

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 2017 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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KENYA

Malaria Operational Plan FY 2017

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ABBREVIATIONS and ACRONYMS

ACSM	Advocacy communication and social mobilization
ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
AMFm	Affordable Medicine Facility for Malaria
ANC	Antenatal care
CCM	Community case management
CDC	Centers for Disease Control and Prevention
CHA	Community health assistant
CHAI	Clinton Health Access Initiative
CHMT	County health management team
CHV	Community health volunteer
DfID	U.K. Department for International Development
DHIS	District Health Information System
DHS	Demographic and Health Survey
eIDSR	Electronic Integrated Disease Surveillance and Response
FELTP	Field Epidemiology and Laboratory Training Program
FY	Fiscal year
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GoK	Government of Kenya
HMIS	Health management information system
IEC	Information, education, communication
IM	Intramuscular
IPC	Interpersonal communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
KEMSA	Kenya Medical Supply Agency
KMS	Kenya Malaria Strategy 2009–2018
LMIS	Logistics management information system
MICC	Malaria Interagency Coordinating Committee
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MMV	Medicines for Malaria Venture
MoH	Ministry of Health
MOP	Malaria Operational Plan
NMCP	National Malaria Control Program
NQCL	National Quality Control Laboratory
OTSS	Outreach training and supportive supervision
PMI	President’s Malaria Initiative
PPB	Pharmacy and Poisons Board
QoC	Quality of Care (survey)
RDT	Rapid diagnostic test
RMNH	Reproductive Maternal Newborn Health
SBCC	Social and behavior change communication
SCHMT	Sub-county health management team

SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TRAC	Tracking results continuously
TWG	Technical working group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization

I. EXECUTIVE SUMMARY

When it was launched in 2005, the goal of the President's Malaria Initiative (PMI) was to reduce malaria-related mortality by 50% across 15 high-burden countries in sub-Saharan Africa through a rapid scale-up of four proven and highly effective malaria prevention and treatment measures: insecticide-treated mosquito nets (ITNs); indoor residual spraying (IRS); accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs); and intermittent preventive treatment of pregnant women (IPTp). With the passage of the Tom Lantos and Henry J. Hyde Global Leadership against HIV/AIDS, Tuberculosis, and Malaria Act in 2008, PMI developed a U.S. Government Malaria Strategy for 2009–2014. This strategy included a long-term vision for malaria control in which sustained high coverage with malaria prevention and treatment interventions would progressively lead to malaria-free zones in Africa, with the ultimate goal of worldwide malaria eradication by 2040-2050. Consistent with this strategy and the increase in annual appropriations supporting PMI, four new sub-Saharan African countries and one regional program in the Greater Mekong Subregion of Southeast Asia were added in 2011. The contributions of PMI, together with those of other partners, have led to dramatic improvements in the coverage of malaria control interventions in PMI-supported countries, and all 15 original countries have documented substantial declines in all-cause mortality rates among children less than five years of age.

In 2015, PMI launched the next six-year strategy, setting forth a bold and ambitious goal and objectives. The PMI Strategy for 2015-2020 takes into account the progress over the past decade and the new challenges that have arisen. Malaria prevention and control remains a major U.S. foreign assistance objective and PMI's Strategy fully aligns with the U.S. Government's vision of ending preventable child and maternal deaths and ending extreme poverty. It is also in line with the goals articulated in the RBM Partnership's second generation global malaria action plan, *Action and Investment to defeat Malaria (AIM) 2016-2030: for a Malaria-Free World* and the World Health Organization's (WHO) updated *Global Technical Strategy: 2016-2030*. Under the PMI Strategy 2015-2020, the U.S. Government's goal is to work with PMI-supported countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination.

Kenya was selected as a PMI focus country in FY 2007.

This FY 2017 Malaria Operational Plan presents a detailed implementation plan for Kenya, based on the strategies of PMI and the National Malaria Control Program (NMCP). 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 National Malaria Control strategy and plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Kenya, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with FY 2017 funding.

The proposed FY 2017 PMI budget for Kenya is \$34 million. PMI will support the following intervention areas with these funds:

Entomologic monitoring and insecticide resistance management: Kenya has developed an IRS business plan and an Insecticide Resistance Management plan to guide IRS activities in the country. To support these vector control objectives, Kenya aims to develop capacity at the county level to implement entomological surveillance and insecticide resistance monitoring. PMI has been supporting entomological surveillance and insecticide resistance monitoring in up to 16 sites throughout western Kenya since 2008.

With FY 2017 funding, PMI will support entomological monitoring in counties with historical IRS programs as well as in counties where IRS will resume in 2017.

Insecticide-treated nets (ITNs): Kenya seeks to achieve universal coverage with long-lasting ITNs, defined as one net per two people, in 23 endemic and epidemic-prone counties. Kenya distributed 13.6 million ITNs in the 2014–2015 mass campaign, including 3.8 million ITNs procured with PMI support. The other primary distribution strategy is free ITNs provided through antenatal care (ANC) and the child health clinics in 36 counties to protect the most vulnerable populations.

PMI will procure an estimated 1.5 million ITNs for free routine distribution through ANC and EPI clinics in 2018 and an estimated 125,000 ITNs to support development of alternative continuous distribution channels to maintain universal coverage in one endemic county following the planned 2017–2018 mass campaign. The NMCP, in collaboration with Information for Malaria Project (INFORM), Spatial Health Metrics Group, KEMRI-Wellcome Trust Research Programme, Nairobi, Kenya is revising its county malaria profiles to allow better targeting of ITNs to high-burden counties. PMI will support durability monitoring for nets distributed during the 2017–2018 mass campaign. Additionally, PMI will continue to work with implementing partners and local non-governmental organizations on community-based social and behavior change communication (SBCC) programs to increase demand for ITNs and encourage correct and consistent use.

Indoor residual spraying (IRS): The NMCP's plan for IRS has been to spray in the lake-endemic counties of western Kenya; the target for IRS implementation is 7 malaria-endemic counties in western Kenya with an estimated population of 8.7 million. PMI supported the national IRS program from 2008 to 2012. In 2012, PMI was the sole funder of IRS and over 2.4 million people were covered in parts of three counties with pyrethroid insecticide. No spraying took place from 2013–2016 due to the transition to a non-pyrethroid insecticide, a change rendered necessary by the emergence of insecticide resistance throughout much of western Kenya. The insecticide transition necessitated changes to national policy and registration of an alternative insecticide. The use of a more expensive non-pyrethroid insecticide has increased the cost of IRS.

With FY 2017 funding, PMI, in collaboration with the NMCP, will support IRS in one to two priority counties. The estimated population coverage is 1.4 million people (276,000 structures). PMI will also support environmental monitoring associated with the IRS activities.

Malaria in pregnancy (MIP): The national package of ANC services includes both malaria prevention and treatment interventions based on epidemiologic-risk zones. Free ITNs and malaria prevention SBCC are provided for all pregnant women in 36 counties; IPTp with sulfadoxine-pyrimethamine (SP) is policy in the 14 counties with high malaria endemicity. All women attending ANC clinics nationwide are screened for anemia during the first and fourth visits as part of profiling for pregnant women, and all pregnant women with signs and symptoms consistent with malaria should receive a diagnostic test and prompt treatment if positive. Since 2011, PMI has provided support for MIP interventions at the national

level including policy and messaging review, development and dissemination, procurement and distribution of ITNs through ANC clinics, and strengthening of case management. In five malaria-endemic counties, PMI has provided support for the full package of MIP interventions, including ITNs, SBCC to promote ITN use, and IPTp.

With FY 2017 funding, PMI will support intensive MIP interventions in up to five malaria-endemic counties, targeting health facilities with ANC services and an estimated 5,500 community health volunteers (CHVs) to reach an estimated 50,000 pregnant women to encourage early ANC attendance and receipt of the full package of prevention and case management services.

Case management: The fifth edition of the *National Guidelines for Diagnosis, Treatment and Prevention of Malaria in Kenya, 2016* recommends diagnosis with a parasitological test and first-line treatment with artemether-lumefantrine (AL) for uncomplicated malaria and parenteral artesunate for severe malaria. PMI has invested in malaria diagnostics, effective treatment, and supply chain management strengthening. Since 2008, PMI has procured and distributed over 160 microscopes, 16 million malaria rapid diagnostic tests (RDTs), and supported strengthening of diagnostics by training over 4,800 healthcare workers. PMI has also procured 55 million AL treatments and has trained over 5,000 healthcare workers on national case management guidelines.

With FY 2017 funding, PMI will support integrated strengthening of case management at the health-facility, sub-county, and county levels. PMI will procure and distribute approximately 15 million RDTs to help meet the projected national RDT gap based on testing of all suspected malaria. PMI will also procure and distribute approximately 5 million AL treatments to help meet the projected national AL gap and 500,000 vials of injectable artesunate to treat severe malaria and complement the funding for this medication from other partners and the Government of Kenya.

Health systems strengthening and capacity building: Since 2008, PMI has invested in efforts to build capacity and integrate with other programs across the health sector. PMI strengthens the overall health system by investing in human capacity through the Field Epidemiology and Laboratory Training Program to increase epidemiology capacity in the Ministry of Health; building capacity for health information systems, surveillance, and monitoring and evaluation (SM&E) across the health sector; strengthening commodity management systems; expanding access to and ensuring a reliable supply of essential medicines; and improving service delivery in the different intervention areas. PMI is also improving governance in the pharmaceutical sector and monitoring of drug quality by building and expanding the capacity of the Pharmacy and Poisons Board (PPB) for routine post market surveillance and strengthening the ability of the National Quality Control Laboratory (NQCL) to conduct confirmatory testing.

With FY 2017 funding, PMI will continue to support capacity building through short- and long-term training and mentoring, health systems strengthening for pharmaceutical regulation and monitoring, supply chain management, and health information utilization at the national level. PMI will support one Field Epidemiology and Laboratory Training Program resident for the two-year program. PMI will provide support to the NMCP and counties and support quality improvement activities with county and sub-county health management teams. PMI will continue to direct its focus and resources to the county level.

Social and behavior change communication (SBCC): PMI has promoted correct and consistent ITN use, prompt diagnosis and treatment for fever, and demand for community and facility-based case

management and MIP services since 2008 through mass media, community mobilization, and interpersonal communication. Since 2013, PMI has supported intensive community-based interpersonal communication (IPC) at the household level via local community organizations and CHVs to reach the highest-risk populations in high-burden malaria counties with historically low intervention uptake.

With FY 2017 funding, PMI will continue to support cross-cutting SBCC investments at community, sub-county, county, and national levels, with a particular emphasis on working with community-based local organizations to strengthen and target interpersonal communication (IPC) activities at the household and village levels to at-risk and hard-to-reach populations.

Surveillance, monitoring and evaluation (SM&E): PMI provides support to the NMCP to ensure that critical gaps in the *Kenya Malaria Strategy Monitoring and Evaluation Plan 2009–2018* are funded. PMI has supported SM&E capacity needs assessments at the national and county levels, development and implementation of a malaria surveillance curriculum to improve routine malaria surveillance data, development and production of quarterly malaria surveillance bulletins, national annual malaria reports, biannual Quality of Care (QoC) surveys, national surveys (MIS and DHS), and data quality audits in priority counties to standardize malaria data collection and reporting.

With FY 2017 funding, PMI will concentrate support at the national level on specific gaps identified in SM&E capacity and in M&E Plan activities, expand support for capacity building at the county and sub-county levels based on identified needs, and support biannual outpatient and inpatient QoC surveys. PMI will also support the next MIS planned for 2018.

Operational research (OR): PMI supports the NMCP's strategic OR activities that are in line with PMI's OR priorities list. With PMI core funding and PMI/Kenya MOP funding, PMI has supported a wide range of OR activities across the focus areas including vector control, case management, and MIP in Kenya. PMI is supporting ongoing OR studies but no new OR studies are planned with FY 2017 funding.

II. STRATEGY

1. Introduction

When it was launched in 2005, the goal of PMI was to reduce malaria-related mortality by 50% across 15 high-burden countries in sub-Saharan Africa through a rapid scale-up of four proven and highly effective malaria prevention and treatment measures: insecticide-treated mosquito nets (ITNs); indoor residual spraying (IRS); accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs); and intermittent preventive treatment of pregnant women (IPTp). With the passage of the Tom Lantos and Henry J. Hyde Global Leadership against HIV/AIDS, Tuberculosis, and Malaria Act in 2008, PMI developed a U.S. Government Malaria Strategy for 2009–2014. This strategy included a long-term vision for malaria control in which sustained high coverage with malaria prevention and treatment interventions would progressively lead to malaria-free zones in Africa, with the ultimate goal of worldwide malaria eradication by 2040-2050. Consistent with this strategy and the increase in annual appropriations supporting PMI, four new sub-Saharan African countries and one regional program in the Greater Mekong Subregion of Southeast Asia were added in 2011. The contributions of PMI, together with those of other partners, have led to dramatic improvements in the coverage of malaria control interventions in PMI-supported countries, and all 15 original countries have documented substantial declines in all-cause mortality rates among children less than five years of age.

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2. Malaria situation in Kenya

Kenya's 2014 population is estimated at 44.9 million people, with an estimated population growth of 2.6% per year; thus, Kenya's 2017 population is projected to be 48.5 million.¹ Of the total population, children under age 5 account for 16% and children under age 15 account for 42%.^{1,2} Geographically, the country falls into two main regions: lowland areas, both coastal and around the Lake Victoria basin, and highland areas on both sides of the Great Rift Valley. Kenya has approximately 42 ethnic groups and has a predominantly agricultural economy with a strong industrial base. Kenya is ranked 145 out of 188 countries on the 2015 United Nation's Human Development Index, which measures life expectancy, adult literacy, and per capita income.³ Life expectancy in Kenya has seen an overall downward trend since the late 1980s but increased to an estimated 62 years in 2013.⁴ The HIV/AIDS estimated adult prevalence is 6%.⁴ The total expenditure on health increased slightly from 4.1% of the gross domestic product in 2004 to 4.5% in 2013.⁵ The Government of Kenya's (GoK) per capita health expenditures also rose from \$19 in 2000 to \$45 in 2013.⁵ The mortality rate in children under five years of age has declined by 55% from 115 deaths per 1,000 live births in the 2003 Kenya Demographic and Health Survey (DHS) to 52 deaths per 1,000 observed in the 2014 DHS.^{6, 7}

Malaria still remains a major public health problem in Kenya and accounts for an estimated 18% of outpatient consultations and 10% of hospital admissions based on data from the routine health information system.⁸ Malaria transmission and infection risk in Kenya is determined largely by altitude, rainfall patterns, and temperature. Therefore, malaria prevalence varies considerably by season and across geographic regions. The variations in altitude and terrain create contrasts in the country's climate, which ranges from tropical along the coast to temperate in the interior to very dry in the north and northeast. There are two rainy seasons—the long rains occur from April to June and the short rains from October to December. The highest temperatures are from February to March and the lowest from July to August.

All four species of *Plasmodium* that infect humans occur in Kenya. *Plasmodium falciparum*, which causes the most severe form of the disease, is the most common accounting for over 99% of all malaria infections in the country. The major malaria vectors in Kenya are *An. gambiae* complex (*An. gambiae* *ss.*, *An. arabiensis*, *An. merus*) and *An. funestus*. The malaria vector distribution in the country is not uniform due to variation in climatic factors, particularly temperature and rainfall.

¹ World Bank, <http://www.worldbank.org/en/country/kenya>. Accessed 14 April 2016.

² UNICEF, State of the World's Children 2015, http://www.unicef.org/infobycountry/kenya_statistics.html. Accessed 14 April 2016.

³ United Nations Development Programme. Human Development Report 2015. http://hdr.undp.org/sites/default/files/hdr_2015_statistical_annex.pdf. Accessed 14 April 2016.

⁴ UNICEF. State of the World's Children 2015, http://www.unicef.org/infobycountry/kenya_statistics.html. Accessed 25 May 2015.

⁵ World Bank, <http://data.worldbank.org/indicator/SH.XPD.PCAP/countries>. Accessed 14 April 2016. [Public health expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations) and social (or compulsory) health insurance funds.]

⁶ Central Bureau of Statistics (CBS) [Kenya], Ministry of Health (MOH) [Kenya], and ORC Macro. 2004. *Kenya Demographic and Health Survey 2003*. Calverton, Maryland: CBS, MOH, and ORC Macro.

⁷ Kenya National Bureau of Statistics (KNBS), Ministry of Health (MOH) [Kenya], and ICF International. 2015. *Kenya Demographic and Health Survey Key Indicators 2014*. Nairobi, Kenya: KNBS, MOH, and ICF International.

⁸ Ministry of Health (MOH) [Kenya]. *Kenya Annual Malaria Report, 2013/2014*. Nairobi: MOH, 2015.

About 80% of the Kenyan population is at risk for malaria.⁹ Among the at-risk population, 27% (approximately 12 million people) live in areas of epidemic and seasonal malaria transmission where *P. falciparum* parasite prevalence is usually less than 5%. However, an estimated 28 million people live in endemic areas, and over a quarter (approximately 11 million people) live in areas where parasite prevalence is estimated to be equal to or greater than 20%. For the purposes of malaria control, the country has been stratified into four epidemiological zones to address the varied risks:

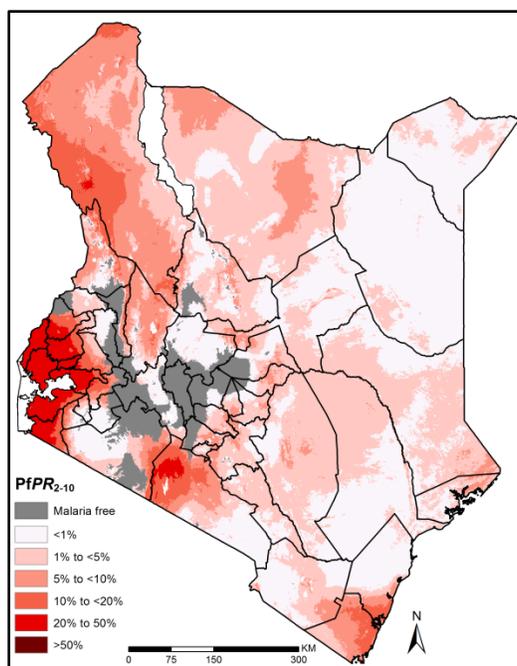
- **Endemic areas:** These areas of stable malaria have altitudes ranging from sea level in the coastal region to up to 1,300 meters around the Lake Victoria basin in western Kenya. Transmission is intense throughout the year with *P. falciparum* prevalence historically greater than 20% and high annual entomological inoculation rates. The coastal counties now have malaria prevalence ranging from 5–20%. Of the total population, 26% lives in a malaria-endemic zone.
- **Highland and epidemic-prone areas:** Malaria transmission in the western highlands is seasonal with considerable year-to-year variation. The entire population is vulnerable and case-fatality rates during an epidemic can be greater than in endemic regions. Approximately 39% of Kenyans live in these areas. The malaria prevalence in these areas ranges from 5–20%.
- **Seasonal malaria transmission areas:** This epidemiological zone includes the arid and semi-arid areas of northern and central parts of the country, which experience short periods of intense malaria transmission during the rainy seasons. Although the largest zone in terms of geographic size, only 14% of the population lives in areas where the malaria prevalence is between 1–5%.
- **Low malaria risk areas:** This zone covers the central highlands of Kenya including Nairobi. Approximately 21% of the population lives in this area.

Kenya's 2015 population-adjusted *P. falciparum* prevalence map (Figure 1) depicts the malaria prevalence by county with the highest *P. falciparum* prevalence in the lake-endemic counties represented by the darker shaded areas. The 2015 Malaria Indicator Survey (MIS) indicated that malaria prevalence in the western lake endemic zone, the darkest area of the map, remained very high at 27%.¹⁰

⁹ Noor AM, Kinyoki DK, Ochieng JO, Kabaria CW, Alegana VA, Otieno VA, Kiptui R, Soti D, Yé Y, Amin AA, Snow RW. The epidemiology and control profile of malaria in Kenya: reviewing the evidence to guide the future vector control. Nairobi: DOMC and KEMRI-Wellcome Trust-University of Oxford-Research Programme, 2012.

¹⁰ National Malaria Control Programme (NMCP), Kenya National Bureau of Statistics (KNBS), and ICF International. Kenya Malaria Indicator Survey 2015. Nairobi, Kenya and Rockville, Maryland: NMCP, KNBS, and ICF International, 2016.

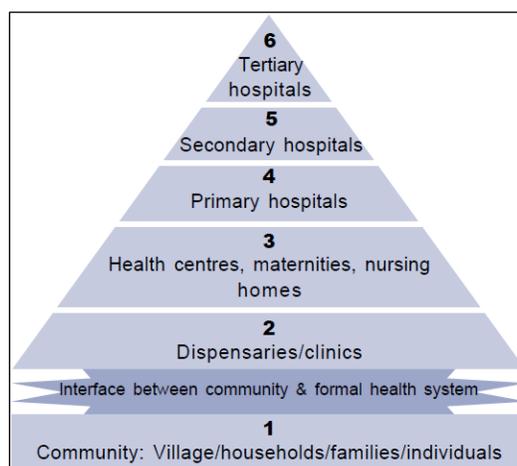
Figure 1. Map of Kenya: 2015 Population-adjusted *P. falciparum* Prevalence by County¹¹



3. Country health system delivery structure and Ministry of Health (MoH) organization

Service delivery is provided along a continuum of care starting from the community level and ending at the country’s national referral hospitals through a hierarchy of healthcare levels (Figure 2).

Figure 2. Service Delivery Pathway¹²



¹¹ Ministry of Health. *The epidemiology and control profile of malaria in Kenya: reviewing the evidence to guide the future vector control*. National Malaria Control Programme, Ministry of Health. Technical support provided by the LINK Project (London School of Hygiene and Tropical Medicine and the Information for Malaria (INFORM) Project, KEMRI-Wellcome Trust Research Programme), Nairobi, Kenya, April 2016.

¹² Ministry of Medical Services (MMS) and Ministry of Public Health and Sanitation (MOPHS). *Accelerating attainment of Health Goals: The Kenya Health Sector Strategic and Investment Plan (KHSSP): July 2013–June 2017*. Nairobi, Kenya: MMS and MOPHS, 2013.

The national long-term development plan, *Kenya Vision 2030*, guides the country's strategies including the health sector. The Kenya Health Sector Strategic and Investment Plan (KHSSP) 2014–2018 provides a range of services and interventions that will be covered under this plan.¹² These services are comprehensively defined under the Kenya Essential Package for Health Services.¹² Malaria has been identified as a disease program area that contributes to the Kenya Essential Package for Health Services under the following policy objectives:

1. Accelerate the burden of reduction of communicable conditions
2. Reduce the burden of violence and injuries
3. Provide essential health services
4. Minimize exposure to health risk factors
5. Strengthen collaboration with health related sectors

From 2008–2013, health services in Kenya were provided through two ministries, the Ministry of Medical Services and the Ministry of Public Health and Sanitation. Following elections in 2013 and as part of the GoK reorganization process, the two health ministries were reunited as a single Ministry of Health (MoH).

In 2013, Kenya began the process of devolution as set forth in the 2010 Constitution of Kenya. The transition to 47 counties from 8 provinces as the primary administrative unit has a 3-year timeline for full implementation guided by a Transitional Authority. At the national level, the MoH has a Cabinet Secretary, Principal Secretary, and Director of Medical Services. Under the Director of Medical Services are five directorates. The Directorate of Preventive and Promotive Services houses the Division of Communicable Disease Prevention and Control. The NMCP has been a part of the Division of Communicable Disease Prevention and Control since late 2013. Key functions at the national level include health policy, national referral health facilities and reference laboratories, disease surveillance, monitoring and evaluation, health commodity procurement for large donor-funded programs including malaria, capacity building and technical assistance.

Following devolution, in 2013, a Transitional Authority was established to serve a three-year period which ended in February 2016. The Transitional Authority, working together with Sectoral Function Assignment and Competency Teams, established roles, responsibilities, and functions of the national and county governments. The Transitional Authority has now been replaced by the inter-governmental relations technical committee which serves as secretariat to the Summit between President and Governors. The Cabinet Secretary for Health participates in this summit when health matters are tabled.

The health sector intergovernmental forum serves as a link between national and county governments. All 47 County Executive Committee Members for Health (one per county), the Permanent Secretary, and Cabinet Secretary are members of the health sector intergovernmental forum that meets quarterly to address health issues affecting national and county governments. These changes necessitated the re-alignment of PMI-supported interventions and implementation at the new administrative units starting in 2014. The changes have had an impact on operational costs and human resources due to shifting roles, responsibilities, and functions.

National Malaria Control Program

The NMCP is currently staffed by technical professionals who are seconded from other divisions in the MoH. The unit has six technical teams: (1) vector control; (2) case management; (3) malaria in pregnancy; (4) epidemic preparedness and response; (5) advocacy, communication and social

mobilization; and (6) surveillance, monitoring, and evaluation (SM&E) and operational research (OR). Each team has a focal point and one or more technical officers.

The Malaria Interagency Coordination Committee (MICC) is convened biannually and on an *ad hoc* basis by the NMCP on behalf of the Director of Preventive and Promotive Services. The MICC includes other MoH divisions and units, non-governmental organizations, community-based organizations, private sector, partners and donors. The NMCP also has six primary technical working groups (TWGs) that meet quarterly and are aligned with the six technical teams. In addition, the primary TWGs have the capacity to form sub-committees for more concentrated discussion or work around a particular issue. The sub-committees report back through the primary working group structure. For example, the Advocacy, Communication, and Social Mobilization TWG started a Resource Mobilization sub-committee in 2013, and the Case Management TWG has standing Drug Management and Diagnostic sub-committees.

County Departments of Health

The counties have a health executive and a director for health, with oversight of the health management team. The health executive and director for health are appointed by the governor in each county. The health executive appointees are not necessarily from the health sector; however, the majority of county health directors are physicians. Each county health department should have four primary units including curative and rehabilitative services, health promotion and disease prevention, sector planning, and governance and administration. The county malaria control program and malaria control coordinator should be part of preventive and promotive services. Functions important to malaria control programs that have been transferred to the counties include health services delivery and management, communicable and vector-borne disease control and management, and environmental health services. Health financing, health information systems, and M&E are expected to be shared functions between the national and county levels. However, the structures and personnel are not yet fully in place in the counties to implement these functions effectively.

Devolution to county governments has impacted the NMCP and PMI. The administrative changes have impacted operational plans and costs as a result of new county-level health structures and malaria control programs. The program costs have increased as county health structures and malaria control programs have become functional and the NMCP continues to provide support to ensure continuity of operations and implementation of malaria interventions.

4. National malaria control strategy

The GoK remains committed to improving health service delivery and places a high priority on malaria prevention and control. The NMCP is guided by the Kenya Malaria Strategy 2009–2018 (KMS) and M&E Plan 2009-2018 which outlines the malaria prevention and treatment interventions and the six strategic objectives that together are focused on reaching a two-third reduction of malaria morbidity and mortality by 2018 compared to 2009, the start date of the original strategy:

- **Objective 1:** To have at least 80% of people living in malaria-risk areas using appropriate malaria preventive interventions.
- **Objective 2:** To have 100% of fever cases which present to a health worker receive prompt and effective diagnosis and treatment.

- **Objective 3:** To ensure that 100% of malaria epidemic-prone and seasonal-transmission counties have the capacity to detect and the ability to respond to malaria epidemics.
- **Objective 4:** To ensure that all malaria surveillance, monitoring and evaluation, and program indicators are routinely monitored, reported, and evaluated in all counties.
- **Objective 5:** To increase utilization of all malaria control interventions by at-risk communities in Kenya to at least 80%.
- **Objective 6:** To improve capacity in coordination, leadership, governance and resource mobilization at all levels towards achievement of the malaria program objectives.

Strategies to support the achievement of the revised KMS objectives include adopting a multi-sectoral approach to malaria control, decentralizing malaria control operations to counties, tailoring interventions to the prevailing epidemiology, and strengthening the malaria control performance monitoring and evaluation system. Given the varied and changing malaria epidemiology, Kenya is targeting appropriate intervention measures for specific malaria-risk areas. The NMCP has strategically reprioritized the approved malaria control interventions according to malaria risk, in order to target resources towards achieving the highest impact possible.

Kenya Malaria Strategy – strategic approach by intervention

Vector Control

The KMS 2009-18 set a target of 80% of the at-risk population using appropriate malaria prevention interventions, including ITNs and IRS by 2018. The GoK plans to achieve universal ITN coverage (i.e., one net for every two people) for all groups in malaria-endemic and epidemic-prone counties through: (1) regular rolling mass distribution campaigns, carried out every three years in targeted geographic areas (i.e., 23 counties); (2) routine distribution through antenatal care (ANC) and child welfare clinics (CWC) in 36 counties; (3) social marketing of nets particularly in designated rural counties; and (4) commercial sales of ITNs in the private sector. The revised KMS has prioritized IRS for malaria-endemic counties for burden reduction with additional support for capacity building and focal IRS in epidemic-prone counties to prevent outbreaks.

Malaria in Pregnancy

The fifth edition *2016 National Guidelines for the Diagnosis, Treatment and Prevention of Malaria in Kenya* emphasize the integration of MIP in the overall ANC package for maternal health that includes IPTp, ITNs, prompt diagnosis and treatment of fever due to malaria, and SBCC to promote early ANC attendance, ITN use, and IPTp uptake. Sulfadoxine-pyrimethamine (SP) should be administered at each ANC visit after quickening at four-week intervals under direct observation. In line with WHO guidance, the revised KMS recommends a minimum of three doses of IPTp-SP for pregnant women living in the 14 malaria-endemic counties. The current guidelines are being reviewed and will be changed to be in line with the revised WHO guidelines on the use of SP.

Case Management

The KMS 2009-18 target for case management is to ensure that 100% of all suspected malaria cases receive a parasitological diagnosis by microscopy or malaria RDT and effective treatment with the first-

line treatment, artemether lumefantrine (AL). Parenteral artesunate is recommended for pre-referral and treatment of severe malaria.

The KMS recommends that CHVs receive training and supportive supervision for case management of malaria, prevention, behavior change communication, record keeping and reporting in malaria endemic areas. Although not fully implemented as of 2016, both RDTs and AL will be integrated into the CHV kit, and all CHVs will be linked to the nearest health facility for resupply of commodities, supervision, monitoring and referral.

Advocacy, Communication, and Social Mobilization

The national target is to strengthen advocacy, communication, and social mobilization to increase utilization of all malaria control interventions by at-risk communities in Kenya to at least 80%. Implementation of SBCC activities focus on the involvement of health providers and CHVs in malaria prevention and control activities. Additional emphasis will be placed on using interpersonal communication (IPC) approaches delivered by CHVs, community-based organizations and special interest groups to target hard-to-reach populations and deliver personalized messaging. Traditional channels of communication (e.g., television, radio, print, mobile phones) will be used, particularly during mass ITN campaigns.

Surveillance, Monitoring and Evaluation, and Operational Research

Surveillance, monitoring and evaluation and operational research are vital for tracking the progress of malaria prevention and control activities. The NMCP has a comprehensive M&E Plan to accompany the revised KMS, which recommends the frequency and methodology of monitoring key program indicators for each of the interventions in order to assess and inform program implementation. In 2015, the NMCP updated the OR priorities agenda in line with the revised KMS following a consultative process with stakeholders and partners.

5. Updates in the strategy section

The key updates are related to recent survey data and revised malaria-risk maps and county profiles. The 2015 Malaria Indicator Survey report and data set were released in April 2016 ahead of World Malaria Day. Overall, malaria indicators have substantially improved compared to the 2010 MIS.¹³

The most recent Kenya Demographic and Health Survey (DHS) was conducted in 2014 with data collected at the national and county levels. Overall, child mortality indicators have improved compared to the 2008–09 DHS.¹⁴

6. Integration, collaboration, and coordination

The U.S. Government team in Kenya has developed a strategy that embraces a whole-of-government, multi-layer communication strategy, reflecting all fundamental principles of PMI. The Department of Defense, Department of Health and Human Services/Centers for Disease Control and Prevention (CDC), Department of State, Peace Corps, U.S. Agency for International Development (USAID), and

¹³ National Malaria Control Programme (NMCP), Kenya National Bureau of Statistics (KNBS), and ICF International. Kenya Malaria Indicator Survey 2015. Nairobi, Kenya and Rockville, Maryland: NMCP, KNBS, and ICF International, 2016.

¹⁴ Kenya National Bureau of Statistics (KNBS), Ministry of Health (MOH) [Kenya], and ICF International. Kenya Demographic and Health Survey Key Indicators 2014. Nairobi, Kenya: KNBS, MOH, and ICF International, 2015.

President's Emergency Plan for AIDS Relief (PEPFAR) have implemented and reported on a large program base for several years. This multi-tiered governance structure allows for full participation across agencies, at all levels, and across technical areas which has resulted in programming responsive to Kenya's needs. Examples include:

- The NMCP and PMI have worked closely with the Walter Reed Army Institute of Research's Malaria Diagnostics Center to support and strengthen malaria diagnostic capacity and implement a quality assurance/quality control (QA/QC) program for malaria diagnostics. PMI-supported activities have included the procurement and distribution of microscopes, malaria microscopy training, QA/QC officer training, development and production of the *National Guidelines on Parasitological Diagnosis of Malaria and Malaria Vector Surveillance in Kenya* (2013) and accompanying microscopy wall charts and job aids, and implementation of the QA/QC program for malaria diagnostics in health facilities.
- The NMCP and PMI have partnered with Peace Corps since 2011 to support community-based malaria activities. PMI supported trained malaria volunteers in 2012–2013 and 2013–2014 to mobilize volunteers across sectors to plan and incorporate malaria prevention and control activities in the communities where they live and work. However, in July 2014, Peace Corps withdrew all volunteers from Kenya due to security concerns.
- The NMCP and PMI have a long-standing relationship with the Kenya Medical Research Institute (KEMRI) through the KEMRI-CDC Public Health Collaboration and KEMRI-Wellcome Trust collaboration. KEMRI collaborative malaria research has contributed to the development of each of the pillars of malaria prevention and control (i.e., effective case management, IPTp, ITNs, and IRS). Current surveillance and OR activities are focused on epidemiological and entomological surveillance and new medications and treatment strategies to inform national policy, strategies and program implementation.

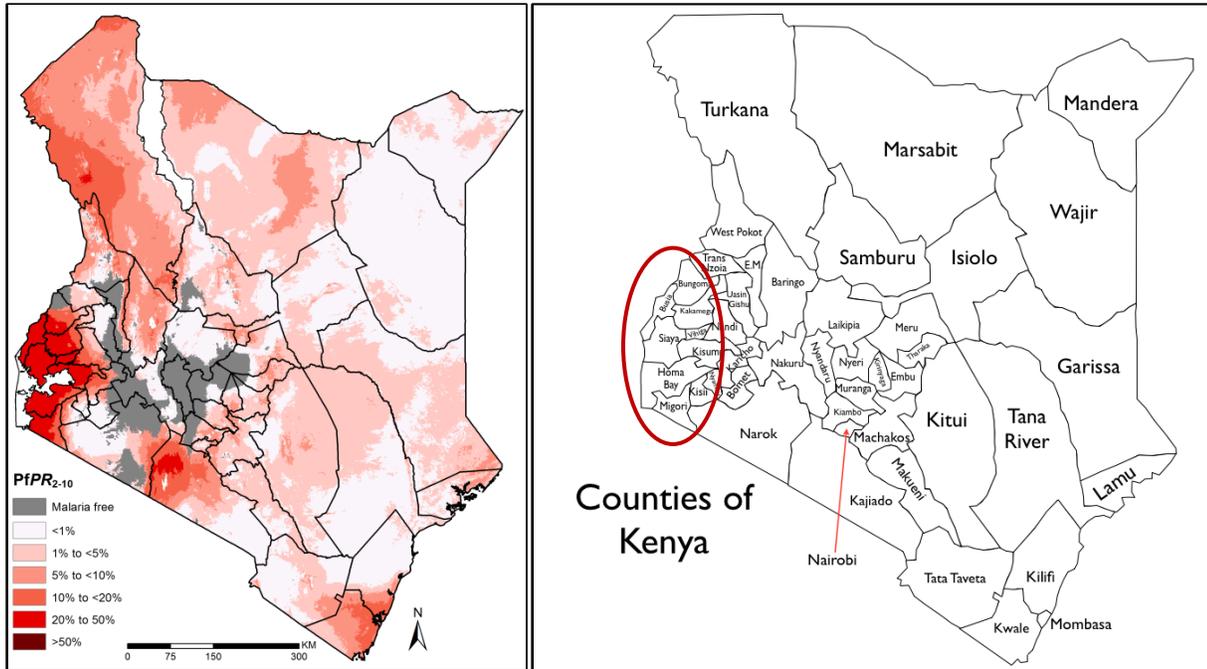
In addition to U.S. Government integration and collaboration, PMI facilitates coordination of activities among key malaria partners in Kenya, including Global Fund, United Kingdom's Department for International Development (DfID), WHO, United Nations Children's Fund (UNICEF), research institutions, non-governmental organizations, private sector, and other donors and stakeholders. PMI is an integral partner to the NMCP and actively participates in annual planning and reviews, technical working groups, interagency coordination committees, and other stakeholder-related activities.

To enhance the impact of PMI-funded activities and in coordination with the NMCP and key partners' PMI supports the distribution of malaria medications and RDTs, SM&E, and SBCC nationally, consistent with NMCP/MOH policies and strategies.

Since 2013 PMI has been prioritizing resources to target the areas of Kenya with the highest burden of malaria and achieve the greatest reduction in malaria morbidity and mortality. The 8 malaria lake-endemic counties with the highest burden of malaria have a population of 8.7 million and, according to the sixteenth NMCP quarterly surveillance bulletin released in March 2016, reported 38 confirmed malaria cases per 1,000 population compared to a national figure of 6 per 1,000. The 2015 MIS showed that parasitemia prevalence (by microscopy) was 26.7% in the lake-endemic areas compared to 8.2% nationally. PMI has prioritized these eight counties for intense targeted support for strengthening case management, SM&E, IRS, and MIP. Per NMCP policy, SP for IPTp is distributed only in the 14 malaria-endemic counties of the coast and western Kenya regions. For the ITN program, PMI supports

routine distribution via ANC and child welfare clinics in 36 counties. For mass campaign distributions, 23 counties receive nets, and PMI support has historically been directed to endemic counties in western Kenya. The NMCP, in collaboration with Information for Malaria Project (INFORM), Spatial Health Metrics Group, KEMRI-Wellcome Trust Research Programme, Nairobi, Kenya, is revising its county malaria profiles to allow better targeting of ITNs to high-burden counties. These profiles are expected to be released in September 2016. Any new ITN routine distribution channel will also be focused on endemic counties. A map showing the counties and the estimated malaria burden is paired with a table of PMI-supported activities by county and strategy to help visualize the geographic focus (Figure 3). In counties without PMI-focused support, the NMCP and other partners are leading malaria prevention and control activities.

Figure 3. Geographic Focus of PMI-supported Activities by County and Strategy¹⁵



Transmission Zone	Counties (name or #)	Malaria Interventions					
		Case management	IPTp / MIP	ITNs (# of counties for routine distribution)	BCC	Surveillance + M&E	IRS
Lake endemic (red circle on map)	Migori	X	X	X	X	X	X
	Homa Bay	X	X	X	X	X	
	Kisumu	X	X	X	X	X	
	Siaya	X		X	X	X	
	Busia	X		X	X	X	
	Bungoma	X	X	X	X	X	
	Kakamega	X	X	X	X	X	
	Vihiga	X		X	X	X	
Coast endemic	6			X (6)			
Epidemic-prone highlands	11			X (10)			
Seasonal	13			X (8)			
Low-risk	9			X (4)			

IPTp/MIP=intermittent preventive treatment in pregnancy/malaria in pregnancy; ITNs=insecticide-treated bed nets; BCC=behavioral change communication; M&E=monitoring and evaluation; IRS=indoor residual spraying with insecticides
Coding: white=no activities; gray shading=activities ongoing; X=PMI-supported activities ongoing

Financial support for the NMCP’s plan has historically come from three primary sources: PMI, Global Fund, and DfID. The five-year Global Fund Round 10 grant, which originally ran from 2012–2016, had a value of \$111 million or \$22.3 million per year. The Global Fund grant has now been extended to

¹⁵ Ministry of Health (2016). *The epidemiology and control profile of malaria in Kenya: reviewing the evidence to guide the future vector control*. National Malaria Control Programme, Ministry of Health. Technical support provided by the LINK Project (London School of Hygiene and Tropical Medicine and the Information for Malaria (INFORM) Project, KEMRI-Wellcome Trust Research Programme), Nairobi, Kenya, April 2016.

December 2017 with additional funding. The African Medical and Research Foundation (AMREF) received a concurrent five-year Global Fund Round 10 grant from 2012–2016 with a value of \$16 million to support implementation of community case management of malaria (CCM) in the endemic counties of western Kenya. Historically, DfID has provided about half (approximately 1.2–1.4 million) of the ITNs for routine distribution through ANC and child welfare clinics and another 600,000-800,000 ITNs for social-marketing channels, along with support through WHO for technical assistance, surveillance, monitoring and evaluation, and OR, and an extension of the Affordable Medicines Facility – malaria. However, the DfID malaria program ends in March 2017.

The net gap expected with the ending of the current DfID malaria program in 2017 has now been closed through a combination of a cost extension through December 2017 of the current Global Fund grants, a reduction in ITN costs resulting from a revision of national ITN guidelines allowing purchase of standard-sized ITNs, and the reprogramming of PMI funds from 2015 to purchase 1.2 million additional ITNs. DfID is preparing a new 5-year program to support the NMCP from 2017 to 2022.

Based on the revised KMS strategy, budget analysis, and confirmed contributions from Global Fund, PMI has concluded that the FY 2017 budget should be focused on filling critical program gaps, particularly commodities. If current trends continue, then PMI will be the only major donor after the end of the cost extension of the Global Fund grants in December 2017. The projected available funding to support the NMCP’s annual malaria prevention and control plan of \$34 million falls significantly short of the expected need, which is estimated to be approximately \$300 million annually based on the revised KMS costing.

7. PMI goal, objectives, strategic areas, and key indicators

Under the PMI Strategy for 2015-2020, the U.S. Government’s goal is to work with PMI-supported countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination. Building upon the progress to date in PMI-supported countries, PMI will work with NMCPs and partners to accomplish the following objectives by 2020:

1. Reduce malaria mortality by one-third from 2015 levels in PMI-supported countries, achieving a greater than 80% reduction from PMI’s original 2000 baseline levels.
2. Reduce malaria morbidity in PMI-supported countries by 40% from 2015 levels.
3. Assist at least five PMI-supported countries to meet the World Health Organization’s (WHO) criteria for national or sub-national pre-elimination.¹⁶

These objectives will be accomplished by emphasizing five core areas of strategic focus:

1. Achieving and sustaining scale of proven interventions
2. Adapting to changing epidemiology and incorporating new tools
3. Improving countries’ capacity to collect and use information
4. Mitigating risk against the current malaria control gains
5. Building capacity and health systems towards full country ownership

¹⁶ http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

To track progress toward achieving and sustaining scale of proven interventions (area of strategic focus #1), PMI will continue to track the key indicators recommended by the Roll Back Malaria Monitoring and Evaluation Reference Group (RBM MERG) as listed below:

- Proportion of households with at least one ITN
- Proportion of households with at least one ITN for every two people
- Proportion of children under five years old who slept under an ITN the previous night
- Proportion of pregnant women who slept under an ITN the previous night
- Proportion of households in targeted districts protected by IRS
- Proportion of children under five years old with fever in the last two weeks for whom advice or treatment was sought
- Proportion of children under five with fever in the last two weeks who had a finger or heel stick
- Proportion receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs
- Proportion of women who received two or more doses of IPTp for malaria during ANC visits during their last pregnancy

8. Progress on coverage/impact indicators to date

Table 1: Evolution of Key Malaria Indicators in Kenya from 2003 to 2015

Indicator	2003 DHS ^a	2007 MIS ^b	2008–09 DHS ^c	2010 MIS	2014 DHS	2015 MIS
% Households with at least one ITN	6%	48%	56%	48%	59%	63%
% Households with at least one ITN for every two people	N/A	N/A	N/A	N/A	34%	40%
% Children under five who slept under an ITN the previous night	5%	39%	47%	42%	54%	56%
% Pregnant women who slept under an ITN the previous night	4%	40%	49%	41%	51%	58%
% Households in targeted districts protected by IRS	N/A	N/A	N/A	26% ^d	N/A	N/A
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	74%	70% ^e	N/A	59%	72%	72%
% Children under five with fever in the last two weeks who had a finger or heel stick	N/A	N/A	N/A	12%	35%	39%
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	N/A	N/A	N/A	51%	86%	92%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	4%	13%	15%	25%	36% ^f	56% ^f
% Children aged 6-59 months with a hemoglobin measurement of <8 g/dL	N/A	4%	N/A	5%	N/A	2%
% Children aged 6-59 months with malaria infection ^g	N/A	3%	N/A	8%	N/A	5%

^a Pre-PMI baseline data for all-cause under-five mortality

^b PMI baseline data for coverage indicators

^c PMI baseline data for all-cause under-five mortality

^d In epidemic-prone highlands and lake-endemic areas targeted for IRS

^e Indicator: percentage of children under five years old with fever who sought treatment from a facility or health provider the same or next day

^f In the 14 endemic counties with an IPTp policy; national estimate was 17%

^g By microscopy

9. Other relevant evidence on progress

In early 2016, a secondary analysis of household survey data, which calculated ITN use to access ratios across PMI counties, was completed. Data from the three household surveys conducted from 2008 to 2015 showed that Kenya has a high use to access ratio (>0.8) across geographic regions and wealth

quintiles.¹⁷ In the 14 malaria-endemic counties, the use to access ratio was >0.95 indicating that almost all persons slept under a net if they had access to one.¹⁷ Therefore, the proportion of the population that uses ITNs is higher than the national target of 80% when there are enough nets in the household such that all persons have access. With only 40% of households achieving universal coverage (i.e., one ITN per two persons per household) as estimated by the 2015 MIS, increasing access to ITNs remains a substantial challenge for Kenya.¹⁸

¹⁷ Koenker H, Ricotta E. PMI ITN Access and Use Report – 2016 (draft). In preparation.

¹⁸ National Malaria Control Programme (NMCP), Kenya National Bureau of Statistics (KNBS), and ICF International. Kenya Malaria Indicator Survey 2015. Nairobi, Kenya and Rockville, Maryland: NMCP, KNBS, and ICF International, 2016.

III. OPERATIONAL PLAN

PMI supports the NMCP in its implementation of the KMS 2009–2018. PMI’s support includes health system strengthening, continued support for the Health Management Information System (HMIS) and Logistics Management Information System (LMIS) reporting in District Health Information System (DHIS2), improving pharmaceutical and commodity supply chain management, improving malaria case management, and enhancing SBCC activities. Improving diagnostic capacity, promoting quality medicines, and supporting ITN distribution through ANC clinics and child welfare clinics, and indoor residual spraying are among specific interventions that PMI will continue to support under its investment approach. Although it is included in the KMS, PMI does not support larviciding in Kenya. Continuing with the approach in previous years, PMI commodities will be distributed nationwide, and limited technical assistance will be provided at the national level with intense focus in the eight high burden malaria endemic counties in western Kenya.

1. Vector monitoring and control

NMCP/PMI objectives

Vector control is a key component of Kenya’s malaria strategy. The objective is to have at least 80% of people in malaria risk areas using appropriate malaria preventive interventions by 2018. The use of ITNs and IRS continue to be the primary vector control tools, with larval source management as a supplementary tool in line with Kenya’s Integrated Vector Management strategy. Kenya aims to achieve universal coverage of ITNs, defined as one net for every two people at risk, through multiple distribution channels, including mass campaigns, distribution to pregnant women and children through ANC/child health visits, and through social marketing. Targeted IRS is to be conducted in endemic areas for burden reduction as well as in epidemic prone areas based upon surveillance data to avert epidemics. Kenya has developed an IRS business plan and an Insecticide Resistance Management plan to guide IRS activities in the country. PMI has prioritized the eight endemic counties for intense targeted support with the aim of significantly reducing morbidity by combining two vector control interventions, IRS and ITNs, to achieve burden reduction while slowing down resistance development to pyrethroids. Current data shows increasing pyrethroid resistance and supports the need to protect the only insecticide recommended for use in ITNs. To support these vector control objectives, Kenya aims to continue to build capacity at national level and develop capacity at the county level to implement entomological surveillance and insecticide resistance monitoring.

a. Entomologic monitoring and insecticide resistance management

Progress since PMI was launched

Entomological surveillance and insecticide resistance monitoring have been conducted in up to 16 sites throughout western Kenya since 2008. The primary malaria vectors in this region are *An. gambiae* s.s., *An. arabiensis* and *An. funestus*. At the beginning of the surveillance, *An. arabiensis* was the most common of the three species collected in most sites, with the exception of sites in Busia and Bungoma counties near the border with Uganda where *An. gambiae* was more common. However, in recent years, *An. funestus* and, to a lesser extent, *An. gambiae* have been found in increasing numbers. These findings have correlated with increasing resistance to pyrethroid insecticides in both species in multiple sites. Resistance to pyrethroids has also been observed in *An. arabiensis*.

Progress during the last 12-18 months

Due to financial issues with the implementing partner, entomological surveillance and resistance monitoring was ceased in April of 2015. A new partner was identified and the surveillance activities restructured to focus on five sites in and around the two sub-counties within Migori County that had been targeted for IRS by the Kenya NMCP for 2016. Monitoring began in December 2015 and included monthly pyrethrum spray catches, light traps, window exit traps as well as human landing catches for five consecutive nights in February 2016. The predominant vector species was *An. funestus* in all traps with initial high numbers following the short rains in late 2015 but declining through March of 2016. Insecticide resistance testing was conducted in April 2016 in five sites, including three in Migori County where IRS will be conducted in 2017. The results, listed in the table below, indicate that there is resistance to the pyrethroids but susceptibility to both bendiocarb and pirimiphos-methyl. The primary species collected were *An. gambiae* s.l. in four of the sites while *An. funestus* was tested at one site in Migori County. PCR testing indicated the *An. gambiae* s.l. were primarily *An. arabiensis*. Resistance to pyrethroids was observed in both species.

Insecticide Resistance Tests, 2016 (% mortality)						
Species	County	Sub-County	Pyrethroid		Carbamate	Organo-phosphate
			Deltamethrin	Permethrin	Bendiocarb	Pirimiphos-methyl
<i>An. gambiae</i> s.l.	Homa Bay	Homa Bay	72	75	100	100
<i>An. gambiae</i> s.l.	Homa Bay	Ndhiwa	60	73	100	100
<i>An. gambiae</i> s.l.	Migori	Rongo	73	69	100	100
<i>An. gambiae</i> s.l.	Migori	Uriri	84	75	75	100
<i>An. funestus</i>	Migori	Awendo	85	85	93	100
<i>An. funestus</i>	Migori	Rongo	NA	NA	100	100
<i>An. funestus</i>	Migori	Uriri	NA	NA	100	100

Plans and justification

With IRS restarting in one county in 2017 and continuing in 2018, PMI will support entomological surveillance and insecticide resistance monitoring in up to 16 sites primarily focused in endemic counties in western Kenya, although additional sites will be assessed for insecticide resistance in central as well as coastal Kenya. Entomological surveillance will include monthly monitoring of mosquito densities through pyrethrum spray catches and light traps. In addition, a smaller number of sites will include window exit traps and outdoor resting traps as indoor collections often yield low numbers of mosquitoes. Insecticide resistance monitoring will be done at a subset of sites to include both WHO susceptibility assays of all four insecticide classes as well as CDC bottle assays to measure the intensity of pyrethroid resistance in the population.

Proposed activities with FY 2017 funding: (\$529,000)

1. **Entomological monitoring and capacity building:** Support for vector surveillance and insecticide resistance monitoring in 16 sites. Monitoring of mosquito densities will focus on ten sites in and around the counties targeted for IRS. Monitoring of mosquito behavior will be done in a subset of these ten sites. Insecticide resistance monitoring will be conducted at all sites as well as four additional sites in other counties of western Kenya where higher levels of pyrethroid resistance have been observed previously. In addition, a site in Central Kenya and a site in Coastal Kenya will be selected for insecticide resistance monitoring only. Capacity building will

primarily be through inclusion of County Health Officers in the entomological monitoring rather than a formal course in entomological or resistance monitoring. The designated County Health Officers will also assist in insecticide resistance testing which is often done directly in the field. For capacity building, PMI will provide transport and per diem for the one to two members of the County Health Teams during mosquito collection periods in their respective counties. (\$500,000)

2. **Technical assistance for entomological capacity building:** Funding for two technical assistance visits from CDC to help develop entomological capacity at the national and county level. (\$29,000)

b. Insecticide-treated nets

The NMCP objective for ITNs is to have at least 80% of people in malaria risk areas using appropriate malaria preventive interventions by 2018. Kenya aims to achieve universal coverage of ITNs, defined as one net for every two people at risk, through multiple distribution channels, including mass campaigns, distribution to pregnant women and children through ANC/child welfare clinic visits, and through social marketing.

Progress since PMI was launched

Since 2008, PMI has procured over 13 million ITNs and distributed 8 million through two channels, health facilities and mass campaigns, with 5 million ITNs still in the process of being delivered. Through June 2016, approximately 2.4 million ITNs have been distributed each year free through routine ANC and child health clinics in 36 counties to reach the most vulnerable populations, pregnant women and children under one year. In 2014–2015, 13.6 million ITNs were distributed as part of a rolling universal coverage mass distribution campaign in 23 counties, including 3.8 million ITNs procured by PMI and targeted to five counties.

Despite substantial investments in ITNs by PMI and other partners for over a decade, only 63% of households have at least one ITN and just 40% have at least one ITN per two persons (i.e., universal coverage) according to the most recent MIS.¹⁹ Access to ITNs at the household level appears to be the primary factor associated with use in both children less than five years of age and pregnant women. According to the 2015 MIS, 56% of children less than five years of age and 58% of pregnant women slept under an ITN the previous night, whereas these estimates were 79% and 82%, respectively, in households that had at least one ITN.²⁰ Communication and promotion efforts to increase uptake and utilization of ITNs were focused initially on national mass media campaigns, particularly around universal coverage mass distributions. Between the mass distributions, PMI re-focused efforts on SBCC at the community-level in high-burden areas where ITN usage has historically been low.

Progress during the last 12-18 months

PMI contributed to the final phase of the rolling mass campaign which distributed 3.8 million ITNs to five counties in 2015. World Vision supported distribution in one county, while Global Fund supported distribution of ITNs in the remaining 17 counties. PMI also continued its support for routine distribution

¹⁹ National Malaria Control Programme (NMCP), Kenya National Bureau of Statistics (KNBS), and ICF International. 2016. *Kenya Malaria Indicator Survey 2015*. Nairobi, Kenya, and Rockville, Maryland, USA: NMCP, KNBS, and ICF International.

of ITNs through ANC and child health clinics; 2.1 million ITNs were distributed through these channels in FY 2015.

To complement existing routine distribution channels and ensure high coverage between mass campaigns, PMI initially planned to support two pilots of additional distribution channels, through the community and through schools. However, only the community distribution channel was selected because the Government had begun rolling out the community strategy and community structures linked to the overall health system existed in country. This choice represented a potential savings over a school-based system that would require setting up distribution systems and structures from scratch. The PMI-supported community pilot was started in one malaria-endemic sub-county, where nets were replaced in targeted households using CHVs. The aim was to maintain high coverage levels, with the ultimate goal of reducing the need for mass distribution campaigns. Results from the pilot and a cost-effectiveness study of current distribution channels are expected in late 2016 and will inform the selection of future ITN distribution channels.

The recent decision by the NMCP to change ITN specifications will mean a reduction in the height of ITNs distributed through campaigns and routine. Any impact this may have on net use will be captured in the 2018 MIS and future Tracking Results Continuously (TRAC) surveys.

PMI supported durability monitoring of ITNs in four counties, with each one representing a different phase of the rolling campaign. Monitoring initially began in Siaya and West Pokot counties where nets were distributed in 2014 and 2015. ITN collections to assess attrition and physical durability one year after distribution have been completed and data analysis is ongoing. Bioassays to determine insecticidal activity of these nets are also ongoing. Additional ITN collections will be done in late 2017 and early 2018 (year 2 and year 3 time points). The final rounds of marking nets in Kisii and Kilifi were done in late 2015 and early 2016 approximately 6 months after distribution was completed. The durability of nets in these counties will be followed through mid-2018.

Commodity gap analysis

Table 2. ITN Gap Analysis

Calendar Year	2016	2017	2018
Total country population	47,279,171	48,555,709	49,866,713
Total targeted population (36 counties)	35,267,710	36,219,938	37,197,876
Continuous Distribution Needs (in 36 counties)			
Channel #1: ANC	1,491,824	1,532,103	1,573,470
Channel #2: Child health clinics	1,410,708	1,448,798	1,487,915
Channel #3: Alternate distribution channel	0	125,000	125,000
<i>Estimated Total Need for Continuous</i>	2,902,532	3,105,901	3,186,385
Mass Distribution Needs (in 23 counties)			
2017–18 mass distribution campaign ^a	0	14,845,598	0
<i>Estimated Total Need for Campaigns</i>	0	14,845,598	0
Total ITN Need: Routine and Campaign[†]	2,902,532	17,951,499	3,186,385
Partner Contributions			
ITNs carried over from previous year	0	0	0
ITNs from MoH	0	0	0
ITNs from Global Fund NFM	0	13,845,598 [‡]	0
ITNs from other donors (DfID)	800,000	0	0
ITNs planned with PMI funding	1,500,000	3,125,000	1,675,000
Total ITNs Available	2,300,000	16,970,598	1,675,000
Total ITN Surplus (Gap)	(602,532)	(980,901)	(1,511,385)
^a The plan is to procure the nets to arrive by the end of 2017, with 3.7M to be distributed in 2017 and the remainder in 2018. Assumptions: <ul style="list-style-type: none"> • population growth estimated 2.7% per year • average of 4.5% of the population would become pregnant • 94% of the pregnant women attend ANC • 4% children under one, plan for 100% child health clinic attendance [†] The assumptions for population at risk are different for routine nets where currently 36 counties are included and for campaign nets where only 23 counties are included. The targeted population listed is for the routine nets in the 36 counties. The population of the 23 counties to be covered by the next campaign is 24,157,573 (i.e., 13.4M nets). For planning purposes the NMCP adds a 10% adjustment to the 2014/15 data for the variance between the projected population and actual number of people registered (resulting in 14.8M nets). [‡] Additional ITNs will be purchased through funds in the Global Fund cost extension.			

Plans and justification

With FY 2017 funds, PMI will procure and distribute up to 1.55 million ITNs free of charge to pregnant women and children under one year through ANC and child health clinics. In addition, PMI will procure 125,000 ITNs to support the implementation of an alternative distribution channel in one county with the aim of maintaining high ITN coverage between mass campaigns (starting after the 2017–18 mass

campaign) and ultimately developing distribution channels that will reduce or eliminate the need for mass campaigns. Lastly, the durability of ITNs distributed in the mass campaign in 2017–18 will be monitored. Durability monitoring will follow PMI guidelines and will include bioassays on net samples.

Proposed activities with FY 2017 funding: (\$5,500,000)

1. **Procure ITNs for routine distribution:** Fill part of the ITN gap for routine distribution by purchasing up to 1.55 million ITNs for routine distribution through ANC and child health clinics in 36 target counties. ITNs will be procured using savings from previous years. (\$3,150,000) (an additional \$1,500,000 from commodity cost savings in 2016 will contribute to this procurement)
2. **Logistic and program support for routine ITN distribution:** Provide logistical support, including transportation and storage of ITNs, for distribution of the 1.55 million ITNs within the 36-county routine distribution system. (\$1,550,000)
3. **Procure ITNs for an alternate continuous distribution channel in one endemic county:** While waiting for results of the economic and process evaluation of the pilot in one sub-county, PMI plans to expand the community-based strategy in two to three counties. It is estimated that each county has a population of roughly 1 million, and therefore needs at least 550,000 nets for universal coverage. After the mass distribution campaign, however, only 50,000 nets would be needed per county per year. Given this new channel would start after the campaign, procuring 125,000 ITNs should be adequate to maintain high coverage in two to three counties during the first year following the 2017–2018 mass distribution campaign. (\$375,000)
4. **Logistic and program support for continuous ITN distribution:** Support an alternate ITN distribution channel in two to three counties to maintain high coverage following the 2017–2018 mass campaign. The specific approach (e.g., community-based) will be based on the planning activity supported with FY 2015 funding. (\$225,000)
5. **Net durability monitoring:** Though durability monitoring is already in progress for ITNs distributed in 2014 and 2015, different types of ITNs are likely to be distributed in 2017 and 2018. ITN durability may also be different in different county settings. Therefore, net attrition/durability monitoring will be conducted on ITNs at two sites that will be receiving nets during the 2017–2018 mass campaign. The final decision to go ahead with additional monitoring will be contingent on the brand of ITNs distributed and site selection in 2017 and 2018, and will be based on any revised PMI guidance. (\$200,000)
6. **SBCC to support ITN use:** At the community level, CHVs will enhance interpersonal communication (IPC) approaches to target household members during their routine household visits. This will ensure that the target risk groups are reached with the appropriate messages on the use of ITNs. In health facilities, particularly ANC clinics, women’s groups, health talks, poster and information displays, and IPC during consultations will be used to deliver messaging on ITNs. Community *barazas*, dramas, and public gatherings will also be used to deliver malaria prevention and control messaging, including promotion of correct and consistent use of ITNs. (see more details in the SBCC section)

c. Indoor residual spraying

Progress since PMI was launched

PMI began spraying in Kenya in two highland districts and one lowland district (now sub-counties) in 2008. However, the NMCP shifted the IRS strategy to focus on lowland-endemic sub-counties beginning in 2010. In response, PMI shifted resources to target six sub-counties (i.e., parts of three counties) covering a total population of 2.4 million in 2012. Resistance to pyrethroids was observed in several locations in western Kenya and after the 2012 spray campaign, the NMCP decided to implement IRS with non-pyrethroid insecticides. However, no non-pyrethroids were registered in Kenya at the time, and PMI and other donors stopped IRS until alternative insecticides could be registered for use. Since 2012, Kenya has developed Integrated Vector Management and Insecticide Resistance Management strategies along with an IRS business plan and a single long-acting organophosphate has been registered for IRS.

Table 3: PMI-supported IRS activities, 2008 – 2018

Calendar Year	Number of Counties Sprayed	Number of Sub-Counties Sprayed	Insecticide Used	Number of Structures Sprayed§	Coverage Rate§	Population Protected§
2008	2	3	Lambdacyhalothrin	764,050	96%	3,061,967
2009	2	3	Deltamethrin	517,051	94.6%	1,435,272
2010	2	5	Alphacypermethrin	503,707	97.1%	1,892,725
2011	2	5	Deltamethrin	485,043	89%	1,832,090
2012	3	6	Deltamethrin	460,447	98%	2,435,836
2013	0	0	NA	0	NA	0
2014	0	0	NA	0	NA	0
2015	0	0	NA	0	NA	0
2016	0	0	NA	0	NA	0
2017*	1	TBD	Pirimiphos-methyl	276,000	NA	1,400,000
2018*	1	TBD	Pirimiphos-methyl	276,000	NA	1,400,000

*Represents projected targets based on national strategic plan and/or discussions with the NMCP.
 §Figures presented through 2012 are from the Kenya IRS2 Task Order Final Report.

Progress during the last 12-18 months

In 2016, the NMCP had planned for a small GoK-funded IRS program in two sub-counties in Migori County. PMI provided technical assistance to the NMCP during preparation for IRS in Migori County. However, funding for the IRS operations was not obtained in 2016 and IRS has been delayed until 2017. Although spraying did not happen in 2016, PMI supported an inventory of all equipment and insecticides available in country as part of the technical assistance and has begun making preparations for IRS in March of 2017.

Plans and justification

PMI will support IRS in one to two counties with an estimated population of 1.4 million people using a non-pyrethroid insecticide. The IRS will be conducted in accordance with the IRS business plan and the IRM strategy, targeting an increasing number of endemic counties bordering the highlands of western Kenya. This approach is aimed to reduce the malaria burden in the targeted counties and will serve as a barrier to the introduction of malaria into highland, epidemic prone areas.

Proposed activities with FY 2017 funding: (\$7,035,000)

1. **IRS implementation and management:** Support IRS in Migori County (estimated to reach 276,000 structures and up to 1.4 million people) with at least 85% coverage in all targeted areas, following the NMCP IRS Business Plan. Blanket spraying will be conducted. The NMCP IRS business plan rationale is to target as many endemic counties as possible to provide a buffer between endemic and epidemic prone areas. Kenya is one of the countries participating in the second round of the UNITAID NexGenIRS project and it is anticipated that there will be some expansion when the lower cost Actellic CS is available for spraying in 2018. (\$7,000,000)
2. **Environmental monitoring:** Environmental monitoring of IRS activities. (\$35,000)

2. Malaria in pregnancy

NMCP/PMI objectives

The KMS 2009–2018, under objective one, aims at ensuring that 80% of people living in malaria-risk areas are using appropriate malaria prevention interventions by 2018. Malaria in pregnancy (MIP) interventions are coordinated in partnership with the Reproductive Maternal and Newborn Health (RMNH) Unit, whose goal is to provide all pregnant women who present at ANC clinics the complete package for maternal health in addition to the three key malaria interventions: IPTp, provision of ITNs, and prompt diagnosis and treatment of fever due to malaria.

Kenya has adopted both the updated 2012 WHO policy on IPTp, as well as the 2013 consensus statement by MIP stakeholders, governments, multilaterals, bilaterals, and non-governmental organizations to optimize the delivery of MIP interventions. Intermittent preventive treatment with SP in Kenya is recommended for 14 counties (i.e., coastal and lake) with endemic malaria and administered by directly observed therapy at each visit after quickening at four-week intervals. The target is all pregnant women receive a minimum of three doses, as stated in the revised KMS 2009–2018. Women receive a free ITN at the first ANC visit and SBCC messaging to encourage correct hanging of the net and consistent usage. The recent MIS 2015 indicated that over 58% of pregnant women used an ITN the night before the survey, an increase from 36% reported in the 2010 MIS survey. In line with the case management strategy, all suspected malaria cases must be tested before treatment, and all pregnant women with signs and/or symptoms of malaria at any ANC visit should be tested for malaria with a parasitological test and treated if positive. The first-line treatment for uncomplicated malaria is oral quinine in the first trimester and AL in the second and third trimesters. The recommended treatment for severe malaria in pregnancy is parenteral artesunate. The national diagnosis and treatment guidelines recommend that pregnant women receive ferrous sulfate (200 mcg) and folic acid (0.4 mg) at all ANC visits and are evaluated for anemia during the first and fourth ANC visits. If a woman is found to be anemic, diagnostic testing for malaria is recommended.

Progress since PMI was launched

Since PMI started supporting MIP interventions, a total of 2.5 million tablets of SP have been procured and 20,678 healthcare workers trained on the MIP package of interventions. PMI has also supported the Kenya Medical Supply Agency (KEMSA) to redistribute 628,000 SP tablets to health facilities with shortages in nine malaria-endemic counties. Since Kenya adopted the MIP strategy more than 16 years ago, IPTp coverage has remained below the national target of 80% despite a high ANC attendance of 94% in women who receive services from a skilled provider (a doctor, nurse, or midwife). However there has been good progress in endemic regions of the country (targeted 14 counties), from 13% in

2007 MIS to the current 56% in the 2015 MIS among pregnant women who received two or more doses of SP. The survey also showed that 38% of pregnant women received the currently recommended three doses.

In 2011 PMI initiated community-based activities to support early attendance for pregnant women. These activities include MIP messaging, use of community data collection tools to capture IPTp uptake, and early referral of pregnant women to health facilities to access ANC and IPTp services. CHVs do not administer IPTp, but refer pregnant women to ANC clinics for antenatal care, including IPTp. The CHVs routinely visit each household monthly in their community unit to collect data on all health issues, register new pregnant women, check on previously registered ones, find out how many are taking SP for IPTp, determine how many have defaulted on the scheduled visits, and refer them to ANCs. The CHVs also sensitize pregnant women to attend ANC clinics to receive as many SP doses as scheduled. The data collected by CHVs is received by the Community Health Assistants (CHA) who verify and forward the data to the health records and information officer who analyzes it. The counties use this data to identify areas with low IPTp uptake, identify influencing factors and propose possible solutions.

The current ANC register captures IPTp3 but the tool to forward the data for entry into DHIS2 has not been revised to include IPTp3. The NMCP has discussed this gap with the national HMIS team and plans are in progress to develop tools to forward IPTp3 data during the next review of DHIS2 tools.

Table 4. The Status of IPTp policy in Kenya

WHO policy updated to reflect 2012 guidance	Yes, updated during the review of the 2009–2018 Kenya Malaria Strategy in 2014
Status of training on updated IPTp policy	First training conducted between 2011 and 2012 (<i>5,759 trained</i>). Second training on policy and SBM-R conducted in 2013 (<i>1,200 facility in-charges trained</i>) Third training conducted from 2014 and still in progress to date (<i>5,074 so far trained</i>)
Number of health care workers trained on new policy in the last year	Health care workers trained last 18 months 5,074 (<i>October 2014 to September 2015: 2,155; October 2015 to April 2016: 2,919</i>)
Are the revised guidelines available at the facility level?	Yes
ANC registers updated to capture three doses of IPTp-SP?	Yes
HMIS/ DHIS updated to capture three doses of IPTp-SP?	No

Progress during the last 12-18 months

PMI has continued to support MIP activities at the national, county, facility, and community levels. At the national level, PMI has supported the management and coordination of the MIP TWG meetings under the leadership of the RMNH department including keeping all stakeholders informed about MIP activities by distributing minutes of TWG meetings. At the county and sub-county levels, PMI has continued to support the development of Homa Bay, Migori, Kisumu, and Bungoma Counties’ annual MIP work plans (2015/16).

PMI has continued to support the 44 RMNH and NMCP trained clinical mentor trainers (FP/RMNH) in MIP interventions. These mentors have trained a total of 232 new clinical mentors from the counties and sub-counties to orient health workers on the MIP guidelines. To date, the newly trained mentors have managed to orient 5,074 health workers from 437 facilities in Bungoma, Homa Bay, Kisumu, and Migori Counties. In order to improve on IPTp data capture and management at health facilities, an additional 42 senior technical officers (Health Records, Information, Public Health, Disease Surveillance and Response, County Clinical officers, County Malaria Control Coordinators, and County Nursing officers) drawn from Busia, Bungoma, Kisumu, Siaya, and Vihiga Counties were trained on IPTp data management. The trained technical officers will support counties to roll out data management skills to sub-counties and carry out supportive supervision to assess the data entry processes in the health facilities.

At the community level, 154 Community Health Assistants (CHAs - *formerly community health extension workers or CHEWs*) from Bungoma, Homa Bay, Kisumu, and Migori Counties were trained on community MIP. The CHAs oriented 3,120 CHVs, who in turn managed to reach 41,626 pregnant women with MIP messages. Out of the 41,626 pregnant women reached, 31,636 had taken at least one or more doses of IPTp-SP (76%) during their pregnancy. The practice of using CHVs to identify and track pregnant women monthly has been expanded from one sub-county to seven sub-counties in Bungoma, two in Kisumu and one in Migori.

In compliance with a government directive to procure SP following devolution, three counties, Bungoma, Migori, and Kisumu have procured SP and distributed to their health facilities. PMI supported a SP quantification exercise to determine the national need (14 counties) and also supported these three counties to determine their SP needs. In 2015, to prevent a reversal of the gains in IPTp uptake and to bridge the commodity gap in the remaining 11 counties, the NMCP, through counterpart financing and PMI, procured SP for 2016 and 2017.

Commodity gap analysis

The table reflects an SP gap in 2018 at the central level. It is hoped that by this time most counties will have started procuring SP at county level. The PMI procurement was meant to avert a gap in SP during 2016. The SP procured are being distributed to the various health facilities by KEMSA. PMI continues to advise counties on the importance of ensuring that pregnant women are protected during pregnancy and advocate for procurement of sufficient stocks of SP. PMI plans to continue discussions with the NMCP and other developing partners to ensure sufficient stocks of SP. UNICEF has already promised to procure additional SP supplies to cover the program. Meanwhile, the 14 counties have been asked to ensure SP is added to the list of essential drugs.

Table 5. SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2016	2017	2018
Total population	47,279,171	48,555,709	49,866,713
Targeted population (14 counties)	13,297,017	13,656,037	14,024,750
SP Needs			
Total number of pregnant women attending ANC	562,464	577,650	593,247
Total SP Need (in treatments)	1,687,391	1,732,950	1,779,741
Partner Contributions			
SP carried over from previous year	0	3,022,276	1,289,326
SP from Government	3,040,000	0	0
SP from Global Fund	0	0	0
SP from other donors	0	0	0
SP planned with PMI funding	1,669,667	0	0
Total SP Available	4,709,667	3,022,276	1,289,326
Total SP Surplus (Gap)	3,022,276	1,289,326	(490,415)
Assumptions: <ul style="list-style-type: none"> • population growth estimated 2.7% per year • average of 4.5% of the population would become pregnant in 14 counties (Coast, Western and Nyanza) • 94% of the pregnant women attend ANC • plan for 3 treatments of SP per pregnant woman 			

Plans and justification

PMI will continue to support the implementation of MIP interventions, strengthening of ANC health worker capacity in endemic areas, dissemination of IPTp guidelines, and supportive supervision. PMI will continue to support the community health strategy by building the capacity of CHVs on MIP interventions to mobilize, refer, track, and report on pregnant women and ANC attendance in their communities. The combined approach of using CHVs, CHAs, and healthcare worker orientations through simplified guidelines and supportive supervision helps to improve ANC attendance by pregnant women and coverage of IPTp and ITNs, in addition to other health services.

In the context of devolution, PMI will continue to support MIP at the national and county levels. With FY 2017 funding, PMI will support the scale up of the MIP package of interventions, including IPTp delivery and quality improvement frameworks, in health facilities in the target endemic counties of

Bungoma, Homa Bay, Kakamega, Kisumu, and Migori. In addition, FY 2017 funding will support refresher trainings of CHAs and CHVs.

Proposed activities with FY 2017 funding: (\$700,000)

1. **Sensitize and train healthcare workers on malaria prevention and management strategies for pregnant women:** Healthcare workers in all healthcare facilities that provide ANC services in the five counties will receive refresher trainings with an estimated target of over 400 healthcare facilities. Activities will include the re-orientation and training of facility in-charges and health service providers on the MIP package and ANC data collection, and implementation of a quality improvement framework. (*\$300,000*)
2. **Sensitize, orient, and supervise CHVs:** This activity will include the orientation, training, and supervision of CHVs to increase early referral to ANC services, register all pregnancies for follow-up, and provide case management and ITNs. CHVs are trained to undertake SBCC activities and to refer and follow pregnant women to promote IPTp at health facilities. An estimated 5,500 CHVs will be sensitized and oriented using the community strategy and other innovative approaches. The target is to reach approximately 50,000 women of reproductive age with community MIP messages and services in five counties. These funds will be used to support building the capacity of counties to deliver MIP services by training the C/SCHMTs, CHAs, CHVs, conducting data quality audits for information collected by CHVs, convening TWGs and partner meetings, reimbursing transport and meal costs when the CHVs bring data monthly. Scaling up of MIP in malaria endemic counties is done in a phased approach to ensure counties develop capacity to provide the services in absence of donors. The first year expenses in a county are higher but from the second year onwards, the main activities only consist of supportive supervision, tracking of the pregnant women, and convening planning and TWG meetings. A study carried out by KEMRI and CDC in 2013 on the uptake of IPTp through community interventions in Bungoma County demonstrated IPTp1 at 88% and IPTp2 at 63% compared to 26% and 25%, respectively, in the 2010 MIS. The biggest obstacle entails changing health-seeking behavior from late to early ANC attendance so that women start IPTp early. As with other social and behavior change communication, in order for behavior change to take root, a pregnant woman needs to receive the message four to five times to start ANC early to receive SP doses for IPTp; having information alone will not enhance ANC attendance. (*\$300,000*)
3. **Strengthen national and county policy and monitoring capacity:** Though most of the activity implementation will be at county level, limited support will be provided at the national level in the areas of policy and monitoring and evaluation of MIP-specific activities. Technical assistance support will be provided to counties on MIP. (*\$100,000*)
4. **ITN continuous distribution channel:** PMI will support routine distribution of ITNs to pregnant women during the first ANC visit. (*Costs covered under the ITN section*)
5. **SBCC activities to promote IPTp and net use:** PMI will continue to promote ANC uptake and ITN use among pregnant women through integrated activities that are outlined in the SBCC section of this MOP. (*Costs covered under the SBCC section*)

3. Case management

a. Diagnosis and treatment

NMCP/PMI objectives

The *Kenya National Guidelines for Diagnosis and Treatment of Malaria Fifth edition, 2016* are aligned with the WHO recommendations on universal diagnostic testing and treatment with an artemisinin-based combination therapy (ACT). The objective as outlined in the KMS 2009 – 2018 is to have 100% of all suspected malaria cases presenting to a health provider managed according to the national malaria treatment guidelines by 2018. This objective is to be achieved through the following strategies:

1. Capacity building of health workers in malaria diagnosis and treatment at health facilities.
2. Access to affordable malaria medicines and diagnostics through the private sector.
3. Strengthening community case management of malaria using the community strategy through Community Health Volunteers (CHV).
4. Ensuring commodity security of antimalarials and diagnostics in the public sector.

The *National Guidelines for the Diagnosis, Treatment and Prevention of Malaria in Kenya* state that patients with symptoms of malaria (i.e., fever) in all age groups and all epidemiologic settings should be tested by either microscopy or RDT, and only those who test positive should be given antimalarial treatment. However, appropriate treatment should not be denied or delayed due to a lack of available testing. The national case management guidelines do not provide clarity on which diagnostic method is most appropriate at the different levels of the health system. Microscopy is being used where it exists, including some lower-level health facilities despite quality concerns. Kenya recommends artemether-lumefantrine (AL) as the first-line treatment for uncomplicated malaria, dihydroartemisinin-piperaquine is the second-line for uncomplicated malaria, and parenteral artesunate is first-line for severe malaria. During pregnancy, the first-line treatment for uncomplicated malaria is oral quinine in the first trimester and AL in the second and third trimesters. The recommended treatment for severe malaria in pregnancy is parenteral artesunate. Quinine is still used in health facilities because it is less expensive and artesunate is not fully rolled out. The recommended pre-referral treatment for severe malaria is intramuscular (IM) or rectal artesunate. If artesunate is not available, IM artemether may be administered. In the absence of those medicines, IM quinine may be used.

Kenya has a large and robust private health sector, including a growing health insurance component, with numerous commercial, governmental, and non-governmental partners working on quality of care initiatives from diagnostic algorithms to physician detailing to pay-for performance incentives. The KMS 2009–2018 includes support for the private sector. Private pharmacy and OTC staff have been trained on malaria case management, recognition of severe malaria signs, referral advice, and appropriate drug storage in order to improve prescriber practices among the outlets.

National policy supports CCM of malaria through CHVs. The NMCP supports the implementation of the MoH Community Health Strategy in the malaria endemic counties. A CHV malaria curriculum exists and CHVs are being trained on malaria case management, SBCC, and reporting. The CHVs are supplied with ACTs, RDTs, and information, education, and communication materials. The CHVs are linked to health facilities and are to be supervised by CHAs at those facilities. Pre-referral treatment by CHVs has not been rolled out in Kenya. CHVs are not trained to deliver pre-referral treatment; they are trained to test and treat for uncomplicated malaria with RDTs and ACTs in the community. The trained

CHVs access RDTs and ACTs from the facility to which they are linked. The NMCP has rolled out training on community case management of malaria in 10 counties (8 malaria endemic and 2 epidemic-prone). Training is currently funded only through the Global Fund. Out of a target of 2,400, 750 community units are fully functional. Each community unit has 50 CHVs, and the country target for the 10 counties is 120,000 CHVs. Coverage for CHV training in malaria endemic counties is at 25%, which includes CHVs trained through Global Fund and PMI funding (see below). No support is in place to train the remaining CHVs. PMI support to CCM of malaria is limited to provision of ACTs and RDTs to CHVs.

Strengthening quality assurance of malaria diagnosis is a critical piece of the case management strategy. The malaria program is operationalizing the Quality Assurance/Quality Control (QA/QC) implementation plan at national and county levels. Implementation of QA/QC includes training of QA officers, supportive supervision and on-the-job training, disseminating the malaria laboratory guidelines and curricula, and convening monthly laboratory sub-committee meetings to monitor progress.

Progress since PMI was launched

The NMCP, PMI, and partners have invested in three key areas related to malaria case management: 1) procurement and distribution of malaria commodities; 2) training and supervision of clinical and laboratory personnel in malaria case management; and 3) implementation of QA/QC systems for malaria microscopy and RDTs.

PMI participates on the case management TWG that meets quarterly and provides a forum for discussion, coordination, and dissemination of case management findings. In addition, the NMCP convenes two case management sub-committees: drug management and diagnostics.

Since 2008, PMI has procured and distributed approximately 160 microscopes, 16 million RDTs, and 55 million AL treatments. PMI procures RDTs and AL that are pooled centrally and distributed to all public health facilities and the community level via linked health facilities in malaria endemic counties. Kenya implemented the Affordable Medicine Facility for Malaria (AMFm) to increase access, affordability, and market share of ACTs in the private sector. The 2014 ACT watch outlet survey showed that quality-assured ACT availability in 2014 remained high following the end of the AMFm pilot period in 2011, particularly among private health facilities and registered and unregistered pharmacies (>80%). Prices for quality-assured ACTs reduced to less than a dollar- and in 2011 the private sector price of quality-assured ACTs was \$0.52 (the same price as SP); and availability of artemisinin monotherapies declined to 1%. However, in 2014 the private sector price of quality-assured ACTs increased to \$1.75 – a nearly 4-fold increase.

The NMCP, PMI, and partners have supported the training and supervision of clinical and laboratory personnel in accurate malaria diagnostics and appropriate treatment. PMI has supported strengthening of diagnostics by training over 4,800 healthcare and laboratory workers. PMI has also trained over 5,000 healthcare workers on national case management guidelines.

The establishment of a QA/QC system for malaria diagnostics was initially operationalized in late 2012 with support from PMI, DfID, WHO, and World Bank. The initial focus was two-fold: (1) to train a cadre of QA officers from an experienced pool of laboratory technicians at county and sub-county levels, and (2) to develop standard operating procedures, tools, and supervisory checklists for both internal and external QA/QC at the health-facility level. With initial funding for supportive supervision and laboratory strengthening from Global Fund and PMI, and technical assistance from WHO, the

counties are being encouraged by the NMCP and partners to incorporate routine QA/QC systems for laboratory diagnostics, including malaria, into their county health plans and budgets. Malaria diagnostic services have also benefited from integrated laboratory supervision and QA/QC systems funded by PEPFAR.

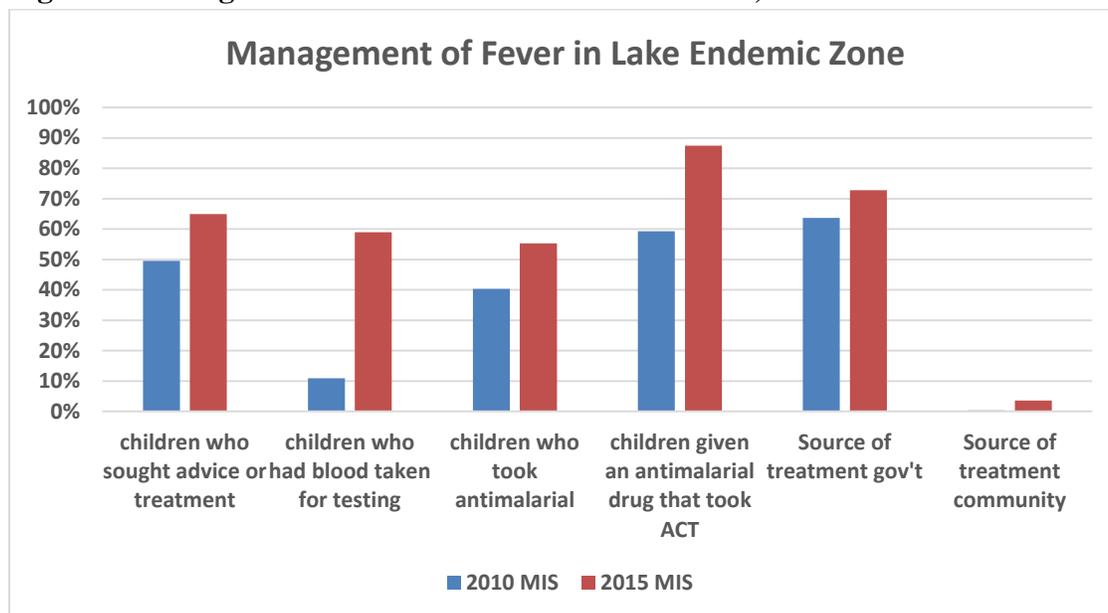
Access to malaria case management was advanced through support for the CHV strategy, which includes RDT training. The Global Fund grant to AMREF has provided support for the training and support for 750 community units, which includes over 35,000 CHVs and 1,400 Community Health Extension Workers providing services to a beneficiary population of 3.5 million people across 10 counties. PMI supported the training and supportive supervision of over 400 CHVs in 2014. With malaria CCM training and increased knowledge among CHVs, CHAs, and healthcare providers, community units are now prioritizing malaria prevention messaging and interventions and initiating implementation of the malaria CCM strategy.

Although PMI has not invested in private-sector case management activities in Kenya, DfID and CHAI have provided funding and implemented projects aimed at increasing RDT use in the private sector and changing national policy to allow point-of-service testing at registered pharmacies. Pilot projects are ongoing in three coastal counties with the objective to increase access to RDTs in the private sector. In addition, when the AMFm ended in Kenya in 2013, DfID funded an extension of AMFm to increase the affordability and accessibility of ACTs in the private sector. A MIP case management study conducted by a malaria Field Epidemiology and Laboratory Training Program (FELTP) resident and supported by PMI found that by October 2013, 91% of rural, informal drug outlets stocked quality-assured AL and at the price target of \$1.00 per treatment course but only 10% of drug outlets stocked RDTs.²⁹ Sufficient funding is available in the AMFm pipeline to continue support through 2017.

The 2015 MIS reported that mothers sought advice or treatment for 72% of children under five years of age who had a fever in the 2 weeks before the survey, an increase from 58% in the 2010 MIS; for the vast majority of children, the advice or treatment was received from a government (72%) [including faith-based] or private health provider (25%), with only 1% receiving care from a CHV. Compared with the 2010 MIS, government provider increased 4%, private increased 2%, and CHV decreased 1%. In the Lake Endemic Zone, the 2015 MIS reported 65% care seeking, of which 73% was government, 22% private, and 4% CHV.

The 2015 MIS reported progress in malaria case management. The percentage of children under five years of age with fever who had blood taken for testing increased from 12% (2010 MIS) to 39%. In the Lake Endemic Zone, the 2015 MIS reported 59% testing (the 2010 MIS reported 11%). In 2015, of children with fever given an antimalarial drug, 92% took an ACT (the 2010 MIS reported 51%).

Figure 4. Management of Fever in Lake Endemic Zone, 2010 and 2015

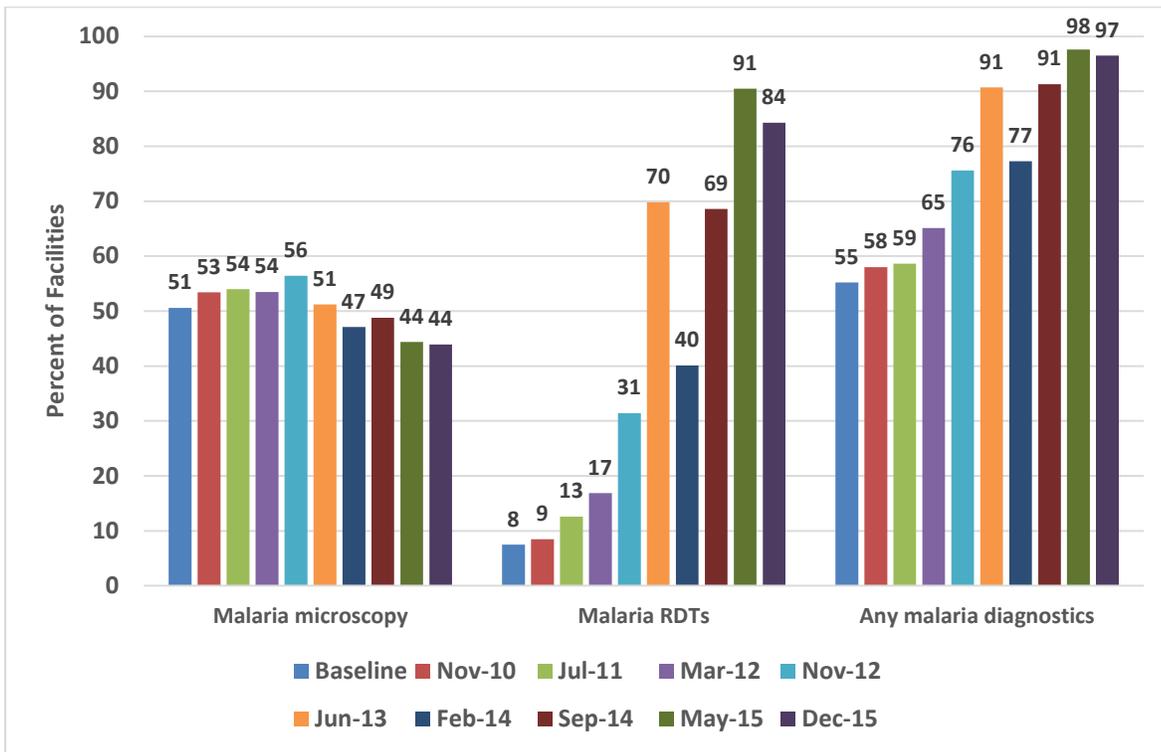


Progress during the last 12-18 months

In 2015, PMI procured 3.4 million RDTs and delivered 500,000 to level 2 and 3 public health facilities countrywide, with the remaining 2.9 million delivered in 2016. PMI also procured 2.9 million AL treatments and distributed 10.4 million treatments to health facilities. These procurements contributed to national RDT and AL stocks and complemented Global Fund procurement cycles. PMI also continued to strengthen the in-country supply chain system with the goal of an uninterrupted supply of RDTs and AL to all public health facilities. PMI trained 110 health care workers as lab and clinical supervisors to improve the accuracy of diagnostic testing and adherence to the test results.

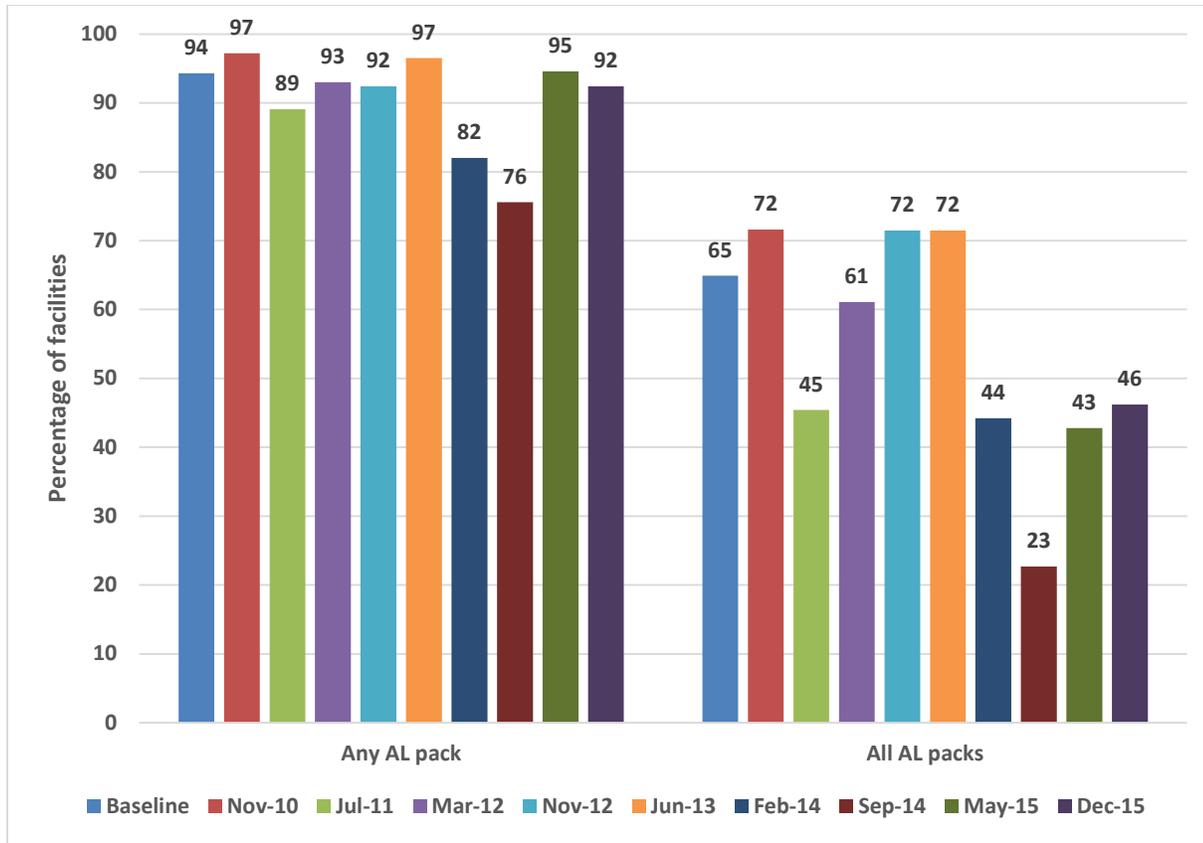
The biannual Quality of Care (QoC) surveys conducted in 2015 indicate that access to malaria diagnostics at health facilities was nearly universal (98/97%) (see Figure 5). Availability of any malaria diagnostic has increased 76% from the 2010 baseline (55%), mostly due to the availability of RDTs, given that microscopy has slowly declined and is concentrated at higher level facilities.

Figure 5: National trends in the coverage of health facilities with malaria diagnostics—Kenya, 2010–2015



National AL stock levels improved in 2015 after challenges in 2014 during the transition from a traditional, central medical store push system to a smart push system based on county orders and capped quantities allocated by facility level and malaria epidemiological zone. At the health-facility level, the latest QoC survey in December 2015 (Figure 6) shows that 92% of health facilities had at least one AL weight band in stock; and 46% had all AL weight bands in stock on the day of the survey compared to only 23% of facilities in September 2014. The NMCP and partners, including PMI, have supported counties to improve quantification and forecasting of commodity needs based on routine DHIS2 data to ensure rational procurements. In the latest QoC survey, the availability of each individual AL pack was: AL6: 68%, AL12: 59%, AL18: 76% and AL24: 80%.

Figure 6: National trends in the availability of AL at health facilities—Kenya, 2010–2015



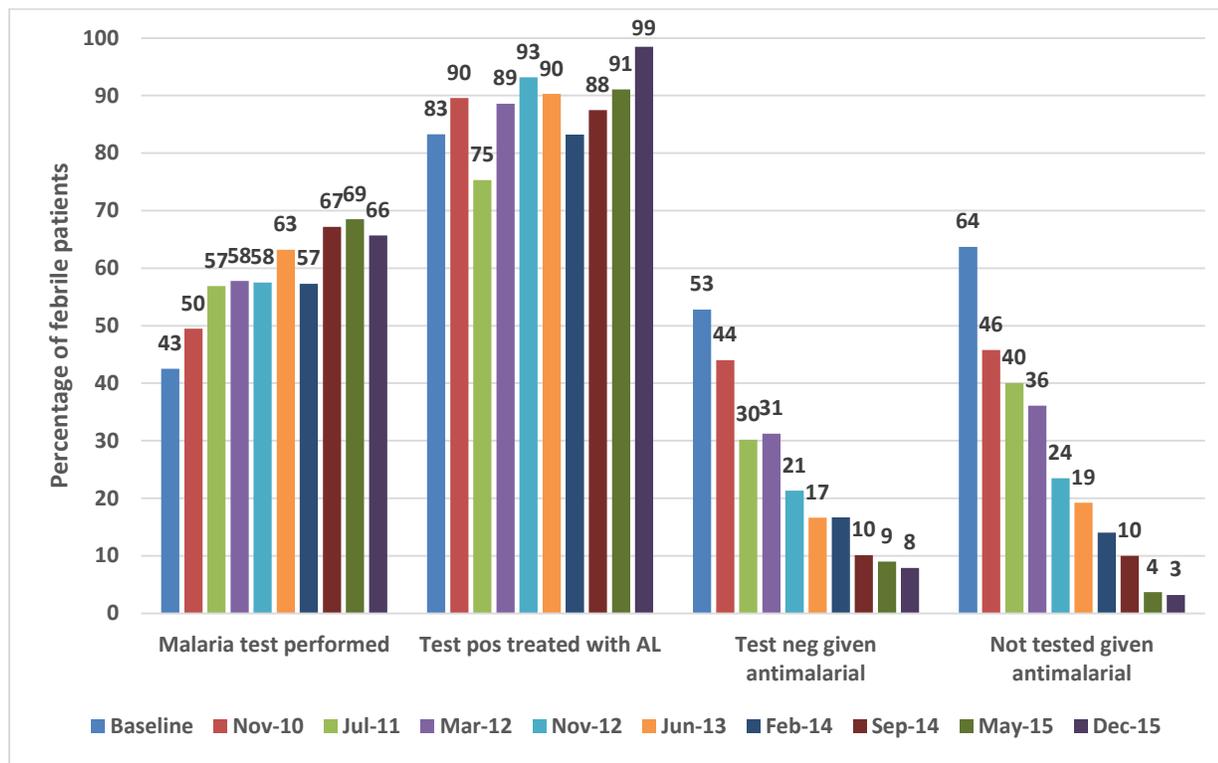
PMI invests in health worker training and job aids to improve performance. The December 2015 QoC survey indicates that 61% of health workers were trained on the new case management policy (26% in November 2012); and the availability of the new case management guidelines and wall charts improved with 72% of health facilities having up-to-date case-management guidelines, 61% having AL dispensing charts, and 40% with diagnostic algorithms on display.

The QoC surveys also evaluate health worker performance. Testing of patients with fever and suspected malaria increased from 24% at baseline in 2010 to 64% by December 2015.²⁰ As malaria diagnostic availability is now consistently over 90%, the testing plateau is likely related to the epidemiology of malaria in Kenya. Most of the country has low malaria prevalence, thus clinicians are less likely to test every fever for malaria, especially if another source of infection is identified. In this context, as this is a national survey, 65-70% testing could reflect very good performance. The MIS 2015 reported higher testing rates in the two endemic zones for children under five years of age with fever (59% Lake Endemic and 44% Coastal Endemic) than those in non-endemic zones (38% Highland Epidemic, 23% Seasonal, and 26% Low Risk). In addition, Figure 7 below shows that those not tested but still receiving an antimalarial has declined markedly from 64% at baseline to 3% in the latest survey.

Treatment of patients who test positive in health facilities where AL was available reached 98% in the December 2015 QoC survey. The percentage of patients who received an antimalarial despite testing negative for malaria declined to 8%.

²⁰ Machini B, Memusi D, Njiru P, Kigen S, Kimbui R, Amboko B, Zurovac D, Kiptui R, Waqo E. *Monitoring outpatient malaria case management under the 2010 diagnostic and treatment policy in Kenya-Progress January 2010 – December 2015*. Malaria Control Program, Ministry of Health, February 2016

Figure 7: National trends in health workers diagnostic and treatment adherence to national case management guidelines where malaria diagnostic services were available and AL was in stock—Kenya, 2010–2015



PMI continues to support the QA/QC system for malaria diagnostics in the Lake Endemic zone. Over the last 12-18 months PMI supported finalization of the National Quality Assurance Guidelines on Parasitological Diagnosis of Malaria. In addition, PMI supported training of 23 laboratory outreach training and supportive supervision (OTSS) supervisors and 25 laboratory supervisors on advanced Malaria Diagnosis Refresher Training (aMDRT), 80 facility level laboratory staff on MDRT, and 46 OTSS supervisors on QA of RDT use. Round one OTSS was conducted at 280 health facilities where QA for case management (Diagnosis and Treatment) was undertaken. PMI also supported the eight high-burden counties to identify locations for county malaria reference laboratories. In the three months preceding the December 2015 QoC survey, 56% of health facilities had received at least one supervisory visit, and 22% included malaria case management.

In 2015, the Medicines for Malaria Venture (MMV), Clinton Health Access Initiative (CHAI) and PMI procured over 1.5 million vials (PMI 500,000, GoK 80,000, and CHAI 928,280) of parenteral artesunate for the treatment of severe malaria. Over 14,000 healthcare workers have been trained on the use of parenteral artesunate for severe malaria. The latest QoC survey reported that 59% of health facilities had parenteral artesunate in stock on the day of the survey.

PMI has been supporting therapeutic efficacy monitoring at two sites in western Kenya to complement therapeutic efficacy monitoring supported by other partners. A TES was begun in 2015, but due to financial issues with the implementing partner, the study was stopped. The TES has now been restarted and should complete data collection by the end of 2016. Analysis of the *Plasmodium falciparum* K-13 propeller mutation associated with artemisinin resistance is planned. PMI does not plan to support a TES

with FY 2017 funding given this activity is already planned to be undertaken by several other partners (EARN, WRAIR, etc.) in Kenya.

Commodity gap analysis

Table 5: RDT Gap Analysis

Calendar Year	2016	2017	2018
RDT Needs			
Total country population	47,279,171	48,555,709	49,866,713
Population at risk for malaria	47,279,171	48,555,709	49,866,713
Total number of projected fever cases	80,374,591	82,544,705	84,773,412
Percent of fever cases confirmed with RDT	75%	75%	75%
Total RDT Needs (Annual)	21,057,339	21,625,887	23,163,487
Partner Contributions			
RDTs carried over from previous year	0	1,389,301	5,943,006
RDTs from Global Fund	11,146,640	13,179,592	0
RDTs planned with PMI funding	11,300,000	13,000,000	15,000,000
Total RDTs Available	22,446,640	27,568,893	20,943,006
Total RDT Annual Surplus (Gap)	1,389,301	5,943,006	(2,220,481)
Pipeline need (6 months)	10,528,670	10,812,944	11,581,744
Assumptions:			
<ul style="list-style-type: none"> • Population growth rate 2.7% per year. • Total population is at risk of malaria. • Projected fever cases estimated at an average of 1.7 fevers per person per year. • Average care seeking for fever is 71% in 2016 and 2017, and 72% in 2018; with 68% public sector in 2016 and 2017, and 70% in 2018. • Diagnostic testing rates of 70%. • RDT use 75%. • As “malaria free” areas are surrounded by malaria zones, and there is frequent travel back and forth, malaria diagnostics remain important in the “malaria free” areas. Therefore, RDTs must be quantified for those areas as well. • Additional 1.2% of fever cases tested in public sector will be managed at the community level (CCM). • Surplus RDTs will contribute to filling the pipeline. 			

Table 6: ACT Gap Analysis

Calendar Year	2016	2017	2018
ACT Needs			
Total country population	47,279,171	48,555,709	49,866,713
Population at risk for malaria	47,279,171	48,555,709	49,866,713
Total projected number of malaria cases	8,564,003	8,208,882	7,733,629
Total ACT Needs (Annual)	10,383,950	9,930,514	9,842,193
Partner Contributions			
ACTs carried over from previous year	2,084,417	5,430,467	7,809,805
ACTs from Global Fund	6,780,000	8,359,852	0
ACTs planned with PMI funding	6,950,000	3,950,000	5,000,000
Total ACTs Available	15,814,417	17,740,319	12,809,805
Total ACT Annual Surplus (Gap)	5,430,467	7,809,805	2,967,612
Pipeline need (6 months)	5,191,975	4,965,257	4,583,105
Assumptions: <ul style="list-style-type: none"> • Population growth rate 2.7% per year. • Total population is at risk of malaria. • Projected fever cases are estimated at an average of 1.7 fevers per person per year. • Average care seeking for fever is 71% in 2016 and 2017, and 72% in 2018; with 68% public sector in 2016 and 2017, and 70% in 2018. • Diagnostic testing rates of 70%. • Test positivity rate would decrease from 30% in 2016 to 28% in 2017 and 26% in 2018. • Of those not tested, 6% will be presumptively treated with an ACT. • Non-compliance rates to negative test: 7%, 6%, and 5%. • Additional cases that test RDT positive will be treated with ACTs through CCM. 1.2% seek care in community. The ACTs for CCM are included in the estimated needs each year in the gap analysis table. • Surplus ACTs will contribute to filling the pipeline. 			

Plans and justification

In FY 2017, PMI will build on the progress to date in scaling-up malaria diagnostic testing, case management strengthening, and QA/QC systems. PMI supports biannual national quantification analyses to ensure that RDT and AL requirements are properly forecasted. PMI has increased investment in ACTs and RDTs in FY 2018 to fill the expected gap when the Global Fund grant ends in 2017 and to ensure adequate supplies in 2018 when no other donor is likely to be supporting commodity procurement. PMI is increasing investments in RDTs as the current Global Fund grant ends in December 2017 and information from a recent quantification exercise suggests that Global Fund-procured RDTs and ACTs will not be available in 2018. The projected annual RDT need has increased as the country target for diagnostic coverage has increased. PMI will procure approximately 15 million RDTs to help meet the projected national RDT need based on testing of all suspected malaria cases. The national AL need has been decreasing due to prevention efforts, increased availability of diagnostics, and

implementation of the “test, treat, track” policy. PMI will procure approximately 5 million AL treatments to help meet the projected national AL need. In addition in FY 2017, PMI will procure 500,000 vials of injectable artesunate to treat severe malaria as funding from MMV/CHAI will end in 2017.

PMI/Kenya will continue to strengthening the capacity of county pharmacists for stock management, pipeline monitoring, and timely inter- and intra-country redistribution practices to minimize potential expiry of commodities.

PMI will support integrated strengthening of case management (i.e., strengthening diagnostic capacity and clinical treatment proficiency together) at the health-facility, sub-county, and county levels. Counties will be prioritized for support and case management activities will be based on the results of a case management assessment completed in 2015; with FY 2017 funding, integrated case management support will continue to focus in the eight high-burden high-priority counties in western Kenya.

Proposed activities with FY 2017 funding: (\$12,585,849)

- 1. Procure RDTs:** Procure approximately 15 million RDTs, which represent approximately 65% of the total annual public sector facility and community need. *(\$4,800,000)*
- 2. Procure AL:** Procure approximately 5 million AL treatments, which represent approximately 51% of the total public sector facility and community need. *(\$4,256,049)*
- 3. Procure parenteral artesunate:** Procure approximately 500,000 vials of injectable artesunate for severe malaria, which represent approximately 30% of the total public sector need. *(\$1,260,000)*
- 4. Logistic and program support for RDT, AL, and parenteral artesunate distribution:** Provide warehousing, storage, and distribution for RDTs, AL, and severe malaria medicines from central to facility level nationwide via KEMSA. *(\$824,800)*
- 5. Capacity building for and strengthening of malaria diagnostics:** Support the appropriate and rational use of RDTs and microscopy at high-volume and community-linked health facilities in all eight malaria-endemic counties in western Kenya; the target for activity implementation is over 800 public health facilities. Activities will be integrated to strengthen all aspects of case management; the diagnostic component will include strengthening diagnostic capacity of existing laboratory and healthcare staff through refresher trainings and capacity building for supportive supervision, on-the job training, and mentoring of county/sub-county/health-facility staff to enable case management improvements at the health-facility level. Support will also be provided for integrated implementation and strengthening of the QA/QC framework for malaria diagnostics in focus counties. *(\$300,000)*
- 6. Capacity building for and strengthening of case management:** Support the appropriate and rational use of AL and parenteral artesunate at referral, high-volume and community-linked health facilities in all eight malaria-endemic counties in western Kenya; the target for activity implementation is over 800 public health facilities. Activities will be integrated to strengthen all aspects of case management in coordination; the clinical component will include strengthening clinical capacity of existing healthcare staff through refresher trainings and capacity building for supportive supervision, on-the-job training, and mentoring of county/sub-county/health-facility staff to improve the management of uncomplicated and severe malaria and malaria in pregnancy in line with national case management guidelines. *(\$1,125,000)*

7. Technical assistance: Support two CDC in-country visits to provide technical assistance for malaria case management. (\$20,000)

b. Pharmaceutical management

NMCP/PMI objectives

The revised KMS 2009–2018 and the *National Guidelines for the Diagnosis, Treatment and Prevention of Malaria Treatment Fifth Edition, 2016* identify ensuring commodity security of antimalarials and diagnostics in the public sector as a key strategy for strengthening malaria case management. PMI has supported the NMCP to implement supply chain management activities and distribute malaria commodities- RDTs and all weight-based packs of AL from the central level-KEMSA to over 5,000 public MoH facilities.

Progress since PMI was launched

Since 2008, PMI has supported strengthening of supply chain management systems to ensure that over 15.6 million RDTs and 55 million ACTs procured were distributed to beneficiaries. Strengthening pharmaceutical management of malaria commodities has improved the availability of RDTs and ACTs at the central and health facility levels countrywide and the community level in high burden counties where CCM of malaria is implemented. To improve reporting on malaria commodity logistics data, PMI has supported the NMCP to develop and disseminate reporting tools to all public health facilities, trained pharmaceutical personnel on reporting, and strengthened reporting of logistics data through DHIS2.

Since 2010, PMI has provided support to the NMCP, the Pharmacy and Poisons Board (PPB), and the National Quality Control Laboratory (NQCL) for antimalarial medicines quality monitoring using Minilab®. Eleven sentinel sites including two port of entry sites where in-flow of commodities is greatest and where counties with large populations and high malaria burden are situated have so far been established and are functional. PMI has also supported five complete rounds of medicines quality monitoring. To date, more than 45 personnel from national and county levels have been trained on the use of Minilab® basic tests, sampling strategies, and reporting for antimalarial medicines quality monitoring

Devolution of health services in Kenya is still at a nascent stage and presents both challenges and opportunities for service delivery. The challenges include limited capacity for counties to accurately forecast their needs and provide quality logistics data to inform order resupply decisions. To counter the effects of irrational orders, in October 2014, the NMCP introduced a smart push system which set a limit on the maximum quantity of malaria commodities that could be supplied to a facility, depending on the level of care and epidemiological zone. To date, counties continue to receive commodities through the smart push system. Among the opportunities has been the establishment of county commodity security TWGs in the high-burden malaria counties to oversee pharmaceutical management activities.

Progress during the last 12-18 months

PMI has continued to support the NMCP to strengthen malaria commodity management at the national, county, and sub-county levels and ensure logistics data are available to inform forecasting, quantification, procurement planning, pipeline and stock status monitoring, and use of data for decision making to prevent stockouts. In August 2015, the NMCP with PMI and other partner support from Global Fund and CHAI, conducted the FY 2015/ 2016 National Annual Quantification for malaria commodities. A midyear review was conducted in March 2016. The annual quantification and review informed the NMCP on the country stock situation, anticipated gaps, and provided an opportunity for

the revision of delivery schedules. The review also informed Global Fund reprogramming for commodity gaps. In 2016, PMI is continuing to support the NMCP for timely placement of orders and determination of distribution quantities of malaria commodities to over 5,000 public health facilities. PMI is also supporting severe malaria treatment by procuring and distributing 500,000 vials of injectable artesunate, expected to meet 31% of the annual national need, and 1.6 million treatments of SP for IPTp in 14 malaria endemic counties.

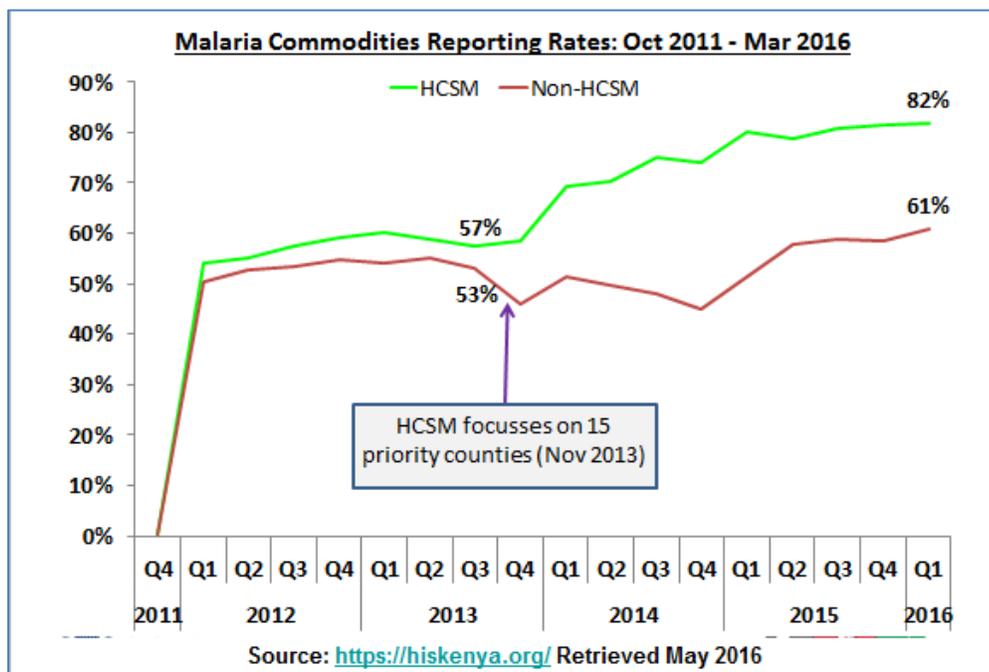
At the national level, PMI supported pipeline monitoring activities including the malaria commodities monthly stock status report that highlights the current national stock levels, expected deliveries, and anticipated stock out periods. This report provided critical information that informed revision of the malaria commodity call down schedule of 6 million PMI-funded ACTs and 3.4 million PMI-funded RDTs in March 2016, preventing an anticipated central level malaria commodity stockout. PMI, in collaboration with Global Fund, supported the NMCP to conduct two QoC (round 9 in June 2015 and round 10 in November 2015) nationally representative health facility surveys on pharmaceutical management of malaria commodities. The surveys showed that availability of at least one AL weight band in stock on day of visit remained above 90% in sampled facilities (see Figure 6). Availability of RDTs declined slightly from 91% to 84% between the two surveys.

PMI has also continued to support the Drug Management Subcommittee, a subcommittee of the case management TWG, to meet monthly to discuss and address malaria commodity security issues. A rapid assessment of the RDT and AL stock situation in 47 counties, undertaken in February-March 2016 with PMI support, revealed huge variations in stock levels among counties. The assessment response rate was 85% with 3,000 facilities in 40 of 47 counties providing information on their stock situation. Forty-six percent of the facilities were found to be overstocked (>6 months of stock) with AL24, 30% were understocked (<6 months of stock) and only 9% (3-6 months of stock) were appropriately stocked. A similar pattern of over- and under-stocking was also observed for AL6, AL12, AL18, and RDTs. The percentage of facilities in each county correctly stocked for all commodities ranged between 5-9%.

PMI is supporting commodity stock management nationwide, with additional focused support to 15 priority counties. In these counties, PMI has supported county commodity security TWGs that oversee implementation of priority supply chain activities including commodity management training, supervision, and routine reporting on malaria commodities through DHIS2. To enable all counties in Kenya to manage their stock effectively, PMI supported the NMCP to develop and disseminate guidelines and a simple Excel tool to monitor months of stock by facility and trigger redistribution of malaria commodities to avoid overstocks and expiries. PMI has worked with the NMCP to provide technical support for inter- and intra-country distribution to all 47 counties country-wide through the National County Pharmacists' Forum, held biannually. In February 2016, PMI, in collaboration with Global Fund, supported the NMCP in holding a joint county pharmacists and lab personnel meeting for all 47 counties to review the reporting performance on malaria indicators and malaria commodity reporting challenges. The forum provided an opportunity for pharmacists and lab personnel to refine reporting modalities for RDTs and share best practices and lessons learnt especially from the 15 PMI priority counties on commodity management. In April 2016, based on the findings of the rapid stock situation assessment, PMI supported a national (47-county) inter- and intra-county redistribution exercise conducted by county pharmacists and malaria coordinators with oversight from the NMCP. Redistribution, though a resource intensive activity, is critical for minimizing wastage and reducing expiries. It is expected that once counties routinely use the guidelines and tools provided to manage stock levels in their facilities, stock redistribution will cease to be a priority.

PMI has continued to support routine malaria commodity data reporting by health facilities through DHIS2. The 15 PMI supported counties have consistently had higher reporting rates, averaging 82%, compared to the average national health facilities reporting rate of 61% over the past year.

Figure 8: Comparison trends of Reporting Rates for Malaria Commodities between PMI Priority Counties and Nationally: Oct 2011–March 2016



As part of strengthening quality control of medicines in Kenya, since 2012, PMI has supported NQCL to pursue ISO17025 accreditation. The NQCL earned ISO17025 accreditation in April 2015. PMI is continuing to provide technical support to NQCL to maintain its accreditation status. In March 2016, a South African National Accreditation System audit revealed 26 major non-conformances and 3 minor non-conformances, which PMI is supporting NQCL to address. PMI has provided technical assistance to PPB for concept and schematic design of the PPB lab to meet international standards and provide a road map for the required lab equipment and training needs.

To build capacity and strengthen medicines quality monitoring activities, in January 2016, PMI supported PPB and NQCL team leaders to undertake the sixth round of training on sample collection, sampling strategies, and Minilab® basic tests. In the fifth round, conducted in 2014, more than 879 samples were tested by Minilab®; 215 samples were tested by compendia. Four samples failed compendia testing, 4 antimalarial medicines were found to be counterfeits (1 sample of Quinine Dihydrochloride; 2 samples of AL; and 1 sample of artemether injection). Medicines identified as counterfeit were recalled and warning letters were sent to the sellers by PPB. Since 2009, the number of medicines that have failed quality testing has declined dramatically.

Despite the significant progress achieved in strengthening pharmaceutical management for malaria commodities in Kenya, some challenges remain. These include: ensuring rational ordering of malaria commodities by counties, improving accuracy in reporting on logistics data, maintaining a full pipeline of commodities along the supply chain, supporting PPB to expand post market surveillance, and integrating reporting for RDTs on the lab reporting tool in DHIS2.

Plans and justification

With FY 2017 funding, PMI plans to continue to provide support to the NMCP for strengthening supply chain management policies and structures and provision of mentorship and oversight to all 47 counties. PMI will also provide support for improving end-to-end visibility of logistics data from central to facility level to inform planning for continuous and uninterrupted availability of malaria commodities and institutionalization of proven commodity management interventions.

In high-priority Lake Endemic counties, PMI will continue to provide intense and targeted technical support for continued development of capacity for forecasting, quantification, reporting and stock management of malaria commodities by county teams and commodity security TWGs and support to improved availability of commodities at community level.

PMI will continue financial support requirements for warehousing and distribution of malaria commodities from central to health facility levels and for inter- and intra-county re-distribution of commodities to prevent health facility level stockouts and minimize wastage and expiries.

Proposed activities with FY 2017 funding: (\$ 1,700,000)

- 1. Strengthen supply chain management for malaria commodities at the national level:** PMI will continue to provide support to strengthen and institutionalize proven supply chain management strategies to ensure commodity data is available through DHIS2 and used to accurately forecast and quantify commodity needs, monitor the pipeline, plan procurements, and prevent stock outs at all levels of the health system. Areas of technical and operational support to the NMCP will include: continued support to the Drug Management Subcommittee, a systematic approach to transitioning oversight of supply chain management roles, institutionalization of proven supply chain system strengthening interventions, building capacity of priority counties for improved reporting, ordering and monitoring stock levels, strengthening linkages between national and county levels through platforms such as the county pharmacists and lab personnel forum, and technical exchange and sharing of county best practices for uptake by non-PMI priority counties. Support to KEMSA will include warehousing, distribution, monitoring and performance evaluation, and strengthening information system linkages with the NMCP. PMI will continue to support end-use verification surveys (budgeted under the SM&E section) as part of the larger QoC surveys conducted biannually to ensure malaria commodities are reaching intended beneficiaries. (\$400,000)
- 2. Strengthen supply chain management for malaria commodities at the county, sub-county, and health-facility levels:** PMI will provide support to build capacity and county structures to ensure data is available and used to quantify malaria commodity needs and plan orders to prevent stockouts and improve stock management at health facilities. Operational and technical activities will focus on improving the organization, management, and security of commodities within health facilities and among the CHVs in select counties, supporting county commodity security TWGs to monitor and supervise malaria commodity management activities, implementing systems to order, track, and evaluate commodity distribution from KEMSA and transfer/re-distribute commodities to alleviate supply shortages and avoid expiries, and troubleshooting to identify distribution bottlenecks and gaps. Capacity-building activities at the county level will focus on county health management teams – including pharmacists, lab personnel and county malaria control coordinators – and will include training and mentoring to strengthen supervisory

and decision-making skills for supply chain management, developing work plans that include supply chain activity monitoring, undertaking commodity audits, and supporting supervisory visits to sub-county and health facilities. To improve malaria commodity consumption data reporting via DHIS2 and use of data for decision making, PMI will support commodity management and reporting system orientations, data audits, reporting form and job aid reviews, and dissemination to health-facility, sub-county, and county levels. (\$1,000,000)

- 3. Strengthen antimalarial drug quality monitoring and surveillance:** PMI will continue to provide technical, strategic, and operational support to the PPB for expansion and strengthening of antimalarial drug quality monitoring at national and county level, strengthen PPB capacity for registration and real time inspection processes at national and county level, strengthen county capacity for routine post market surveillance, support strategies to sustain a pool of trainers and champions/team leaders for medicines quality monitoring activities at PPB and NQCL and promote cost effective dissemination strategies of post market surveillance findings to counties. PMI will also support the NQCL to maintain its accreditation and promote close working collaboration with key stakeholders including PPB, KEMSA, national health programs and Mission for Essential Drugs. (\$300,000)

4. Health system strengthening and capacity building

PMI supports a broad array of health system strengthening activities which cut across intervention areas, such as training of health workers, supply chain management and health information systems strengthening, drug quality monitoring, and NCMP capacity building.

NMCP/PMI objectives

The NMCP continues to provide leadership and coordination to ensure that malaria control services are equitably and efficiently delivered in all health facilities in malaria endemic and epidemic regions of the country. To achieve this, the program has identified key strategies as part of its program management objective 6 of the Kenya Malaria Strategy 2009–18, to address health systems challenges, namely: a) to develop, update, and disseminate policy and lobby for legislation and regulations to guide malaria control in Kenya; b) to strengthen capacity for planning, partnerships, coordination, and implementation at all levels; c) to strengthen resource mobilization to improve malaria control financing; and d) to strengthen procurement and supply management systems for malaria medicines and commodities. Since the country introduced devolution in 2013 and most of the national functions became devolved to the 47 counties, service delivery has been affected where personnel roles and responsibilities were changed (i.e., some of the NMCP's malaria coordinators were assigned new responsibilities thus affecting effective planning, supervision and coordination of malaria control activities in these counties). In addition, counties are grappling with efficient and rational planning and budgeting for public health programs, particularly in the funding of human resources (around 70% of the county budget) and commodities and inadequate dissemination of policy and guidelines at all levels. The NMCP together with PMI and other partners work together to promptly address bottlenecks in service delivery and support continuity of services.

Progress since PMI was launched

PMI has continued to support the GoK's health systems by enhancing the technical capacity of NMCP personnel, developing the procurement and supply chain system to more efficiently deliver supplies and commodities to health facilities, improving and streamlining the routine malaria data collection, and assisting the program in monitoring its achievements.

To support streamlining and expansion of routine health systems to ensure collection and improve availability and use of quality malaria data, PMI has supported the training of 30 national level Health Information Systems (HIS)/ Information Communication Technology staff on DHIS2/Master Facility List data management, data quality, and data use. In addition, over 190 participants from 12 counties were trained, thus increasing the capacity of county health management teams (CHMTs) and facility managers to use the new information communication technology equipment. PMI has also supported integration and reporting for malaria commodity data into the DHIS2 platform.

To strengthen the capacity of the NMCP to plan and oversee implementation of malaria control activities, PMI resident advisors work with the NMCP and the technical working groups to develop, review, and disseminate tools and guidelines for malaria activity implementation. This support has included review of the KMS and M&E plan 2009–18, development of the Global Fund Round 10 concept note and budget reallocation requests, and successful design and implementation of the Kenya MIS 2015.

At county level, PMI supported the establishment of 8 malaria TWGs to coordinate the implementation of malaria prevention and control activities in consultation with other programs and sectors and supported establishment of 14 county commodity security TWGs to manage supply chain strengthening activities, including forecasting, quantification and ordering.

PMI has supported the NMCP and PPB to establish and equip 11 sentinel sites with Minilabs® to test the quality of malaria medicines being dispensed to patients in health facilities. In addition, PMI has procured and distributed over 160 microscopes to health facilities in both endemic and epidemic regions of the country for strengthening malaria diagnosis, and supported capacity building for effective malaria case management. PMI has also built the capacity of PPB staff at national and county Minilab® sites for post market surveillance activities such as sample collection, sampling strategies, and Minilab® basic tests.

Since FY 2012, PMI has supported six FELTP residents who have acquired skills such as epidemiology, program evaluation, surveillance, and manuscript development. They have used these skills in critical technical and leadership positions in malaria control and in the public health sector overall. The current positions of the graduated residents include: 1) Malaria Control Coordinator for Mombasa County; 2) outbreak response official for the MoH; and 3) Head of the Malaria Section of the National Public Health Laboratory. The three current residents work with the NMCP in the areas of case management, ITN management, and diagnostics. The skills acquired through the FELTP program include epidemiology and program evaluation.

Progress during the last 12-18 months

Capacity building: To strengthen the capacity of counties to increase IPTp uptake, PMI trained 44 mentors who in turn trained 232 new clinical mentors in four counties to orient health workers on the MIP guidelines. To date the newly trained mentors have managed to orient 5,074 health workers from 437 facilities.

PMI continued to support the eight county malaria TWGs to coordinate and provide oversight for implementation of malaria prevention and control activities in collaboration with other partners, to develop integrated malaria work plans for the counties, and to provide support supervision.

Since 2014, PMI has provided support for formation of quality improvement teams in three malaria endemic counties, namely, Busia, Kakamega, and Siaya. PMI supported one quality improvement team

in each of 25 sub-counties in Busia, Kakamega, and Siaya to conduct joint quarterly quality improvement meetings, county quality improvement learning sessions, and malaria quality improvement data validation for select facilities. The health workers are part of work improvement teams who provide on-site quality improvement mentorship to address low performing malaria indicators. The teams are composed of a pharmacist, laboratory technologist, clinician, and records officer. Health facilities were supported to form work improvement teams to promote proper malaria case management at the patient level. Their promotion efforts have resulted in a demonstrable increase in adherence to malaria case management guidelines, with more suspected cases being tested for malaria before treatment in most target health facilities. These efforts have also led to a marked reduction in health workers treating test negative cases with antimalarials, thus preserving these life-saving commodities for only those requiring them. A case study of Khunyangu sub-county hospital showed a reduction in the consumption of ACTs from a monthly average of 1980 doses before implementation to 890 doses post implementation, leading to savings equivalent to 7 months of stock within one year of implementation. At Matayos Health Center in Busia sub-county the confirmed malaria cases as a proportion of total malaria cases rose steadily with the onset of quality improvement activities from 40% in June 2014 to 100% in March 2016.

Health information systems: PMI supported the roll out of surveillance training in the 8 malaria endemic counties where 79 training of trainers (ToTs) and 1,152 health workers were trained. PMI continued to work with the NMCP to strengthen reporting of malaria case and commodity management data in DHIS2.

Health workforce: PMI has continued to support activities geared towards the development of a health workforce that is able to deliver effective and efficient health services for malaria control.

Two FELTP residents are currently assigned to the NMCP and support both national and field activities. As an example of activities, in the last year FELTP residents have participated in the following: (1) surveillance evaluations; (2) training for case management / parenteral artesunate use; (3) technical working groups for case management, surveillance, M&E, and OR; (4) MIS 2015 report writing workshop; (5) malaria impact evaluation; (6) fieldwork for the QoC surveys; and (7) malaria microscopy refresher trainings at county level. A FELTP resident completed a manuscript, “Cross-sectional study of the availability and price of anti-malarial medicines and malaria rapid diagnostic tests in private sector retail drug outlets in rural Western Kenya, 2013,” which was accepted for publication by *Malaria Journal*.

As part of building and sustaining a healthy work force, PMI also facilitated participation of MoH staff - Kisumu County Executive Committee Member of Health and the Kakamega County Director of Health to attend a diploma training course on health systems management and leadership at Galilee International Management Institute, Israel.

Essential medical products, vaccines and technologies: At national level, PMI provided support to the NMCP for forecasting and quantification, pipeline monitoring, and planning for redistribution of malaria commodities at county level. PMI also supported a county pharmacists meeting for all 47 counties to discuss commodity security challenges and share best practices. In addition, PMI provided support to 14 county commodity security TWGs for monitoring and supervision of supply chain strengthening activities, including reporting consumption of malaria commodities and stock management.

Table 7: Health Systems Strengthening Activities

HSS Building Block	Technical Area	Description of Activity
Health Services	<i>Case Management</i>	<ul style="list-style-type: none"> • Support on-the-job training, mentoring, and supportive supervision of county/sub-county/health facility staff to improve management of uncomplicated and severe malaria • Strengthen diagnostic capacity of existing laboratory and healthcare staff through refresher trainings and capacity building for supportive supervision, on-the job training, and mentoring of county/sub-county/health-facility staff.
Health Workforce	<i>Health Systems Strengthening</i>	<ul style="list-style-type: none"> • Support quality improvement activities with CHMTs and SCHMTs in four counties across all health interventions • Continue with the sensitization and orientation of CHVs on MIP messaging and IPC for increased uptake of ANC services • Train one FELTP resident in epidemiology and program evaluation
Health Information	<i>Surveillance, Monitoring and Evaluation</i>	<ul style="list-style-type: none"> • Contribute to the integrated support and oversight of DHIS2 • Improve reporting, use of data for decision making, development of county and national level information products, and data review meetings • Provide technical assistance to the NMCP on MIS 2018 • Support outpatient and inpatient QoC surveys (outpatient surveys include EUV indicators)
Essential Medical Products, Vaccines, and Technologies	<i>Pharmaceutical management</i>	<ul style="list-style-type: none"> • Support the NMCP in forecasting, pipeline monitoring, procurement planning for malaria commodities, and use of data for decision making to prevent stock outs at the national and peripheral levels • Continue to support the functioning of commodity security TWGs to oversee commodity management in 8 high burden counties • Support inter and intra-county redistribution of malaria commodities to prevent expiry, overstocking, and stockouts • Support the PPB for expansion and strengthening of antimalarial drug quality monitoring at national and county level
Leadership and Governance	<i>Health Systems Strengthening</i>	<ul style="list-style-type: none"> • Support TWGs across the technical areas and Malaria Interagency Coordinating Committee at national level • Continue to support the Malaria Control TWGs in 8 endemic counties to coordinate the implementation of malaria control activities in consultation with other sectors, and to spearhead the development of malaria control work plans for these counties

Plans and justification

PMI, in collaboration with other partners and the NMCP, will continue to support the development of technical and managerial capacity of staff both at the national and county levels to ensure that the program meets the core functions in line with the revised KMS 2009–18. As a result of task-shifting and reduction in technical staff at the national level, PMI anticipates additional capacity development activities will be required at the national level in the short term and at the county level in the short and longer term to ensure adequate program management and technical expertise.

Proposed activities with FY 2017 funding: (\$1,000,000)

1. PMI direct technical support to the NMCP: Provision of technical support by PMI advisors and specialists to the NMCP. Advisors and specialists will spend a portion of the work week with the NMCP to provide direct technical assistance and support for activities. (*Built into staff costs*)

2. Other support to NMCP: the activities supported will follow PMI guidance and be similar to those supported through previous Kenya MOPs. (*\$200,000*)

- a. **NMCP capacity building:** Improve the NMCP's technical capacity with regard to implementation, management, and leadership development through formal and informal training, courses and workshops, supportive supervision, on-the-job coaching, and mentoring.
- b. **Attendance of NMCP staff at technical consultative meetings:** Provide assistance for NMCP program management and technical team members and priority county malaria control coordinators to attend key technical meetings (e.g., Multilateral Initiative on Malaria). Attendees will be expected to make presentations and share key technical updates with TWGs, partners, and stakeholders.
- c. **Support to TWGs and Malaria Interagency Coordinating Committee (MICC):** Functional and collaborative TWGs and MICC are essential to monitor and evaluate the progress of malaria prevention and control interventions and inform partners, donors, and stakeholders. PMI will continue to support the MICC and TWGs as essential platforms for NMCP policy, strategy and guideline review, updating and validation processes.

3. Support for county malaria control programs: PMI will support the county malaria control programs to develop malaria-specific work plans consistent with each county's malaria profile and the revised KMS and M&E Plan and assist with inter-county coordination. PMI will support malaria control coordinators, county pharmacists, county lab coordinators, disease surveillance coordinators, and health management teams at the county and sub-county levels to increase supervision and management capacity for program implementation. The CHMTs will be responsible for collating and analyzing malaria related information that will be used in planning for the county's need in terms of carrying out quantification for drugs and laboratory supplies and also planning for the training of more health workers in areas where capacity gaps have been identified. The county teams will also be responsible for organizing review meetings with teams from the sub-counties to assess progress made in each of the counties malaria control interventions. These activities will be carried out in the eight high-burden malaria-endemic counties. (*\$400,000*)

4. Support CHMTs and SCHMTs for quality improvement activities: PMI will support quality improvement activities both at the county and sub-county levels by working with the technical teams (CHMTs and SCHMTs) to improve program performance across all malaria intervention areas. PMI will continue to work in four endemic counties – Busia, Migori, Kakamega, and Siaya – and support malaria TWGs, the quality improvement teams, and increase the number of work improvement teams by

expanding to new facilities within the four counties. PMI will support CHMTs, and other partners in applying quality improvement approaches to augment ongoing efforts to improve malaria prevention and case management interventions and support the robust learning environment on how to apply improvement science within malaria programming in the counties. (\$300,000)

5. Support FELTP: Provide support for one malaria-focused FELTP resident for the full two-year training program. The budget for each trainee includes tuition and fees, stipend, laptop, books and equipment, a field project, travel, supervision, and administration. (\$100,000)

5. Social and behavior change communication

NMCP/PMI objectives

The SBCC objective in the revised KMS aims at increasing, utilization of all malaria control interventions by communities to at least 80% by 2018. In order to achieve this objective, the SBCC TWG with representation from each of the intervention areas coordinates the development, production, and dissemination of all SBCC materials and tools. The materials produced for SBCC activities are designed for different target groups, i.e., health workers, CHVs, and the community at large. In specific regions, the materials are also translated into the local languages for easier understanding and acceptance. The electronic media is also another key channel of communication where different products are developed for dissemination through the TV or radio, announcements for public functions like World Malaria Day, mass net distribution campaigns, and attendance in public *barazas*.

The NMCP continues to expand the community strategy, which provides an opportunity for CHVs to use interpersonal communication (IPC) skills at the household level, where CHVs have one-on-one discussions with household members in order to identify barriers that could be preventing community members from using/ accessing the available malaria control interventions and tools provided by the government, i.e., consistent use of nets, early ANC attendance to receive IPTp, early treatment for any fevers, as well as adherence to treatment regimens. During monthly meetings, CHVs and CHAs discuss and suggest solutions to the various reasons for not using/accessing malaria interventions raised by community members. The solutions are used to design future messages on the different interventions.

Progress since PMI was launched

Since 2008, PMI/Kenya has supported training opportunities for malaria program staff on SBCC, the production of guidelines, reprinting of 20,000 copies of the malaria treatment guidelines for use in training health workers, and education and communication materials on different aspects of malaria control for World Malaria Day.

In the last three years, PMI has focused SBCC activities at the community level through chosen local organizations and established community health units. This approach allows for more interpersonal interactions on a one-to-one basis between the CHVs and the beneficiaries of the various malaria control tools and interventions.

Progress during the last 12-18 months

In 2015, PMI continued its support to the NMCP's SBCC activities at the national, county, and community levels. The SBCC activities undertaken have primarily focused on ensuring that the highest-risk groups are aware of, have access to, and consistently use the available malaria prevention and control tools. During the 2015 mass net campaign, the advocacy communication and social mobilization

(ACSM) TWG coordinated the development of communication and promotion materials for the campaign. The materials produced included posters, banners, T-shirts, and voucher cards for net redemption. In addition, radio and TV announcements about the campaign were aired on national and county broadcasting stations to raise awareness and inform beneficiaries on how they could access the mosquito nets.

PMI supported intensive community-based interventions through small group sessions and IPC at the household level to promote the consistent use and maintenance of ITNs and prompt diagnosis and treatment of malaria. The IPC activities were targeted to the highest risk groups in six sub-counties of Siaya and Busia counties in Nyanza and Western Kenya, respectively and Kilifi in Coast region. The three local organizations in each of these sub-counties and CHVs were able to reach 161,423 people in 110,950 households with messages on the various malaria control interventions. The wider community was reached through public *barazas*, and local radio and television messaging, interviews, and shows.

With regard to MIP activities at the community level, CHVs reached 41,626 pregnant women with MIP messages through IPC and small group sessions. Out of these pregnant women reached, 31,636 had taken at least one or more doses of IPTp-SP (76%) during their pregnancy, as established through follow ups in the community.

In order to address specific behavior change drivers in malaria control, the NMCP and partners carry out in-depth qualitative research in some of the targeted counties. Based on these findings, the SBCC campaign is designed, pretested, and rolled out through a multi-channeled approach. For example, research carried out in 2013 revealed that people in the malaria endemic regions felt at risk “only” during rainy seasons, leading to consistent net use only during the rainy season. This finding guided the development of a net use campaign dubbed *msimu wowote* or “use nets during all seasons of the year.” The MIS 2015 revealed that risk perception throughout all seasons had increased, with the highest increase noted in the malaria endemic regions; the increase could be in part attributed to this campaign.

Several studies have evaluated SBCC activities, including the 2015 MIS, the survey evaluating the pilot continuous net distribution project and the Malaria TRaC surveys carried out every two years. As a result of the various SBCC activities, in comparison with the 2010 MIS, the 2015 MIS results indicate an increase in utilization levels of ITNs the night before the survey from 29% to 48%; prompt treatment seeking behavior increased from 18% to 60% among those who took action on the same or next day; IPTp uptake of the second and third dose of SP rose from 26% and 25% to 56% and 38%, respectively. The continuous net distribution pilot demonstrated an increase in net use among household members in the intervention sites from 85% at baseline to 96% at endline. In the control area, net use increased from 82% to 85% respectively. The improvement in net use within the intervention area could be attributed to the active interpersonal communication carried out by CHVs. Similarly the malaria TRaC survey demonstrated an increased use of nets the previous night by children under five years in households exposed to any form of IPC compared to households not exposed (87% vs 78%). In the last five years, there has been good progress towards increasing utilization but the levels are still below the national target of 80%.

At the national level, PMI supported the production of information, education, and communication materials for use during World Malaria Day events hosted by counties. The NMCP held a national World Malaria Day event in Kwale County in 2016. The day was presided over by the Director of Medical Services and the Governor of Kwale County. Kwale was chosen for the commemoration of the World Malaria Day following the results of the 2015 MIS which indicated that malaria prevalence had

increased from 4% to 8% since 2010. The importance of malaria control was stressed in the speeches given by the various key speakers during the occasion. The event was covered by both local and national media. Malaria messaging was included in the main national newspapers and on several national and local radio and television channels.

PMI is supporting the NMCP to revise the malaria communication strategy. This activity began in early 2016 and is expected to be completed by end of the year.

PMI and NMCP are working together with the county governments to ensure that there are teams at the county level to coordinate and build the capacity of county staff to carry out malaria control activities. County teams comprised of key county health management focal persons have been trained on how to plan and implement county specific malaria SBCC activities under the leadership of the county malaria control coordinators.

Plans and justification

Even though a great deal has been achieved in increasing the use of the various malaria control tools as demonstrated in the 2015 MIS, there is still need to continue with efforts to increase the awareness and use of these interventions. Some of the specific problem behaviors that will be prioritized for SBCC activities include consistent net use, early ANC attendance for uptake of IPTp, and early and prompt treatment. With FY 2017 funding, PMI will continue to support SBCC activities focused at the community level where the community health strategy remains a viable platform for delivering malaria prevention and control messages in endemic and epidemic counties. PMI also plans to support other traditional channels of communication to ensure that other groups are reached with malaria prevention and control messaging via radio, television, and print media.

Proposed activities with FY 2017 funding: (\$1,000,000)

1. Integrated community-based SBCC: PMI will support the expansion of community-based SBCC efforts by increasing outreach to priority populations in endemic counties through different strategies and channels of communication. Enhanced IPC delivered via the community approach will be one of the main channels of communication at the household level. In health facilities, particularly ANC clinics, women's groups, health talks, poster and information displays, and IPC during consultations will be used to deliver malaria messaging. Community *barazas*, dramas, and public gatherings will also be used to deliver malaria prevention and control messaging, including promotion of correct and consistent use of ITNs, early and regular ANC attendance by pregnant women to increase the proportion of women receiving IPTp, and early and appropriate health-seeking behavior and prompt diagnosis and treatment for all persons with fever. The activity will be carried out in 4 counties in the malaria endemic zones, namely Bungoma, Homabay, Kwale, and Migori, with a population of 4.9 million. The target population for the activity is estimated at 1.06 million people, mainly women of reproductive age group. (\$900,000)

2. National SBCC promotion and material production: PMI will support national-level SBCC message development and dissemination of key malaria interventions related to the new policies and guidelines. PMI will work with other partners, donors, and stakeholders to coordinate advocacy-related activities, including regular ACSM TWGs and other ad hoc review meetings to monitor and evaluate progress towards malaria control targets. In addition PMI will support the NMCP to implement its revised communication strategy as well as the printing of new copies of the malaria treatment guidelines. (\$100,000)

6. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

The NMCP's goal is to have all malaria surveillance, monitoring and evaluation (SM&E), and program indicators routinely monitored, reported, and evaluated in all counties by 2018 as included in the revised KMS 2009–2018.

Since 2009, the NMCP and stakeholders have relied on a comprehensive national M&E Plan to enable transparent and objective monitoring and evaluation of malaria control activities. The costed M&E Plan is used for M&E advocacy, communications, and resource mobilization. Kenya has a large number of stakeholders, including governments, universities, research institutions, private sector, non-government organizations and donor agencies, organized into an SM&E TWG that meets on a quarterly basis to provide a forum for discussion, coordination, and dissemination of findings of the SM&E activities.

In early 2015, the NMCP prioritized SME and OR activities for 2015–2018 to align with the revised KMS during a consultative process that included academia, partners, donors, and stakeholders. Key activities were also prioritized for funding within the strategy areas: vector control, case management, MIP, and ACSM. The activities prioritized by the NMCP for vector control were: (1) monitoring the durability and efficacy of next-generation LLINs under field conditions, (2) feasibility and efficacy of dry season larva control in different malaria epidemiological zones, and (3) effectiveness of targeted IRS versus blanket IRS for malaria vector control. The activities prioritized for case management were: (1) identify the factors that facilitate and/or hinder testing and confirmation of patients with suspected malaria and adherence to treatment guidelines by health workers, and (2) measure the impact of devolved health care on quantification and distribution of malaria commodities (i.e., RDTs and ACTs) and quality of malaria case management. The activity prioritized for malaria in pregnancy was to evaluate the potential for IPTp and/or intermittent screen and treat alternatives to SP (e.g., dihydroartemisinin-piperaquine) on maternal malaria morbidity and infant birth weight. The two activities prioritized for ACSM were to evaluate the: (1) impact of LLIN campaign communication and messages on the uptake and use of interventions (e.g., *msimuwowote* or “every season” messaging), and (2) communication models to influence positive behavior change for intervention uptake within specific population groups and malaria epidemiologic zones. The NMCP implements most malaria SM&E activities through funding from the Global Fund, PMI, and WHO/DfID. Available funding is targeted towards achieving:

- Improved functioning of SM&E unit resources (e.g., technical capacity, hardware and software capability, and information collection, analysis, reporting and dissemination)
- Coordination of malaria SM&E activities within the country
- Improved data flow to/from all levels of the health system
- Data quality assurance
- Data use for decision making

PMI's support to SM&E in Kenya aligns with the revised M&E plan. Sources of data and information will include the routine health information system, integrated disease surveillance system, periodic household and facility surveys, and activity reports from the implementing partners.

Progress since PMI was launched

PMI has supported data collection activities in Kenya through the routine health information system and periodic household surveys, supporting the 2008–2009 DHS, 2010 MIS, 2014 DHS, and 2015 MIS.

DHIS2 is a national HMIS platform that has been adopted by the country for collection, analysis, validation, and presentation of aggregate and patient-based statistical data. It houses several malaria data sets namely case management, commodity and soon electronic Integrated Disease Surveillance and Response (eIDSR), and is linked to the county level. PMI provided support to strengthen routine malaria-specific reporting in DHIS2, which started in 2010, to ensure malaria indicators were included in the reporting modules and to develop a malaria commodity module with the NMCP for inclusion in DHIS2. Standard malaria indicators are reported at the facility, sub-county, and county levels on a monthly basis.

In addition, PMI has provided support over the years for SM&E capacity building for the NMCP, including support to attend international M&E courses and holding an M&E course in Kenya for MoH staff at all levels of the health system, and Kenya National Malaria Forums. PMI provided support for the second Kenya National Malaria Forum held in October 2014. The two-day event included sessions across the malaria intervention areas and was attended by 250 participants with 50 abstracts presented. PMI staff and PMI's implementing partners provided technical input into the planning of the forum. The NMCP, counties, PMI's implementing partners, and FELTP residents all gave presentations to disseminate scientific and programmatic data. In addition, PMI supported technical assistance for the implementation of the National Malaria M&E Plan 2009–2018 within the framework of the KMS 2009–2018.

Progress during the last 12-18 months

The malaria surveillance systems in Kenya include HMIS and eIDSR; both are accessible on the DHIS2 platform. The NMCP uses data from both HMIS and eIDSR in generating the quarterly surveillance bulletins. The eIDSR has laboratory data (slide and RDT positivity rates), which is missing from HMIS. The HMIS lab data reported through DHIS2 is limited (less than 10% reporting). PMI's support for surveillance activities included supporting the surveillance curriculum development which focuses on HMIS and eIDSR data. PMI supported the implementation of the national surveillance training based on WHO surveillance guidance in the eight high burden malaria endemic counties in western Kenya and Global Fund supported the training in the remaining counties. The surveillance curriculum has been used to train healthcare workers on malaria surveillance, including threshold setting in epidemic-prone areas. By April 2016, a total of 313 training of trainers and 4,669 health workers had been trained countrywide. PMI supported the rollout of the surveillance training in the 8 high malaria endemic counties where 79 training of trainers (out of 313) and 1,152 (out of 4,669) health workers were trained. In addition, PMI provided technical assistance for quality control during the surveillance trainings including the Global Fund-supported trainings in seasonal and low-malaria transmission areas.

PMI continues to build capacity by supporting attendance to regional and international trainings and conferences. PMI is providing support for county malaria control coordinators to attend the regional M&E training in Ghana in June 2016.

A quarterly malaria surveillance bulletin was developed and distributed by the NMCP to malaria stakeholders in Kenya with PMI support. Over the past year, responsibility for preparing the malaria surveillance bulletins transitioned to the NMCP, with PMI supporting technical assistance as needed. The bulletins include the malaria indicators recommended by the WHO surveillance guidance, standardized graphs, and updates on key activities. In addition, PMI has provided support to assist the endemic counties to develop malaria surveillance bulletins and county malaria profiles (the county profiles include other disease reporting in addition to malaria). As a result, one county, Kisumu, has

produced three county malaria bulletins, and two other counties have produced a total of three county profiles to date.

PMI supported the customization of the routine data quality audit tool for malaria and supported a national data quality audit in 2014, which included malaria datasets. While reporting rates have improved, there still remain issues with data quality. In 2015, PMI support was focused on capacity building through surveillance training. In 2016, the support targets improving data quality and laboratory reporting through data quality audits and data review meetings.

PMI provided support for the malaria module in the 2014 DHS survey. PMI provided approximately 44% of the support for the 2015 MIS, with additional funding from the Global Fund and WHO/DfID. The MIS was completed in 2015 and final report disseminated in April 2016.

The PMI-supported Roll Back Malaria impact evaluation used the malaria intervention coverage and mortality data from the 2014 DHS survey. The malaria impact evaluation was started in the last half of 2015 and a preliminary summary report disseminated on World Malaria Day 2016. The core report will be completed and disseminated by late 2016.

Epidemiologic health facility-based surveillance in former IRS sub-counties (four IRS sub-counties and one non-IRS sub-county, two facilities per sub-county) began in August 2012 with PMI support. Data collection ended in April 2015. Information on suspected malaria cases, RDT test-positivity rate, and the proportion of confirmed cases prescribed an ACT was collected. From February 2013 to December 2014, the testing rate of suspected cases was above 99% across the 10 health facilities. The RDT test-positivity rate for all patients ranged from 37–56% across the facilities, but was highly dependent on seasonality. Three of the five sub-counties saw an increase in malaria test positivity rate in 2014 compared to 2013. Five bulletins were developed and disseminated to report the findings from this activity to the NMCP, counties, PMI, and stakeholders.

PMI continued to support the QoC surveys which are conducted on a semi-annual basis and incorporate PMI's standard end-use verification indicators. At least 170 of the approximately 5,000 health facilities were randomly sampled for each survey, for a total of an estimated 340 health facilities sampled per year. The nationally-representative sample includes dispensaries, health centers, and hospital outpatient departments owned by the GoK, faith-based organizations, and non-governmental organizations across the country. The data from the QoC surveys are referenced frequently to demonstrate program progress and performance. A report describing the progress in key health systems and case-management indicators, based on data from the ten surveys conducted between January 2010 and December 2015, was produced and disseminated in February 2016. In 2012, the NMCP launched revised guidelines for the management of severe malaria recommending change of treatment policy from quinine to parenteral artesunate. Given the increased investments in management of severe malaria through commodity procurement, training for parenteral artesunate, and the need to measure implementation progress, the NMCP developed and rolled out the first semi-annual inpatient QoC survey (with Global Fund and CHAI support) in February 2016 at 47 county hospitals where 185 inpatient health workers were interviewed and data extracted from 1,410 medical files for patients admitted with suspected malaria. The findings of the survey will be disseminated in October 2016.

PMI supported technical assistance for the SM&E and governance structures including the SM&E and OR TWGs. The NMCP held SM&E and OR TWG meetings in December 2015 and March 2016 with PMI support. An assessment was conducted of malaria SM&E capacity for the NMCP and an SM&E

capacity building action plan was developed based on this assessment. Technical assistance was provided for the midterm review of the KMS 2009–2018, and the review of the National M&E plan 2009–2018, which was revised and finalized. In October 2015, the MoH launched the revised KMS and M&E plan. Technical assistance was provided for the Global Fund round 10 reprogramming proposal. PMI also supported the assessment of gender and malaria in Kenya as part of the Global Fund reprogramming and midterm review of the KMS.

The table below summarizes the available data sources and assessments since 2010 and planned activities through 2018. Note this table is not exhaustive as there are many additional studies from the demographic surveillance system sites (six in Kenya) and by research institutions.

Table 8. Surveillance, Monitoring, and Evaluation Data Sources in Kenya, 2010–2018

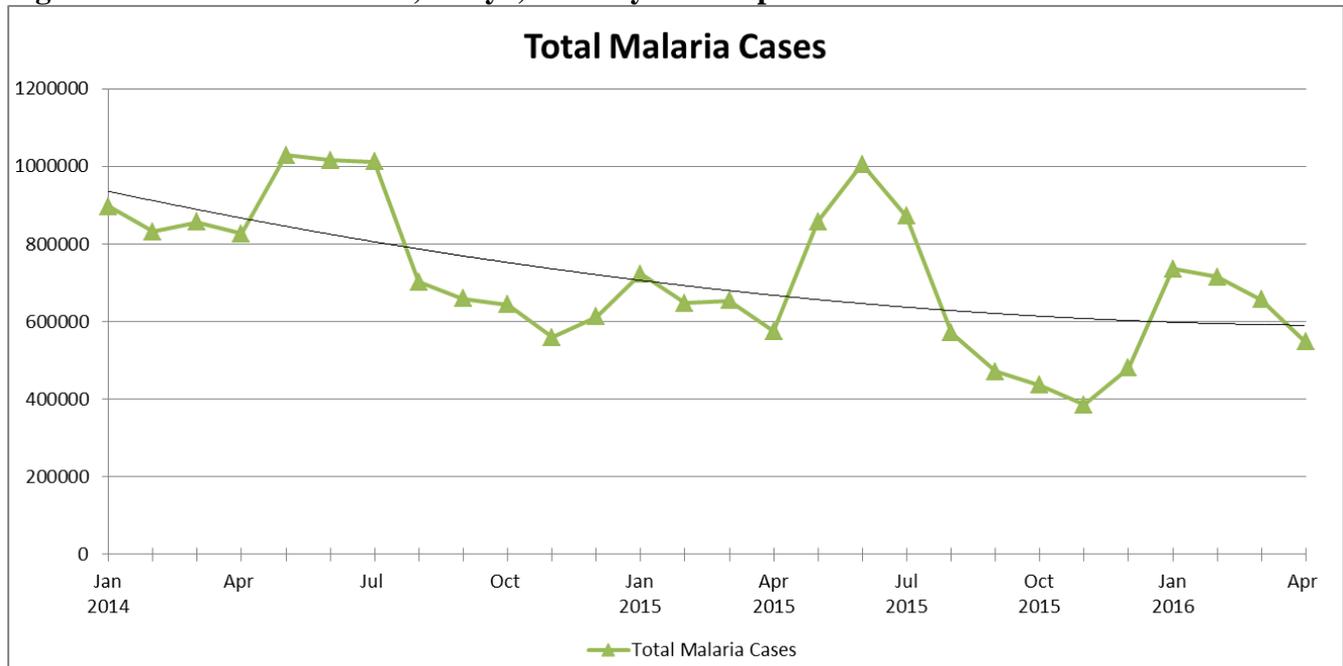
Data Source	Survey Activities	Year								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
National-level Household surveys	Demographic Health Survey (DHS)					X				
	Malaria Indicator Survey (MIS)	X					X			X
	TRaC Survey ^a					X*				
Health Facility and Other Surveys	School-based malaria survey (national and sub-national) ^b	X*	X*							
	SPA survey	X*								
	Service Availability and Readiness Assessment Mapping				X*					
	EUV/Quality of Care survey (outpatient) ^c	X	X	X	X	X	X	(X)	(X)	(X)
	Inpatient QoC survey							X*	(X*)	(X)
	ITN Post-campaign survey			X				(X)*		
	ITN Post-campaign qualitative assessment				X					
Malaria Surveillance and Routine System Support	Support to malaria surveillance system ^d			X	X	X	X			
	Support to HMIS/DHIS2	X	X	X	X	X	X	X	(X)	(X)
	Support to IDSR/eIDSR	X*	(X*)	(X*)						
Therapeutic Efficacy monitoring ^e	In vivo efficacy testing		X		X		X	X*	(X*)	(X*)
Entomology	Entomological surveillance and resistance monitoring	X	X	X	X	X	X	X	(X)	(X)
	ITN durability monitoring						X	X	X	X
Other malaria-related evaluations	Rapid epidemic preparedness and response assessment			X						
	Malaria Program Review/Midterm Review					X*			X*	
	Epidemiologic Risk Map & County Malaria Profiles			X				X		
Other Data Sources	Malaria Impact Evaluation						X	X		

*Not PMI-funded
^a Aloo, S. Findings of the 2014 malaria TRaC study among populations living in different malarial zones of Kenya.
^b C.W. Gitonga et al., 2010. Malaria Journal, 9:306; K.E. Halliday et al., 2012. Trop Med Int Health, 17:532; K.E. Halliday et al., 2014. PLoS Med, 11.
^c End-use verification survey started in 2009 and was incorporated into the Quality of Care survey in 2010.
^d Health facility-based surveillance in IRS districts, PMI funded. August 2012–April 2015.
^e PMI-funded TEM activities are shown in the table. Additional TEM activities prior to 2017 were funded by other donors and are not shown.

Table 9. Routine Surveillance Indicators

Indicators	Value	Comments
1. Total number of reported malaria cases Data source: DHIS	7,978,674	
Total diagnostically confirmed cases	5,816,272	The reporting rate is 89%
Total clinical/presumed/unconfirmed cases	2,162,402	
Outpatient number of reported malaria cases		
Diagnostically confirmed	5,410,424	The reporting rate is 89%
Clinical/presumed/unconfirmed	2,162,402	
Inpatient number of reported malaria cases		
Diagnostically confirmed	405,848	The inpatient data reported in the DHIS is lumped together. It does not capture disaggregation. The reporting rate is 26%
Clinical/presumed/unconfirmed		
2. Total number of reported malaria deaths Data source: DHIS		
Diagnostically confirmed	15,061	The inpatient data reported in the DHIS is lumped together. There is no clinical or confirmed disaggregation. The reporting rate is 26%
Clinical/presumed/unconfirmed		
3. Malaria test positivity rate (outpatients) Data source: IDSR	34%	
Numerator: Number of outpatient confirmed malaria cases	3,321,158	The reporting rate is 65%
Denominator: Number of outpatients receiving a diagnostic test for malaria (RDT or microscopy)	9,743,274	The reporting rate is 65%
4. Completeness of monthly health facility reporting Data source: DHIS	88%	
Numerator: Number of monthly reports received from health facilities	81,188	This is the number of OPD reports received from health facilities in 2015.
Denominator: Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered)	92,208	This is the number of OPD reports that are expected to be received from health facilities in 2015.

Figure 9. Total Malaria Cases, Kenya, January 2014–April 2016



Plans and justification

With FY 2017 funding, PMI will support the implementation of the revised national malaria M&E plan. PMI will work with the NMCP, counties, and partners to ensure continuity of SM&E activities. PMI will continue shifting resources to support strengthening of SM&E at the county level. PMI will support the collection, reporting, analysis, and use of routine malaria data through the DHIS2 at health facility, sub-county, and county levels to enable data-driven decision making.

PMI will support both the DHIS2 and the next rounds of QoC surveys. The QoC provides data and results that are complementary rather than redundant to those coming from the DHIS2. For instance, QoC surveys capture case management data and indicators on an individual patient and facility level that allows evaluation of the quality of services provided and adherence to guidelines by health providers. DHIS2 captures aggregate data and does not currently include routine reporting of laboratory results (i.e., RDT and microscopy). In addition, because the QoC surveys have been implemented biannually since 2010, they provide important trend data for evaluation of interventions. The DHIS2 malaria indicators data captured and reporting rates have improved steadily since 2010; however, the ongoing changes in data collection make trend analysis difficult. The NMCP, partners and donors rely on the data and analysis provided both by QoC surveys and by DHIS2 for decision-making and targeting of interventions and program support. In addition the QoC surveys include commodity availability information typically collected in EUV surveys, avoiding a separate EUV survey.

The inpatient QoC, implemented for the first time in 2016, was funded by donor supporting case management because inpatient data currently are not available in the DHIS2, as it currently captures less than 20% of inpatient admissions in Kenya. PMI anticipates that the inpatient QoC survey will be implemented biannually if the data and analysis is informative to the NMCP, partners, donors and stakeholders. The inpatient QoC survey is a cross-sectional survey repeated at specific time intervals, similar to the outpatient QoC survey.

PMI will provide support for HMIS strengthening focusing on capacity building for NMCP program staff on data analysis, use and governance, and will also work with the NMCP to define and refine malaria outputs for inclusion into DHIS2, including creation of data visualization dashboards and products, dissemination and use of data, development of Application Program Interphase (API) enabling programs to manage and validate data from various sources such as HIS and IDSR. PMI will also support strengthening linkages between national and county HIS through a county Measurement Learning and Accountability Platform to ensure standardization of indicators tracked across the country and dissemination of National HMIS tools and policies to counties. PMI will build on Mission-wide DHIS2 support, by focusing HMIS/DHIS2 strengthening activities at the facility and county levels in the eight focus endemic counties. Other partners supporting DHIS2 include the World Bank, UNICEF, DFID, DANIDA, and CDC.

PMI will support, along with other stakeholders, implementation of the next MIS in Kenya. The field work for the survey is scheduled to take place in July and August 2018.

Proposed activities with FY 2017 funding: (\$2,060,000)

1. **Strengthen malaria SM&E at national level:** Continue support for implementation of the national M&E plan by providing technical assistance to increase the capacity of existing NMCP M&E staff to ensure that data is used for program improvements. Specific activities are listed below. (\$200,000)
 - Support the TWGs to monitor implementation of the SM&E plan
 - Build NMCP SM&E staff capacity for data collection, analysis and use
 - Provide technical assistance for production of annual reports, bulletins, and other information products
 - Contribute to the integrated support and oversight of DHIS2 in order to maintain and update system-wide data management capacity, and DHIS2 policies and standards

2. **Strengthen HMIS and malaria SM&E at county level:** Provide support for strengthening SM&E capacity and routine malaria surveillance systems at county and sub-county levels. The national surveillance strategy was rolled out in 2014 and training completed in 2015. With FY 2017 funds PMI will continue to support training and strengthening activities, using a holistic approach to DHIS2 strengthening, with the overall USAID project providing hardware/software/system support; PMI implementing partners providing training and supervision of strategy components that feed information into DHIS2 and data collection/analysis/data demand and use strengthening for facility and county personnel. Each county has about 200-250 personnel at facility, sub-county and county levels that are primarily responsible for DHIS2 data. PMI provides additional support to ensure high-quality data in the DHIS2 through training on surveillance, data review meetings and strengthening reporting through DHIS2. Objectives for PMI support will include support to uploading eIDSR data into DHIS2, updating source documents and MOH forms, holding data demand and use meetings, and producing and dissemination of malaria information products based on DHIS2 data. PMI FY 2017 funding will also continue to support mentoring and on-the-job training for data collection and reporting at the county health management team, sub-county health management team, and facility level. The focus will expand from health facilities with large patient volumes to lower level, smaller facilities to increase county-wide coverage for all eight endemic counties. Technical assistance will be provided during county data review meetings in the endemic counties to facilitate quality assurance activities and for increased demand and use of routine data. Reporting rates for case and commodity management, completeness and data quality of

malaria indicators in the DHIS2 system will be monitored longitudinally, by county and facility to monitor the success of these activities. (\$700,000)

- 3. Malaria Indicator Survey:** Provide support, along with other stakeholders, for the implementation of the next MIS in Kenya scheduled to start in 2018, in addition to the \$200,000 provided through reprogrammed FY 2016 funds. Provide technical assistance to the NMCP to insure comparability with the 2015 MIS and that the survey will provide the data to assess the impact and progress in malaria indicators. (\$800,000)

- 4. Quality of Care Surveys (end-use verification survey)**

Outpatient QoC Survey/End-use verification survey: Monitor stocks of ACTs and RDTs through the end-use verification survey. The data collection will be done semiannually as part of the QoC survey to allow for a comprehensive evaluation of case management progress and performance. Global Fund provides half of the funding for this activity. (\$200,000)

In patient QoC Survey: Evaluate the diagnosis and treatment of severe malaria by monitoring key health systems and case-management indicators for inpatient care in level 5 hospitals in all 47 counties. Data will be collected semi-annually. PMI will contribute half of the funding. (\$150,000)

- 5. Technical assistance—CDC:** Support one CDC in-country visit to provide technical assistance for M&E activities. (\$10,000)

7. Operational research

Table 10. PMI Supported Operational Research in Kenya, FY 2006–FY 2017

Completed OR Studies			
Title	Start date	End date	Budget
Phase III field evaluation of long-lasting insecticide-treated nets (Kenya, Malawi, and Senegal)	December 2009	May 2014	\$150,000 (PMI core funding)
Longevity of insecticides used for IRS	September 2011	April 2012	\$50,000
Evaluation of integrated vector control in high- and low-transmission areas of western Kenya	May 2008	August 2009	\$193,000 (PMI core funding)
Knowledge and adherence to malaria treatment guidelines for pregnant patients in rural western Kenya	August 2013	December 2013	\$75,000
Intermittent screening and treatment (IST) or intermittent preventive treatment (IPT) with dihydroartemisinin-piperaquine versus IPT with sulfadoxine-pyrimethamine for the control of malaria in pregnancy in Kenya: Assessment of acceptability, feasibility and cost-effectiveness within a randomized controlled trial	September 2012	July 2015	\$150,000
Ongoing OR Studies			
Title	Start date	End date (est.)	Budget
Evaluation of intermittent mass screening and treatment (IMSaT) to reduce malaria transmission in western Kenya	January 2013	August 2016	\$2,150,000 (FY11–FY13 PMI Core funding)
Impact of intensification of malaria control activities on household microeconomics and health services in western Kenya	January 2015	December 2016	\$500,000 (\$88,000 of PMI Core funding)

NMCP/PMI objectives

In March 2015, the NMCP developed a revised list of OR priorities to improve malaria control interventions and programming in line with the revised KMS 2009–2018. The current OR priorities

target vector control, case management, MIP, and SBCC research questions. In addition, the NMCP has identified research questions related to epidemic response and climate change. In Kenya, OR priorities are set by the NMCP and OR TWG in accordance with the KMS. The OR proposals are reviewed and agreed upon by the OR TWG, which includes PMI representation. PMI fills OR gaps that are identified by the NMCP and are in line with PMI's OR priorities and capacities. In addition to Kenya-specific PMI funding, PMI supports OR studies in Kenya via core funding. Below is a list of the OR studies funded by PMI that have been completed or are ongoing in Kenya.

Progress since PMI was launched

- **Phase III field evaluation of long-lasting insecticide treated nets (Kenya, Malawi, and Senegal).** This multi-year study, completed in May 2014, estimated and compared attrition, physical integrity, and insecticidal activity over time among several brands of long-lasting ITNs, under field conditions in western Kenya. The study found that attrition of nets (which ranged between 30%–40%) was primarily driven by nets being moved, taken, or given away. Findings from this study informed the revision of country specifications for ITNs and how frequently mass net campaigns should be conducted. The results were also used in the initial validation of resistance to damage scores for ITNs which are based upon laboratory textile tests and are designed to predict ITN durability under field conditions.
- **Longevity of insecticides used for IRS.** This study, completed in April 2012, was conducted to determine the optimal insecticide for use after Kenya shifted away from pyrethroid insecticides for IRS. The study identified one formulation of bendiocarb that had the longest duration of efficacy and highest level of acceptance among household owners. Findings from this study were used to inform policy change from pyrethroids to non-pyrethroid insecticides for IRS. Carbamates were recommended but could not be registered due to public health concerns. A single long-acting organophosphate has now been registered for IRS in Kenya.
- **Evaluation of integrated vector control in high- and low-transmission areas of western Kenya.** This study was completed in August 2009. It was conducted to assess changes in the prevalence of parasitemia and anemia after vector control measures were implemented, and estimate the effect of IRS and ITNs on malaria specific outcomes. In this study, ITNs were found to be moderately effective in reducing parasitemia. IRS was highly effective and may have masked the effects of ITNs. These data helped guide PMI and NMCP programmatic decisions and confirmed future commitments to implementing IRS for vector control. Study findings were published in January 2016.²¹
- **Knowledge and adherence to malaria treatment guidelines for pregnant patients in rural western Kenya.** This study, which was completed in December 2013, was conducted to assess the knowledge of malaria treatment guidelines for pregnant women among health care providers and drug dispensers, and to describe their prescribing practices. Results from this study, were presented at the Roll Back Malaria MIP Expert Review Group in July 2015. Study findings were disseminated to the wider public health community beyond Kenya at ASTMH and published in a peer-reviewed journal.²² Findings from this study will be used in the revision of MIP case management documents as well as other MIP supporting materials.

²¹ Gimnig, et al., PLoS One. 2016 Jan 5;11(1): e0145282.doi:10.1371/journal.pone.0145282

²² Riley, et al., [PLoS One](https://doi.org/10.1371/journal.pone.0145616). 2016 Jan 20;11(1):e0145616. doi: 10.1371/journal.pone.0145616

Progress during the last 12-18 months

- **Intermittent screening and treatment (IST) or intermittent preventive treatment (IPT) with dihydroartemisinin-piperaquine versus IPT with sulphadoxine-pyrimethamine for the control of malaria in pregnancy in Kenya: assessment of acceptability, feasibility, and cost-effectiveness within a randomized controlled trial.** This is a multi-year study that began in September 2012 and was completed in June 2015; the main trial results have been published.²³ PMI funded the final phase of the study addressing operational feasibility, which was based on the results of the interim analysis from the main trial. Results of the component to evaluate user and provider acceptability were published in March 2016.²⁴ The preliminary results from the operational feasibility component were presented at the Roll Back Malaria MIP Expert Review Group meeting in July 2015.
- **Evaluation of intermittent mass screening and treatment to reduce malaria transmission in western Kenya.** This study evaluates the addition of intermittent mass screening and treatment (IMSaT) for malaria to the standard malaria interventions (i.e., ITNs, case management) as a means to further reduce malaria transmission in a high-burden malaria-endemic setting. This is a multi-year study funded through PMI core operational research support. Six rounds of mass screening and treatment in an intervention arm of 27,000 people were completed by mid-2015. Preliminary findings were presented at the 64th American Society of Tropical Meeting and Hygiene Annual Meeting in November 2015 and with the Siaya County Health Management Team in early 2016. Results from the community component on perceptions of mass screen and treat were published in 2016.²⁵ Additional publications are in preparation.
- **Impact of intensification of malaria prevention and control activities on household microeconomics and health service delivery in western Kenya.** PMI core operational research support funded this study, which began in January 2015. The microeconomic study will determine the economic impact of the intensive malaria-reduction efforts in western Kenya at the household and health-system levels. Study findings will provide evidence on the changes in household income and economic status as measured by wealth quintile as a result of improvements in malaria prevention and control activities. The study will demonstrate any improvements in the efficiency of health service delivery resulting from a decreasing burden of severe and uncomplicated malaria. The study will also provide evidence for the cost implications of malaria-elimination efforts at the county and national levels. Preliminary results have been submitted as an abstract for the 65th American Society of Tropical Meeting and Hygiene Annual Meeting in November 2016. The study is expected to be completed in late 2016.

Plans and justification

PMI currently has no studies planned with FY 2017 funding.

Proposed activities with FY 2017 funding: (\$0)

PMI currently has no studies planned with FY 2017 funding.

²³ Desai, et al., [Lancet](#). 2015 Dec 19;386(10012):2507-19. doi: 10.1016/S0140-6736(15)00310-4

²⁴ Hill, et al., [PLoS One](#). 2016 Mar 17;11(3):e0150259. doi: 10.1371/journal.pone.0150259

²⁵ Shulford, et al. [Malaria Journal](#). 2016. doi: 10.1186/s12936-016-1123-y

8. Staffing and administration

Two health professionals serve as Resident Advisors (RAs) to oversee PMI in Kenya, 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 RA 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.

The PMI interagency 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 and direction to PMI implementing partners.

The PMI lead in country is the USAID Mission Director. The day-to-day lead for PMI is delegated to the USAID Health Office Director and thus the two PMI RAs, one from USAID and one from CDC, report to the USAID Health Office Director for day-to-day leadership, and work together as a part of a single interagency team. Technical expertise housed in Atlanta and Washington complements PMI programmatic efforts.

The two PMI RAs are physically based within the USAID health office but are expected to spend approximately half of their time with and providing TA to the NMCPs and implementing partners, including time in the field monitoring program implementation and impact.

The number of locally-hired staff and necessary qualifications to successfully 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 U.S. Global Malaria Coordinator.

Proposed activities with FY 2017 funding: (\$1,890,151)

1. **USAID in-country staffing and administration:** Support for one PMI resident advisor and one Foreign Service National staff member to oversee activities supported by PMI in Kenya. Additionally, these funds will support pooled USAID Kenya Mission staff and mission-wide assistance from which PMI benefits. (\$1,222,829)
2. **CDC in-country staffing and administration:** Support for one PMI resident advisor to oversee activities supported by PMI in Kenya. (\$667,322)

Table 1: Budget Breakdown by Mechanism

**President's Malaria Initiative – KENYA
Planned Malaria Obligations for FY 2017**

Partner Organization	Geographic Area	Activity Description	Budget (\$)	%
CDC IAA	Endemic/Epidemic Counties	Technical Assistance: CDC TDYs	\$159,000	0%
	Nationwide	Technical Assistance: CDC TDY		
		Technical Assistance: CDC TDYs		
		Support one FELTP resident		
County SI Mechanism	Endemic Counties	Strengthen malaria SM&E at county, subcounty and facility levels	\$700,000	2%
GHSC-PSM	Endemic/Epidemic Counties	Procure ITNs for health facility-based distribution channels	\$13,841,049	41%
	Endemic County(s)	Procure ITNs for alternate distribution channel		
	Nationwide	Procure RDTs		
		Procure AL		
Nationwide	Procure severe malaria medications			
	Health Information Governance and Data Analytics (HIGDA)	National	Strengthening malaria SM&E at the national level	\$200,000
KEMSA Medical Commodities Project (MCP)	Nationwide	Provide warehousing and distribution for RDTs, ACTs and severe malaria medicines	\$824,800	2%
MCSP	Endemic Counties	Sensitize and train healthcare workers and supervisors on the malaria in pregnancy package of interventions and improve facility reporting	\$700,000	2%
		Sensitize, orient, and supervise CHVs on malaria in pregnancy package of interventions and		

		improve reporting		
		Strengthen national and county level malaria in pregnancy policy and monitoring capacity		
TBD - Case Management	Endemic Counties	Provide supportive supervision for malaria diagnostics within the national quality assurance/quality control framework	\$1,425,000	4%
		Provide supportive supervision, training, and mentoring for healthcare providers for malaria case management		
TBD - Survey Contract	Nationwide	Support 2018 MIS	\$800,000	2%
TBD - Environmental Management	Endemic/Epidemic Counties	Environmental Monitoring	\$35,000	0%
TBD-bilateral	Endemic/Epidemic Counties	Logistic and program support for ITN distribution	\$3,575,000	11%
		Support alternate ITN distribution channel		
		Monitoring of interventions: net durability monitoring		
		Support for county malaria control programs		
		Integrated community-based SBCC		
	Nationwide	Support to NMCP		
National SBCC promotion and material production				
TBD - IRS Project	Endemic County	IRS implementation and management	\$7,500,000	22%
	Endemic/Epidemic Counties	Entomological and insecticide resistance monitoring in IRS and other selective areas		

TBD - Supply Chain Contract	Nationwide	Strengthen supply chain management for malaria commodities at the national level	\$1,750,000	5%
		Quality of Care Survey (outpatient)/End-use verification survey		
	Inpatient Quality of Care Survey			
	Endemic Counties	Strengthen supply chain management for malaria commodities at the county, sub-county, and health-facility levels		
TBD - QI mechanism	Endemic/Epidemic Counties	Support CHMTs and SCHMTs for quality improvement	\$300,000	1%
USP PQM	Nationwide	Strengthen antimalarial drug quality monitoring and surveillance	\$300,000	1%
USAID/CDC	Nationwide	USAID and CDC in country staffing and administration	\$1,890,151	6%
TOTAL			\$34,000,000	100%

Table 2: Budget Breakdown by Activity

**President's Malaria Initiative – KENYA
Planned Malaria Obligations for FY 2017**

Proposed Activity	Mechanism	Budget (\$)	Commodities (\$)	Geographic area	Description of Activity
PREVENTIVE ACTIVITIES					
VECTOR MONITORING AND CONTROL					
Entomologic monitoring and insecticide resistance management					
Entomological and insecticide resistance monitoring in IRS and other selective areas	TBD - IRS Project	\$500,000	\$0	Endemic/ Epidemic Counties	Continue insecticide resistance monitoring (including resistance intensity) in endemic counties with an IRS program and counties where IRS has been withdrawn. Expansion to selected counties identified as having gaps in insecticide resistance monitoring by the NMCP.
Technical Assistance: CDC TDYs	CDC IAA	\$29,000	\$0	Endemic/ Epidemic Counties	Support two visits from CDC to provide assistance in implementing IRS and ento monitoring activities.
SUBTOTAL ENTO		\$529,000	\$0		
Insecticide Treated Nets					
Procure ITNs for health facility-based distribution channels	GHSC-PSM	\$3,150,000	\$3,150,000	Endemic/ Epidemic Counties	Fill part of the ITN gap for routine distribution by purchasing up to 1.55 million ITNs. Routine distribution: free-of-charge to pregnant women and children under one through the ANC and EPI/child health clinics.

Logistic and program support for ITN distribution	TBD-bilateral	\$1,550,000	\$0	Endemic/ Epidemic Counties	Provide logistical support, including transportation and storage of nets, for distribution of the 1.55 million ITNs within the national routine distribution system.
Procure ITNs for alternate distribution channel	GHSC-PSM	\$375,000	\$375,000	Endemic County(s)	Procure 125,000 ITNs for an alternate distribution channel.
Support alternate ITN distribution channel	TBD-bilateral	\$225,000	\$0	Endemic County(s)	Support an alternate ITN distribution channel in about one county to maintain universal coverage following the start of the 2017/18 mass campaign. The specific approach (e.g. community-based, school-based) will be based on the planning activity funded with FY 2015 funding.
Monitoring of interventions: net durability monitoring	TBD-bilateral	\$200,000	\$0	Endemic/ Epidemic Counties	Net attrition/durability conducted on nets distributed in the 2017-18 mass ITN campaign. Includes the 6-month and 12-month time point for two sites.
SUBTOTAL ITNs		\$5,500,000	\$3,525,000		
Indoor Residual Spraying					
IRS implementation and management	TBD - IRS Project	\$7,000,000	\$2,070,000	Endemic County	Support IRS in one to two endemic counties (estimated to reach 276,000 structures and up to 1.4 million people) with at least 85% coverage in all targeted areas.
Environmental Monitoring	TBD - Environmental Management	\$35,000	\$0	Endemic/ Epidemic Counties	Conduct biannual independent environmental monitoring visit.

SUBTOTAL IRS		\$7,035,000	\$2,070,000		
Malaria in Pregnancy					
Sensitize and train healthcare workers and supervisors on the malaria in pregnancy package of interventions and improve facility reporting	MCSP	\$300,000	\$0	Endemic Counties	Target all healthcare facilities that provide ANC services in up to eight counties. An estimated total of up to 800 healthcare facilities will be reached. Activities will include the orientation and training of facility in-charges and health service providers on the MIP package and ANC data collection, and implementation of a quality improvement framework for healthcare facilities providing ANC services.
Sensitize, orient, and supervise CHVs on malaria in pregnancy package of interventions and improve reporting	MCSP	\$300,000	\$0	Endemic Counties	This activity will include the orientation, training and supervision of CHVs to increase early referral to ANC services and to register all pregnant women for follow-up. CHVs are trained to undertake BCC activities and to refer and track pregnant women to ensure that they receive IPTp at health facilities. An estimated 5,500 CHVs will be sensitized and oriented using the community strategy and other innovative community approaches. The target is to reach approximately 50,000 women of reproductive age with community MIP messages.
Strengthen national and county level malaria in pregnancy policy and monitoring capacity	MCSP	\$100,000	\$0	Endemic Counties	Support will be provided at the national and county levels for policy and monitoring of MIP-specific activities. Technical support will be provided to counties on MIP as necessary. Support cross-county learning, printing guidelines, and TWGs.
SUBTOTAL MIP		\$700,000	\$0		

SUBTOTAL PREVENTIVE		\$13,764,000	\$5,595,000		
CASE MANAGEMENT					
Diagnostics & Treatment					
Procure RDTs	GHSC-PSM	\$4,800,000	\$4,800,000	Nationwide	Procure and distribute up to 15 million RDTs to help fill the gap at level 2 and 3 health facilities (dispensaries and health centers) and to provide RDTs for the community case management strategy.
Procure AL	GHSC-PSM	\$4,256,049	\$4,256,049	Nationwide	Procure and distribute up to 5 million AL treatments to fill gaps in the public sector and community case management.
Procure severe malaria medications	GHSC-PSM	\$1,260,000	\$1,260,000	Nationwide	Procure severe malaria drugs, including up to 500,000 vials of injectable artesunate, as needed.
Provide warehousing and distribution for RDTs, ACTs and severe malaria medicines	KEMSA Medical Commodities Project (MCP)	\$824,800	\$0	Nationwide	Provide warehousing and distribution for RDTs, ACTs and severe malaria medicines from central to facility level nationwide. KEMSA, the central medical store, transitioned from a quarterly "push" supply system to an order-based (i.e., smart push) system from counties due to devolution.

Provide supportive supervision for malaria diagnostics within the national quality assurance/quality control framework	TBD - Case Management	\$300,000	\$0	Endemic Counties	Activities will include strengthening capacity of laboratory and healthcare staff for malaria diagnostics through initial and/or refresher trainings and capacity-building for supportive supervision, on-the-job training, and mentoring at the health facility level. Support scale up and integration of QA/QC framework and systems for malaria diagnostics in endemic counties. Conduct monitoring and evaluation of QA/QC officer performance and program implementation.
Provide supportive supervision, training, and mentoring for healthcare providers for malaria case management	TBD - Case Management	\$1,125,000	\$0	Endemic Counties	Provide supportive supervision, training and mentoring for malaria case management, including severe malaria, at the health facility level in line with national case management guidelines to promote rational use of medicines.
Technical Assistance: CDC TDY	CDC IAA	\$20,000	\$0	Nationwide	Support two CDC visits to provide technical assistance for malaria case management.
SUBTOTAL DIAGNOSIS AND TREATMENT		\$12,585,849	\$10,316,049		
Pharmaceutical Management					
Strengthen supply chain management for malaria commodities at the national level	TBD - Supply Chain	\$400,000	\$0	Nationwide	Support the NMCP and KEMSA to strengthen supply chain management and build capacity to ensure commodity data are available (through DHIS2) and used to accurately forecast and quantify commodity needs at the national level and prevent stockouts at all levels of the health system.

Strengthen supply chain management for malaria commodities at the county, sub-county, and health-facility levels	TBD - Supply Chain	\$1,000,000	\$0	Endemic Counties	Support throughout the supply chain (county, sub-county, and health-facility levels) to build capacity and structures to ensure data is available and used to quantify commodity needs and plan orders to prevent stockouts. Activities will focus on improving the organization, management and security of commodities within regional and county warehouses, strengthening county systems to order, track and evaluate commodity distribution from KEMSA, and transfer/redistribute commodities to alleviate supply shortages and avoid expiries. Supervision of stock monitoring, on-the-job training, and collection of antimalarial drug consumption data. Assist with distributing job aids and materials to health facilities.
Strengthen antimalarial drug quality monitoring and surveillance	USP PQM	\$300,000	\$0	Nationwide	Strengthen antimalarial drug quality monitoring through the provision of technical, strategic and operational support to the NMCP and counties, drug monitoring sentinel sites in the counties, Pharmacy and Poisons Board, and National Quality Control Laboratory. Includes collaboration with KEMSA and MEDS.
SUBTOTAL PHARMACEUTICAL MANAGEMENT		\$1,700,000	\$0		
HEALTH SYSTEMS STRENGTHENING/CAPACITY BUILDING					

Support to NMCP	TBD - bilateral	\$200,000	\$0	Nationwide	Provide technical assistance and capacity building to improve the NMCP's capacity to fulfill the roles and responsibilities in line with the revised KMS. Provide support for technical working groups and inter-agency coordination committees for robust participation and regular meetings.
Support for county malaria control programs	TBD - bilateral	\$400,000	\$0	Endemic/ Epidemic Counties	Programatic support to malaria control coordinators, county pharmacist, county lab coordinator, disease surveillance coordinator, and health management teams at the county and sub-county levels to increase supervision and management capacity for program implementation. Support emerging malaria control issues at the county level. Assist with inter-county coordination.
Support CHMTs and SCHMTs for quality improvement	TBD - QI mechanism	\$300,000	\$0	Endemic/ Epidemic Counties	Support quality improvement activities with CHMTs and SCHMTs, to improve program performance across all malaria intervention areas.
Support one FELTP resident	CDC IAA	\$100,000	\$0	Nationwide	Support one FELTP trainee for the two-year program to increase epidemiologic capacity within the MoH. PMI encourages the MoH to second FELTP graduates to the NMCP or endemic/epidemic counties to enhance the capacity of malaria control programs. The budget for each trainee includes tuition, stipend, laptop, materials, training and travel for the two-year program.
SUBTOTAL HSS & CAPACITY BUILDING		\$1,000,000	\$0		
SOCIAL AND BEHAVIOR CHANGE COMMUNICATION					

Integrated community-based SBCC	TBD-bilateral	\$900,000	\$0	Endemic Counties	Expand community-based SBCC efforts by increasing outreach to priority counties and at-risk populations, particularly pregnant women and children less than five years of age, through different strategies and channels of communication, such as IPC. Messages and mode of dissemination will be dependent on the venue and target group but will include health facilities, ANC clinics, home visits by CHVs, <i>barazas</i> , and public gatherings.
National SBCC promotion and material production	TBD-bilateral	\$100,000	\$0	Nationwide	Support national-level SBCC message development and dissemination on key malaria control interventions; donor coordination; advocacy-related activities, including regular review meetings with malaria partners, donors, and stakeholders to monitor and evaluate program progress. Activities will also strengthen the Division of Health Promotion.
SUBTOTAL BCC		\$1,000,000	\$0		
SURVEILLANCE, MONITORING AND EVALUATION					
Strengthening malaria SM&E at the national level	Health Information Governance and Data Analytics (HIGDA)	\$200,000	\$0	National	Continue support for implementation of the national M&E plan by providing technical assistance to increase the capacity of M&E staff at the national level and to promote data use for decision making. Oversight, governance, data management/analytics and updating DHIS2 forms for malaria.

Strengthen malaria SM&E at county, subcounty and facility levels	County SI Mechanism	\$700,000	\$0	Endemic Counties	Increase data demand and use of routine data for programmatic improvements at county level. Support for M&E strengthening at the county level, working with the CHMT, SCHMT and select health facilities. Continue capacity building in counties for surveillance and M&E activities, mentorship, and reporting in line with county malaria control plans.
Support 2018 MIS	TBD - Survey Contract	\$800,000	\$0	Nationwide	Support the next malaria indicator survey planned for 2018.
Quality of Care Survey (outpatient)/End-use verification survey	TBD - Supply Chain Contract	\$200,000	\$0	Nationwide	Monitor quality of care for malaria case management and assess stockouts through the End-use verification tool included in the semi-annual Quality of Care surveys.
Inpatient Quality of Care Survey	TBD - Supply Chain Contract	\$150,000		Nationwide	Inpatient QoC survey in level 5 hospitals in all 47 counties on a semi-annual basis.
Technical Assistance: CDC TDYs	CDC IAA	\$10,000	\$0	Nationwide	Support one CDC TDY to provide technical assistance for M&E activities.
SUBTOTAL SM&E		\$2,060,000	\$0		
IN-COUNTRY STAFFING AND ADMINISTRATION					
USAID in-country staffing and administration	USAID	\$1,222,829	\$0	Nationwide	USAID staffing and mission-wide support costs

CDC in-country staffing and administration	CDC IAA	\$667,322	\$0	Nationwide	CDC Advisor staffing and support costs
SUBTOTAL IN-COUNTRY STAFFING		\$1,890,151	\$0		
GRAND TOTAL		\$34,000,000	\$15,911,049		