

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 2019 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



U.S. PRESIDENT'S MALARIA INITIATIVE



PRESIDENT'S MALARIA INITIATIVE

Côte d'Ivoire

Malaria Operational Plan FY 2018 and FY 2019

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ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
CDC	Centers for Disease Control and Prevention
CHW	Community Health Worker
CY	Calendar year
DHS	Demographic and Health Survey
DPML authority)	<i>Direction de la Pharmacie du Médicament et des Laboratoires</i> (National medicines authority)
DSC	<i>Direction de la Santé Communautaire</i> (Directorate of Community Health)
eLMIS	Electronic logistics management information system
ESPC	<i>Établissements sanitaire de premier contact</i> (primary healthcare facility)
EPI	Expanded program of immunization
FY	Fiscal year
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GOCI	Government of Côte d'Ivoire
GSA	<i>Groupe Scientifique d'appui</i> (Scientific Advisory Council)
HMIS	Health Management Information Systems
DIIS	<i>Direction de l'Informatique et de l'Information Sanitaire</i> (Directorate of IT and health information)
iCCM	Integrated community case management
IEC	Information, education, communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LMIS	Logistics management information system
LNSP	<i>Laboratoire National de la Santé Publique</i> (National Public Health Laboratory)
MSHP	<i>Ministère de la Santé et de l'Hygiène Publique</i> (Department of Health and Public Hygiene)
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MBS	Malaria Behavior Survey
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MOP	Malaria Operational Plan
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
NPSP	<i>Nouvelle Pharmacie de Santé Publique</i> (Central Medical Store)
PMI	President's Malaria Initiative
PEPFAR	President's Emergency Plan for AIDS Relief
PNDAP Pharmaceutical Agency)	<i>Programme National de Développement de l'activité Pharmaceutique</i> (National Pharmaceutical Agency)
RASS	<i>Rapport Annuel sur la Situation Santé</i> (Annual Health Situation Report)
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SM&E	Surveillance, monitoring, and evaluation

SP	Sulfadoxine-pyrimethamine
TES	Therapeutic efficacy survey
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
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 percent 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 Roll Back Malaria (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's) 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.

In 2017, consistent with an increase in annual appropriations, PMI again launched new country programs in Cameroon, Côte d'Ivoire, Niger, and Sierra Leone, and expanded an existing program in Burkina Faso to PMI focus country status. With the addition of these new focus countries, PMI now has programs in 24 countries in sub-Saharan Africa, in addition to two bilateral programs and targeted support in the Greater Mekong Sub-region in Asia.

Côte d'Ivoire began implementation as a PMI focus country in FY 2018.

This combined FY 2018–2019 Malaria Operational Plan presents a detailed implementation plan for Côte d'Ivoire, 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 Côte d'Ivoire, 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 2019 funding.

The proposed FY 2018-FY 2019 PMI budget for Côte d'Ivoire is \$25 million. PMI will support the following intervention areas with these funds:

Entomological monitoring and insecticide resistance management: Côte d'Ivoire has strong entomological capacity and insecticide resistance data has been provided to the NMCP prior to the commencement of PMI funding. However, PMI funding has permitted the increase in the number of sentinel sites that will be monitored for insecticide susceptibility. Additionally, work to measure insecticide susceptibility and monthly relative densities of malaria vectors has begun in four sites under consideration for indoor residual spraying. This work will continue in CY 2019 and CY 2020, and will be important for selection of insecticides for IRS as well as the choice of nets for the mass distribution campaign in 2020.

Insecticide-treated nets (ITNs): The most recent mass distribution campaign took place in 2017-2018. While PMI did not provide ITNs for this campaign, it did cover some of the distribution costs for the third phase of distribution (Abidjan). With FY 2018 and FY 2019 funding, nets will be procured for both the routine distribution through antenatal care (ANC) and the expanded program of immunization (EPI) programs, as well as stockpiling nets for the mass distribution campaign in 2020. The choice of nets will take the insecticide resistance results in the sentinel sites into account, due to the intense pyrethroid resistance noted in preliminary work.

Indoor residual spraying (IRS): Indoor residual spraying has not been conducted on a wide scale in Côte d'Ivoire. Some private companies have conducted IRS. However, this vector control intervention is included in the National Malaria Strategic Plan 2016-2020 (NMSP 2016-2020) and the NMCP envisages using it as a knock-down approach to reduce malaria burden in some high transmission districts. With FY 2018 and FY 2019 funds, PMI will support preliminary entomological monitoring and insecticide susceptibility tests in preparation of IRS operations planned in two districts for 2020 and for which funding to procure insecticide is also included in this MOP.

Malaria in pregnancy (MIP): The NMSP 2016-2020 reflects the former WHO policy for providing IPTp. In November 2017, the NMCP revised the previous IPTp guidelines to reflect the updated 2016 WHO ANC guidelines. The new guidelines were drafted in conjunction with the National Program for Maternal and Child Health and the new policy has been validated by key stakeholders. However, the Maternal and Child Health Program has not yet rolled out the 2016 WHO ANC guidelines recommending eight ANC contacts, including an additional visit at 13-16 weeks to ensure early initiation of IPTp1. There is currently no national MIP or ANC technical working group in Côte d'Ivoire that would allow for discussion and coordination between NMCP and the Maternal and Child Health Program on technical and policy issues. The PMI team will encourage the establishment and support the functioning of a MIP technical working group.

With FY 2018 and FY 2019 funding PMI will support the procurement of malaria prevention and treatment related commodities for eligible pregnant women; the training of health care providers on the prevention and treatment of MIP; social and behavior change communication (SBCC) to facilitate behavior change about malaria in pregnancy, and increase demand for antenatal care services to receive at least three doses of sulfadoxine-pyrimethamine (SP).

Case management: The NMCP has prioritized achieving universal coverage for diagnostic confirmation of suspected cases of malaria within public health facilities. Likewise, achieving universal coverage for

diagnostic confirmation of suspected cases of malaria among children under five years of age at the community level has also been prioritized. Côte d'Ivoire's malaria diagnostic guidelines are in line with WHO recommendations that require every suspect malaria case to be confirmed before administering ACTs. With FY 2018 and FY 2019 funding, PMI will procure ACTs, RDTs, and treatments for severe malaria to fill the nationwide needs. Rectal artesunate will be introduced as a bridging treatment in the community for children five years of age and under. FY 2018 and FY 2019 funding will support direct technical assistance and support to strengthen malaria case management in public and private not-for-profit health facilities. PMI will also provide direct implementation support for integrated community case management (iCCM), including training and supervision of community health workers for the implementation of iCCM in 22 districts. In accordance with WHO-recommended study protocol, PMI will support two therapeutic efficacy studies with testing for the K13 mutation, to monitor susceptibility of *P. falciparum* to first-line ACTs.

Pharmaceutical Management: USAID/Côte d'Ivoire addresses supply chain strengthening a holistic manner, building on previous work, funded by the President's Emergency Plan for AIDS Relief (PEPFAR), and leveraging PEPFAR, PMI and Family Planning, where appropriate funding streams exist. Currently, commodities required to support national health programs are either procured by the *Nouvelle Pharmacie de Santé Publique* (NPSP) or provided by donor organizations, various health partners, and other in-country stakeholders. Côte d'Ivoire's supply chain currently consists of a push system from the central warehouse and at the district level. ACTs and RDTs are stored in the main warehouse in Abidjan and then distributed to district level where PMI's partner assists with last mile distribution (health facilities). Community health workers receive their supplies from nurses at the health facility level.

In 2013, the MOH decided to transition from a paper-based to an electronic logistics management information system (LMIS) system (eLMIS). Following a successful USAID-supported pilot of eLMIS in 2016 in 14 regions, the system will now be expanded to all regions in Côte d'Ivoire. As of September 2018, the eLMIS is rolled out in 370 out of 373 eligible health facilities. The three non-covered sites are recent additions to the NPSP system.

PMI will continue to invest in strengthening the overall health commodities supply chain system in Côte d'Ivoire, ensuring that quality malaria commodities are delivered in a timely fashion to service delivery points. PMI will target relevant agencies and regulatory bodies who intervene at the national level, including the MOH, the *Programme National de Développement de l'activité Pharmaceutique* (PNDAP), NPSP, and the *Commission Nationale pour la Coordination des Approvisionnements en Médicaments* (CNCAM), as well as regional pharmacists, and health and supply chain staff at the district and health facility levels. Additional assistance will be provided directly to the NMCP to strengthen their capacity to oversee the management and procurement of malaria related commodities.

Social and behavior change communication (SBCC): The NMSP 2016-2020 identified social and behavior change communication as a key strategy for malaria prevention and case management. PMI will support the NMCP to update the existing National Strategic Plan for Social and Behavior Change Communication for Malaria 2016-2020 based on the findings of the Malaria Behavioral Survey (MBS) currently underway. This will include refining and updating the behavioral and communication objectives to accurately reflect all priority areas and SBCC considerations as well as set baseline and target levels for the indicators.

With support from PMI, stakeholders (*Direction de la Santé Communautaire* [DSC], NMCP, *Groupe Scientifique d'appui* [GSA], WHO, UNICEF, Save the Children, *Réseau des Organisations pour la lutte contre le paludisme en Côte d'Ivoire* etc.) will be involved in analyzing the results of the MBS and

developing data-driven SBCC approaches based on the findings; reviewing, approving and harmonizing the malaria SBCC interventions; and harmonizing mass media communication.

PMI will support the NMCP to implement SBCC in health facilities and at the community level focusing on ITN use, IPTp uptake and prompt care seeking/treatment. Activities will be focused on 34 PMI districts but will be consistent with the NMCP's national policies and coordinated with SBCC activities in the rest of the country.

Strategic malaria communication activities are managed by the NMCP through its communications unit. These activities are implemented at regional and district level under the supervision of regional and district health managers.

Surveillance, monitoring, and evaluation (SM&E): The NMSP 2016-2020 aims to strengthen surveillance, monitoring, and evaluation at all levels of the health system by reinforcing the capacity of the Health Management Information System (HMIS/SNIS). This system should be able to provide accurate data for entomological, epidemiologic, and parasitological surveillance. Specific objectives include reinforcing the operational capacity of structural changes of the management of malaria data, making the monitoring and evaluation tools of malaria control available; reinforcing quality control and malaria information diffusion at all levels; making accurate strategic malaria data available; and evaluating the follow up plans, both mid-course and final

Epidemiological routine data are already integrated in the HMIS from the district level to the central level (*Direction de l'Informatique et de l'Information Sanitaire* [DIIS] and NMCP). In addition, epidemiological survey data are regularly reported to NMCP through MICS and other Malaria Indicator Surveys (DHS 2012 and MICS/MIS 2016). In addition, the NMCP collects parasitological data through Therapeutic Efficacy Studies (TES) in order to ensure ACT and SP monitoring. Entomological data are collected regularly on sites by entomology institutes. These data are reported to the NMCP.

With FY 2018 and FY 2019 funds, PMI will strengthen routine data collection and use through training and supervision at the district level and district-level data quality assurance.

With FY 2018 funding, PMI will support a regional SME course for the regional advisors and other SME staff in health regions/districts to improve monitoring and evaluation of malaria activities within their areas. This course will be held every two years.

Operational research (OR): There is no OR planned at this time.

Other health systems strengthening: Strengthening health systems is a fundamental objective of the NMCP in Côte d'Ivoire. The NMCP supports expansion of efforts to train, supervise and overall capacitate healthcare workers to effectively deliver malaria prevention and control interventions at all levels of the health care system in Côte d'Ivoire. PMI will provide support to the NMCP to convene different malaria technical working groups including the Malaria Task Force bi-annual meeting to assess progress achieved on improving indicators. PMI will also provide support on a routine basis with the goal of ensuring effective coordination and technical support of all stakeholders active in malaria control efforts. Such support will include capacity building of service providers at both health facility and community levels. In addition, PMI will support 10 regional advisors covering 20 regions, continue support for two long-term technical advisors seconded to the NMCP, and provide NMCP technical staff with opportunities to learn about new malaria control trends through participation in international forums.

II. STRATEGY

1. Introduction

When it was launched in 2005, the goal of PMI was to reduce malaria-related mortality by 50 percent 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 Sub-region 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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policies and interventions in Côte d'Ivoire, 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 2019 funding.

2. Malaria situation in Côte d'Ivoire

Côte d'Ivoire is located in West Africa, encompassing an area of 322,462 km². It borders Mali and Burkina Faso to the north, the Gulf of Guinea to the south, Ghana to the east, and Liberia and Guinea to the west. The political capital is Yamoussoukro, situated 248 km north of the economic capital of Abidjan. According to the 2014 General Population and Housing Census, Côte d'Ivoire's population was 22,671,331 in 2014, and is estimated at 26,232,692 in 2018, with 51.2percent located in urban areas and 48.8percent situated in rural areas. The population density is 74 habitants/ km². Forty-three percent of the total population is less than 15 years of age, and 49percent of the population is female. Women of childbearing age represent 24percent of the population, while children under 5 years of age comprise 16percent. The annual population growth rate is estimated at 2.6percent.

Malaria is endemic throughout Côte d'Ivoire the whole year, with peaks during the rainy season. The rains occur in line with a sub-equatorial climate between May and July for the main season and between October and November for the secondary season, and with a tropical climate from March through May. Côte d'Ivoire has a tropical climate with four seasons in the coastal and central regions and two seasons in the northern savannah region, including a long dry season from November to May and a wet season from June to October. The coastal and central region has:

- a long dry season from December to May
- a short dry season from July to October
- a long rainy season from May to July and
- a short rainy season from October to November.

Plasmodium falciparum (98 to 99 percent of cases) is the strain that causes most of the uncomplicated and severe cases found, followed by *Plasmodium malariae* (3 to 4 percent).¹ Total parasite prevalence (microscopy) varies from 3percent in Abidjan city to over 60percent in the West and Southwest regions.² The main vectors in Côte d'Ivoire are *Anopheles gambiae* s.s., *An. coluzzii*, and *An. funestus* s.s. The resistance level of the major vector, *Anopheles gambiae* s.l., to the insecticides used to impregnate mosquito nets varies depending on the study area, with mortality in susceptibility bioassays ranging from 39 to 95 percent for permethrin, 75 to 100 percent for deltamethrin and 50 to 100 percent for alpha-cypermethrin.³ Malaria continues to be a major public health problem in Côte d'Ivoire, with incidence in the general population dropping slightly from 155 per 1000 in 2015 to about 154 per 1000 in 2016. Among children under five years of age, the incidence has declined from 292 per 1000 in 2015 to 287 per 1000 in 2016. In 2016, 3,645,081 confirmed malaria cases were reported to the World Health Organization. The same year,

¹ Assi SB, Henry MC, Rogier C, Dossou-Yovo J, Audibert M, Mathonnat J, et al. Inland valley rice production systems and malaria infection and disease in the forest region of western Côte d'Ivoire. *Malar J.* 2013;12:233-246

² Institut National de la Statistique (INS), Programme National de Lutte contre le Paludisme (PNLP) et ICF. 2016. Enquête de prévalence parasitaire du paludisme et de l'anémie en Côte d'Ivoire 2016. Rockville, Maryland, USA : INS, PNLN et ICF.

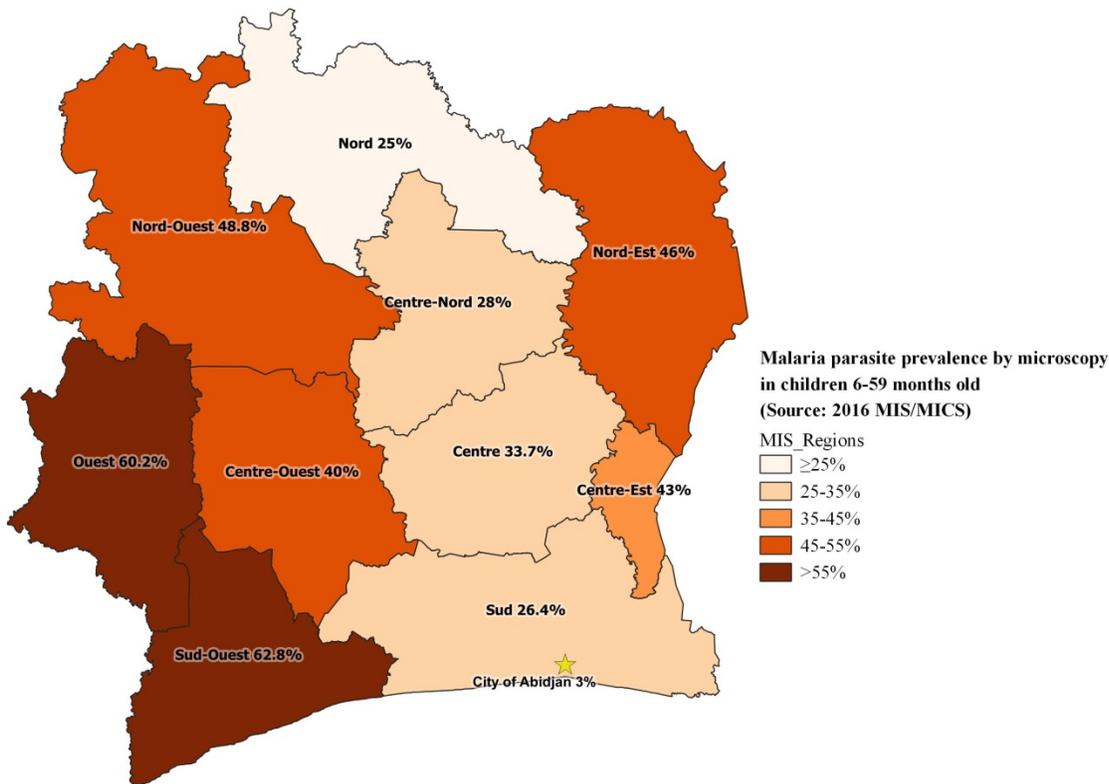
³ Koffi AA, Ahoua Alou LP, Kabran JPK, N'Guessan RN, Pannetier C. 2013. Re-visiting insecticide resistance status in *Anopheles gambiae* from Côte d'Ivoire: A nation-wide informative study. *PLoS One* 8(12): e82387

4,000 deaths due to malaria were reported nationwide. Among regions with the highest incidence are Hambol (259.60 per 1000), Goh (257.78 per 1000) and Gbeke (251.4 per 1000).⁴

Côte d'Ivoire is divided into 20 health regions and 86 health districts. PMI is supporting national-level malaria interventions, but is focusing technical assistance and service delivery in seven eastern regions. The seven regions are: Boukani-Gontougo, N'Zi-Ifou, Indenie-Djuablin, Sud-Comoe, Agneby-Tiassa-Me, Abidjan 1-Grands Ponts, and Abidjan 2. These regions include 34 districts (Figure 1), and cover over 45percent of the population. PMI will continue working collaboratively with the Government of Côte d'Ivoire (GOCI), the Global Fund, UNICEF and other donors to ensure there is support of malaria interventions in the remaining 13 regions and 52 health districts.

⁴ Annual Report on Health Statistics, RASS 2016

Figure 2: Parasite Prevalence by Region, 2016



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

The health system in Côte d'Ivoire comprises an administrative element and a care element, which are interdependent. Each has three levels, which play specific roles in malaria control. The central level, which is overseen by the Minister of Health, comprises the Cabinet, 2 General Directorates, 9 Central Directorates, 14 National Public Health Institutes and 24 Coordination Departments for the national health programs, including the NMCP. This level is responsible for defining health policy, general coordination of the healthcare system, resource mobilization, monitoring and evaluation and operational research. In terms of care services, the central level is made up of four University Hospitals, five specialized institutions, five National Public Institutes, and the Medical Emergency Hospital. These care services provide not only treatment for severe malaria cases but also IPTp, routine distribution of ITNs, and conduct malaria-related operational research.

The intermediate level represents 20 regional health departments, each of which covers several health districts, which oversee all private, public and community-level health services within their respective health region. It comprises 18 regional hospitals, 81 general hospitals, and 2 specialized hospitals, which also provide treatment for both uncomplicated and severe malaria cases, IPTp, and routine distribution of ITNs. Amongst its responsibilities are coordination of the implementation of the national health policy and monitoring and evaluation of health activities, including malaria control interventions. The regional level hospitals serve as the first referral site for medical services that are unavailable at district level hospitals.

The peripheral level consists of 86 health districts, which are responsible for all the public and private health services within the area it covers. Each health district is administered by a District Management Team (*Equipe Cadre de District (ECD)*) led by the Departmental Director. The ECDs are responsible for the operational implementation of the national health policy. They monitor and supervise providers' application of malaria control guidelines and are responsible for collecting and submitting health data on malaria from the health facilities to the central level. The public sector is comprised of 1,945 health facilities (*établissements sanitaire de premier contact (ESPC)*). Each ESPC is managed by a qualified health professional (i.e., a medical doctor, specialized nurse or midwife). The ESPCs provide routine case management for uncomplicated malaria, IPTp, routine distribution of ITNs to pregnant women during their first antenatal care visit, to children under one year of age during immunization visits and to children between one and five years of age during health child consultations. Severe malaria cases are referred to district-level hospitals. The public sector consists of 3,215 doctors, 7,989 nurses and 2,814 midwives. Based on the total population in 2015 of an estimated 23.2 million, the ratio of public-sector healthcare workers to the population is as follows: 1 doctor per 7,232 inhabitants, 1 nurse per 2,910 inhabitants and 1 midwife per 1,990 women of childbearing age. An estimated 67percent of the population lives at least 5 km from the nearest health facilities.⁵

The community sector helps to support the public sector. GOCI is working to reinforce community case management for home-based case management in children under five years of age, which is primarily led by NGOs. The 2012 enumeration of health care workers reported a total of 14,520 health volunteers, comprising 12,933 community health workers and 1,587 health aides. Nationally, there are more than 8,500 traditional medicine workers (*tradipraticiens de santé (TPS)*). In 2018, the country has adopted a national community health strategic plan with the aim of making community health an important component of the health system.

In 2011, the private health sector consisted of 2,036 institutions, (554 registered, and 1,482 non-registered facilities), and included 13 private hospitals, 964 private health centers, and 463 company health centers.⁶ These facilities provide a range of services including treatment of malaria. The NMCP collaborates with 100 not-for-profit enterprises, referred to as *Coalition des Entreprises de Côte d'Ivoire (CECI)*, to provide a package of malaria-prevention activities that include free SP to pregnant women, ITNs during antenatal care (ANC) and to children under one year of age, trainings to improve diagnosis and treatment, and SBCC activities targeting patients and healthcare workers. The NMCP also collaborates with 60 for-profit health facilities, *l'Association des Cliniques Privées de Côte d'Ivoire*, for the distribution of free ITNs and SP.

4. National malaria control strategy

The NMCP in Côte d'Ivoire was established in 1996. The previous national strategic plan covered the period of 2012-2017. This was superseded by the current plan, adopted in 2016, covering the period 2016-2020. The key aims and objectives of the National Malaria Strategic Plan 2016-2020 (NMSP 2016-2020) are presented below.

The objectives of the NMSP 2016-2020⁷, are to:

- Reduce malaria incidence by 40% by 2020 compared to 2015 baseline; and
- Reduce malaria-related mortality by 40% by 2020 compared to 2015 baseline.

⁵ Annual Health Situation Report (Rapport Annuel sur la Situation Sanitaire, (RASS)), 2015

⁶ The National Malaria Strategic Plan, 2012-2017, Côte d'Ivoire

⁷ The National Malaria Strategic Plan, 2016-2020, Côte d'Ivoire

To achieve the two objectives, the following targets have been set:

- At least 80% of the general population sleep under a long-lasting insecticidal net
- At least 80% of children sleep under a long-lasting insecticidal net
- At least 80% of pregnant women sleep under a long-lasting insecticidal net
- At least 80% of the population in target areas are protected with IRS during the past twelve months
- At least 80% of pregnant women have received at least three doses of SP during ANC
- At least 90% of suspected malaria cases have been tested with RDTs or microscopy
- At least 90% of confirmed simple malaria cases have been correctly treated in health facilities according to national treatment guidelines
- At least 90% of confirmed complicated malaria cases in hospitals have been correctly treated according to national treatment guidelines
- At least 90% of simple malaria cases confirmed by community health workers have been correctly treated within the 24 hours of onset according to national treatment guidelines
- At least 80% of the population has a knowledge of major signs and preventive measures of malaria
- At least 80% of expected reports from health facilities at the national level have been received (HMIS report).

The country's strategic directions and priorities for malaria control as expressed in the NMSP 2016-2020 are: (1) Achieve and maintain universal coverage of malaria prevention measures and their use, in particular vector control (ITNs) amongst the general population and IPTp; (2) Achieve universal coverage for biological confirmation of suspected cases of malaria seen in public-sector health care facilities; (3) Achieve universal coverage for biological confirmation of suspected cases of malaria at the community level amongst children under five years of age; (4) Achieve universal coverage for correct treatment of cases seen in integrated public-sector and not-for-profit private health care facilities; (5) Aim for universal coverage for correct treatment of cases of uncomplicated malaria in the community amongst children under five years of age; (6) Strengthen social mobilization and communications on measures to prevent and treat malaria; (7) Strengthen the program's management, coordination and leadership capacities at all levels; (8) Develop an effective mechanism to mobilize resources for control activities.

In the light of the aforementioned priorities, the NMSP 2016-2020 introduces a number of new key interventions:

Vector Control:

- Extension of routine distribution of ITNs to children from 1 year to 5 years of age
- Inclusion of prisons, orphanages, boarding schools, disability support centers, and hospitals in ITN mass distributions
- Extension of mass distribution for a period of one month following the end of the net distribution campaign in order to catch up with the population absent during the campaign

Malaria in Pregnancy:

- Increase of IPTp coverage of SP from three doses to at least three doses for pregnant women during ANC clinics
- Use of SMS to improve IPTp coverage
- Involvement of community health workers in provision of IPTp services to pregnant women who have missed ANC clinics

Case Management:

- Expansion and saturation of high impact interventions including scale-up of iCCM from 9 to 78 districts
- Provision of hospitals, mainly emergency rooms and external consultations facilities with RDTs to perform diagnostics
 - Systematic quality control of malaria commodities (RDTs and ACTs)
- Involvement of community health workers (CHWs) in advanced strategies to increase utilization at the community level to improving malaria diagnostics
 - Promote equity through advanced strategies geared to providing care to population leaving more than 5 km of health facilities
- Enrollment of private service providers in enforcing national case management directives as well as implementing no-payment policy

Social and Behavior Change Communication:

- Inclusion of traditional and religious leaders in social mobilization and advocacy efforts
- Use of social networks to promote use of malaria prevention and control measures
- Involvement of local market users, unions, and truckers in disseminating messages related to malaria prevention and control.

5. Updates in the strategy section

See discussion of the new strategy in section 4.

6. Integration, collaboration, and coordination

The National Malaria Control Program (NMCP) prioritizes efforts to coordinate all partners active in malaria control. Key donor and technical partners supporting the NMCP include the Global Fund, the WHO, and the United Nations Children’s Fund (UNICEF).

The **Global Fund to Fight AIDS, Tuberculosis and Malaria** has been the major donor supporting malaria control efforts in Côte d’Ivoire over the last decade. Côte d’Ivoire’s first Global Fund malaria grant covered the seven-year period of 2009-2015 with the NMCP and CARE International as the two Principal Recipients, for a funding level of \$186 million (approximately \$30 million/year). The following Global Fund grant (NFM1) covered the period of 2015-2017, and supported case management in public and private sectors, ITNs, entomological surveillance, IPTp, SBCC, supply chain logistics, and monitoring and evaluation. The current Global Fund grant, NFM2 2018-2020, has a funding level of \$111 million for the continuation of activities begun under NFM1.

The **World Health Organization** provides technical support to the NMCP for the development and updating of malaria control policy and strategy documents for Côte d’Ivoire assisting the country to ensure consistency of these documents with global malaria strategic and policy normative guidance. The WHO country office is also engaged in supporting the Ministry of Health to develop key policy documents for the health sector that have a focus broader than malaria but that impact malaria service delivery and program implementation. For example, WHO is working with health sector partners to support the community health framework that will guide all community-based public health programming in Côte d’Ivoire.

The **United Nations Children’s Fund** is an active member of the development partners’ coordination group of which the United States Government is actively engaged. UNICEF Côte d’Ivoire provides support to four main areas within the health sector including support to the expanded program of immunizations, maternal and neonatal health, integrated management of childhood illness and support to health systems and emergencies. UNICEF supports the National Malaria Control Program’s efforts to implement effective diagnosis and treatment of malaria in the context of effective fever management among children at health facilities and at the community level. UNICEF is currently working with PMI to identify areas of collaboration in implementing integrated community case management (iCCM) in four districts that are part of the 34 districts to be supported by PMI. In addition, UNICEF has received funding from the Global Fund to procure 50 small trucks that will be distributed to districts to allow health commodities to be distributed to service delivery points from district depots.

U.S. Government Programs

The **President’s Emergency Program for AIDS Relief (PEPFAR)** supports investments to combat HIV/AIDS in Côte d’Ivoire, which contribute to strengthening health care worker capacity and the health care delivery system overall. With an annual budget of over \$138 million, Côte d’Ivoire’s PEPFAR program has significant investments in HIV prevention, treatment, care and support for people infected and affected by the virus. Currently, the PEPFAR program supports 376 health facilities and 117 community sites in the seven regions under consideration for PMI support (Boukani-Gontougo, N’Zi-Ifou, Indenie-Djuablin, Sud-Comoe, Agneby-Tiassa-Me, Abidjan 1-Grands Ponts, and Abidjan 2). PEPFAR invests in the health facility and community level through relationship building, training, capacity building and a decentralized supply chain system which focuses on last-mile delivery model, all of which are opportunities that can be leveraged by the PMI program.

Over the last five years, PEPFAR has invested more than \$5 million in the implementation and deployment of Côte d’Ivoire’s District Health Information System (DHIS2) as the new national health data reporting system. DHIS2 is now operational in all the 82 health districts as well as in 17 regional hospitals and 84 general hospitals. PEPFAR’s investment in the Health Management Information System (HMIS), coupled with a successful implementation of an electronic logistics management information system (e-LMIS) for health commodities through health facilities, health districts pharmacies and the central medical store, may create opportunities for collaboration with PMI.

Côte d’Ivoire is a recipient of **Global Health Security Agenda (GHSA)** funding aimed at strengthening the capacity of the health system to prevent and detect public health threats with program implementation at country level by USAID and CDC. PMI will work closely with the GHSA program to leverage GHSA’s investments in laboratory strengthening including coordinating assessments and microscope procurement, disease surveillance including implementation of the DHIS2 platform, and strengthening public health skills among the health workforce through the CDC Field Epidemiology and Laboratory Training Program (FELTP).

At present time, the United States Peace Corps does not have a program in Côte d’Ivoire.

Domestic Investments

The Government of Côte d’Ivoire projected within their Global Fund concept note proposal that their domestic budget for malaria, primarily composed of salary support for health workforce involved in diagnosing and treating malaria, is approximately \$12.5 million per year. The Ministry of Health has also supported the cost of 200,000 ITNs for the 2017-2018 mass campaign and plans on procuring 280,000 ITNs every year from 2018 to 2020.

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 three 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.⁸

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 with the aim of full country ownership

To track progress toward achieving and sustaining scale of proven interventions (area of strategic focus 1), PMI will continue to track the key household survey 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 the population with access to an ITN. [Please see <http://www.malariasurveys.org/documents/Household%20Survey%20Indicators%20for%20Malaria%20Control.pdf> for a description of this indicator.]
- Proportion of children under five years of age who slept under an ITN the previous night
- Proportion of pregnant women who slept under an ITN the previous night
- Proportion of the population that slept under an ITN the previous night
- Proportion of children under five years of age 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 of age 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
- Proportion of women who received three or more doses of IPTp for malaria during ANC visits during their last pregnancy

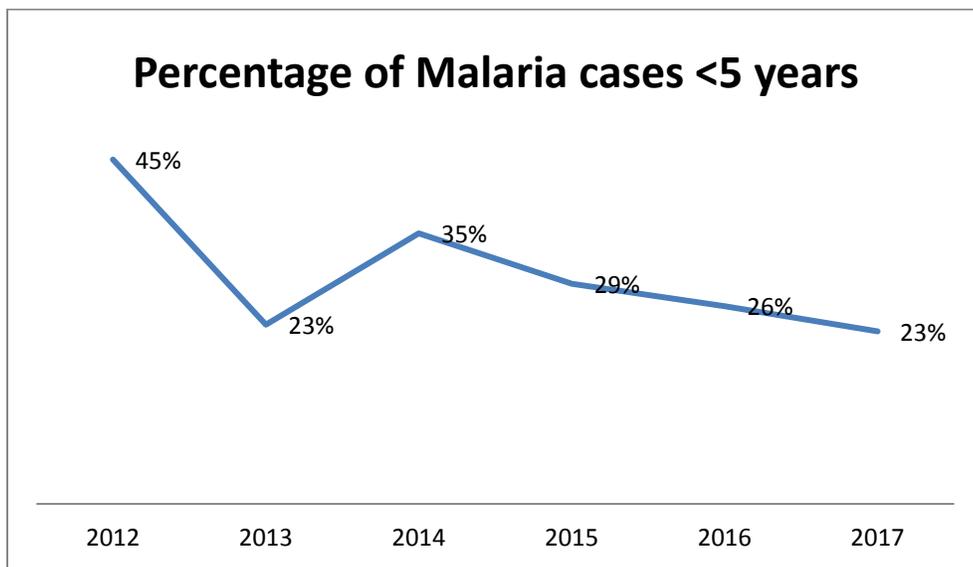
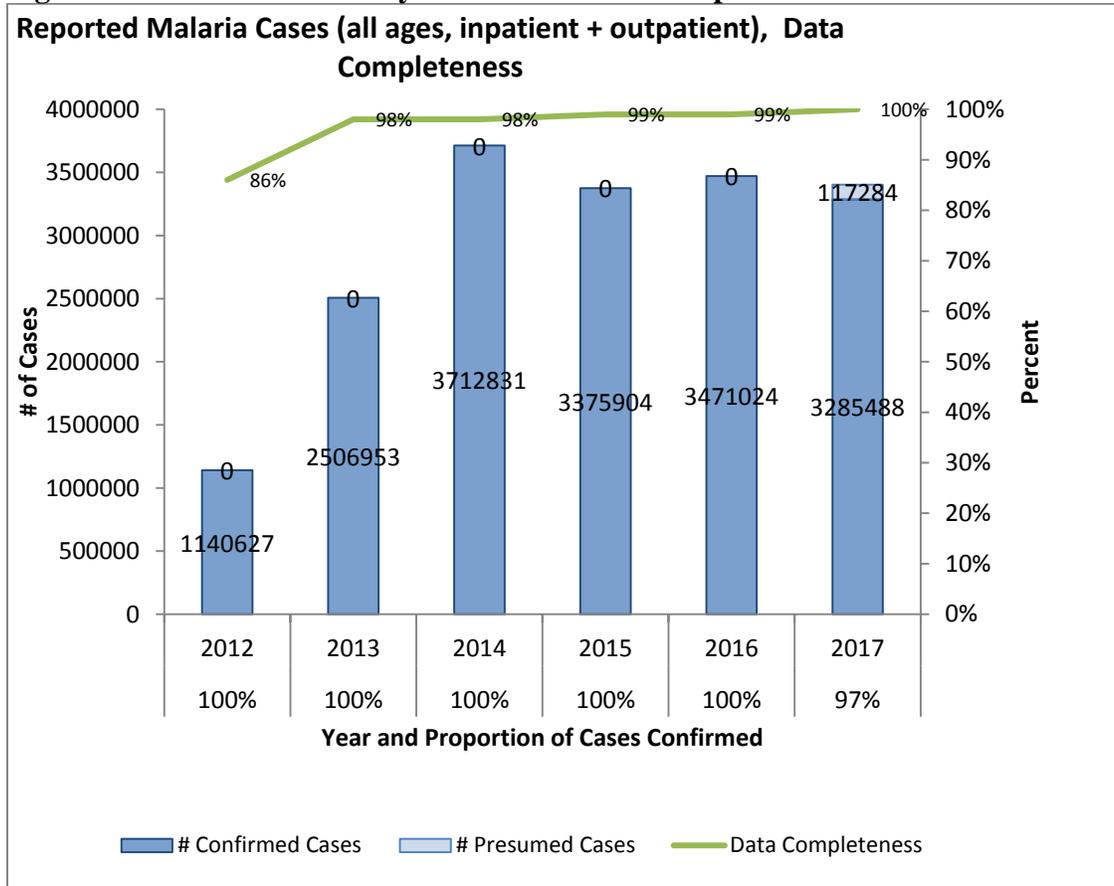
⁸ http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

8. Progress on coverage/impact indicators to date

Table 1: Evolution of Key Malaria Indicators in Côte d'Ivoire from 2012 to 2016

Indicator	2012	2016
	DHS	MICS /MIS
% Households with at least one ITN	67%	76%
% Population with access to an ITN	31%	47%
% Children under five who slept under an ITN the previous night	32%	47%
% Pregnant women who slept under an ITN the previous night	37%	58%
% Population that slept under an ITN the previous night	40%	40%
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	43%	45%
% Children under five with fever in the last two weeks who had a finger or heel stick	11%	26%
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	17%	64%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	18%	47%
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	NA	23%
Under-five mortality rate per 1,000 live births	108	NA
% children under five with parasitemia (by microscopy , if done)	18%	37%
% children under five with parasitemia (by RDT , if done)	42%	48%

Figures 3 and 4: Trends in Key Malaria Indicators Reported in Routine Surveillance Systems



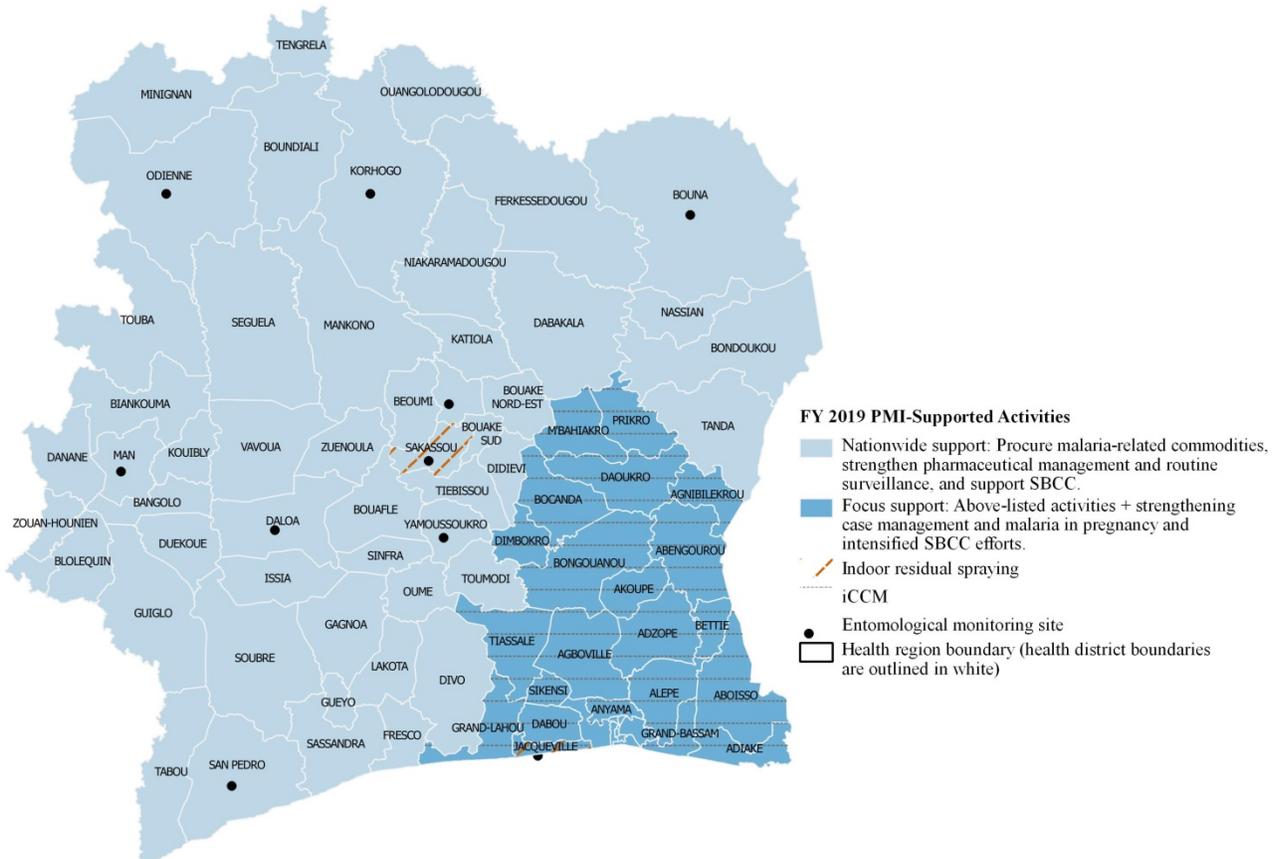
9. Other relevant evidence on progress

N/A

III. OPERATIONAL PLAN

PMI will support the NMCP to implement their national strategic plan aimed at reducing the burden of malaria in Côte d’Ivoire. PMI will prioritize investments across key proven interventions including vector control, malaria in pregnancy, case management and provide support to strengthen key aspects of the health system including supply chain logistics, drug quality monitoring and regulation, surveillance, monitoring and evaluation and social and behavior change communication. Consistent with PMI guidance, PMI will not provide support for larviciding or epidemiologic sentinel surveillance, both components of the NMCP’s current strategy. PMI will work at the national level with the NMCP and malaria partners to ensure technical assistance and support is available across all interventions. This national level support will include needed technical assistance for Global Fund financed implementation districts. PMI will also provide direct support for implementation in 34 contiguous districts that comprise over 40 percent of the total population. Figure 5 summarizes where PMI is supporting various interventions in Côte D’Ivoire.

Figure 5: PMI-supported activities with FY 2019 funding



1. Vector control

NMCP/PMI objectives

The NMCP's current objective is 90percent universal coverage (one ITN for two people) of the population at risk of malaria with ITNs, with 80percent utilization among those with nets. The strategy for reaching this objective includes universal coverage campaigns and routine distribution for pregnant women through ANC, children less than one year old through the expanded program on immunization (EPI) and children one-five years of age during health child visits. The next universal coverage campaign, planned for 2020, will be the fourth such campaign in Côte d'Ivoire, after a first campaign in 2011, a second in 2014-2015, and a third in 2017/2018. During the 2017/2018 mass distribution campaign, the NMCP switched to an approach of providing one ITN for each sleeping space. The NMSP 2016-2020 also recommends IRS and larval control activities in the areas with the highest levels of malaria transmission, but due to a lack of funding, neither activity has been implemented at scale to date.

a. Entomological monitoring and insecticide resistance management

The primary vectors of malaria in Côte d'Ivoire are *Anopheles gambiae* s.s., *Anopheles coluzzii*, and *Anopheles funestus* s.l. Considerable use of agricultural insecticides combined with scaling up of ITNs has resulted in widespread insecticide resistance, although the distribution of resistance to specific insecticides is heterogeneous.

Progress since PMI was launched

PMI began supporting entomological monitoring in three districts (Abidjan, Korhogo, and Bouaké) and insecticide resistance management activities in June 2018. The primary activities in the first year workplan included monitoring of insecticide susceptibility of *An. gambiae* s.l. in six sites throughout the country and providing technical assistance for six other sites (funded by the Global Fund), and conducting entomological surveillance (including susceptibility tests) in four potential sites for IRS. In addition to these activities, PMI supported capacity building through entomological trainings, as well as preparing logistical and environmental assessments prior to starting IRS.

At the time of writing, the primary activity which has been completed is the measuring of insecticide susceptibility in the four sites considered for IRS: Bocanda, Jacqueville, Sakassou, and Gagnoa. Pyrethroid susceptibility was very low in all four sites, and resistance to insecticides used for IRS (such as pirimiphos methyl and bendiocarb) was also noted in all sites, except Gagnoa, where mosquitoes were susceptible to pirimiphos methyl (see Table 2). In addition, two insecticides recently recommended for public health use were also tested. Clothianidin is a neonicotinoid insecticide used in IRS treatments, and chlorfenapyr is a pyrrole insecticide used on ITNs. While *Anopheles gambiae* s.l. was susceptible to clothianidin, chlorfenapyr did not result in greater than 98percent mortality in either site tested. However, the mortality after exposure to chlorfenapyr was considerably higher than pyrethroids tested alone or with PBO in all sites.

Table 2: 24 hour mortality of *Anopheles gambiae* s.l. in WHO susceptibility tests (except where noted otherwise) in four sites where IRS is being considered.

	Bocanda	Gagnoa	Jacqueville	Sakassou
Deltamethrin 1X	3	5	5	4
Deltamethrin 5x	22	8	2	19
Deltamethrin 10x	94	27	34	64
Deltamethrin + PBO	61	32	10	58
Permethrin 1x	4	10	2	1
Permethrin 5x	52	82	28	75
Permethrin 10x	93	n/a	43	91
Permethrin +PBO	8	5	1	5
Alphacypermethrin 1x	15	3	0	1
Alphacypermethrin 5x	15	n/a	n/a	11
Alphacypermethrin 10x	66	50	27	44
Alphacypermethrin + PBO	64	7	2	22
Bendiocarb	55	15	0	0
Pirimiphos methyl	57	99	3	6
Clothianidin (7 days)	n/a	n/a	100	100
Chlorfenapyr (100µg/bottle, 2 days)	n/a	n/a	74	84

Plans and justification for proposed activities with FY 2018 and 2019 funding:

The plans for FY 2018 and FY 2019 funding include: continued entomological monitoring focused on insecticide susceptibility monitoring in six sites, with support to six other sites, entomological monitoring and susceptibility monitoring in sites selected for IRS (TBD in 2020). Further capacity will be developed through two technical assistance visits from CDC each year. In FY 2018, an evaluation of the entomological capacity of public institutions involved in entomological monitoring in Côte d'Ivoire will be undertaken, and support provided for the capacity building of these institutions.

PMI will support the collection, testing, and analysis of *Anopheles gambiae* s.l. in six sites (Abidjan, Bouna, Bouake, Daloa, Odiene, and Aboisso) and will provide technical assistance to the collection of the same data in six other sites supported by the Global Fund (San Pedro, Man, Korhogo, Yamoussoukro,

Abengourou, Adzope). This data will inform the provision of ITNs for the mass distribution campaign planned for the end of 2020 (see ITN section below). Additional information determined through laboratory work will provide information on the species present in these sites and their mechanisms for resistance.

In addition to support in these 12 sites, entomological monitoring will take place in four sites that were potential IRS sites (Bocanda, Jacquville, Sakassou, Gagnoa). These sites were selected due to high levels of pyrethroid resistance, high population densities, and high malaria burden. Monthly monitoring in these sites began in September 2018. Despite the fact that IRS will not be conducted in all four sites, monthly monitoring will be conducted in all sites to provide information on the seasonality of malaria vector populations in these sites.

As PMI will cooperate closely with national organizations involved in entomological monitoring and research (*Institut National d'Hygiene Publique, Institut Pierre Richet, Centre d'Entomologie Médicale et Veterinaire*), an evaluation of the capacity and needs of these organizations will be completed in CY 2019. This evaluation will focus on the capacity of personnel, laboratory, and insectary facilities, and will then identify certain steps which can be taken to improve the capacity of each institution, particularly as this relates to support of PMI activities and their support to the NMCP. To ensure that the needs identified in this evaluation can be met, PMI has planned for funds that can be used for training, purchase of equipment, or renovation of existing facilities.

In FY 2019, entomological monitoring will continue in the 12 insecticide resistance monitoring sites, to include insecticide susceptibility bioassays as well as monitoring insecticide resistance mechanisms. Entomological monitoring and insecticide susceptibility testing will also be done in districts which are conducting IRS to ensure appropriate insecticides are being used and to evaluate the impact of IRS on mosquito populations. CDC will provide technical assistance through two visits to ensure that support provided by PMI for entomological surveillance is appropriate and provide adequate data for IRS operations and vector control at large.

Please see Tables 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.

b. Insecticide-treated nets

The current NMCP policy in Côte d'Ivoire is to support the scaling-up of ITNs through distribution in mass campaigns and distribution during ANC and EPI visits.

Three mass ITN distribution campaigns have been organized in Côte d'Ivoire. The first was conducted in 2011, which distributed 8,093,869 nets nationally. The second was conducted in 2014-2015, which distributed 14,667,718 nets. The third campaign was conducted in 2017/2018 (districts in Abidjan were the only ones covered in 2018); PMI contributed to the operations cost for the distribution in Abidjan. As a result of these campaigns, the net coverage in Côte d'Ivoire has gone from 10percent in 2006 (MICS), to 67percent in 2012 (DHS 2012), to 76percent in 2016 (MICS 2016). While further work is needed to increase access and use of ITNs, there has been an increase in households reporting use of a net the previous night from 33percent (2012) to 59percent (2016). Similarly, amongst households with at least one ITN, use reported for the previous night increased from 46percent (2012) to 70percent (2016).

Routine distribution of ITNs is currently being supported through funding from the Global Fund and the Ivoirian government. Until December 2017, this routine distribution channel provided mosquito nets for women attending ANC and those attending the expanded program of immunizations for children 0-12

months of age. As of January 2018 and following discussion between the NMCP and PMI, the distribution of routine ITN has been expanded to children between 1-5 years of age. The distribution of ITNs through these activities provide an opportunity to ensure vulnerable populations maintain access to ITNs between mass campaigns as well as providing opportunities for sensitization for ITN use and care practices. Distribution of nets from their arrival in country to the distribution point is assured by the Central Medical Store (*Nouvelle Pharmacie de Santé Publique (NPSP)*). The NPSP has a central warehouse in Abidjan, and is constructing a regional warehouse in Bouaké.

Progress since PMI was launched

With FY 2017 funds, PMI contributed to support the distribution costs of the mass campaign that was completed in January-February 2018.

Commodity gap analysis

Table 3. ITN Gap Analysis

Calendar Year	2018	2019	2020
Total Targeted Population ¹	26,232,692	26,914,742	27,614,525
Continuous Distribution Needs			
Channel #1: ANC ²	1,032,912	1,065,824	1,099,748
Channel #2: EPI ³	2,154,681	2,229,197	2,306,132
Estimated Total Need for Continuous Channels	3,187,593	3,295,021	3,405,880
Mass Campaign Distribution Needs			
2020 mass distribution campaign ⁴	0	0	17,015,047
Specific sites (e.g prisons, IDPs)			161,565
Estimated Total Need for Campaign	0	0	17,176,612
Total ITN Need: Routine and Campaign	3,187,593	3,295,021	20,582,492
Partner Contributions			
ITNs carried over from previous year	1,108,208	0	1,338,434
ITNs from MOH	280,000	280,000	280,000
ITNs from Global Fund	486,779	1,700,599	15,581,390
ITNs from other donors			
ITNs from FY17 PMI funding		1,175,000	
ITNs planned with PMI funding ⁵		1,477,856	2,531,474
Total ITNs Available	1,874,987	4,633,455	19,731,298
Total ITN Surplus (Gap)	-1,312,606	1,338,434	-851,194

Footnotes:

1 Population used is from EPI unit. This differs from the population used in the 2017 MOP that had been estimated based on the 2014 general census

2 Population *% pregnant women (5%)* ANC1 attendance rate*NMSP objective for coverage rate (90%)

3 Population*percentage of children <1 year (3.24%)*x EPI attendance*NMSP objective for coverage rate (90%) PLUS Population *percentage of children 1-5 years (12.03%)*OPD attendance rate*NMSP objective for coverage rate (90%)

4 Based on historic need of ITNs from previous campaign. There has been historical increase of approximately 10% between campaigns.

5 ITNs budgeted for procurement with FY18 funds will contribute to cover needs for routine distribution in CY2019 and CY2020.

Plans and justification for proposed activities with FY 2019 funding:

In FY 2018, PMI will procure 1,477,856 ITNs for routine distribution through ANC and EPI to cover needs in CY 2019 and (partially) CY 2020, as well as covering the costs of the distribution of these nets to health centers. The current policy is to distribute ITNs to pregnant women attending ANC and to children under one year of age attending EPI sessions.

In FY 2019, 2,531,474 nets will be procured for the mass distribution campaign. Due to the high levels of insecticide resistance found as of September 2018, both through the preliminary results of the PMI funded monitoring (see above) and other research conducted in country, it is expected that either synergist or dual-treated nets will be warranted in most parts of the country, so the current costs for synergist nets have been used to budget for this procurement. The operational costs of this distribution will be budgeted for in FY 2020 MOP.

PMI will work with NMCP and other stakeholders to monitor ITN use and distribution closely and will adjust planned PMI procurements as needed.

Insecticide treated net durability will be monitored for the mass campaign in 2020, but this money will be budgeted from the FY 2020 MOP.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.

c. Indoor residual spraying

The NMCP is not implementing IRS in Côte d'Ivoire at present. However, in the 2012 DHS survey, 1.5percent of respondents stated that their house had been sprayed in the past 12 months. This is likely to have been done by non-governmental organizations or private operators.

As IRS is one of the primary malaria control strategies of PMI and is also an explicit strategy of the NMCP of Côte d'Ivoire, this intervention can be planned for implementation in Côte d'Ivoire. However, given the cost in terms of human and financial resources, this limited IRS intervention in Côte d'Ivoire will form a small but important part of a comprehensive vector control strategy and an emphasis will be placed on ensuring that every Ivoirian at risk will be protected from the vector. Furthermore, in order to ensure that the intervention is conducted appropriately and given the high insecticide resistance observed in many of the targeted districts, more than a year of preparation will precede this work in Côte d'Ivoire.

Progress since PMI was launched

PMI funding has permitted the increase in the number of sentinel sites that will be monitored for insecticide susceptibility. Additionally, work to measure insecticide susceptibility and monthly relative densities of malaria vectors has begun in four sites under consideration for indoor residual spraying. This work will continue in CY 2019 and CY 2020, and will be important for selection of insecticides for IRS as well as the choice of nets for the mass distribution campaign in 2020.

Plans and justification for proposed activities with FY 2018 and FY 2019 funding:

PMI, the NMCP, and its scientific advisory group (GSA) discussed opportunities and challenges to implement IRS in 2019 as initially planned. Due to insecticide resistance across potentially selected districts, PMI and the NMCP agreed that further vector susceptibility tests, entomological monitoring, environmental assessment and an active resistance management plan are necessary to collect appropriate data needed to conduct the first campaign in 2020 in two districts with high incidence, in accordance with PMI guidance. Based on the fact that the country will be conducting a net mass distribution campaign in the last quarter of CY 2020, PMI and the NMCP set aside resources in the FY 2018 and 2019 MOPs to start IRS operations early in the second quarter of 2020. Resources will be added in the 2020 MOP to support the IRS campaign in 2021. It is essential that the insecticides used for IRS be managed in a way to reduce their environmental impact, before, during, and after spraying. To this effect, an environmental assessment will be undertaken to ensure that facilities in the potential spray areas meet minimum safety requirements, and that the standard procedures for transporting, storing, applying, and disposing of insecticides can be met in the targeted areas. Similarly, the next eighteen months will be used to conduct budgeting and microplanning exercises to provide logistical information on the practicality of the different potential spray zones. Susceptibility testing will be conducted as described above (entomological monitoring and insecticide resistance management sections). Once suitable insecticides have been determined, these insecticides and the necessary equipment can be procured in preparation for IRS activity implementation in CY 2020. Due to high level of resistance, PMI will support collection of post-IRS epidemiological data at health facilities in IRS districts.

PMI will also support a robust SBCC intervention for IRS to ensure that the population sleeps in sprayed houses in the selected IRS areas. The specific messages, aimed at heads of households, will focus on preparing structures for spraying, allowing IRS spray operators into the homes, and adhering to IRS spray operators' instructions post-spraying. Specific ideational factors (e.g., self-efficacy, perceived social norms, etc.) will need to be considered when developing the IRS SBCC intervention. To this end, PMI will adapt a standard barrier analysis tool that has been developed specifically for IRS and implemented in other PMI countries. The SBCC plan will address pre, per and post IRS campaign activities. The success of the campaign will be monitored through daily spray operator reports, and a post-campaign coverage survey.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.

2. Malaria in pregnancy

NMCP/PMI objectives

The NMSP 2016-2020 emphasizes the protection of pregnant women from malaria as a key intervention due to the health risks malaria poses to pregnant women and their unborn child. The main objectives outlined in the NMCP strategy are:

- At least 80% of pregnant women sleep under insecticide-treated mosquito nets;
- At least 80% of pregnant women receive at least three doses of SP according to national guidelines

The NMSP 2016-2020 reflects the old WHO policy of providing IPTp with SP at every antenatal care visit after the first trimester (after the 16th week of pregnancy or at first signs of fetal movement) with four weeks between doses, providing an ITN during the first ANC visit, and prompt appropriate management of malaria illness during pregnancy.

In November 2017, the NMCP revised the previous guidelines regarding intermittent preventive therapy to reflect the updated 2016 WHO antenatal care guidelines. The new guidelines were drafted in conjunction with the National Program for Maternal and Child Health and the new policy has been validated by key stakeholders, including the WHO country office. However, the Maternal and Child Health Program has not yet rolled out the 2016 WHO ANC guidelines recommending eight ANC contacts, including an additional visit at 13-16 weeks to ensure early initiation of IPTp1.

There is currently no national MIP or ANC technical working group in Côte d'Ivoire that would allow for discussion and coordination between NMCP and the Maternal and Child Health Program on technical and policy issues. Discussions on national guidelines for ANC are coordinated by the *Programme de la Santé des Mères et Enfants* (PSME) with input from the *Société de Gynécologie et Obstétrique de Côte Ivoire* and the *Société Ivoirienne de Pédiatrie*. These groups are charged with adopting the WHO ANC guidelines and adapting them to Côte d'Ivoire. The Scientific Advisory Group (GSA) to the NMCP would then update the NMCP guidelines after review of the new PSME guidelines. The PMI team will encourage the establishment and support the functioning of a MIP technical working group. In addition, PMI will work with its IPs and other partners (UNICEF and UNFPA) to encourage adoption of the WHO ANC guidelines by health care providers (HCPs)

Between the 2012 MICS and the 2016 MIS surveys, the utilization of ITNs by pregnant women stayed essentially the same at about 40percent. In order to improve ITN coverage among pregnant women, the NMCP continues to support the provision free of charge of long-lasting ITNs to pregnant women at their first ANC visit in both public and private sectors, and the Global Fund substantially increased its funding for SBCC targeting increased uptake of malaria services, including utilization of ITNs, early care seeking behaviors, and ANC attendance for SP under NFM2 (2018-2020).

The NMCP supports the implementation of intermittent preventive treatment of pregnant women (IPTp) with sulfadoxine-pyrimethamine (SP) under direct observation and provided free of charge in both public and private health facilities. The first dose is recommended at the sixteenth week of pregnancy or at the first signs of active fetal movement. Subsequent doses are to be administered in one month intervals until delivery with a minimum goal of at least three doses. The administered dose is given as three pills taken at the same visit with potable water and under observation by health center staff. The guidelines for providing IPTp are as follows:

- HIV-negative or HIV-positive pregnant women not receiving cotrimoxazole: SP is provided orally in three doses from the second trimester of pregnancy
- Pregnant women with unknown HIV status: IPTp is provided from the second trimester of pregnancy with SP in three doses
- HIV-positive pregnant women receiving cotrimoxazole: IPTp with SP is not recommended

The national guidelines recommend that pregnant women receive iron-folate but the guidelines state that patients should not take folic acid and SP at the same time. The recommended dose for folic acid at the national level is 0.4 mg. In accordance with national guidelines, currently the following applies: In pregnant women on anemia prophylaxis (folic acid + iron), discontinue treatment and resume 15 days after taking SP. Patients are instructed to stop taking folic acid at the time of IPTp and to restart 15 days after the last dose of SP. The PMI team will advise the NMCP and the Maternal and Child Health Programs that when the low dose folate (0.4 mg) is given as daily supplement, there is no need to stop or delay IPTp-SP for 15 days.

According to the revised national treatment guidelines, pregnant woman diagnosed with symptomatic malaria are treated with quinine during the first trimester. In the case of any contraindication to quinine or a gestational age greater than 16 weeks the guidelines recommend treatment with ACTs. PMI will have to work with its IP to encourage changing the guidelines and to encourage adoption by health care providers.

Intervention overview/Current status

Côte d'Ivoire has demonstrated some progress with IPTp which was introduced in 2014. According to the most recent MICS/MIS household survey conducted in 2016, 93percent of women attended ANC at least once during their last pregnancy, with attendance dropping off sharply for subsequent visits. Coverage of pregnant women with IPTp2 has increased from 20percent in 2012 (MICS 2012) to 46.7percent in 2016 (MICS 2016). According to the 2016 MICS, only 23percent of all women attending ANC received at least three doses of SP during their most recent pregnancy. According to the NMCP annual report derived from HMIS data, between 2015 and 2017, IPTp2 coverage increased from 54percent to 57percent, and IPTp3 coverage rose from 23percent to 35percent, with a total of 1.5 million women seen in 2017. Coverage of pregnant women with routine ITN distribution has increased from 47percent in 2015 to 61percent in 2017.

The NMSP 2016-2020 identified several potential reasons for the low coverage of IPTp3, including late debut of prenatal care visits, stockouts of SP at ANC clinics, inefficiency of the referral system, non-compliance with the directly observed therapy (DOT) strategy by healthcare providers, and weak involvement of the private health sector. The NMCP has tried several new approaches to help improve IPTp coverage; these interventions are supported by Global Fund and may be supported by PMI if data on the impact of each of the interventions is positive. These approaches include:

- Active search for pregnant women lost to follow up by community health workers who conduct community sensitization on the importance of prenatal visits and intermittent preventive therapy.
- Outreach activities which involves mobile outreach health care delivery by an integrated facility based team to communities located more than 5 km from the nearest health center, and to some urban slums with poor health indicators
- Intensification of SBCC activities, including mass media (broadcasts on the radio and television networks), and posters to increase awareness and use of malaria prevention and treatment services.
- Pilot of SMS appointment reminders to pregnant women in two districts

Some of the key challenges to improving coverage of MIP interventions include:

- Late debut of prenatal care leading to starting the first dose of IPT late in pregnancy, and not completing all required visits
- Women's illiteracy rate remains high (63.2percent, RGPH⁹ 2014).

⁹ Population Census 2014

- Socio-cultural barriers and practices, including reliance on traditional healers and self-medication, low involvement of husbands, and susceptibility to false rumors.
- Structural barriers to access include poor quality of health care services, frequent stockouts of supplies at health centers, long waiting times, poor customer service, and crowded facilities
- Financial and distance barriers

Progress since PMI was launched

PMI’s SBCC partner has started support to the NMCP to revise the National Communication Strategy with new messages to promote IPTp and ITNs targeting ANC providers and pregnant women. In 2018, PMI supported a nationwide Malaria Behavior Survey (MBS) to identify the determinants of behaviors and examine some of the challenges to addressing malaria in pregnancy. The NMCP is planning to update the national communication plan based on the MBS findings.

Table 4: Status of IPTp policy in Côte d’Ivoire

Status of training on updated IPTp policy		Number and proportion of HCW trained on new policy in the last year if training on new policy is not yet completed	Are the updated IPTp guidelines available at the facility level?	ANC register updated to capture 3 doses of IPTp-SP	HMIS/ DHIS2 updated to capture 3 doses of IPTp-SP
Completed/Not Completed	Date (If training completed, when, if not completed, when expected)				
Not completed	2019	0	No	Yes	Yes

Table 5. Status of ANC guidelines in Côte d’Ivoire

Status of 2016 WHO ANC guidelines adoption		Number and proportion of HCWs trained in new ANC guidelines in the last year	Are the updated adopted ANC Guidelines available at the facility level?	Additional IPTp contact added to ANC schedule at 13 weeks?	ANC register updated to capture 8-9 ANC contacts?	HMIS/DHIS 2 updated to capture 8-9 ANC contacts
Started/Completed/Not completed	Date completed (or expected to be completed)					
Completed	November 2017	0	No	No	No	No

Commodity gap analysis

Previously, the Global Fund has covered national needs for SP through quality-assured international suppliers. Procurement of anti-malaria drugs by the Global Fund, including SP, are delivered to the NPSP warehouse which is then responsible for storage and distribution to health districts nationwide. Despite efforts to ensure a stable supply of SP, national-level stockouts of SP have been frequently documented. PMI will monitor SP need and consumption closely and will adjust planned PMI procurements as needed.

Table 6. SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2018	2019	2020
Total Population ¹	26,232,692	26,914,742	27,614,525
SP Needs			
Nb of pregnant women estimated ²	1,311,635	1,345,737	1,380,726
Total number of pregnant women attending ANC 1 ³	1,147,680	1,184,249	1,221,943
Total number of pregnant women attending ANC 2 ⁴	1,032,912	1,065,824	1,099,748
Total number of pregnant women attending ANC 3 ⁵	929,621	959,241	989,774
Total number of pregnant women attending ANC	3,110,214	3,209,314	3,311,465
Total SP Need (in treatments) ⁶	2,488,171	2,567,451	2,649,172
Partner Contributions			
SP carried over from previous years	2,240,107	114,542	
SP from Government	0	0	0
SP from Global Fund		92,978	178,461
SP from Other Donors			
SP planned with PMI funding	362,606	2,252,518	2,470,711
Total SP Available	2,602,713	2,460,038	2,649,172
Total SP Surplus (Gap)	114,542	-107,413	0

Footnotes:

1 Population used is from EPI unit. This differs from the population used in the 2017 MOP that had been estimated based on the 2014 general census

2 Population*% of pregnant women (5%)

3 # pregnant women*ANC1 attendance rate

4 # pregnant women attending ANC1 - #pregnant women attending ANC1*drop out rate between ANC visits

5 # pregnant women attending ANC2 - #pregnant women attending ANC2*drop out rate between ANC visits

6 # of pregnant women attending any ANC*NMSP IPTp coverage objective (80%)

Plans and justification for proposed activities with FY 2018 and FY 2019 funding:

With FY 2018 and FY 2019 funding, PMI will support activities to strengthen IPTp implementation in public and private health facilities. PMI will support direct implementation in 34 districts with training, supervision, and provision of supplies to facilitate the DOT strategy. The Global Fund provides support for the remaining districts. PMI will also support technical assistance at the national level to strengthen the country's capacity to implement IPTp nationwide, including a review of the current policy and guidelines to ensure they are fully consistent with WHO's revised global guidance.

PMI's proposed investments complement those of the Global Fund and are aimed at supporting the NMCP to ensure SP administration during ANC visits, starting in the second trimester, at least four weeks apart with

every pregnant woman receiving at least three doses during pregnancy. Furthermore, PMI will support the NMCP to make ITNs available free of charge to pregnant women at their first ANC visit in both public and private health facilities. As detailed in the SBCC section, PMI will support the NMCP to implement SBCC activities that promote early and regular ANC attendance and consistent use of ITNs during pregnancy. Finally, PMI will procure SP to meet nationwide needs and provide technical assistance to ensure consistent SP availability at health facilities.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.

3. Case management

NMCP/PMI objectives

One of the two goals of the NMCP's NMSP 2016- 2020 is "to reduce the number of malaria cases by 40 percent as compared to 2015 levels." The NMCP has several stated case management priorities they aim to achieve under their current strategy. Among the NMCP strategic objectives are first, at least 90percent of suspected malaria cases should receive a confirmatory test (RDT or microscopy) in public and private health facilities. Second, at least 90percent of confirmed simple malaria cases in public and private health centers receive the correct treatment according to national guidelines. Third, at least 90percent of confirmed severe malaria cases in public and private health centers receive the correct treatment per national guidelines. Fourth, at least 90percent of simple malaria cases confirmed by CHWs are treated with a correct antimalarial treatment according to national guidelines.

Intervention Overview/Current status

Côte d'Ivoire's malaria diagnostic guidelines are in line with WHO recommendations that require every suspected malaria case to be confirmed before administering ACTs. Per national guidelines, microscopy is used to confirm malaria diagnosis in the public and private-not-for-profit (faith-based operated) sectors at all regional and district reference hospitals while RDTs are used to confirm malaria diagnosis at health centers and at community level, or in any health care facility whenever microscopy is unavailable. The total number of districts and regional reference hospitals with functioning microscopes and trained technicians is currently unknown. The NMCP plans to carry out a rapid assessment in early 2019 of availability of microscopy and numbers of trained technicians across all regions of Côte d'Ivoire and based on the results of the assessment develop a capacity building plan. Although the NMCP has developed guidelines for quality control of malaria microscopy, implementation has not formally started.

The introduction and scale up of RDTs to all health centers nationwide was implemented in 2011. The NMCP has reported a steady increase in the proportion of malaria cases which have a documented positive diagnostic test (RDT, microscopy) in public health care facilities. They reported a 66percent case confirmation in 2012, with an increase to 92percent in public health facilities by 2015, and 96percent in 2017.

In 2012, Côte d'Ivoire revised its national malaria treatment policy to make both artemether/lumefantrine (AL) and artesunate-amodiaquine (AS/AQ) their first-line drugs for treatment of uncomplicated malaria for patients of all ages other than pregnant women. If these ACTs are not available, artesunate/pyronaridine or artesunate /mefloquine are used. In 2017, the NMCP revised the guidelines for the treatment of pregnant women. In the first trimester, quinine remained the first line therapy. In the case that oral quinine is contra-indicated or if the woman is in the second or third trimester of pregnancy, AS/AQ, AL, or

dihydroartemisinin/piperazine is used. As per national directive, there is no fee to receive a RDT or ACTs in public and private not-for-profit health facilities for children under five years of age and pregnant women. Emergency diagnosis and treatment (which includes severe malaria) is free of charge for patients of all ages. For older children and adults, all RDTs and ACTs are provided free of charge in public health facilities but this may not occur in private for profit facilities.

For cases of severe malaria, first line treatment is IV artesunate. If it is not available, IM artemether or IV quinine is used. Treatment is given according to where the severe malaria case is diagnosed. In the primary health centers (ESPC), artesunate IV/IM or artemether IM are given. In infants 5 years and under treated in the community, rectal artesunate 50 mg is given. The national guidelines were revised in 2017, and are consistent with the WHO guidance, with the exception of the rectal artesunate dosing and alternative treatment for malaria.

Three methods are used to confirm a case of malaria. The HRP2 RDT is used; if it is not available the pLDH RDT is used in clinics without laboratories (ESPC, or in the community) or in reference hospitals that do not have a laboratory, experience an interruption of laboratory services, or a stockout of laboratory supplies. All pLDH RDTs must be on the WHO pre-qualified list. No particular brand is favored. In public and private health facilities and private facilities with a working laboratory, microscopy is used.

Private sector: A significant portion of the population chooses to seek care outside of the public health system. Patients have been known to seek treatment from private clinics, traditional practitioners and even directly from pharmacies. At present it is unclear what proportion of patients seeks care in the private sector but the NMCP feels that this is a significant issue. According to the 2016 MICS, 13.5percent of children under 5 years of age with fever presented to private facilities for care, while another 38.5percent did not seek treatment at all. According to the *Rapport Annuel sur la Situation Santé* (Annual Health Situation Report) the utilization rate of services in the public sector in 2016 was only 45percent compared to 43percent in 2015. This means that about 55percent of cases seek care outside of public facilities which can include community, private health facilities, pharmacies, traditional healers, or not at all.

Private for-profit medical offices and clinics: The NMCP provides ITNs and SP for pregnant women. The distribution is free. The use of microscopy and/or RDTs in private-for-profit health care facilities to confirm malaria diagnosis varies. The NMCP is aiming to improve private sector provider adherence to malaria diagnostic guidelines even though the malaria case management services are not provided free of charge. In order to improve compliance with the national guidelines the NMCP is partnering with an association of 60 for profit health facilities for SP and ITNs distribution free of charge during ANC visits. This partnership is planned to expand and eventually include 250 for profit facilities by 2020. However, the NMCP does not intend to supply these private-for-profit facilities with RDTs or ACTs.

Private not-for-profit medical offices and clinics offer services to workers and their families. They receive the same benefits as in the public sector, such as ITNs, SP, RDTs, and ACTs. These are all free to everyone, including the employee and their family. The NMCP is partnering with a coalition of 29 private industries to reach their industry managed not-for-profit health facilities. The NMCP, in collaboration with the health district staff in the districts where these health centers are located, have provided training in malaria case management including recording and reporting data to health center staff. The NMCP has supplied these health centers with RDTs and ACTs (alongside SP and ITNs). There are approximately 100 health facilities currently engaged in this partnership.

Although, the national policy around private sector case management is the same as for the public sector, the monitoring of data collected by district offices shows that private facilities can vary with regard to treatment for simple malaria. To date, there has not been a survey of the available antimalarial medications in the private sector so this information is not known.

Community level: Côte d'Ivoire's community health policy and implementation framework continues to evolve. In 2017, the Division of Community Health within the Ministry of Health drafted the *Plan Stratégique de la Santé Communautaire* (Strategic Plan for Community Health). The NMCP, as well as other partners, has used this plan as a guide in designing the approach to community-based services. The plan defines who can be considered a CHW, how they will be supervised by health district offices, the requirements for training CHWs, their monthly stipend, and the equipment they will need to implement activities. Despite the introduction of this national CHW strategy there are still questions amongst donors and partners as each has its own policies and regulations. The number of CHWs included in the NMCP plan is 12,600, including 5,900 CHWs in the 44 health districts covered by Global Fund, 4,700 in the 22 districts covered by PMI, and 2,000 in the 12 districts covered by UNICEF. CHWs offer RDT diagnostic and malaria treatment only to children under 5 years of age.

The training manual and package of health services to be delivered by CHWs is quite large and includes HIV, neglected tropical diseases (NTD), maternal/child health (MCH), nutrition, malaria, immunization, and other programs being implemented. Each sector is different in terms of level of training and supervision required and importantly in terms of compensation or incentives for CHWs which leads to some competition between programs at the local level. The MOH, with technical assistance from UNICEF, has developed a standardized training curriculum of 12 days and they are working to specify the training and supervision required, commodity supply processes, and data reporting. They have asked programs to support the national strategy while they work to revise the community health framework to identify the essential activities to be included in the package of services to be delivered by CHWs.

As of December 31, 2017, community based management of malaria by CHWs is currently implemented in 51 out of the now 86 health districts in Côte d'Ivoire. In the past year, 5,128 community health workers have been trained in malaria diagnosis and treatment (AL has been added to AS/AQ as another antimalarial used by CHWs), which includes 700 functioning CHWs in 12 districts in the PMI zone. In 42 of these 51 districts, only malaria and diarrhea diagnosis and treatment are provided (*PECADOM plus*). Integrated case management of malaria, pneumonia and diarrhea (iCCM) is implemented in just nine districts at present time with UNICEF supplying the antibiotics needed for iCCM in these districts. Thirty-five health districts do not have any CHWs implementing either malaria or iCCM case management. It is the NMCP and the MOH Community Health Division's shared vision to eventually implement iCCM in all communities greater than 5 kilometers from a health facility nationwide in 78 districts (44 Global Fund districts, 12 UNICEF districts, and 22 PMI districts) but the availability of the needed non-malaria commodities (antibiotics, oral rehydration salts and zinc) and support for training and supervision has remained insufficient to date.

Previously CHWs were identified by the district and health facility staff. The new strategy requires that CHWs be selected by the communities they serve in the villages they represent. After their selection, CHWs are trained by nurses who have been trained by the district health team (*équipe cadre de district*). At the end of the training, each CHW receives a first supply of drugs: a kit consisting of 25 RDTs, 20 treatments for children (2-59 months), and 20 doses of paracetamol. This kit corresponds to one month's supply (based on the pilot experience). A nurse supervises the CHWs at least once a month when they return to the health post to validate their data and renew commodities.

Table 7. Status of Case Management Policy and Implementation in Côte d'Ivoire

Status of Case Management Policy in Côte d'Ivoire according to Arrete no. 109/CAB/MSLS, July 14, 2014		Currently being implemented (yes/no)? Are there plans to modify the recommendations?
What is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria?	AS/AQ or AL or DH/P	AS/AQ or AL currently; plan to add DH/P soon. Artesunate/pyronaridine and artesunate/ mefloquine are considered alternate treatment.
What is the second-line treatment for uncomplicated <i>P. falciparum</i> malaria?	Oral quinine	Yes
What is the first-line treatment for severe malaria?	IV/IM artesunate	Yes
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the first trimester?	Oral quinine	Yes
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the second and third trimesters?	AS/AQ or AL or DH/P	AS/AQ and AL current policy; plan to add DH/P
In pregnancy, what is the first-line treatment for severe malaria?	IV quinine	Yes
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	IM artesunate or IM artemether	Yes
Is pre-referral treatment of severe disease recommended for community health workers? If so, with what drug(s)?	Rectal artesunate 50 mg	Planned to start in January 2019
If pre-referral rectal artesunate is recommended, for what age group? (note: current international guidelines do not recommend administering to those ≥ 6 years)	< 5 years	Planned to start in January 2019

Progress since PMI was launched

The delay in the engagement of PMI's service delivery implementing partner led to a delay in starting field activities, including training of CHWs, implementation of iCCM, training of lab technicians, data validation workshops, and site supervision. This delay also contributed to the late delivery of commodities and medicines, although as of the end of FY 2017, PMI has procured and distributed 229,500 treatment doses of ACTs in four different formulations. The NMCP had planned a training of 386 lab technicians throughout the nation. To date, 174 have attended the training which included didactic and laboratory-based parasitological diagnosis using microscopes. The following activities have been conducted since PMI inception:

- Development and execution of a redeployment plan of antimalarial medications and commodities
- Urgent order in anticipation of the commodities that were to be bought by the Global Fund
- Global Fund subsidization of all the 86 health districts during the first semester of 2018, (they had originally agreed to cover 52 districts only). Their work included training lab technicians, validating data, and supervising sentinel sites.

PMI was able to support the identification and remobilization of 700 community health workers in 12 districts. PMI also supported the semi-annual malaria task force bringing in health directors from all 20 regions to review the 2018 national malaria program performance and identify challenges and the operational level for the first half of the year. During the task force meeting, the national program also presented the updated national program guidelines.

Antimalarial resistance testing: Côte d'Ivoire follows WHO recommendations and systematically monitors for antimalarial resistance.

Therapeutic efficacy studies (TES) were last conducted in 2017 in six of Côte d'Ivoire's epidemiologic and entomological sentinel sites carried out with Global Fund support. Both first-line ACTs were evaluated and preliminary results of clinical and parasitological response was adequate. The NMCP's GSA, consisting of 18 technical experts from academia and the scientific research community, reviews, verifies and assists with interpretation of TES results. Due to the delay in program launch, PMI was not able to support a TES in 2018. The program will plan to support studies at two sites for each of the next two years. To date, the PMI program has not funded a TES in Côte d'Ivoire.

Commodity gap analysis

Table 8: RDT Gap Analysis

Calendar Year	2018	2019	2020
RDT Needs			
Total country population ¹	26,232,692	26,914,742	27,614,525
Population at risk for malaria ²	26,232,692	26,914,742	27,614,525
PMI-targeted at-risk population			
Total number of projected fever cases ³	16,074,397	16,492,331	16,921,132
Total number of projected fever cases seen by HCP ⁴	7,962,259	8,516,907	9,095,014
Percent of fever cases seen by HCP tested with an RDT ⁵	5,895,061	6,293,916	6,713,575
Total RDT Needs	5,895,061	6,293,916	6,713,575
Partner Contributions			
RDTs carried over from previous year	1,097,400	0	0
RDTs from Government	0	0	0
RDTs from Global Fund	2,409,738	3,888,474	4,289,874
RDTs from other donors			
RDTs from FY17 PMI funding		536,433	
RDTs planned with PMI funding	2,136,433	1,869,009	2,423,701
Total RDTs Available	5,643,571	6,293,916	6,713,575
Total RDT Surplus (Gap)	-251,490	0	0

1 Population used is from EPI unit. This differs from the population used in the 2017 MOP that had been estimated based on the 2014 general census

2 Geographic coverage: 100% of the country is at risk

3 Fever cases estimated based on predicted average number of fevers by age group: <1 (3.2), 1-5 (1.5), 6-13 (0.6), >13 (0.33)

4 Of all total estimated fever cases, those that present to a public, private or community health care provider. Sector usage rates: Public: 47% (2018); 49% (2019); 51% (2020); Private: 1.9% (2018); 2.0% (2019/20); Community (children<5): 1.4% (2018); 1.4% (2019/20)

5 # estimated fever cases*NMSP coverage objective (80%)*% fevers treated in public sector (excluding the for-profit private sector)

Table 9: ACT Gap Analysis

Calendar Year	2018	2019	2020
ACT Needs			
Total country population ¹	26,232,692	26,914,742	27,614,525
Population at risk for malaria ²	26,232,692	26,914,742	27,614,525
Total projected number of malaria cases ³	4,815,406	4,989,881	5,156,692
Total ACT Needs ⁴	4,478,327	4,640,589	4,795,724
Partner Contributions			
ACTs carried over from previous year	2,799,915	0	0
ACTs from Government	0	0	0
ACTs from Global Fund	251,720	3,187,476	3,322,472
ACTs from other donors			
ACTs from FY17 PMI funding		725,626	
ACTs planned with PMI funding	1,164,748	727,487	1,473,252
Total ACTs Available	4,216,383	4,640,589	4,795,724
Total ACT Surplus (Gap)	-261,944	0	0

1 Population used is from EPI unit. This differs from the population used in the 2017 MOP that had been estimated based on the 2014 general census

2 Geographic coverage: 100% of the country is at risk

3 #malaria cases=# tested*estimated % positive test

4 #cases*NMSP coverage objective (100%)*% uncomplicated malaria (93%)

Quantification of IV artesunate/IM artemether

Côte d'Ivoire based the quantification of IV artesunate and IM artemether on an expected number of cases of severe malaria with some minor adjustments from year to year due to population growth. The NMCP projects slightly more than 320,000 cases per year starting in 2018. The vast majority of severe malaria cases (> 96%) will be treated at public health facilities. IV artesunate will represent 80percent of the treatments while IM arthemether will make up 5percent. IV quinine, used for pregnant women, accounts for the other 15percent of treatments. The government of CI is procuring IV artesunate and IM artemether using its own resources to support severe malaria case management. As a result, PMI will not support these commodities under this MOP.

Quantification of rectal artesunate

Rectal artesunate is indicated for children under five years of age who present with severe malaria. It is given by staff at the community level or at peripheral health facilities when a child under five years of age presents with signs and symptoms of severe malaria. Patients are given the medication as they are being prepared for transfer to a referral hospital. All local facilities (of which there are about 2,000) in the system should have access to rectal artesunate. The NMCP has determined the need for 36,000 treatments of rectal artesunate each of the next two years. This quantification was based on the hypothesis that only 7percent of positive malaria cases are deemed severe and referred to the next level of the health care system.

Plans and justification for proposed activities with FY 2018 and FY 2019 funding:

With FY 2018 and FY2019 funds, PMI will support the NMCP to strengthen implementation of core components of effective malaria case management. PMI will work closely with the NMCP to carefully coordinate all PMI planned investments with investments planned by the Global Fund. In FY 2018, PMI will provide support for procurement of approximately 31percent percent of the nationwide annual need of ACTs and 38percent percent of RDTs. In FY 2019, PMI will provide support for procurement of approximately 31 percent of the nationwide annual need of ACTs and 36percent of RDTs, as well as needed treatments for severe malaria. PMI will monitor RDT and ACT need and consumption closely and will adjust planned PMI procurements as needed.

With FY 2018 and FY 2019 funding, PMI will also provide direct technical assistance and support to strengthen malaria case management in public, not-for-profit private health facilities (companies' health center), and 60 private clinic facilities (for-profit health clinic) in 34 districts representing over 39 percent of the general population of Ivory Coast. Technical assistance and support will include training and supportive supervision for health care providers in diagnosis and treatment of malaria at fixed health facility sites as well as during outreach services.

PMI will also support facility based SBCC to improve case management and care seeking behavior. See the SBCC section for further details.

Given significant distance and/or inaccessibility of a considerable portion of the population to health facilities, with FY 2018 and FY 2019 funding PMI will work with the NMCP, the Community Health Division of the MOH, UNICEF, and others to support scale-up of iCCM with the longer-term vision of reaching nationwide coverage in communities greater than five kilometers from a health facility. UNICEF currently supports the provision on non-malaria iCCM commodities for 2018. This is planned to be taken over by the government as of 2019. PMI will continue to support malaria-related commodities. PMI will provide direct implementation support for iCCM in 22 districts, including supporting training and supervision of community health workers in iCCM and reporting.

Since Global Fund support for TES is ending after this year, PMI will support studies at two sites for each of the next two years (FY18 and FY19).

Please see Table 2 for a detailed list of proposed activities with FY 2018 and 2019 funding.

4. Cross-cutting and other health systems strengthening

To successfully implement the aforementioned activities, PMI Côte d'Ivoire supports a suite of activities that cut across and benefit insecticide- and drug-based prevention and case management activities. For example, availability of high-quality commodities is necessary to ensure high ITN coverage and effective case management, and health-seeking behavior of individuals and communities is necessary to improve coverage of all interventions. In addition, the gains achieved in malaria control in Côte d'Ivoire can only be sustained if there are strong health systems and local capacity. Hence, systems strengthening and capacity building are intrinsic in all PMI intervention-specific activities previously mentioned (e.g., training and supervision of health workers, technical assistance for planning and monitoring interventions, etc.). Non-intervention specific or cross-cutting health systems strengthening activities are described below.

a. Pharmaceutical management

NMCP/PMI objectives

The overarching strategy for the management of the supply chain in Côte d'Ivoire is presented in the National Plan for Health Commodity Security, which was updated in 2015 and covers the 2016-2020 period. Its main objective is to improve the availability of and access to medicines, vaccines and other essential commodities at service delivery points.

Although cost recovery is practiced at all levels of the health system, antimalarial inputs (ACTs, RDTs and SP) have been free of charge since 2010 to remove any financial barrier to access for treatment of malaria.

To strengthen supply chain and stock management the NMSP 2016-2020 calls for:

- The development of stock management guidelines for health facilities and districts
- Training of health workers in stock management
- Contracting with the NPSP for storage, management, and supplying of health care facilities with antimalarial commodities

The National Health Commodity Supply Chain

The national health commodity supply chain system is led by three entities. The GOCI National Pharmaceutical Agency (*Programme National de Développement de l'activité Pharmaceutique- PNDAP*) develops and enforces health commodity policy, and designs standard operating procedures (SOPs) for the health supply chain. The GOCI National Medicines Authority (*Direction de la Pharmacie, du Médicament et des Laboratoires*) is responsible for the registration of pharmaceuticals and for the approval of health commodities. The Central Medical Store (NPSP) is a nonprofit, nongovernmental organization (NGO) under contract with the GOCI to manage all implementation aspects of the national public health commodity supply chain system. In this regard, NPSP functions as the primary procurement agency for the GOCI health commodity supply chain.

Other important agencies involved in the supply chain include the National Public Health Laboratory (*Laboratoire National de la Santé Publique (LNSP)*), which is the main government entity responsible for quality assurance of pharmaceutical and other health commodities, and the National Commission to Coordinate Supply Chain Commodities (*Commission Nationale pour la Coordination des Approvisionnements en Médicaments (CNCAM)*). The latter was created in 2015 by the Ministry of Health and Public Hygiene (*Ministère de la Santé et de l'Hygiène Publique (MSHP)*) to act as a coordinating body for the supply planning and procurement of commodities for the different national health programs, including malaria. CNCAM is also charged with working with the programs to conduct commodity forecasts and quantifications, and to monitor stock levels and system performance.

The national supply chain system mirrors the healthcare system's three-tiered pyramidal structure, with offices and infrastructure at each of the healthcare system levels: central, regional, and district levels. Thus the national health commodity supply chain system includes the NPSP at the central level; regional pharmacists at the regional level; and district pharmacists, and 86 district pharmaceutical depots, at the district level. There are no storage facilities at the regional level (although a regional depot of NPSP will soon be opened in Bouaké in central Côte d'Ivoire). Commodities are moved from the NPSP and are delivered directly to the 86 district depots, the 4 CHUs, the regional Hospitals and general hospitals across the country. In the Abidjan area, NPSP may deliver health commodities directly to primary health care facilities as well.

In 2013, USAID helped the GOCI to further decentralize the health commodity supply chain to increase access to and ensure continuous availability of essential medicines and pharmaceutical products at service delivery points. Decentralization meant that districts would have greater autonomy and authority to determine transport and delivery of health commodities, and to forecast their own commodity needs. The districts were also delegated greater responsibility for storeroom and stock management and organization.

Each of the country's 20 health regions has a pharmacist who is tasked with overall supply chain management for the region. Responsibilities include commodity needs forecasting, inventory, staff training, and LMIS reporting. The regional pharmacists also monitor the performance of district pharmacies within their respective regions. Each of the health districts has a district pharmacist who executes similar supply chain management activities within the district, including coordinating the distribution of commodities to health facilities.

The commodities required to support national health programs are either procured by the NPSP or provided by donor organizations, various health partners, and other in-country stakeholders. Côte d'Ivoire's supply chain currently consists of a push system from the central warehouse and at the district level. ACTs and RDTs are stored in the main warehouse in Abidjan and then distributed to district level where PMI's partner assists with last mile distribution (health facilities). Community health workers receive their supplies from nurses at the health facility level. The push system is being reinforced with the recent purchase of 50 small trucks funded by the Global Fund and 15 funded by PEPFAR. The country is working towards providing 1 vehicle to each of the 86 districts to facilitate distribution of commodities to service delivery points.

The GOCI developed a paper-based LMIS in 2007, which is still in use. The LMIS never reached full functionality and the data that NPSP has on hand does not reflect the actual status of the supply chain. Furthermore, LMIS data vary significantly across disease programs, particularly for HIV, malaria, TB and essential medicines. In July 2013, the MSHP decided to transition from a paper-based to an electronic LMIS system (eLMIS). Following a successful USAID-supported pilot of eLMIS in 2016 in 14 regions, the system will now be expanded to all regions in Côte d'Ivoire. As of September 2018, the eLMIS is rolled out in 370 out of 373 eligible health facilities. The three non-covered sites are recent additions to the NPSP system.

USAID/Côte d'Ivoire addresses supply chain strengthening a holistic manner, building on previous work, funded by PEPFAR, and leveraging PEPFAR, PMI and Family Planning, where appropriate funding streams exist.

Until 2018, the NPSP received, cleared, stored and distributed (to the district level) U.S. Government - donated pharmaceuticals at no charge. To foster sustainability, USAID awarded a five-year cooperative agreement to NPSP in August 2018 to ensure:

- a rational and transparent supply, an appropriate storage and an effective distribution of certain health products to the designated service providers;
- ease of the customs clearance and transit operations of the other health projects financed by the American Government;
- maintenance of the electronic Logistic Management of information System (eLMIS) and implementation of a formal mechanism of data analysis for better decision making at all levels of the supply chain.

Progress since PMI was launched

With technical assistance from PMI, the reporting rate on the status in stocks increased from 10percent in FY 2017 to 81.5percent as of the last quarter of FY 2018, exceeding the annual target of 80percent. Also, the quality of reporting has improved from 42percent in FY 17 to 76percent as of the last quarter of FY 2018, exceeding annual target of 70percent. Reporting quality and timeliness have also improved with increased decentralized-level attention to the data that are being submitted and their usefulness to regional pharmacists, and to district and regional directors for decision making. The quality of reporting is measured through the following indicator: percentage of storerooms with a passing score on the CNCAM-conducted audit on monthly LMIS data reports. To collect performance data, an audit tool (Routine Data Quality Assessment) is applied to a sample of storerooms on logistical reports during field visits. It compares the reported data through the LMIS reports to the field primary data source, such as stock cards, dispensation register, etc. The following seven data categories are assessed as part of the audit: stock on hand, consumption, losses, adjustments, quantities received from the highest level, duration of stock out, and number of tests performed.

PMI also worked with local institutions to improve the inventory management systems at district and health facility level with completion of the selection of software package to electronically manage national inventory and the introduction of mSupply, which will be implemented in 286 sites in FY 2019. Interim inventory management training tools were developed to support the logistics support staff. To reduce the recurring stockouts of laboratory commodities, PMI assisted the ministry in developing a training curriculum to train commodity managers and laboratory staff on laboratory product stock management. Also, PMI supported an assessment of specific factors that influence commodity distribution effectiveness, proposed multi-dimensional response, with the purpose of addressing transport bottlenecks that lead to inadequate “last mile” commodity distribution.

An EUV was conducted from June 18-28, 2018 in 42 health facilities, including 29 clinics, 7 hospitals, and 6 district pharmacies in the region of Agneby Tiassa-Me, with the objective of evaluating the inventory management of malaria commodities at the health facility level. The findings raised some key points, such as 8percent of facilities had no AL on the day of the visit. None of the sites had a stockout on the visit day. RDTs were stocked at all but one facility. In total, 53percent of malaria commodities were understocked, and 27percent were overstocked. This highlights difficulties for the managers to maintain stock at the desired level. In addition, up to 19percent of simple malaria cases in children under five years of age did not receive an ACT. This could be related to the low proportion of people who had been trained in malaria case management.

Plans and justification for proposed activities with FY 2018 and 2019 funding:

The U.S. Government continues investment in strengthening the overall health commodities supply chain system in Côte d’Ivoire, ensuring that quality health commodities, including malaria inputs, are delivered in a timely fashion to service delivery points. PMI will target relevant agencies and regulatory bodies who intervene at the national level, including the MHSP, PNDAP, NPSP, and CNCAM, as well as regional pharmacists, and health and supply chain staff at the district and health facility levels. Additional assistance will be provided directly to the NMCP to strengthen their capacity to oversee the management and procurement of malaria related commodities.

PMI will fund NPSP to ensure warehousing and distribution of PMI-procured malaria commodities.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and 2019 funding.

b. Social and behavior change communication

NMCP/PMI objectives

The NMSP 2016-2020 identified social and behavior change communication as a key strategy for malaria prevention and case management. Thus, the NMCP drafted the National Strategic Plan for Social and Behavior Change Communication for Malaria 2016-2020 (*Plan Stratégique National de Communication pour le Changement Social et des Comportements en matière de Lutte contre le Paludisme 2016-2020*) in accordance with the strategic orientations and priorities of the NMSP. The communication strategy will be further updated based on the findings of the MBS currently underway.

The MBS was designed by the PMI SBCC technical working group and its partners to collect data on intermediate behavioral outcomes, such as risk and efficacy, attitudes, and norms. It is currently being piloted in CI. The aim of the MBS is to provide data to inform the design of national malaria SBCC strategies and subsequent SBCC activities in country. It aligns with the RBM Partnership to End Malaria's Malaria SBCC Indicator Reference Guide. As such, it will provide baseline data on intermediate and behavioral outcomes to monitor trends and evaluate the impact of SBCC activities nationally and sub-nationally. Data collection for this survey began in September 2018 and preliminary results were available in December 2018.

The communication and behavioral objectives included in the national malaria SBCC strategy are listed in Table 10 below. There are a number of gaps in this table. For example, while ITNs are mentioned in the situation analysis within the strategy, net ownership and use not reflected in the communication and behavioral objectives/indicators. Additionally, the communication objectives primarily speak to the proportion of those who know the benefits of case management/IPTp and show interest in the services. They also track the number of organizations that support malaria initiatives, as well as the number of providers that have been trained (these are not included in the table below as they are numerous). However, they do not track some of the key ideational factors that drive behavior change. Once the MBS data is analyzed, PMI will support the NMCP to revise the SBCC strategy and behavioral and communication objectives to accurately reflect priority areas and SBCC considerations (as well as set baseline and target levels for the indicators).

Strategic malaria communication activities are managed by the NMCP through its communication unit. These strategies are implemented at regional and district level under the supervision of regional and district health managers. The district health managers are aided by the district SBCC focal point who is in charge of communication activities (communication for all health issues—not malaria specific).

All malaria SBCC activities are supported by Global Fund (through the NMCP and Save the Children), UNICEF and PMI). Activities are guided by the national malaria strategic plan and coordinated by the NMCP communication unit. At the community level, UNICEF, Global Fund and PMI work through local NGOs and CHWs in collaboration with the district SBCC focal points. The NMCP's vision is that all community and facility-based SBCC be based on the same materials adapted for local cultural differences. All national, mass media activities are managed by the NMCP with support from both the Global Fund and PMI.

At present, there is no working group or task force specific to SBCC within the NMCP or the MOH, although these topics may be reviewed as part of the biannual malaria task force meetings. However, discussions have been initiated with NMCP and its partners to initiate such a group. As currently envisioned,

this group would serve a range of roles and functions, including analyzing the results of the MBS and developing data-driven SBCC approaches based on the findings; reviewing, approving and harmonizing the strategies and messages; advocating for SBCC initiatives; and coordinating mass media communication. PMI will provide technical assistance and financial support for the establishment of the SBCC working group and the conduct of regular working group sessions.

Table 10. Behavioral and Communication Objectives for Key Malaria-Related Behaviors

	Sources	Baseline	Target
% of women who attend first ANC visit during the first trimester of pregnancy	RASS 2016	85.71%	90%
		Baseline	Target
1. Proportion of WRA able to cite at least 3 benefits of ANC and SP		NA	NA
2. Proportion of pregnant women informed about the need to begin ANC visits during the first trimester of pregnancy		NA	NA
3. Proportion of pregnant women who think it is important to have the first ANC visit during the first trimester of pregnancy		NA	NA
		Baseline	Target
Proportion of pregnant women who take the first dose of SP during the fourth month of pregnancy		NA	NA
		Baseline	Target
1. Proportion of pregnant women who know that they must take the first dose of SP during the fourth month of pregnancy		NA	NA
2. Proportion of pregnant women who think it is important to take the first dose of SP during the fourth month of pregnancy		NA	NA
		Baseline	Target
Proportion of women who have 4 ANC visits	MICS 2016 RASS 2016	51.3% 44.1%	90%
		Baseline	Target
1. Proportion of pregnant women able to cite at least 3 benefits of 4 ANC visits	NSP 2016-20	NA	90%
2. Proportion of pregnant women who understand the importance of having 4 ANC visits		NA	NA
		Baseline	Target
Proportion of pregnant women who take at least 3 doses of SP during pregnancy	MICS 2016 CAP 2017	22.6% 28.3%	80%
		Baseline	Target
1. Proportion of pregnant women who understand the importance of taking at least 3 doses of SP during pregnancy	CAP 2017	41%	90%
2. Proportion of women who think it is important to take at least 3 doses of SP during pregnancy	NSP 2016-20	22,60%	80%
		Baseline	Target
Proportion of children 0-5 who receive a malaria treatment according to national guidelines	MICS	64.1%	
		Baseline	Target
1. Proportion of mothers and caretakers of children 0-5 who are informed about the importance of treating malaria in a health center		NA	NA
2. Proportion of mothers and caretakers of children 0-5 who are informed about the need of treating malaria in a health center		NA	NA

Behavioral Objective		Baseline	Target
Proportion of the population who go to health centers for malaria treatment		NA	NA
Communication Objective (s)		Baseline	Target
1. Proportion of the population informed about the importance of treating malaria in a health center		NA	NA
2. Proportion of the Ivoirian population who think it is important to go to a health center or CHW for treatment of malaria		NA	NA

Progress since PMI was launched

In addition to limited communication activity support, such as support for the broadcast of a malaria awareness competition among school children, the main activity undertaken since PMI was launched was the development, finalization and approval of the MBS protocol. Field work for this survey began in September 2018 and was still underway as of the writing of this MOP.

Plans and justification for proposed activities with FY 2018 and 2019 funding:

PMI will support the update of the SBCC Strategy based on the results of the MBS. The updated strategy will guide the development of SBCC interventions at all levels. PMI will provide support to the NMCP communication unit to manage and coordinate the development and oversight of SBCC interventions in the country. This will begin with support for the establishment of an SBCC technical working group that will provide broad input into and support for the new SBCC strategy and interventions. PMI will also fund in-country training for about 15 staff from the NMCP and the districts on leadership in strategic communication for SBCC. Through the proposed training, participants will learn about communication theory, design and measurement strategies, project management, crisis management, and leadership.

Based on the new SBCC strategy, PMI will provide technical and financial assistance to the NMCP for the creation of messages and materials adapted to the target populations throughout the country. These messages, materials, target audiences, channels of communications and monitoring and evaluation methodology will be defined by the new SBCC strategy.

With the expansion and deepening of support for community health workers (CHW) throughout Côte d'Ivoire, PMI will support training of CHWs in interpersonal communication and community mobilization.

PMI will also support facility-based SBCC for ITN use, IPTp uptake and case management at the health facility. The activities will focus on client-based SBCC as well as provider behavior change. Activities will be focused on 34 PMI districts but will be consistent with the NMCP's national policies and coordinated with SBCC activities in the rest of the country.

PMI will continue to support the NMCP's school-based malaria interventions (School Children against Malaria). This activity, co-funded with Global Fund, comprises a competition among primary schools to promote awareness of malaria prevention. Primary-school-aged children from approximately 100 schools in a health district are trained on malaria prevention and treatment in a trimester. Students of targeted schools then participate in an inter-school competition through various fora including question and answer sessions, poetry readings and drama skits with messages centered around malaria prevention and management.

The proposed activities will be monitored by the NMCP and PMI teams through quarterly monitoring meetings. These meetings will allow stakeholders to address challenges and resolve issues. An annual assessment will be conducted for planning purposes. The revised malaria SBCC strategy will include modalities for more strategic monitoring of SBCC outcomes. As a part of this, the MBS will be repeated in two years to provide an indication of the impact of the SBCC interventions on communication objectives.

PMI will also support SBCC for IRS (FY 2019 funds). Please see the IRS section for information on the IRS SBCC intervention.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.

c. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

The NMSP 2016-2020 aims to strengthen surveillance, monitoring, and evaluation at all levels of the health system by reinforcing the capacity of the Health Management Information System (*Systeme National d'Information Sanitaire (SNIS)*). This system should be able to provide accurate data for entomological, epidemiologic, and parasitological surveillance. This plan follows the Roll Back Malaria (RBM) M&E guidance to provide a comprehensive framework for obtaining reliable and consistent data in order to assess progress toward the achievement of universal coverage of malaria interventions and the reduction of disease burden.

Specific objectives include reinforcing the operational capacity of the management of malaria data, making the monitoring and evaluation tools of malaria control available; reinforcing quality control and malaria information diffusion at all levels; making accurate strategic malaria data available; and evaluating the follow up plans, both mid-course and final.

Epidemiological routine data are already integrated in the HMIS from the district level to the central level (DIIS and NMCP). In addition, epidemiological survey data are regularly reported to NMCP through MICS and other Malaria Indicator Surveys (DHS 2012 and MICS 2016). In addition, the NMCP collects parasitological data through TES in order to ensure ACT and SP monitoring. Entomological data are collected regularly on sites by entomology institutes. These data are reported to the NMCP.

Currently a formal working group outside of the trained professionals in the NMCP does not exist. There is currently a Division of Epidemiology which carries out some key activities, including data management and monitoring and evaluation. PMI will assist the Ministry of Health in developing an M&E group with influential stakeholders.

National household surveys

Population-based surveys currently provide the most accurate data on malaria intervention coverage and malaria biomarkers (i.e. anemia and parasitemia). A Demographic Health Survey (DHS), combined with the Multiple Indicator Cluster Survey (MICS), was conducted from December 2011 – May 2012. Results from this survey documented malaria parasite prevalence as 42percent by RDT and 18percent by microscopy among children under 5 years. The most recent MICS/MIS, carried out December 2015 – February 2016, will serve as the baseline estimate for PMI coverage indicators. The next national household survey, which will include a malaria module and measure all cause under-five mortality, was originally scheduled to occur

in calendar year 2018 but has been rescheduled for 2019-2020. One of the reasons for this was that the Ministry of Health recently completed a large national survey for HIV.

CARE International, with funding from the Global Fund, conducted a TRaC survey in November-December 2013 to assess ITN use and MIP services. The study covered the 20 health regions throughout Côte d'Ivoire, with a total of 4,290 households surveyed: 2,647 head of households, 2,283 mothers or caretakers of children under five years of age and 2,004 pregnant women or women who delivered within the last 12 months. Approximately 79percent of those interviewed knew that ITN use was effective at preventing malaria, and roughly 75percent knew that fever was a symptom of malaria. Around 40percent owned at least one ITN. Consistent with results from the 2016 MICS/MIS, 30percent of children under five years of age slept under an ITN the night before the survey; 34percent of pregnant women slept under an ITN the previous night. Among women who delivered in the past 12 months, approximately 79percent attended ANC at least once; however, SP1 and SP2 remained low (34percent and 23percent, respectively).

Health facility and other surveys

To measure the programmatic impact of malaria prevention and control activities, the NMSP 2016-2020 encourages periodic targeted surveys. A 2013 survey conducted by *Le Centre de Recherche pour le Développement*, designed to assess malaria-specific activities in health facilities was conducted in 80 randomly selected public and private health facilities. Fifty-two percent had ITNs for routine distribution available at the time of the survey; 73percent of health facilities had RDTs and 72percent had any ACT available. The proportion of cases that were correctly diagnosed and treated for malaria was only 59percent.

Malaria surveillance and routine health information system

Côte d'Ivoire uses routine health management information system data as the main source of data for tracking and measuring programmatic progress. Managed by the *Direction de l'Informatique et de l'Information Sanitaire (DIIS)*, their objective includes the coordination and implementation of SNIS, the collection, analysis and dissemination of data for RASS, the strengthening of the information health system. Routine malaria data is recorded into standard reporting forms at the health facility level. At the health facility level, malaria data are collated from various registers (consultation, laboratory, antenatal) by the facility health information officer and sent to the district on a monthly basis via paper reporting. However, reporting forms lack the necessary indicators to accurately collect and report community-level malaria indicators. In districts where community case management is implemented, NGOs and community-based organizations report monthly data to the district. Once received by the district, no later than the fifth of the month, the data manager is responsible for validating and sharing the data during monthly meetings. Validated data is then transmitted to the regional level no later than the tenth of the month. Where capacity exists, hospitals and some facilities enter data directly in the District Health Information Software (DHIS2), which was rolled out in 2013 and scaled up nationally by 2015. The surveillance officers at the regional level are charged with transmitting the district-level data via email to the central level. Two NMCP staff members currently have access to DHIS2 for monitoring malaria morbidity. Moreover, the NMCP supports health regions for organizing quarterly data validation workshop for collecting quality data.

Under PEPFAR funding, a situational analysis of the HMIS was conducted using the Performance of Routine Information System Management tool in 2014. The assessment identified various inadequacies, including 1) incomplete and inaccurate malaria-related data reporting by healthcare providers at the health facility level; 2) insufficient availability of primary reporting tools (registers, monthly summary report forms); poor integration of community and private sector data; 3) lack of timeliness in passive feedback of data; 4) limited involvement of regional and district management teams in data validation; 5) poor supervisory activities from district level to health facilities; and 6) lack of data comprehension due to

inadequate understanding of definition of indicators. A plan was developed to address the challenges and is currently being implemented with the support of Global Fund. PMI will contribute to strengthening the HMIS based on the plan.

The Global Fund also supports the strengthening the institutional, regulatory and governance framework of the SNIS through DIIS. The Global Fund also supported improvement of data quality in public and private health facilities and reinforcement, dissemination and use of health information for better decision making. From 2009-2013, the *Centre Suisse de Recherches Scientifiques* supported a Demographic Surveillance System in south-central Côte d'Ivoire, referred to as the Taabo health and demographic surveillance system (HDSS). The HDSS was established to serve as a platform for evaluating interventions and health systems strengthening, with the ultimate goal of reducing mortality and morbidity due to malaria and neglected tropical diseases. At the end of 2013, the Taabo HDSS consisted of 13 villages with a total population of 42,480 inhabitants drawn from 6,707 households. Verbal autopsies were conducted in addition to repeated cross-sectional epidemiological surveys. Due to lack of funding, the HDSS was discontinued.

As described in the entomological monitoring section, there are 12 sentinel surveillance sites located in health districts throughout the country. In addition to their geographical representation, these sites were strategically selected for entomological monitoring. These sites also serve as epidemiological sentinel surveillance sites, with the primary objectives of monitoring malaria mortality, determining the correlation between transmission and correct prevention measures, and producing and disseminating quarterly epidemiological bulletins on the progression of malaria morbidity and mortality. Health workers in each sentinel site are tasked with ensuring there are sufficient commodities and reporting forms, in addition to compiling individual-level data and transmitting monthly via paper to the district focal point. Reported data includes the initial diagnosis, type of diagnostic test administered, result of test, final diagnosis, and treatment administered. The district focal point enters the data into a database to electronically transmit to the regional, then central level. On a quarterly basis, the NMCP will report results through a bulletin and various reports. The long-term vision of the sites is to provide trends in malaria incidence, mortality rates, consultation rates and quality of malaria diagnosis. An evaluation of the Sentinel-Based Surveillance of Malaria-Attributable Mortality in Côte d'Ivoire was conducted in late 2018 for measured malaria mortality.

Table 11. Surveillance, Monitoring, and Evaluation Data Sources

Data Source	Survey Activities	Year									
		2012	2013	2014	2015	2016	2017	2018	2019	2020	
Household surveys	Demographic Health Survey (DHS)	X							(X)		
	Malaria Indicator Survey (MIS)					X					
	Multiple Indicator Cluster Survey (MICS)					X					
	TRaC survey		X								
Health Facility and other surveys	Service Provision Assessment (SPA)										
	Service Availability Readiness Assessment (SARA) survey					X		X			
Malaria Surveillance and Routine System Support	Support to parallel malaria surveillance system										
	Support to HMIS (RHIS performance survey: PRISM)	X						X			
	Support to Integrated Disease Surveillance and Response (IDSR)										
Other Surveys	EUV					X	X	X	(X)	(X)	
	School-based malaria survey										
	Other (specify) Health Facilities Survey : Evaluation of malaria prevention and case management activities in Côte d'Ivoire	X				X					

Progress since PMI was launched

To guide the NMCP, a specific Monitoring and Evaluation plan was drafted by the NMCP (*Plan Suivi et Evaluation*) to accompany the NMSP 2016-2020. This plan was distributed to both the regions and districts. The NMCP's approach to RHIS strengthening for malaria is an integrated approach which uses DHIS2 as a main source for routine malaria data. The work consists of standardizing community-level data collection, integrating community level indicators into DHIS2, assisting with data validation in the private sector, strengthening the NMCP M&E (training, developing a specific electronic tool to improve the monitoring of malaria intervention and training related to malaria), developing the malaria dashboard in DHIS2, and building capacity in data management.

A rapid assessment of 50 private clinics to examine the technical and organizational capacity for service delivery and data management was conducted in 2018 with the Global Fund support. This is a precursor to selecting the private clinics and integrating them into the national health system. Thus, the integration process begins by the training of the health care providers and data managers from the private clinics. These training sessions are useful for strengthening the capacity of physicians, nurses, midwives and data managers for better quality service delivery and quality data.

PMI supported the participation of four NMCP M&E staff in the regional two week Malaria S&ME course in Grand Bassam in spring 2018. There has been some training in the private sector: 60 data managers in private clinics were trained on malaria information collection. In addition, CHWs were trained on the use of the paper based data collection tools the week of September 24-28, 2018.

Since activities began in Côte d'Ivoire, PMI assisted the DIIS and NMCP to identify additional malaria indicators to be collected at the community level and developed complementary data collection tools. The community information system is designed in DHIS2. Eighteen CHWs who are in charge of implementing home-based care (*Prise en charge a domicile; PECADOM*) in two districts (Abengourou and Aboisso) were trained on the use on these tools September 24, 2018 in Aboisso. PMI also supported training of 19 NCMP staff (4 from the M&E team) and three people from the private sector on DHIS software.

Creation of Malaria dashboard in DHIS2: Over 20 dashboard indicators including 5 prevention and 6 case management indicators were selected and were launched in DHIS2. In addition, a specific malaria report based on the malaria performance framework was included. In 2018, six dashboards were produced.

Routine data validation and use: One data validation and use workshop for the private health sector and three for PMI health regions were supported. The SNIS (through DHIS2) holds meetings every four months to validate their data. There were four that occurred in 2017 and two in 2018. In addition, 4 meetings for data validation occurred in 39 private clinics. One challenge that was encountered was the reports had not been internally validated before the meetings.

Development of malaria bulletin: PMI has supported the development of a bi-annual malaria bulletin which will be launched in late 2018. It is currently under review by the NMCP and it will be distributed to the program, who will further distribute it to relevant partners. It features epidemiologic information about number of cases and mortality related to malaria.

Data management capacity building: Thirty two district malaria focal points from the 34 PMI districts completed 5-day training in the use of DHIS2 in September, 2018 in Jacquville. The topic areas addressed were data quality assessment and use of information. Four staff members from the NMCP attended the Regional Malaria M&E course in Burkina Faso.

Plans and justification for proposed activities with FY 2018 and FY 2019 funding:

With FY 2018 and FY 2019 funding for SM&E activities, PMI's goal is to continue building a solid foundation based on reliable data. For this, PMI will support quarterly audits of the data, providing feedback after each one with the aim of improving data quality. As data is further decentralized, PMI will support the strengthening of HMIS as the regional, and more importantly, district levels through targeted technical assistance. With FY 2018 funds, PMI will support the conduct of an SME course, building on the previous course, aimed at regional coordinators and other SME staff in health regions/districts. This course will be repeated every two years. CDC will provide technical assistance visits to support the work of the M&E coordinators in the NMCP and in the regions.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.

d. Operational research

NMCP/PMI objectives

The NMSP 2016-2020 states that the NMCP is assisted by its GSA and a steering committee whose mission is to support the implementation of activities. The strategic plan emphasizes the need for better monitoring and evaluation. The plan also highlighted that: 1) all studies (entomological, parasitological, and vector transmission) initiated by the NMCP should be conducted in collaboration with the consortium of research centers via the GSA; and 2) any research activities should support local capacity building and the reinforcement of coordination between NMCP and researchers to harmonize and prioritize research efforts.

Through their discussions with PMI and the Global Fund, the current research agenda is focused on evaluating malaria related mortality in Côte d'Ivoire and the barriers to collecting accurate mortality data. Previous topics considered for further research include implementing studies to measure the durability of long-lasting ITNs, monitoring insecticide resistance, and therapeutic efficacy studies for first-line treatment for malaria. At this stage, the NMCP has not clearly identified questions and/or projects of interest that would benefit from PMI supported operational research financing. During the next year, PMI will work with the GSA, the NMCP, and the PMI vector control technical working group to identify subjects important to the NMCP that could benefit from more studies.

Progress since PMI was launched

No PMI-supported OR has been completed, is ongoing or planned.

Plans and justification for proposed activities with FY 2018 and FY 2019 funding:

There are no OR activities planned with FY 2018 and FY 2019 funding.

e. Other health systems strengthening

NMCP/PMI objectives

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

Strengthening health systems is a fundamental objective of the NMCP in Côte d'Ivoire. The NMCP supports expansion of efforts to train, supervise and overall capacitate healthcare workers to effectively deliver malaria prevention and control interventions at all levels of the health care system in Côte d'Ivoire. The NMCP partners with the national public health pharmacy to support strengthened warehousing and distribution of essential malaria commodities to all health facilities nationwide. The NMCP also supports improving the quality of malaria data collection and reporting throughout the health system and works to support regional malaria data review meetings at least quarterly to analyze malaria data and identify implications for programming.

With its counterpart and willingness-to-pay requirements, funding from the Global Fund has prompted Côte d'Ivoire to invest more in public health generally and in malaria control specifically. Program planning, activities and budgeting remain areas that need to be strengthened, as activities are often implemented under urgent conditions because timetables overlap with the Ministry of Health's other activities. These shortcomings are linked to excessive workloads due to a lack of personnel. The NMCP is currently faced with the major challenge of coordinating interventions supported by both the Global Fund and PMI, which places an important burden on the staff, thus the need of strengthening the NMCP organizational and management capacities.

Progress since PMI was launched

In early October 2018, PMI supported the first Malaria Task Force meeting, held in Jacqueville involving the NMCP and Implementing Partners' regional health offices, to review malaria indicators and progress achieved in activities. Such meetings will be held every six months moving forward with PMI support. PMI sponsored the participation of two NMCP staff to attend the RBM SBCC Working Group meeting in Zambia in late September 2018. An important milestone achieved in strengthening the health system was the recruitment using PMI resources of ten regional malaria advisors who will support the 20 health regions (one advisor for two regions) to better implement and report on malaria prevention and control activities.

Plans and justification for proposed activities with FY 2018 and FY 2019 funding:

With FY 2018 and FY 2019 funding, PMI will continue providing support to the NMCP to convene different malaria technical working groups on a routine basis with the goal of ensuring effective coordination and technical support of all stakeholders active in malaria control efforts in Côte d'Ivoire. Each technical working group (i.e., SM&E, vector control, research) will be convened at least semi-annually.

PMI will continue to support the ten regional advisors recruited with FY 2017 funding to cover the 20 regions (one per two regions). The objective is to build capacity of the regional and district level health teams for effective malaria program management and implementation. PMI will continue its support to the two long-term technical advisors seconded to the NMCP. The focus of these national level technical advisors will continue to be to build capacity of the NMCP staff for effective malaria control program leadership, management, coordination and oversight of the national program overall. In order to strengthen the coordination capacity of the NMCP currently facing the challenges of managing both the Global Fund and PMI resources and interventions, PMI will support an assessment of the organizational capacity of the NMCP and identify challenges and weaknesses and provide corrective actions.

Also, PMI will support the NMCP to conduct the first in-country malariology course that will involve at least 25 district medical officers throughout the country. This activity will provide participants with a better understanding of the epidemiology of malaria as well as the continuum from control to elimination of malaria, including partnership and the international funding landscape.

With Côte d'Ivoire being a malaria endemic country, there is an important need to build capacity of various research institutions (entomology, parasitology, and medical schools) to enable a better understanding of malaria epidemiology and take appropriate strategic steps towards control and elimination. This long-term effort justifies various capacity building actions listed under this other health strengthening section.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.

5. Staffing and administration

Two health professionals serve as Resident Advisors (RAs) to oversee PMI in Côte d'Ivoire, one representing CDC and one representing USAID. In addition, one Foreign Service National (FSNs) works 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, management of collaborating agencies and supervision of 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.

Please see Table 2 for a detailed list of proposed activities with FY 2018 and FY 2019 funding.