This expansion has included procuring and installing 12 oxygen concentrators. ETAT performance against standards and case fatality rates are monitored at each site monthly. A total of 1,840 children were seen at the original 13 hospitals from February 2013 to January 2014. While positive performance trends were observed such as triaging at arrival and adherence to case management standards, the case fatality rate of severe malaria among the 311 children diagnosed with severe malaria showed no measurable change (n=16). While results should be interpreted cautiously given the small numbers, if feasible, PMI and the MOH plan to review the total results of ETAT to date from all sites to better assess the effectiveness of the intervention.

The past 12 months have been a transitional period, as PMI and its partners prepared for handover of iCCM activities in five health zones for direct funding to local NGOs with demonstrated iCCM capacity. Recipients are expected to be awarded by October 2014. In the interim, sub-grants have been provided to local NGOs in the same five health zones where a total of 1,214 CHWs were trained to use RDTs in February–March 2014. The actual number of CHWs trained was 190 more than originally planned, to allow for iCCM training for additional CHWs trained in malaria only. Due to these increases, 67 CHWs have not yet received kits, but this is expected to be resolved shortly. Building on previous work with mobile phone solutions to improve communications between health managers and CHWs, PMI supported the development and introduction of a smartphone application for iCCM in the health zones of Tchaourou and Bassila to report on cases seen, referrals, stocks, and routine activities.

Furthermore, USAID/Benin participates in a joint WHO-UNICEF-USAID effort to rapidly scale up iCCM nationwide. This group completed a full mapping of CHWs by health zone, commune, and health facility. Approximately 12,500 CHWs (34% women) were mapped. Of these, 18% provided only malaria treatment and 11% provided iCCM to children with malaria, pneumonia, and diarrhea. Plans were put in place to coordinate support to health zones to train existing CHWs across the uniform iCCM package, building on the planned CHW RDT training funded largely by the Global Fund and PMI. While there has been some success with the scale-up, a critical gap remains for 13 of the 34 zones which only have support of the Global Fund for malaria treatment. The country partnership is reviewing options, including resources from the national budget, to fill this critical gap.

Plan and justification

Using FY 2015 funding, PMI plans to increase support for health zone-level performance improvement, through supportive supervision and comprehensive quality assurance approaches, to improve compliance with case management standards and norms nationwide. PMI will review options, including leveraging the site-based performance-based financing data validation controls, to improve coverage, frequency, and effectiveness of supervision nationwide.

In coordination with national efforts, PMI will support local organizations to expand from 5 to 10 health zones to provide quality iCCM for sick children under five. The zones were selected in collaboration

with the National Directorate of Public Health, Maternal and Child Health Directorate (DSME), and the NMCP based on the need to sustain existing USAID/Benin-supported CHW networks and to respond to the low health care access challenges faced by rural populations, as well as the urban and peri-urban poor. These zones require strengthening, and they have high mortality and low maternal and child health service coverage rates. This work is complementary but not duplicative to the support of the Global Fund, enabling higher coverage of remote communities, increased supervision, and practical M&E tools including mHealth. A performance evaluation is planned with FY 2015 funding; it will review progress and protracted challenges that affect CHW performance and sustainability and is described under the M&E section.

PMI will procure ACTs to close the supply gap and provide support to improve the accuracy of the estimated ACT needs (see Pharmaceutical Management section for further details), monitor planned procurements, and strengthen the ACT supply chain, including provision of ACTs to CHWs and accredited private clinics.

Given the large number of public and private health providers trained since 2011 on the new malaria case management guidelines with PMI support, there is an immediate need to develop a national training strategy and identify gaps by location and provider type. The FY 2015 funding will focus on supporting trained providers to improve and maintain their performance, pre-service training, and in-service IMCI training for the public and private sector.

Commodity gap analysis

In this year's MOP, the projected needs have increased to respond to the increasing needs of the private sector (for-profit and not-for-profit) and community. In the gap analysis assumptions, the coverage rate considered in 2014 is 85% but 100% in 2015. These figures include an expected incidence impact from reduced vector presence and diagnostic confirmation at facility and community levels.

Table G. ACT Gap Analysis for 2014-2016

Year		2014	2015	2016
Total estimated ACT need based on consumption data (B)		2,508,480	3,316,500	3,497,400
GOB and Donor's Stated Commitments	National budget	100,000	75,000	75,000
	GF/RCC/Transition Africare (ends June 2015)	552,199	399,767	N/A
	GF/RCC/Transition/ CRS (ends June 2015)	431,250	583,174	N/A
	USG/PMI (Funded through 2015, proposed 2016)	1,500,000	1,500,000	2,160,000
	UNICEF	60,000	40,680	204,000
	World Bank	590,000	1,101,200	
Carryover ACTs		0	724,969	1,108,290
Total ACTs available (A)		3,233,449	4,424,790	3,547,290
(Gap) or surplus (A-B)		724,969	1,108,290	49,890

It is important to note that AS-AQ, the first-line malaria treatment for children under six months of age, is procured directly by the Government of Benin.

In regards to severe malaria kits, PMI has discontinued procurement of kits as it was unable to provide all essential items. Currently, hospitals purchase kits directly from CAME. Costs are supported by the national budget and increasingly from performance-based financing revenue, receiving payment of approximately \$10.40 and \$11.60 per severe child or pregnant woman case treated respectively.

Proposed activities with FY 2015 funding (\$3,449,000)

1. *Procure ACTs:* Procure approximately 2,160,000 million AL treatments for the public and accredited private sector facilities, (\$2,379,000).
2. *Support IMCI training:* In-service training for both public and accredited private providers to maintain practice standards and prevent gaps in knowledge and performance (\$100,000).
3. *Support quality improvement and supervision of health workers at public and private facilities and at the community level:* Provide technical and financial assistance to the Regional and Health Zone Management Teams to conduct regular supportive supervision visits, IMCI, diagnostics, using the standard malaria supervision module, to review supervision visit findings, and to

support and monitor health facility and community level standard case management quality improvement activities. This comprehensive system is coordinated by the MOH with technical assistance from PMI. It incorporates training of supervisors (including supervisors of CHWs), developing practical tools, conducting on-the-job observation and refresher training, record keeping monitoring, and promoting correct use of diagnostic results (\$370,000).

4. *Support integrated community case management of malaria, pneumonia, and diarrhea among sick children (iCCM):* Up to ten local organizations will be supported to reinforce CHW networks in the ten selected health zones to strengthen their quality (diagnostics, treatment, referrals) and sustainability. Support will include mapping CHW coverage gaps; training of replacement CHWs as per the national iCCM training curriculum; monitoring performance through case reviews and observation; reinforcing collaboration with local leaders, women's groups, schools, and other social opinion leaders; strengthening routine community reporting; and supply chain and supervision monitoring (\$600,000).

Pharmaceutical Management

NMCP/PMI objectives

The National Malaria Strategic Plan (2011-2015) for pharmaceutical management objectives are to:

- Facilitate the purchase of ACTs, SP, ITNs, and RDTs;
- Streamline spending;
- Ensure sustainable distribution of essential products;
- Encourage proper use of drugs and ITNs; and
- Monitor and evaluate the process and outcomes of the supply chain of pharmaceutical management.

Progress since PMI was launched

The CAME is the entry point for commodities into the pharmaceutical system. The main objective of PMI for the malaria commodities supply chain management (SCM) component is to strengthen Benin's SCM system to avoid commodity stockouts and overstocking, including building the capacity of Benin's CAME and improving its performance to ensure commodity availability at the service delivery points. To achieve this objective, PMI is supporting the NMCP and CAME in planning and implementing a well-designed malaria LMIS in order to reduce stockouts and overstocking.

Progress in the last 12 months

During the past 12 months, PMI continued to focus on supporting the LMIS and some supply chain pillar performance improvements like the CAME, the National Laboratory for Quality Control (LNCQ), and Directorate of Pharmacy, Medicines, and Diagnostics (DPMED). The implementation of activities planned in the FY 2013 MOP have led to the following results:

As reported during the workshop to discuss the feedback from quarterly supervisions, 1,632 persons were trained on malaria LMIS, 34 persons benefitted from training of trainers (TOT) activities.

Activities on data collection show an improvement of the consumption data completeness rate from 74% to 95% in 2014.

Stakeholder coordination by the NMCP with support from PMI has contributed to improve availability of commodities at the service delivery points. The Mono/Couffo and the Borgou/Alibori EUVs conducted in November 2013 and March 2014, respectively, showed that only 5% of visited health facilities in Mono/Couffo and 10% in Borgou/Alibori have experienced stockouts of ACTs. These EUVs also showed that 80% or more of health facilities visited in Borgou/Alibori accurately reported their consumption data.

A recent quantification planning exercise revealed that 64% of the consumption data reported by the 48 health facilities visited were correct. This helped the NMCP and other SCM stakeholders perform the first quantification exercise based on consumption data and produce a two-year supply plan. PMI provided continuous support to the NMCP to improve consumption data quality and upgrade Medistock software. PMI is actively helping health zone depots to acquire the legal authorization to contract with CAME, allowing depot managers to efficiently manage commodities at the zonal level. PMI is also supporting efforts to improve the timeliness of routine testing by facilitating communications between the NMCP and the LNCQ and building the capacity of the LNCQ to perform drugs testing on a regular basis. These efforts will be accelerated with FY 2014 funding.

Plan and justification

Fiscal Year 2015 funds will be used to focus on strengthening the capacity of multiple country partners to better forecast/quantify, track, and store malaria commodities. LMIS supervision will be reinforced by the NMCP/LMU and the SCM/TWG, to improve the quality of data completeness and reporting and the availability of commodities at the health facility level. PMI will provide additional support to the national laboratory for quality control testing of malaria commodities at the entry port and spot checks at facilities. This support includes purchase of laboratory equipment, reagents, Minilabs®, and training of personnel. A national supply chain assessment will be conducted in 2015 in partnership with CAME, DPMED, DNSP; the NMCP will use the findings to establish SCM priorities. Other specific interventions will be defined based on the findings of this assessment.

Proposed activities with FY 2015 funding (\$745,000)

1. Strengthen logistics management information system and supply chain management: Continue to support and strengthen the national LMIS as well as the supply chain management system to focus on the department and zone level. This includes a software upgrade and scorecard system for monitoring at all levels; technical assistance to CAME in warehouse management and data analysis; technical assistance to CAME, DPMED, NMCP, and zones to strengthen their capacity in forecasting antimalarial drug and RDT needs and gap analyses; assisting DNSP, NMCP, DPMED, CAME, and LNCQ to update the national directives and edit SCM standard operating procedures (SOPs) at all levels; improving communications on consumption/stocks from health facility to district and higher levels; developing an integrated waste management plan and strategy and improving the central and decentralized system to manage the disposal of malaria commodities. (\$500,000)

2. *Supervise and monitor the redesigned logistics management information system:* Routine LMIS supervision from NMCP and Departments to the health zones, including the health centers. This includes the transfer of capacity towards the department and zonal levels. (Supervision within HZs covered under case management quality improvement) (\$50,000).

3. *Test and control drug quality:* Provide support to the national laboratory for quality control through routine testing of malaria commodities entering the port and spot checks at public and private facilities. This includes the cost of reagents, equipment for testing, and Minilabs®. (\$195,000).

MONITORING AND EVALUATION

NMCP/PMI objectives

Benin's national malaria M&E strategic plan (2011–2015), is designed to capture malaria trends and describe the dynamics of social, temporal and spatial distribution of morbidity and mortality. Ideally this information can be used to determine the risk factors for malaria in order to propose measures of prevention and appropriate recommendations that inform interventions or assess the prevention activities.

Benin's M&E activities include a multi-institutional M&E Technical Working Group and monitoring of programmatic process indicators with routinely collected data and periodic evaluations of outcome indicators. Benin has multiple sources of malaria information, all of which are supported and strengthened by PMI and include: 1) household and health facility surveys; 2) end-use verification surveys; and 3) the national HMIS.

The NMCP's M&E operations have recently transitioned through an interim leadership period and will benefit from the arrival of a new section chief which will allow greater M&E capacity and more sustained engagement with important M&E activities. As PMI/Benin provides the NMCP with technical assistance for its 2015-2018 National Strategic Plan, additional M&E opportunities that will benefit the NMCP will be more realistically discussed and planned. Anticipatory activities include a thorough assessment of Benin's M&E system and completion of a planned M&E workshop focused on the standardization of Benin's RMIS indicators.

Progress since PMI was launched

Demographic and Health Surveys were completed in 2006 (PMI's baseline survey) and 2012. These DHSs were methodologically similar with two exceptions: 1) the 2006 survey was done at the end of the rainy season and the 2012 survey was done during the dry season, and 2) only the 2012 survey measured parasitemia prevalence. The United Nations Children's Fund is administering a Multiple Indicator Cluster Survey (MICS) in 2014; however, due to timing, PMI is not able to incorporate an expansion of the malaria module to measure parasitemia. The next DHS is planned for 2016 and will be timed to capture parasitemia (i.e., end of rainy season).

Another nationally representative household survey (the Leadership and Development, or LEADD survey), based on the MIS methodology, was conducted in November 2010. However, methodological concerns and the use of non-standard indicators may have compromised the validity of the results.

Results of the PMI-supported LLIN durability assessment¹⁰ that monitored indicators of durability, survivorship, and integrity observed that survivorship was closer to a two-year LLIN serviceable life assumption as opposed to three years. Additionally, the integrity of nearly one third of ‘surviving’ nets was so degraded that they were in need of replacement. As a result of this study, PMI, in collaboration with CREC and the NMCP, will conduct regular Vector Control Work Grouping meetings to discuss programmatic implications and opportunities, such as increasing BCC strategies to support LLIN repair and maintenance and to reinforce available channels for routine replacement of LLINs between national campaigns. There is currently a centrally-funded operational research study underway in Benin that will also help inform PMI on the success of certain strategies applied in specific test areas to increase the longevity and utilization of LLINs.

Four of the 11 IRS entomological monitoring sites conducted by CREC continue to monitor vector-insecticide susceptibility. This includes evaluations for the presence of physiological resistance mechanisms in the malaria vector (including mixed function oxidases, a mechanism that, if present, can be managed through the use of new ITN products). PMI will continue to support its existing resistance entomological surveillance and LLIN monitoring activities

In 2009 and 2013, nationally representative health facility surveys were done to assess the availability of malaria-related commodities, diagnostic capacity, and quality of malaria case management. Beginning in 2010, EUV surveys of commodity availability were conducted on a quarterly basis and completed on small convenience samples of health facilities. A larger EUV survey on a nationally representative sample of 128 health facilities was completed in April 2012.

From 2008 to 2014, PMI funded the Regional Institute of Public Health in Benin to supervise the collection and reporting of data on malaria morbidity and mortality from five hospital sentinel surveillance sites. Data reported from the sites generated tables of key malaria indicators and trend analyses, however, the information generated from the data was not used to inform any programmatic decisions or activities. Evaluations of the sentinel sites showed that relatively low proportions of outpatient cases with suspected malaria were tested (63% in 2010 and 60% in 2011), due in part to the persistent commodity stockouts of RDTs, and ACT presentations at the sites. Additional situational and organizational constraints of the system prompted a PMI/NMCP decision to suspend the surveillance activity in 2014. There is continued interest by the NMCP and PMI for continued utility of a modified sentinel surveillance system designed to inform decision making and strategic planning for malaria interventions. However, until systemic challenges are addressed, there appears to be limited added value of the investment beyond what is already captured in the HMIS. There are ongoing meetings with CREC and NMCP, and other M&E TWG members on ways of coupling CREC’s strong entomologic surveillance with available historic and current epidemiologic data to inform decision making on strategic directions for PMI interventions such as IRS.

The HMIS reports the number of malaria cases, deaths, and case fatality rates at the health facility level. Prior to PMI, the HMIS did not distinguish clinically diagnosed cases from those confirmed by

¹⁰British Medical Journal for Infectious Diseases and Malaria (2014)14 :69

laboratory testing. In addition, concerns existed about the accuracy, timeliness, and coverage of the data, as well as how the data were used for decision-making. With the support of PMI, the World Bank, and WHO, the NMCP is strengthening the malaria module of the national HMIS (i.e., the Routine Malaria Information System, or RMIS) to achieve the evaluation indicator goal of at least 80% of public and private health facilities continuously and accurately reporting malaria data. Over the past two years, quality, timeliness, and completeness of data reporting have improved significantly and the number of health facilities reporting exceeds the desired goal (details below). The system collects and reports on twenty key malaria indicators each month. The module was recently updated to include reports from community health workers; however the precision of confirmed positivity, and the reliability capturing total health facility malaria incidence (definition) remain significant concerns. With support from PMI, quarterly RMIS newsletters are prepared to keep stakeholders abreast of the current malaria epidemiological situation in Benin.

Table H summarizes the different M&E activities that have been supported by PMI as well as other partners.

Table H. Monitoring & Evaluation Activities

Data Source	Activities	Calendar Year (2006-2016)										
		'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16
Household surveys	Demographic and Health Survey	X						X				X
	Multiple Indicator Cluster Survey									X*		
	LEADDs					X						
Health facility and other surveys	EUV survey					X	X	X	X	X	X	X
	Health facility survey				X				X			
Malaria surveillance and routine system support	Sentinel surveillance			X	X	X	X	X	X	X		
	Support to HMIS	X	X	X	X	X	X	X	X	X	X	X
	HMIS Evaluation (see HSS section)								X			
Entomological monitoring	Entomological surveillance and resistance monitoring			X	X	X	X	X	X	X	X	X
	Routine net longevity monitoring					X						
Therapeutic efficacy testing	<i>In vivo</i> efficacy testing									X*	X	X

*Funded by WHO

Progress in the last 12 months

M&E support: During the last 12 months, PMI and NMCP continued to collaborate closely on M&E issues, and PMI Resident Advisors remained active participants in the M&E Technical Working Group (TWG). The TWG met several times to review and discuss the value of a sentinel site system for Benin and whether its epidemiologic data could complement entomological data. It was agreed that epidemiologic data was critically needed to achieve a more comprehensive understanding of the distribution of malaria burden and malaria transmission at the sub-district or sub-department level. Evaluations showed that the sentinel surveillance sites did not provide any added value to the existing HMIS/RMIS as this activity did not generate during the past five years accurate malaria burden data to inform programmatic decisions. The M&E WG in collaboration with the NMCP decided to instead invest the PMI funds towards strengthening the HMIS/RMIS. In the past year, the RMIS form was updated to include data received from community health workers (CHWs). The extra redirected funds will go towards ensuring that CHWs and district and health zone coordinators understand how to complete the RMIS forms (trainings and supervision). Additionally, the M&E WG will work with the NMCP to encourage and reinforce quarterly meetings to review and validate the data and release the

RMIS bulletins in a timely manner. The M&E TWG will continue to look for credible data that can assist all partners to make decisions about ongoing malaria control activities and interventions.

PMI supported the training of 153 community health workers to pilot the collection and transmission of data using a new pilot mHealth (SMS) initiative to improve timeliness and quality of data reported to health facilities in two zones (Bassila and Tchaorou). Data from this pilot activity is currently being analyzed.

Survey Support: PMI continued support of EUV surveys to gauge commodity availability at health facilities. The most recent EUV (March 2014) conducted in central Benin noted a continued lack of communication between central and peripheral levels regarding supply chain management of malaria medications. In October 2013, PMI conducted the HFS to assess the readiness of outpatient health facilities to manage malaria, as well as the quality of malaria case-management in outpatient settings, laboratory testing and antenatal care. Results from the EUVs and preliminary results from the HFS showed consistent stockouts of malaria commodities including RDTs, ACTs, and SP. As a result, diagnoses of malaria usually did not follow the national treatment guidelines, which require testing using RDTs when malaria is suspected. Additionally, recent EUV reports noted a continued lack of communication between central and peripheral levels.

In the last several months, PMI/Benin has learned that WHO intends to implement therapeutic efficacy studies (TES). Following discussions with WHO and PMI leadership, TES will be implemented in a total of four sites over a two-year period. PMI will work collaboratively with WHO to fund TES in two sites in alternate years. The selection of sites for 2014, 2015, and 2016 has not yet been determined.

HMIS Support: During the last 12 months, PMI supported refresher training to statisticians in the 34 Health Zones on the operation and maintenance of the data logic system used in the collection of National Informational and Health Management data System (SNIGS) and RMIS. Quarterly supervision of selected data collection sites in six departments, covering 34 health zones were conducted, in addition to two routine data quality assessment audits designed to improve data collection. PMI provided technical guidance to improve the quality of health facility data reported to the RMIS through quarterly regional validation workshops. From October 2011 to September 2013, the percentage of health facilities submitting complete and timely data on malaria burden indicators increased from 35% to 81%. Two quarterly and one annual RMIS bulletins were published.

Plan and justification

PMI is committed to working with the NMCP to support monitoring the quality of malaria data collected through RMIS to ensure that the programmatic needs of the NMCP are met. The ability to use routine data to identify temporal and geographic variation morbidity or mortality in an endemic country like Benin would be an important milestone to achieve. Support from PMI will contribute to key data collection and analysis activities, including quarterly EUV surveys and the 2016 DHS, to work towards strengthening the NMCP's M&E strategy.

As PMI supports iCCM national scale-up, it is critical to evaluate the performance, costs, challenges, and lessons learned from this intervention. PMI has increased support to health zones offering iCCM from five zones in 2009 to 10 zones in 2015, doubling the number of CHWs providing iCCM services. A midterm process evaluation will assess the performance effects of the expansion of doubling

geographic coverage (more CHWs providing services, more supervision, more reporting into HMIS and adaptation for urban contexts) as well as review the newer components introduced since the 2012 iCCM evaluation including the transfer of management to local organizations, the use of mHealth, the incorporation of RDTs, as well as the implications of the free malaria treatment policy.

Proposed activities with FY 2015 funding (\$1,012,000)

1. *Strengthen health management information system:* PMI will continue support to strengthen procedures and indicators for malaria in the national HMIS and comprehensive strengthening of the overall system. The funding will support the NMCP's efforts to implement PMI's recommendations, in particular: 1) providing training in database management, analysis, and survey methodologies to enhance data accuracy and quality; 2) increased technical assistance and material support to the zonal offices; 3) creation of a final, detailed (and updated) indicator list with better case definitions; and 4) the creation and printing of written documentation (i.e., standard operating procedures, protocols) with specific tasks, dates, and persons responsible for all levels participating in the RMIS (\$250,000).
2. *Provide technical assistance to NMCP:* Provide technical assistance to the NMCP to evaluate the data quality of the RMIS (\$50,000).
3. *Conduct EUV surveys:* Conduct quarterly monitoring of the availability and utilization of key antimalarial commodities at the health facility level (\$100,000).
4. *Evaluation of NGO implementation of iCCM:* Conduct a midterm evaluation to assess coverage, performance, and implementation quality of PMI-supported iCCM activities across 10 health zones. Methods will include a household knowledge, practice, coverage survey, CHW case management observations, health supervisor interviews, reported data validation, and CHW system functionality review (selection, training, supervision, M&E, supply chain, and working tools). Results from the evaluation will identify weaknesses as well as promising practices to help improve implementation and inform community case management policies (\$150,000).
5. *Support 2016 DHS:* Provide technical and financial support for the planning and implementation of the 2016 DHS (\$350,000).
6. *Therapeutic efficacy testing:* PMI plans to support therapeutic efficacy studies at two sites to monitor the susceptibility of *P. falciparum* to the first-line ACTs (\$100,000).
7. *Technical assistance:* Support for technical assistance from the CDC PMI M&E team. Technical assistance will include working with the NMCP to support strengthening RMIS (\$12,000).

OPERATIONAL RESEARCH

Table I. PMI-funded Operational Research Studies

Completed OR Studies			
Title	Start date	End date	Budget
Implementation of a vector control strategy based on a combination of a pyrethroid LLIN + a non-pyrethroid IRS at the community level to assess its protective efficacy against malaria in an area where <i>Anopheles gambiae s.s.</i> has a high level of pyrethroid resistance.	4/2008	10/2011	\$300,000
Evaluation of a new technology (colorimetric test) for determining when to replace LLINs in communities	06/2008	03/2009	\$37,000
Durability assessment results suggest a serviceable life of two, rather than three, years for the current long-lasting insecticidal mosquito) net (LLIN) intervention in Benin	07/2011	07/2013	\$200,000
Ongoing OR Studies			
Title	Start date	End date	Budget
Field testing of dried malaria positive blood as quality control samples for malaria RDTs	05/2014	11/2014	\$25,000
Planned OR Studies FY 2015			
Title	Start date (est.)	End date (est.)	Budget
Evaluating the impact and cost-effectiveness of integrating LLIN and IRS insecticide-based vector control interventions	4/2016	5/2017	\$160,000

Progress in the last 12 months

A study to determine the operational feasibility of using dried tube specimens (DTS) as quality control and proficiency testing samples for malaria RDTs began in July 2014. Dried tube specimens and RDTs are stored at a reference laboratory and are compared to DTS and RDTs stored at two health facilities to determine the ability of DTS to detect facility RDTs and also how quality control based on DTS can be incorporated into a larger RDT quality assurance program. Completion of data collection is scheduled for January 2015. Programmatic implications will determine if having a quality control method for RDTs in the field is likely to increase the confidence in the tests and results in an increase in the

proportion of suspected malaria cases that are confirmed by a test and also decrease antimalarial drug prescription to patients who test negative by RDTs.

Plan and justification

The NMCP's national plan for malaria prevention related to LLINs is to achieve universal LLIN coverage. One distinct approach for universal coverage is a national LLIN distribution campaign conducted every three years. The three-year LLIN distribution-replacement campaign is based on the widely accepted assumption that nets remain effective for three to five years under field conditions.¹¹ To assess the validity of this assumption, PMI supported an LLIN durability tracking assessment¹², conducted by CREC. The results¹³ indicate that the LLINs distributed during a 2011 LLIN campaign had a serviceable life of two, rather than three, years, raising the question of LLIN impact during the third year of distribution-replacement cycle.

PMI proposes an OR study to evaluate conducting a single round of IRS every three years to compensate for the loss of LLIN impact and determine a more cost-effective approach to vector control strategies. Using FY 2015 funds, PMI plans to support a baseline survey prior to the next national LLIN campaign, scheduled for calendar year 2017.

Proposed activities with FY 2015 funding (\$160,000)

1. *Operational research to evaluate a new IRS model*

PMI plans to support an OR study to evaluate the impact and cost effectiveness of integrating IRS and LLIN control activities. With FY 2015 funds, PMI will support a baseline survey to assess the impact of IRS on a population with LLINs that are more than two years old (\$160,000).

BEHAVIOR CHANGE COMMUNICATION

NMCP/PMI objectives

The national malaria BCC strategy was developed in 2006 as part of the 2006-2011 National Malaria Control Plan and Strategy. It is designed to serve as an integrated communication plan, promoting standardized key messages and tools for all malaria partners in Benin. The strategy has identified the following universal BCC target indicators for both urban and rural populations:

- 100% of heads of households know that ITNs are an effective means of prevention against malaria
- 100% of mother and/or child caregivers know the treatment for uncomplicated malaria
- 100% of mother and/or child caregivers know that treatment with ACTs requires positive confirmation with RDTs
- 100% of mothers and/or caregivers know the signs of malaria
- 100% of pregnant women are aware of IPTp and its advantages

¹¹WHO / WHOPEs.Recommendations and Reports of WHOPEs Working Group Meetings. Geneva. World Health Organization; 2012

(<http://www.who.int/whopes/recommendations/wgm/en/>)

Masum, H. *et al.*2010. Africa's largest long-lasting insecticide-treated net producer: lessons from A to Z Textiles. BMC Int Health Human Rights, 10:56

¹² Tracking Long-lasting Insecticidal (mosquito) Nets (LLINs) Distributed by National Campaign: Monitoring LLIN loss,physical deterioration and insecticidal decay in Benin. PMI OR 2010-2013.

¹³Gnanguenon *et al.* 2014. Durability assessment results suggest a serviceable life of two, rather than three, years for the current long-lasting insecticidal (mosquito) net (LLIN) intervention in Benin. *BMC Infectious Diseases*14: 69. <https://www.biomedcentral.com/1471-2334/14/69>.

Progress since PMI was launched

The 2012 DHS results have shown an improvement of behaviors around the use of ITNs with the percentage of those who slept under an ITN the night before the survey increasing among both pregnant women (from 20% in 2006 to 75% in 2012) and children under five years of age (from 20% in 2006 to 70% in 2012). Unfortunately, prompt care-seeking of children with fever and compliance with at least two doses of SP during pregnancy have not improved near the level seen with use of nets (from <1% in 2006 to 7% in 2012, and from 3% in 2006 to 23% in 2012, respectively).

PMI supports a multi-pronged approach to reach all segments of the population, including those who are illiterate, through multiple channels including mass media spots on national television and radio featuring malaria music videos, social mobilization events using community theatre, social marketing, as well as interpersonal communications through health facility staff, CHWs, and social and opinion leaders. Reality radio talk shows are aired on national and local radio. Highly visual flyers are produced on IPTp and SP, LLIN use, and treatment of confirmed malaria cases with ACTs. PMI provides technical assistance in the production of radio programs including the monitoring and supervision of recording, editing, and airing. Furthermore, guidelines are provided to radio stations to ensure appropriate and consistent messages. However, more systematic monitoring of BCC activities beyond process indicators is still required. For example, PMI's implementing partner reports that, to date, 104,000 flyers have been produced and distributed through facility and community health workers to parents and other caregivers as well as pregnant women; however, there is no rigorous information about changes in awareness, attitudes nor practice.

Since 2010, PMI has supported the revitalization of the NMCP's malaria communications technical working group (TWG). The group is responsible for reviewing the technical content of all malaria BCC messages and updating the national malaria communications strategy. Group membership is wide, including financial, technical, and implementing partners including the World Bank, UNICEF, WHO, Africare, Catholic Relief Services, PMI, *Association Béninoise du Marketing Social* (AMBS/PSI), and the Peace Corps.

For communication activities specifically related to IRS, PMI adopted a streamlined approach under which the majority of spray operators are also engaged in community mobilization, structure identification, and enumeration activities.

Targeting the lower income working class urban population, the workplace social marketing of LLINs has been underway since 2012 and is now functional in 21 companies with a total of 95,500 LLINs sold. Revenue from the sales is used for malaria and general health promotion activities in the workplace.

Progress in the last 12 months

During the last 12 months, PMI-supported household-level communications were implemented nationwide. Malaria workplans with BCC activities and subgrants with local organizations were put into place in all 34 health zones to intensify efforts. PMI trained 1,634 CHWs in communication strategies in order to promote the prevention of malaria in pregnancy at the household level; collectively, these CHWs reached 141,161 people through home visits and group education sessions. A PMI-supported

reality radio shows reached 9,100 women of reproductive age and expanded to 647,574 more women through re-broadcasts. Community events (fairs, theatre) reached 28,121 people.

Routine monitoring of the effects of BCC activities was a focus this year and PMI supported the training of local partners in BCC Best Practices in Ethiopia in an effort to strengthen this critical component. In addition, a rapid BCC assessment was conducted in September 2013 in 11 villages purposively selected as they received the full malaria BCC activity package to assess the contribution to changes in knowledge, attitudes, and practice. The assessment found that 52% of pregnant women had received IPT2, 82% slept under a LLIN, and 83% of children under five slept under a LLIN the previous night. Exit interviews with clients indicate that traditional/home-based care practices are important barriers to early care-seeking for suspected malaria cases and perceived and real stockouts of malaria products at facilities are impediments to desired care-seeking behaviors.

Consistent with this increased focus on monitoring the impact of BCC activities, PMI also supported the development of an evaluation protocol to provide more scientific evidence in regards to determinants and performance of malaria prevention and care-seeking behaviors which will be carried out in late 2014. The planned evaluation will include 400 structured interviews for mothers across 10 health facilities in 2-4 health departments that received the most intense PMI supported BCC intervention over the past three years. The tool will measure independent variables (exposure to messages, specific channels, and message recall), intermediate outcomes (malaria knowledge measures), and health outcomes (e.g. slept under LLIN last night, received IPTp last pregnancy, received more than one IPTp treatment during last pregnancy, obtained diagnostic test for malaria, treated confirmed malaria with ACT, etc.)

With the heightened concern about counterfeit ACTs on the market in Benin over the past year, PMI, with core support, has initiated the design of a special communication campaign, targeting urban poor families about the risk associated with purchasing ineffective medicines and the benefits of testing before treating suspected malaria cases. This campaign is planned to be carried out over a one-year period in the Cotonou/Abomey-Calavi markets. Recall surveys will be conducted to determine the reach of the activity.

Plan and justification

With FY 2015 funding, PMI will support household-level communications on the problem behaviors of IPTp and early care seeking for fever while maintaining core messages on use and maintenance of nets and IRS. Local organizations will be supported to implement the national Malaria BCC strategy using mixed local media. Best practices emerging from the planned 2014 counterfeit ACT communication plan will be continued under the bilateral and local NGO partners operating in the urban areas. As part of these efforts, a new BCC partner will provide technical assistance to strengthen effectiveness monitoring and decision making by the BCC TWG to sharpen the national communications strategy. Given the role of the Direction of Public Health in the coordination and integration of BCC activities, PMI will support modalities of collaboration and clarification of roles and funding is planned to be provided directly to the NMCP to better manage its BCC and other TWGs. As the partners in country move forward with collecting BCC data to measure behavior change and demonstrate the value of specific approaches, PMI will encourage and help facilitate the use of PMI resources such as the BCC pilot toolkit.

Proposed activities with FY 2015 funding (\$350,000)

1. *Support community and household-level malaria communication activities* to promote net use among pregnant women and children under five years of age; the hanging up and maintenance of nets; improving prompt and appropriate careseeking behavior; and encouraging ANC attendance and IPTp up until delivery. PMI-supported local organizations working in ten selected health zones will receive technical and financial support to implement national malaria BCC messages and materials using multiple channels including local radio, community theatre, traditional music, local women's groups, as well as interpersonal counseling from health providers and CHWs. (\$250,000).
2. *Technical assistance for national BCC strategy and mass communication campaigns.* This assistance will be for updating and disseminating the national strategy and strengthening routine BCC activity monitoring in tandem with the malaria BCC TWG. Support will also be provided to plan and deliver national malaria events and special campaigns. (\$100,000).

HEALTH SYSTEMS STRENGTHENING/CAPACITY BUILDING

NMCP/PMI objectives

The Benin malaria strategic plan aims at contributing to the achievement of the Millennium Development Goals (MDGs) in reducing by 75% the number of malaria cases by 2015, with year 2000 as baseline. PMI is a major component of Benin's GHI country strategy. Health systems strengthening (HSS), and women, girls, and gender equality are the two key principles chosen as emphases in the implementation of the GHI strategy. In the last three years, the NMCP and PMI have focused on three major challenges of the NMCP as a unit within Benin's health system: (1) the lack of adequate human resource capacity – both in numbers and skills sets – to plan, manage, and coordinate a comprehensive malaria program; (2) the collection, management and use of health information for M&E and surveillance purposes; and (3) the management of the health commodities supply chain, which is especially weak at the periphery, resulting in stockouts, and expiration of drugs and RDTs. With these priorities in mind, PMI has worked in close collaboration with the GOB and other stakeholders (WHO, the Global Fund, UNICEF, bilateral partners, and NGOs) to reduce these barriers and reinforce the delivery of malaria interventions. PMI's support in strengthening the health system and the integration of malaria interventions with other programs has benefitted other MOH units and health programs, especially child and maternal health.

Many donors are working to strengthen Benin's public sector health system. One important mechanism is the Health Compact, signed in 2011, which was promoted by health-focused multilateral organizations and European donors to strengthen the health system. Important signatories include: the Global Fund, the *Coopération Technique Belge*, the World Bank, the Global Alliance for Vaccines and Immunizations, and more recently, the *Coopération Française*, through their recently approved Muskoka Initiative. The purpose of the compact is to maximize aid effectiveness to the health sector through the support of country systems. USAID/Benin is not a signatory to the compact and is still in the early stages of implementing procurement reforms under USAID Forward. The MOH is a principal recipient under Benin's Global Fund Round 9 grant that includes an HSS component. This will

complement the results-based financing arrangements already approved and ready to be implemented by the Global Alliance for Vaccines and Immunizations (two health zones) and the *Coopération Technique Belge* (five health zones). The World Bank is already implementing a \$22.8 million grant project to increase the coverage of quality maternal and neonatal health services in eight health zones in Benin. Two health zones remain uncovered.

Universal health care financing through the *Régime d'Assurance Maladie Universelle* (RAMU) is a new MOH priority, and was launched by President Yayi Boni on December 19, 2011. It is based on the existing *mutuelles*, the grassroots health cooperatives supported by several aid organizations in Benin including USAID, the *Coopération Suisse*, the *Coopération Technique Belge*, and UNICEF. This initiative will have a significant impact on the financing of malaria services throughout the country. To achieve the target of the MDGs 4 and 5, the Government of Benin has decided to make malaria case management free of charge for children less than five years of age. With the passage of RAMU, Benin expected an increase in access to malaria treatment services. However, RAMU instead created some dysfunction in the drug supply chain, as some health facilities do not generate enough income from malaria case management commodities to cover the cost of providing free medicine to all clients.

Capacity building and health system strengthening will focus on improving leadership, management, and governance of the NMCP as a functional unit within the MOH. Support to the Department-level malaria staff will focus on data quality, data analysis, and supply chain management.

Community case management is implemented by local organizations who are in the process of transitioning to direct USAID funding from both PMI and USAID/Benin's Maternal and Child Health and Family Planning funding streams.

Progress since PMI was launched

PMI directly invests in government and local organizations where capacity is present. Direct government investment for malaria control efforts is targeted towards Benin's NMCP. Over the past five years, PMI has invested in activities addressing the 2009 organizational capacity assessment recommendations including investments in human resources, routine malaria information systems and information technology, donor coordination, and supply chain management

Capacity building: PMI investment during the past three years has focused on capacity building. This includes training provided to health workers in health facilities and community health workers as well as some medical equipment to health facilities and hospitals. It also includes support for various training provided to NMCP staff members either on technical interventions or on leadership development in order to enable them to effectively accomplish their responsibilities. The table below presents an overview of training activities in support of the malaria control program during the past three years.

Table J. Number of people trained per year during the past three years

Training description	2011	2012	2013	Total
Malaria in pregnancy	0	1,225	1,813	3,038
Malaria diagnosis	15	967	2,196	3,178
Malaria case management	110	1,953	2,260	4,323
Malaria case management with private sector	0	0	77	77
Malaria commodities	16	1,947	109	2,072
Monitoring and evaluation	13	120	122	255
Private sector (LLINs, distribution)	0	110	77	187
BCC	0	445	720	1,165
ICCM (acute respiratory infection & diarrhea)	0	0	1,550	1,550
Other trainings (Leadership development program)	53	124	0	177
TOTAL	207	6,891	8,924	16,022

Source: ARM 3 Progress report

Progress in the last 12 months

PMI continued supporting training activities on each malaria technical intervention during the past 12 months. As shown in the table above, 8,924 health professionals were trained at various levels of the health care delivery system as well as at malaria program coordination level. The majority of training events supported by PMI in 2013 met or exceeded the targeted goals. Specific capacity building activities to improve malaria services include training of 635 public sector health workers in malaria in pregnancy and 68 trainers in inter-personal communication related to MIP. PMI also supported supervision of health facility staff in 22 of the 34 health zones. To improve the quality of diagnosis, PMI supported the training of 28 laboratory technicians in microscopy and RDTs use in 22 health zones. Following these training activities, supervision visits were conducted after 27 new OTSS supervisors were trained.

In accordance with a memorandum of understanding signed between PMI implementing partner and health zone management teams in the 34 health zones, PMI sponsored the training of 597 of the 977 public sector health workers on the new case management protocols and 22 of the 34 health zones received supervision after the training. Also, health workers in 17 health centers in the populated suburban areas of Abomey-Calavi received training on collaborative approach to improve case

management. Health workers in the public sector were also trained in pharmaceutical management, behavior change communication as well as monitoring and evaluation.

PMI support continued with the revival of the Technical Working Groups (TWGs): M&E, Supply Chain Management, Behavior Change and Communication, Case Management, and Vector Surveillance. The resumption of PMI's commitment to increase its Advisors presence at the NMCP office; the participation of NMCP staff in PMI quarterly program reviews, the MOP planning exercise, the Integrated Annual Work Plan workshop and other malaria meetings. The TWGs now have started holding meetings and the Supply Chain Management TWG is meeting weekly to monitor stocks. Also, PMI participated in the committee that revised the National Strategic Plan and helped recruit an Information Management consultant who is currently assisting the NMCP.

With regard to improving the health information system, PMI continued its support to the NMCP in implementing the recommendations of the evaluation of the existing health information system conducted in 2013. Some of the findings included: lack of a centralized database at the NMCP; different health information databases stored on the personal computers of staff; inconsistency in data collection for some databases; and a low level of motivation among staff responsible for collecting data. PMI continues supporting the improvements in the system, including developing scopes of work for positions to be filled; the re-establishment of internet connection at the NMCP; the provision of updated hardware; and continued training of personnel responsible for data collection and management.

Finally, regarding the supply chain management, PMI has supported the NMCP and CAME by reviewing current plans and assisting in development of better tracking tools. The results of these actions have helped the NMCP better identify current weaknesses and allowed them to propose actions to remedy them. The improved tracking tools are currently being evaluated to see if improvements in the supply chain are taking place. Also, upcoming EUVs should shed light on whether improvements in commodity distribution to peripheral levels are occurring.

Team members are directly engaged in NMCP technical working groups based on their area(s) of expertise, manage in institutional assessments and resulting action plans, and actively participate in health sector reviews, malaria strategic planning and annual integrated malaria plan development and reviews. The two PMI resident advisors are based at the USAID health office but also sit at the PMI office within the NMCP.

Plan and justification

In the next year, PMI will focus on improving capacity within the MOH in the areas of leadership, management, and governance. In addition, PMI will continue dialogue with the MOH to identify key staff to fill current gaps in staffing, as well as collaborate with the NMCP to improve leadership across NMCP functions: information systems, supply chain management, communications, case management, and program development. Furthermore, PMI will continue negotiating with the NMCP to update the assessment conducted in 2008 and implement any recommendations that will contribute to improving the management of the program. Such an assessment will include a thorough review of training provided to the NMCP staff since the World Bank Malaria Booster Program started in 2006 and PMI's inception in FY 2008 and recommendations for an innovative and more strategic approach to capacity building. This activity has been included in the FY 2014 reprogramming request and findings will guide future PMI investment in training. PMI will also continue its support to Peace Corps to work on malaria

control and prevention at the community level, maximizing grassroots impact and providing assistance to the NMCP to provide services to hard-to-reach populations or identifying unmet needs.

The combined effect of these HSS and capacity building activities is to enable the NMCP to shape, own, manage, and monitor malaria services at the central, health zone, and health center levels.

Proposed activities with FY 2015 funding (\$180,000)

1. *Support capacity building of the NMCP:* PMI will continue supporting strategic and integrated planning with partners, strengthening the management of technical working groups, and logistics support for monthly RBM meetings. PMI will also provide short-term human resources support (specifically, a data manager and accountant). Support will also be provided for NMCP staff field supervision and production of the RMIS data collection tools and quarterly bulletin production. Staff training will also be supported per gap analysis and attendance to state-of-the-art conferences to make technical presentations on malaria work in Benin. Finally, support will be provided to support running costs of the program's operations along with the Government of Benin and other donors (e.g. internet connection, generator fuel and maintenance, basic office supplies) (\$150,000).
2. *Peace Corps:* Support for two Peace Corps Volunteers (PCVs) who will facilitate malaria BCC activity implementation among Benin PCVs and who will ensure coordination of all malaria efforts carried out by PCVs with PMI and the NMCP. Funding will also be provided to support small grants proposed by PCVs for malaria activities at the community level (\$30,000).

STAFFING AND ADMINISTRATION

Two health professionals serve as Resident Advisors to oversee PMI in Benin, one representing CDC and one representing USAID. In addition, one or more Foreign Service Nationals (FSNs) work as part of the PMI team. All PMI staff members are part of a single interagency team led by the USAID Mission Director or his/her designee in country. 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 resident advisor positions (whether initial hires or replacements) 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 individual agency.

PMI professional staff work together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance to PMI partners.

The PMI lead in country is the USAID Mission Director. The two PMI resident advisors, one from USAID and one from CDC, report to the Senior USAID Health Officer for day-to-day leadership, and work together as a part of a single interagency team. The technical expertise housed in Atlanta and Washington guides PMI programmatic efforts and thus overall technical guidance for both RAs falls to the PMI staff in Atlanta and Washington. Since CDC resident advisors are CDC employees (CDC

USDD—38), responsibility for completing official performance reviews lies with the CDC Country Director who is expected to rely upon input from PMI staff across the two agencies that work closely day-in and day-out with the CDC RA and thus best positioned to comment on the RA's performance.

The two PMI resident advisors are based within the USAID health office and are expected to spend approximately half their time sitting with and providing technical assistance to the national malaria control programs and partners.

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, in addition to the USG Global Malaria Coordinator.

Proposed support with FY 2015 funding (\$1,330,000)

1. Support for in-country PMI staff including two PMI resident advisors and one senior malaria specialist with support encompassing salaries, benefits, travel, and other staff support related costs. In addition, support is provided for general administrative costs that enables Mission-wide assistance from which PMI benefits. (*\$1,330,000*).

TABLE 1

**President's Malaria Initiative – Benin
FY 2015 Budget Breakdown by Partner (\$16,500,000)**

Partner	Geographic Area	Activity	Budget (\$)	%
TBD New commodity/supply chain project	Nationwide	Procure LLINs, SP, RDTs, and ACTs	6,938,000	42%
IRS 2 Task Order 6	IRS target areas	Technical assistance, procurement, implementation of IRS and environmental compliance	4,000,000	24%
New Mission Bilateral Program	Nationwide	IPTp and case management performance improvement, malaria training, technical assistance to update BCC strategy and strengthen M&E plan	870,000	5%
Community PIHI implementing organizations	Selected health zones	Support iCCM in 10 selected health zones using local community organizations	850,000	5%
USAID	Cotonou	USAID technical staff and in-country support to PMI	830,000	5%
SIAPS	Nationwide	Strengthen LMIS, supply chain management and conduct EUVs	600,000	4%
CDC Interagency Agreement	National	Technical staff and technical assistance for IRS, diagnosis and M&E	57,000	3%
	Conakry	One Resident Advisor	500,000	
NMCP	Nationwide	Capacity building, RMIS, LMIS and IRS supervision and monitoring	450,000	3%
Measure DHS	Nationwide	Support 2016 DHS	350,000	2%
Malaria Care	Nationwide	Supervision and strengthening malaria diagnostic activities	300,000	2%
CREC	Nationwide	Operations research, implementation of some	280,000	2%

		IRS and entomologic surveillance		
USP PQM	Nationwide	Drug quality control testing	195,000	1%
RMNCH	Nationwide	Evaluation of iCCM	150,000	1%
WHO	Nationwide	Support therapeutic efficacy testing	100,000	0.8%
Peace Corps	Nationwide	Support volunteers and community and facility based malaria activities	30,000	0.2%
TOTAL			16,500,000	100.00%

TABLE 2

**President's Malaria Initiative – Benin
Planned Obligations for FY 2015 (\$16,500,000)**

Proposed Activity	Mechanism	Budget		Geographical area	Description
		Total \$	Commodity \$		
PREVENTIVE ACTIVITIES					
Insecticide-Treated Nets					
1. Procure and distribute LLINs	TBD New commodity/supply chain project	\$3,300,000	\$3,300,000	National	Procure and deliver to health facilities 730,000 LLINs for distribution through routine ANC and EPI services.
	Subtotal: ITNs	\$3,300,000	\$3,300,000		
Indoor Residual Spraying					
1. IRS implementation and management	IRS 2 Task Order 6	\$4,000,000	\$0	Targeted IRS areas	In collaboration with CREC, NMCP, MOH district and local authorities, and with continued focus on building capacity, support IRS implementation in targeted areas. IRS operations include training of personnel, purchase of insecticide and related spray equipment, community mobilization, and implementation.
2. Entomological monitoring for spray areas and selected sentinel sites	CREC	\$120,000	\$0	Nationwide	Entomological monitoring and surveillance of vectors for insecticide resistance, in spray areas and in sentinel sites. CREC will work with NMCP staff trained in entomology.
3. Procure vector control supplies	CDC IAA	\$9,000	\$0	Nationwide	Procure equipment and replacement supplies for insectary, traps, spray and landing catches, storage of specimens

							and related laboratory supplies.
4. Technical assistance for entomological capacity building	CDC IAA	\$24,000	\$0	Nationwide	Funding for two technical assistance visits from CDC to monitor IRS and entomologic surveillance.		
Subtotal: IRS		\$4,153,000	\$0				
Malaria in Pregnancy							
1. Procure SP	TBD New commodity/supply chain project	193,000	\$193,000	Nationwide	Procure approximately 1 million treatments of SP to contribute to supporting all projected pregnancies with three SP doses. SP will be made available to both the public and private sector.		
2. Support supervision and refresher training	New bilateral	\$250,000	\$0	Nationwide	Support on-site supervision and refresher training of health care workers including benchmark assessments, on the spot-training and coaching for improved quality of service in MIP and case management.		
Subtotal: MIP		\$443,000	\$193,000				
Subtotal: PREVENTIVE		\$7,896,000	\$3,493,000				
CASE MANAGEMENT							
Diagnosis							
1. Procure RDTs	TBD New commodity/supply chain project	\$1,066,000	\$1,066,000	Nationwide	Procure approximately 2,000,000 RDTs for use in health facilities and in communities via CHWs to cover most of the nationwide needs.		
2. Support supervision and strengthen malaria diagnostics	Malaria Care	\$300,000	\$0	Nationwide	Support supervision and monitoring of malaria diagnostics, maintenance of microscopes, training, and quality control of slides/RDTs at the health facility and community levels.		

3. Technical assistance for malaria diagnostics	CDC IAA	\$12,000	\$0	Nationwide	Funding for one CDC advisor to provide technical assistance for microscopy and RDT quality assurance at the facility and community levels.
Subtotal: Diagnosis		\$1,378,000	\$1,066,000		
Treatment					
1. Procure ACTs	TBD New commodity/supply chain project	\$2,379,000	\$2,379,000	Nationwide	Procure approximately 2,160,000 ACT treatments which is about 90% of the projected need. This will be reviewed after the NMCP updates their assumptions in their gap analysis. It is noted that the current projected need fall short of the estimated 5,500,000 treatments needed based on 2013 consumption data.
2. Support IMCI training	New bilateral	\$100,000	\$0	Nationwide	Support a gap analysis and training of public and private facility health workers in IMCI.
3. Support quality improvement and supervision of health workers	New bilateral	\$370,000	\$0	Nationwide	Provide support to departments and health zones to conduct on-site supervision of health workers including benchmark assessments, on the spot training and coaching, supervision of clinical, diagnostic activities and logistics activities.
4. Support community case management	Community PIHI implementing organizations	\$600,000	\$0	Selected health zones	Support an iCCM program in 10 selected health zones, which complements the Global Fund iCCM program.
Subtotal: Treatment		\$3,449,000	\$2,379,000		
Pharmaceutical Management					

1. Strengthen logistics management information system and supply chain management	Systems for Improved Access to Pharmaceuticals and Services (SIAPS)	\$500,000	\$0	Nationwide	Assessment conducted with FY 2014 funding will inform specific interventions, such as strengthening DPMED, CAME regional offices and zonal depots and the logistics information system.
2. LMIS supervision	NMCP	\$50,000	\$0	Nationwide	Routine LMIS supervision from NMCP and departments to the health zones, including the health centers. (Supervision within health zones covered under case management quality improvement).
3. Drug quality control testing	USP PQM	\$195,000	\$0	Nationwide	Provide support to the national laboratory for quality control to conduct routine testing of ACTs entering the port and spot checks at public and private facilities. Support the cost of reagents and equipment for testing.
Subtotal – Pharmaceutical Management		\$745,000	\$0		
Subtotal: Case Management		\$5,572,000	\$3,445,000		
MONITORING AND EVALUATION					
1. Support RMIS	NMCP	\$250,000	\$0	Nationwide	RMIS strengthening including production of quarterly RMIS bulletin, data quality assurance, maintenance of the database and a data manager.
2. Technical assistance for RMIS	New bilateral	\$50,000	\$0	Nationwide	Technical assistance to the NMCP to assess the validity of data.
3. Conduct EUV surveys	SIAPS	\$100,000	\$0	Nationwide	Monitoring of availability and utilization of key antimalarial commodities at the health facility level.
4. Evaluation of iCCM	RMNCH	\$150,000	\$0	Nationwide	Evaluate NGO's implementation of iCCM program in ten health zones, which complements the Global Fund

							iCCM program for malaria.
5. Support 2016 DHS	Measure DHS	\$350,000	\$0	Nationwide			Support for malaria module including parasitemia and anemia biomarkers.
6. Support therapeutic efficacy testing	WHO	\$100,000	\$0	Nationwide			Support therapeutic efficacy testing of anti-malaria drugs.
7. Technical assistance for M&E	CDC IAA	\$12,000	\$0	Nationwide			Support for one visit by CDC advisor to provide technical assistance for ongoing M&E activities.
Subtotal: M&E		\$1,012,000	\$0				
OPERATIONAL RESEARCH							
8. OR for new model of IRS	CREC	\$160,000	\$0	16 villages			Baseline surveys for an OR study of the impact of IRS on a population with LLINs that are more than two years old.
Subtotal: OR		\$160,000	\$0				
BEHAVIOR CHANGE COMMUNICATION							
1. Support development and implementation of new integrated communication strategy	Community PIHI implementing organizations	\$250,000	\$0	Selected health zones			Support household visits and group education to promote ITN use, recognizing signs of malaria and increasing care seeking behavior and encouraging ANC attendance and IPTp through women's groups, CHWs, and mass media.
2. Technical assistance for BCC	New bilateral	\$100,000	\$0	Nationwide			Technical assistance to update the national malaria BCC strategy and strengthen its M&E plan. This will support nationwide efforts to be implemented by Global Fund, UNICEF and other partners.
Subtotal: BCC		\$350,000	\$0				
HEALTH SYSTEMS STRENGTHENING/CAPACITY BUILDING							

1. Support capacity building of the NMCP	NMCP	\$150,000	\$0	Central	Direct support for strategic and integrated planning with partners, management of technical working groups, human resource capacity building (e.g. data manager, accountant), staff training as per a gap analysis, some sponsorship for participation in international conferences, and some NMCP operational running cost gaps (i.e. internet, fund for generator maintenance and fuel).
2. Peace Corps Response Volunteers and Small Project Grants	Peace Corps/SPA	\$30,000	\$0	Nationwide	Support to maintain two Response Volunteers in Benin (\$20,000) and to supervise volunteers throughout the country, as well as to support small project grants for malaria for which volunteers can submit applications (\$10,000).
Subtotal: Capacity Building		\$180,000	\$0		
1. USAID Resident Advisor and Locally Engaged Senior Malaria Advisor	USAID	\$830,000	\$0	Cotonou	Support for one USAID PMI Advisor and one USAID locally-engaged senior malaria specialist as well as one CDC PMI Advisor, and all related local costs to sitting in USAID Mission.
2. CDC Resident Advisor	CDC IAA	\$500,000	\$0	Cotonou	
Subtotal: In-country Staffing		\$1,330,000			
		\$16,500,000			

