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U.S. PRESIDENT'S MALARIA INITIATIVE

Nigeria

Malaria Operational Plan FY 2022

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This FY 2022 Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans relies on the final FY 2022 appropriation from U.S. Congress. Any updates will be reflected in revised postings.

This document was prepared in the early months of 2021 as the COVID-19 pandemic continued to evolve worldwide, including in PMI-focus countries. The effects of the pandemic on malaria control and elimination work in 2022 are difficult to predict. However, because U.S. Congressional appropriations for PMI are specific to work against malaria and any appropriations for work against the COVID-19 are specific for that purpose and planned through separate future U.S. Government planning processes, this FY 2022 MOP will not specifically address the malaria-COVID-19 interface and will reassess any complementary work through timely reprogramming in countries.

CONTENTS

ABBREVIATIONS

ACSM	Advocacy, communication, and social mobilization
ACT	Artemisinin-based combination therapy
AI	Active ingredient
AL	Artemether-lumefantrine
AMF	Against Malaria Foundation
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
BE	Behavioral economics
BMGF	Bill & Melinda Gates Foundation
BSS	Behavioral Sentinel Survey
C19RM	COVID-19 Response Mechanism
CDC	U.S. Centers for Disease Control and Prevention
CHIPS	Community health influencers, promoters, and services
cIPTp	Community intermittent preventive treatment of malaria in pregnancy
CORP	Community-oriented research persons
CY	Calendar year
DHIS2	District Information Health Software 2
DHS	Demographic and Health Survey
DP	Dihydroartemisinin-piperaquine
DQA	Data quality assurance
DRF	Drug Revolving Fund
eLMIS	Electronic Logistics Management Information System
EM/IR	Entomological monitoring and/or insecticide resistance management
EPI	Expanded Program on Immunizations
EUV	End-use verification
FCDO	United Kingdom Foreign, Commonwealth, and Development Office
FCT	Federal Capital Territory
FETP	Field Epidemiology Training Program
FY	Fiscal year
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GON	Government of Nigeria
HBHI	High burden high impact
HC3	Health Communication Capacity Collaborative
HSS	Health systems strengthening
IAS	Injectable artesunate
iCCM	Integrated community case management
Interceptor G2	Interceptor G2 nets
IPC	Interpersonal communication
IPTi	Intermittent preventive treatment for infants
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying

ITN	Insecticide-treated mosquito net
KOICA	Korean International Cooperation Agency
LGA	Local Government Area
LMCU	Logistics Management Coordination Unit
LSM	Larval source management
M&E	Monitoring and evaluation
MICS	Multiple Indicator Cluster Survey
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MNCH	Maternal, newborn, and child health
MNCHN	Maternal, newborn, child health, and nutrition
MOH	Ministry of Health
MOP	Malaria Operational Plan
MOU	Memorandum of Understanding
NAFDAC	National Agency for Food and Drug Administration and Control
NCDC	Nigeria Centre for Disease Control
NHLMIS	National Health Logistics Management Information System
NLNG	Nigeria Liquefied Natural Gas Company
NMDR	National Malaria Data Repository
NMEP	National Malaria Elimination Program
NMORA	National Malaria Operations Research Agenda
NMSP	National Malaria Strategic Plan
NPSCMP	National Product Supply Chain Management Program
OIC	Officers-in-Charge
OR	Operations research
PBO	Piperonyl butoxide
PE	Program evaluation
PF	Philanthropic funding
PHC	Primary healthcare
PMI	U.S. President's Malaria Initiative
PPE	Personal protective equipment
PPMV	Patent and proprietary medicine vendors
PSM	Procurement and supply management
QA	Quality assurance
QC	Quality control
RDT	Rapid diagnostic test
SBC	Social and behavior change
SMC	Seasonal malaria chemoprevention
SM&E	Surveillance, monitoring, and evaluation
SMEP	State Malaria Elimination Programs
SOP	Standard operating procedures
SP	Sulfadoxine-pyrimethamine
SPAQ	Sulfadoxine-pyrimethamine + amodiaquine
SuNMaP II	Support to the National Malaria Programme – Phase II in Nigeria program

TA	Technical assistance
TES	Therapeutic efficacy studies
TWG	Technical working group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Nigeria to end malaria. PMI has been a proud partner of Nigeria since 2011, helping to decrease child death rates by 16 percent according to the Nigeria Demographic and Health Survey (DHS) and reduce malaria parasite prevalence from 42 percent (in 2010) to 23 percent (in 2018) through investments totaling almost $712 million.

The proposed PMI fiscal year (FY) 2022 budget for Nigeria is $68 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Nigeria using FY 2022 funds. Developed in consultation with the National Malaria Elimination Program (NMEP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Nigeria (GON) as well as other donors and partners.

According to the World Malaria Report 2020, Nigeria contributed to 27 percent of the global malaria burden in 2019 and accounts for 23 percent of the global estimated malaria deaths. Malaria is transmitted throughout Nigeria, with 76 percent of the population living in high-transmission areas and 24 percent in low-transmission areas. In Nigeria, the climate varies from arid in the north to a predominantly humid climate in the south. Rainfall is highest in the northern parts of the country between the months of June and September and from March to November in the southern parts, which usually coincides with the peak incidence of malaria. The malaria case incidence is 303.3 per 1,000 population at risk.

The current 2021–2025 National Malaria Strategic Plan (NMSP) is based on the vision of achieving a malaria-free Nigeria with a goal of reducing malaria morbidity to less than 10 percent parasite prevalence and mortality attributable to malaria to less than 50 deaths per 1,000 by 2025. To achieve these indicators, PMI will support investments in the following intervention areas with FY 2022 funds:

Vector Control

In accordance with joint planning with the NMEP and State Malaria Elimination Programs, PMI currently supports insecticide-treated mosquito net (ITN) procurement and distribution in 11 states, longitudinal vector bionomics surveillance, insecticide resistance monitoring, development of ITN procurement decision tree and developing national vector surveillance and insecticide resistance implementation guide. Due to the withdrawal of United Kingdom's Foreign, Commonwealth, and Development Office (FCDO) funding for malaria in Nigeria (under the Support to the National Malaria Programme [SuNMaP] II project), PMI plans to reprogram FY 2021 funds to expand entomological monitoring support to an additional non-PMI-focus state, Kaduna State sentinel site. PMI will also intensify its efforts in Kebbi to support the state to drive down malaria prevalence, starting with the procurement of dual active ingredient (AI) Interceptor G2 nets. PMI support includes enhanced entomological and epidemiological impact monitoring of the Interceptor G2 nets in Kebbi along with piperonyl butoxide (PBO) nets in Sokoto, as well as supporting streamlined durability monitoring of the Kebbi dual AI Interceptor G2s. We are continuing to support the partnership with Nigerian Liquified Natural Gas (NLNG) to eliminate malaria on

Bonny Island including provision of PBO nets and entomological monitoring, and are partnering with the Against Malaria Foundation (AMF) to move forward the ITN campaign in Akwa Ibom.

With FY 2022 funds, PMI will maintain support for vector control monitoring in all 11 PMI-focus states and entomological monitoring for five non-PMI-focus states (including Bayelsa, Bonny Island [Rivers], Enugu, Federal Capital Territory [FCT], and Kaduna). PMI will continue to transition ITN procurements to PBO and dual AI ITNs, as appropriate. With FY 2022 funds, PMI is proposing to procure and distribute 6.6 million PBO nets for Plateau and Zamfara states. PMI will also continue to support the expanded entomological monitoring sites in Kebbi and Sokoto states to facilitate monitoring of Interceptor G2 and PBO nets, respectively. Streamlined durability monitoring of Kebbi Interceptor G2 nets will continue to be supported, with the addition of supporting the 36-month study round of standard net durability monitoring currently taking place under the New Nets Project.

Human Health

Case Management: PMI supports technical assistance (TA) at the federal level and in the 11 PMI-focus states in the following key areas: (1) procuring and distributing diagnostic and treatment commodities, (2) training and supervising laboratory and clinical care personnel in accurate malaria diagnostics and appropriate treatment, and (3) implementing quality assurance (QA) systems for malaria diagnostics. Proposed investments for case management with FY 2022 funds will support capacity-building, expand malaria diagnostic QA efforts to all supporting states, expand community-based services, and strengthen integrated community case management (iCCM) within the new Community Health Influencers, Promoters, and Services (CHIPS) program with a particular focus on Kebbi State. PMI/Nigeria is exploring expanding RDT support to select private facilities as a strategy to increase diagnostics of suspected malaria in all sectors.

Drug-Based Prevention: PMI supports drug-based prevention programs, namely Malaria in Pregnancy (MIP) and Seasonal Malaria Chemoprevention (SMC) in Zamfara State. Proposed investments will be maintained for MIP and SMC. For MIP's social and behavior change (SBC) interventions, PMI will leverage Maternal, Newborn, and Child Health (MNCH) funds in four states (Kebbi, Sokoto, Bauchi, and Ebonyi) to address behavioral barriers to antenatal care (ANC) and intermittent preventive treatment in pregnancy (IPTp) uptake. Nigeria has expanded the number of eligible states for SMC, so there is a possibility of expanding SMC to another PMI-supported state depending on funds availability.

Cross-Cutting and Other Health Systems

Supply Chain: PMI will support supply chain coordination at all levels of government in Nigeria and will reach more health facilities with malaria commodities through the Drug Revolving Fund (DRF) scheme. This will improve the current level where, on average, only 36 percent of public health facilities are supported by PMI with malaria commodities. COVID-19 pandemic movement restrictions affected malaria commodity availability from countries of origin resulting in significant low inventory levels at the central level in Nigeria. With FY 2022 funds, PMI will invest in strengthening the DRF scheme, medicines quality and regulation, and linkages that improve availability and access to malaria medicines in private sector health service providers, and at the community level.

Surveillance Monitoring and Evaluation: With FY 2022 funds, PMI will continue to support malaria surveillance system strengthening, monitoring, and evaluation (SM&E) efforts of malaria interventions as stated in the

country's National M&E Strategy Plan (2021–2025) including the technical and operational support for the National Malaria Data Repository (NMDR).

Program Evaluation (PE) and Operational Research (OR): PMI will continue to facilitate partnerships among NMEP, partners, and in-country research institutions, as well as building staff capacity. Given the sustained high malaria burden in Kebbi State, PMI is considering alternative approaches to malaria control. One of these alternatives includes planned reprogramming of FY 2021 funds to conduct a feasibility pilot for targeted larval source management (LSM) in Kebbi State.

Social and Behavior Change: With FY 2022 funds, PMI will continue to support SBC activities, expand SBC TA support to service delivery partners, and strengthen SBC capacity at both national and state levels. Capacity-building efforts will focus on improving coordination, planning, design, and evaluation of SBC programs; development and operationalization of annual operational and SM&E plans; and data analysis and use capacity for advocacy, communication, and social mobilization (ACSM) staff to inform SBC program priorities and strategies.

Other Health Systems Strengthening (HSS): PMI will continue to support NMEP's capacity-building, the World Health Organization/National Professional Officers (WHO/NPO), health finance, leadership and governance, strengthening capacity of local nongovernmental organizations to implement malaria control efforts and support to NMEP to enable program and supportive supervision at the district level (unless that supervision is intervention-specific). PMI will continue training of new advanced Field Epidemiology Training Program (FETP) students to support the NMEP's program planning, management, and monitoring and evaluation (M&E) unit to strengthen malaria surveillance at the national and subnational levels and will also support two National Youth Service malaria volunteers to support malaria activities in select states in the country.

1. INTRODUCTION

The U.S. President's Malaria Initiative (PMI)—led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention (CDC)—delivers cost-effective, lifesaving malaria interventions alongside catalytic technical and operational assistance to support Nigeria to end malaria. PMI has been a proud partner of Nigeria since 2011, helping to decrease child death rates by 16 percent according to Nigeria Demographic and Health Survey (DHS) and reduce malaria parasite prevalence from 42 percent (in 2010) to 23 percent (in 2018) through investments totaling almost $781 million.

The proposed PMI fiscal year (FY) 2022 budget for Nigeria is $68 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Nigeria using FY 2022 funds. Developed in consultation with the National Malaria Elimination Program (NMEP) and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country context and health system. Proposed PMI investments support and build on those made by the Government of Nigeria (GON) as well as other donors and partners.

Nigeria at a Glance

- **Geography:** Nigeria is on the west coast of Africa with a surface area of 923,708 square kilometers lying between latitudes 4–14°N and longitudes 2–15°E. It borders Cameroon in the east, Benin to the west, Chad to the northeast, Niger to the north, and the Atlantic Ocean to the south.[1]
- **Climate and Malaria Transmission Seasonality:** The climate varies from arid in the north, with annual rains of 600–1,000 mm lasting for three or four months, to predominantly humid climate in the south with an annual average rainfall of 1,300–1,800 mm (and in some coastal areas up to 2,500 mm) lasting for 9–12 months. Rainfall is highest in the northern parts of the country between the months of June and September and from March to November in the southern parts, which usually coincides with the peak incidence of malaria.
- **Population in 2021:** Approximately 227 million[2] (National Population Commission, 2006)
- **Population at Risk of Malaria:** 97%[3]
- **Principal Malaria Parasites:** *Plasmodium falciparum*[4]
- **Principal Malaria Vectors:** *Anopheles gambiae* s.l.[5]
- **Malaria Case Incidence per 1,000 Population:** 303.3 per 1,000 population at risk[6]
- **Under-Five Mortality Rate:** 132 per 1,000 live births[7]

[1] National Malaria Strategic Plan: 2021–2025, National Malaria Elimination Programme, Federal Ministry of Health, Abuja.
[2] 2006 National Census, National Population Commission.
[3] National Malaria Strategic Plan: 2021–2025, National Malaria Elimination Programme, Federal Ministry of Health, Abuja.
[4] National Malaria Strategic Plan: 2021–2025, National Malaria Elimination Programme, Federal Ministry of Health, Abuja.
[5] National Malaria Strategic Plan: 2021–2025, National Malaria Elimination Programme, Federal Ministry of Health, Abuja.
[6] World Health Organization. (2019). Global Health Observatory Data Repository/World Health Statistics.
[7] National Population Commission – NPC and ICF. 2019. Nigeria Demographic and Health Survey 2018 Final Report.

- **World Bank Income Classification and Gross Domestic Product (GDP):** Nigeria is a lower middle-income country with a GDP per capita of $2,229.9[8]
- **Government Health Budget[9]:** 380,208,769,472.37 Naira ($938.8 million)
- **Trafficking in Persons Designations, 2018–2020:** Tier 2[10]
- **Malaria Funding and Program Support Partners Include:**
    - Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund)
    - U.S. President's Malaria Initiative (PMI)
    - World Bank (WB)
    - Islamic Development Bank (IDB)
    - World Health Organization (WHO)
    - United National Children's Fund (UNICEF)
    - Bill & Melinda Gates Foundation (BMGF)
    - Clinton Health Access Initiative (CHAI)
    - GiveWell Community Foundation (GWCF)
    - Against Malaria Foundation (AMF)
    - Nigeria Liquefied Natural Gas Company (NLNG)
- **PMI Support of National Malaria Control Strategy:** PMI supports key intervention areas in the national malaria control strategy but prioritizes the areas of Nigeria with the highest burden of malaria to achieve the greatest reduction in malaria morbidity and mortality. As such, PMI support is focused in the 11 states of Akwa Ibom, Bauchi, Benue, Cross River, Ebonyi, Kebbi, Nasarawa, Oyo, Plateau, Sokoto, and Zamfara. In other areas of Nigeria, PMI provides support for vector surveillance, insecticide resistance monitoring, surveillance of antimalarial medicines and other technical areas through collaborative efforts led by the NMEP and other partners. (See III. Overview of PMI's support of Nigeria's Malaria Control Strategy for additional details.)
- **PMI Investments:** Nigeria began implementation as a PMI-focus country in FY 2011. The proposed FY 2022 PMI budget for Nigeria is $68 million; this brings the total PMI investment to nearly $849 million.

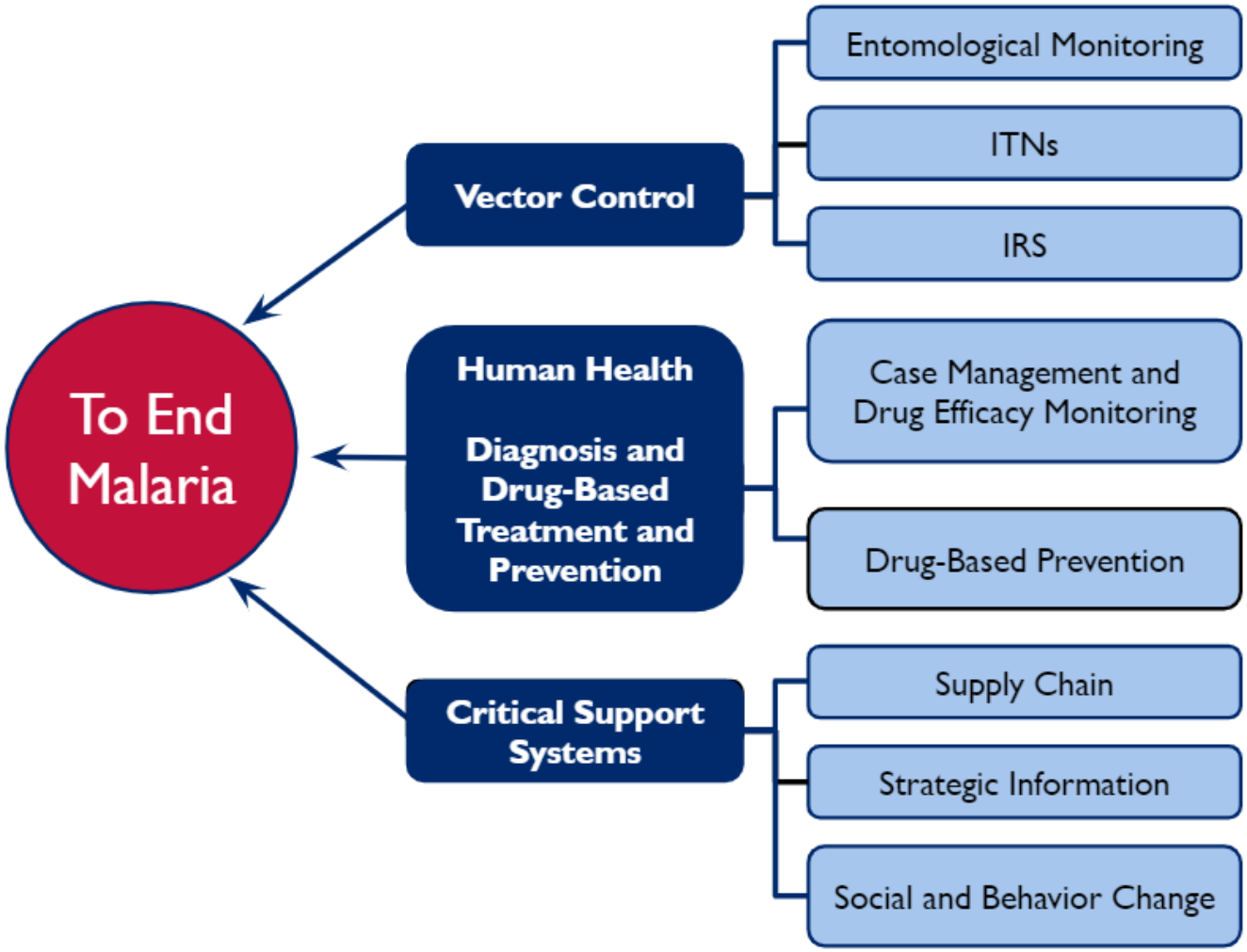
PMI organizes its investments around the activities below, in line with the Nigeria National Malaria Strategy 2021–2025.

[8] World Bank Open Data. 2019. GDP Per Capita in Current US Dollars. World Bank.

[9] https://www.budgetoffice.gov.ng/: Figure reflects only the Federal budget. Each state has its health budget.

[10] United States Department of State, 2020 Trafficking in Persons Report – Nigeria, June 2020

Figure 1. PMI's approach to end malaria[11]



Building and strengthening the capacity of Nigeria's people and institutions—from the central level to communities—to effectively lead and implement evidence-based malaria control and elimination activities is paramount to PMI. The majority of PMI's planned support for FY 2022, across the areas of vector control, human health, and critical support systems such as supply chain, contains elements of capacity-building and system strengthening. PMI/Nigeria will continue to rely on and engage with local partners such as local nongovernmental organizations, universities/research institutions, and local logistics partners, and is expanding its local partner base to reach more civil societies and health professional groups. Finally, PMI/Nigeria will continue to rely on private sector partnerships such as working with the NLNG company on Bonny Island.

[11]A number of actions are cross-cutting in nature. For example, social and behavior change (SBC) is embedded in all vector control and human health work; program evaluation (PE) and operational research (OR) are relevant in all of the fieldwork; finance and management support and the introduction of new tools/interventions are critical for all programs; and elimination requires work across the full spectrum of transmission.

The activities proposed in this MOP are tailored to draw on these strengths and address weaknesses; activities will be monitored to evaluate the effectiveness of capacity-building efforts. In addition, while PMI understands it will take time for Nigeria to fully finance its development priorities, PMI will work with other partners (e.g., the Global Fund) to jointly track Nigeria's funding commitments across the malaria portfolio.

II. MALARIA SITUATION AND PROGRESS

Malaria is transmitted throughout Nigeria, with 97 percent of the population at risk of malaria. Five ecological zones define the intensity and seasonality of transmission and mosquito vector species: mangrove swamp, rainforest, Guinea-savannah, Sudan-savannah, and Sahel-savannah. These various ecological zones with transitional mosaics are distinguished by rainfall and other climatic conditions. The rainfall duration ranges from about three months in the Sahel-savannah to nine months in the mangrove swamps and rainforest. These climatic patterns affect vegetation and most flora and fauna are differentiated across the ecological zones. Nigeria's 2021–2025 National Malaria Strategic Plan (NMSP) recommends at least three entomological sentinel sites in each of the ecological zones, which will generate data on vector bionomics, while insecticide resistance monitoring is recommended to be carried out in each state. The duration of the transmission season ranges from year-round transmission in the south to three months or less in the north. *Plasmodium falciparum* is the predominant malaria species. The primary vector across most of the country is *Anopheles* (*An.*) *gambiae* s.s., accounting for 67.1 percent of all the *An. gambiae* s.l. collected, with *An. funestus* as a secondary vector in some areas of Nigeria (2020 Nigeria Entomology Report).

According to the World Malaria Report 2020, Nigeria contributed to 27 percent of the global malaria burden in 2019 and accounts for 23 percent of the global estimated malaria deaths. The 2018 DHS reported a fever prevalence of 24 percent in children in the two weeks before the survey. Of those with fever, 72 percent sought advice or treatment. Microscopy data from the 2018 DHS showed that the prevalence of malaria parasitemia in children under five years of age was 23 percent, with regional differences, ranging from 16 percent in the South South and South East Zones to 34 percent in the North West Zone. The prevalence of malaria parasitemia in rural populations is 2.4 times that of urban populations (31 percent vs. 13 percent) and when compared with the highest socioeconomic group, the prevalence among children in the lowest socioeconomic group is more than six times higher (38 percent vs. 6 percent). A further molecular analysis of blood samples collected for the Nigerian HIV/AIDS Indicator and Impact Survey, using the multiplex bead-based assay, showed the highest prevalence of malaria among children 9 to 14 years of age. This analysis provided first time estimates of malaria antigen across all age groups.

In response to the malaria situation and to guide implementation, the NMEP initiated the High Burden High Impact (HBHI) approach with technical support from the WHO and technical partners to address the malaria situation in Nigeria. Key steps taken include an analysis leading to subnational tailoring of interventions (stratification), development of a National Malaria Data Repository (NMDR) with program tracking dashboards, and development of a national malaria strategic operational plan to guide implementation.

Within Nigeria, Kebbi State (a PMI-focus state) has the highest malaria prevalence at 52 percent in children under five years of age (see Figure 2 below for more background). PMI will intensify its efforts in Kebbi to support the state to drive down malaria prevalence, starting with the procurement of dual Active Ingredient (AI) Interceptor G2 Insecticide-Treated Nets (ITNs) using FY 2020 funding. This MOP continues to reflect this increased support.

Figure 2. PMI focus on Kebbi State

The intolerable malaria burden in Kebbi state: what's known, needed.

The Burden

- Prevalence of malaria among children is highest in Kebbi at 52% (DHS 2018).
- Between 2017 and 2020, total # malaria cases grew by 54% and severe cases by 34%.*
- Test positivity rate ranges from 75% to 78%.*
- % cases in children under five years of age ranges from 44% to 46%.*

The Context

- 2022 Population Estimate: 5,278,369.** Annual growth rate of 3.1%, estimated 72% of state live in rural areas
- Economic mainstay is agriculture, in particular, rice farming.
- Resistance to pirimiphos-methyl was observed in four local government areas (LGAs) in Kebbi.
- ITN Access 77.6%; Use 81.6% (DHS 2018).
- ITN Use:Access Ratio 0.98 (for Northwest Nigeria).
- Less than 20% of households in Southwest Kebbi have ITNs available for effective coverage (Behavioral Sentinel Survey [BSS] 2019).
- Most cited reason for ITN nonuse (41%) was that "*the net was not needed*" (DHS 2018).
- Although most children with fever sought care (73.1%), only 32.3% did within 48 hours.
- Barriers to uptake of care-seeking behaviors includes a mix of internal, social, and structural factors. Distrust in public facility-based care, especially free medicines and gender norms that restrict women's movement are social factors that bear on child care-seeking behaviors.
- In 2019, USAID and the Kebbi state government signed a five-year Memorandum of Understanding (MOU) to strengthen PHC systems.
- The MOU presents roles, indicators, and targets for both MOU parties across all HSS blocks.

What's known

- PMI's support to Kebbi state commenced in 2013 and intervention strategies include ITN, entomological monitoring and/or insecticide resistance management (EM/IR), IPTp, case management, procurement and supply management (PSM), SBC, and surveillance.
- PMI has supported four ITN mass/replacement campaigns (2013, 2015, 2018, and 2021).
- In 2021, PMI procured 2.8 million IG2 nets with planned support for a streamlined durability monitoring.

What's Needed

Reach the unreached

- Implement iCCM in areas with highest transmission yet low intervention coverage.
- ITN replacement campaigns to prioritize coverage for households in Southwest Kebbi.
- Targeted, data-driven scale-up of community-level SBC interventions to increase care-seeking for fever within 24 hours, provider adherence to case management guidelines, and maintenance of ITN use and care behaviors.
- Leverage MNCH funds to address behavioral barriers to ANC and IPTp uptake.

Make community health systems work

- Scale up to broaden the scope of engagement with Ward Development Committees to strengthen facility–community linkages.
- Support the operationalization of Community Health Influencers and Promoters (CHIPS) program.

Invest in people and leaders closest to those we serve

- Seek out traditional and nontraditional private sector partners to co-fund malaria.

Shifts in PMI programming in Kebbi State

- Reprogram FY 2021 funds to conduct a feasibility pilot for targeted LSM in Kebbi State.
- Enhanced community level programming support, for demand, service delivery and management.

* Source: HMIS/DHIS2, from total number of health facilities in Kebbi State reporting data into the HMIS/DHIS2 system between 2017 and 2020.

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Figure 3. Trends in malaria prevalence

Children 6 to 59 months of age who tested positive for malaria by microscopy/rapid diagnostic test (RDT) [DHS/2018]

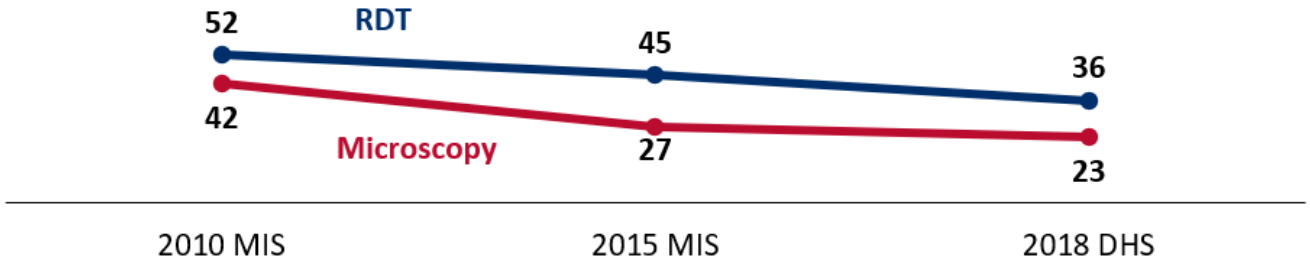
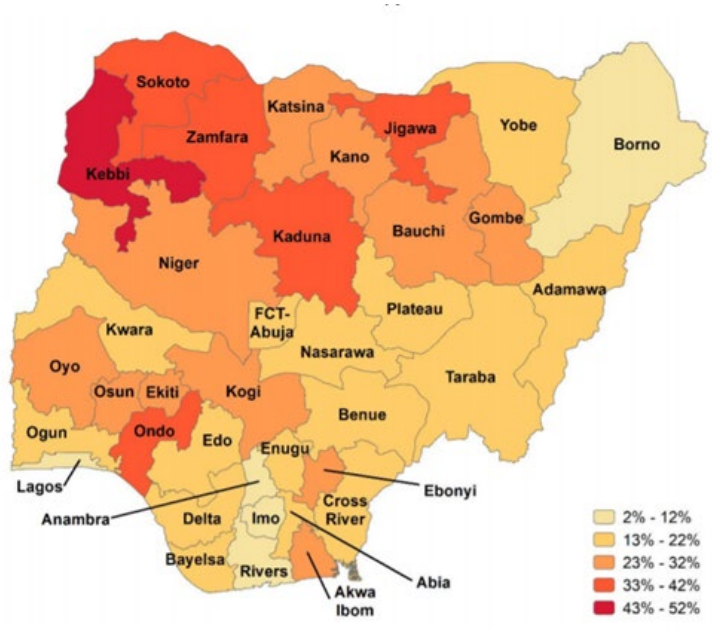


Figure 4. Malaria prevalence by geographic area

Children 6 to 59 months of age who tested positive for malaria by microscopy/RDT [DHS/2018]



Stratification by geographic area shows that the northwestern states have the highest percentage of positive malaria tests.

Table 1. Key indicators from demographic health surveys (DHS) and malaria indicator surveys (MIS) from 2010–2018

Indicator	2010 MIS	2011 MICS	2013 DHS	2015 MIS	2016 MICS	2018 DHS
% Households with at least one ITN	42%	41%	50%	69%	65%	60%
% Households with at least one ITN for every two people	14%	n/a	22%	35%	32%	30%
% Population with access to an ITN	29%	n/a	36%	55%	50%	47%
% Population that slept under an ITN the previous night*	23%	n/a	13%	37%	41%	43%
% Children under five years of age who slept under an ITN the previous night*	29%	16%	17%	44%	49%	52%
% Pregnant women who slept under an ITN the previous night*	34%	17%	16%	49%	40%	58%
% Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought[2]	83%	n/a	73%	66%	63%	70%
% Children under five years of age with a fever in the last two weeks who had a finger or heel stick	5%	8%	11%	13%	14%	14%
% Children receiving an artemisinin-based combination therapy (ACT) among children under five years of age with a fever in the last two weeks who received any antimalarial drug	12%	n/a	18%	38%	21%	28%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years[1]	15%	20%	17%	41%	31%	40%
% Women who received three or more doses of IPTp during their last pregnancy in the last two years	n/a	n/a	n/a	21%	15%	17%
<5 mortality rate per 1,000 live births	n/a	158	128	n/a	120	132
% Children under five years of age with parasitemia by microscopy*	42%	n/a	n/a	27%	n/a	23%
% Children under five years of age with parasitemia by RDT*	52%	52%	n/a	45%	n/a	36%
% Children under five years of age with severe anemia (Hb<8gm/dl)**	13%	13%	n/a	9%	n/a	3%

*DHS/Multiple Indicator Cluster Survey (MICS) surveys are generally fielded during the dry season, whereas MIS surveys are deliberately fielded during the high-transmission season, which should be taken into consideration when interpreting these indicators.

**The 2018 DHS includes nutrition cutoff for severe anemia (hemoglobin < 7.0 g/dl). There is no estimate for hemoglobin <8.0 g/dl.

[1]Note that this indicator has been recalculated according to the newest definition, at the specified number of doses of sulfadoxine-pyrimethamine (SP)/Fansidar from any source, wherever possible.

[2]Note that this indicator has been recalculated according to the newest definition, care, or treatment from any source excluding traditional practitioners, wherever possible.

Table 2. Evolution of key malaria indicators reported through routine surveillance systems from 2016–2020

Indicator	2016	2017	2018	2019	2020
# Suspect malaria cases[1]	18,530,219	21,797,297	23,431,139	28,248,224	27,013,175
# Patients receiving diagnostic test for malaria[2]	15,221,965	18,640,349	20,450,528	25,637,654	24,049,641
Total # malaria cases[3]	15,935,066	18,118,061	19,042,032	22,473,582	21,005,907
# Confirmed cases[4]	*10,719,693*	*13,170,255*	*14,810,847*	*18,860,723*	*17,725,943*
# Presumed cases[5]	*5,215,373*	*4,947,806*	*4,231,185*	*3,612,859*	*3,279,964*
% Malaria cases confirmed[6]	67%	73%	78%	83.9%	87.3%
Test positivity rate (TPR)[7]	72%	72%	72%	73.6%	73.7%
Total # <5 malaria cases[8]	6,535,939	7,224,489	7,727,256	8,741,018	7,947,300
% Cases in children under five years of age [9]	41%	40%	41%	38.9%	37.8%
Total # severe cases[10]	251,124	276,425	273,003	267,175	266,701
Total # malaria deaths[11]	n/a	n/a	n/a	n/a	n/a
# Facilities reporting[12]	24,908	27,961	28,646	32,911	29,442
% Data completeness[13]	67%	75%	79%	85.2%	74%

1. Number of patients presenting with signs or symptoms possibly due to malaria (e.g., fever). 2. RDT or microscopy, all ages, outpatient and inpatient. 3. Total reported malaria cases; all ages, outpatient and inpatient, confirmed and unconfirmed cases. 4. Diagnostically confirmed; all ages, outpatient and inpatient. 5. Clinical/presumed/unconfirmed; all ages, outpatient and inpatient. 6. # confirmed cases divided by total # cases. 7. Confirmed cases divided by # patients receiving a diagnostic test for malaria (RDT or microscopy). 8. Outpatient and inpatient, confirmed and unconfirmed. 9. Total # <5 cases divided by total # of cases. 10. There is severe malaria data element captured in the HMIS; includes all cases of *P. falciparum* malaria with certain conditions. 11. All ages, outpatient, inpatient, confirmed, and unconfirmed. 12. Total # of health facilities reporting data into the HMIS/DHIS2 system that year. 13. # monthly reports from health facilities divided by # health facility reports expected.

III. OVERVIEW OF PMI'S SUPPORT OF NIGERIA'S MALARIA STRATEGY

The current 2021–2025 National Malaria Strategic Plan (NMSP) is based on the vision of achieving a malaria-free Nigeria with a goal of reducing malaria morbidity to less than 10 percent parasite prevalence and mortality attributable to malaria to less than 50 deaths per 1,000 by 2025.

The objectives of the 2021–2025 NMSP are as follows:

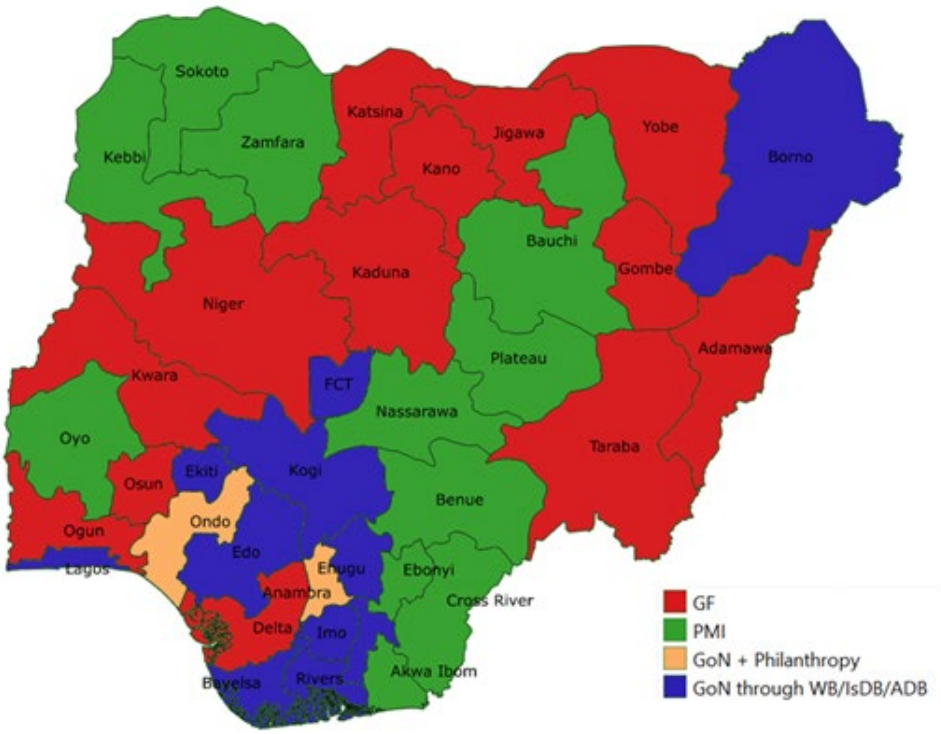
- Improve access and utilization of vector control interventions to at least 80 percent of targeted population by 2025.
- Ensure provision of chemoprevention, diagnosis, and appropriate treatment for 80 percent of the target populations at risk by 2025.
- Improve generation of evidence for decision-making and impact through reporting of quality malaria data and information from at least 80 percent of health facilities (public and private) and other data sources, including surveillance, surveys, and operations research by 2025.

- Strengthen coordination, collaboration, and strategic partnership to promote efficiency and effectiveness of malaria control activities toward achieving at least 75 percent improvement from baseline using a standardized organizational capacity assessment tool.
- Improve funding for malaria control by at least 25 percent annually through predictable and innovative sources to ensure sustainability at federal and subnational levels.

Under the strategic plan, the Government of Nigeria (GON) supports the provision of insecticide treated nets (ITNs), targeted indoor residual spraying (IRS), targeted larval source management (LSM), IPTp, seasonal malaria chemoprevention (SMC), and diagnosis and treatment of uncomplicated malaria through routine health services and integrated community case management (iCCM). The strategy also supports the treatment of severe malaria using injectable artesunate (IAS). There are two cross-cutting strategies: (i) Advocacy, Communication, and Social Mobilization (ACSM); and (ii) Procurement and Supply Management, which are listed in the Strategic Framework. The entire strategic plan is built on the bedrock of a strengthened health system. The 2021–2025 NMSP is aligned with the 2018–2022 National Strategic Health Development Plan and the September 2019 National Health Council theme "Consolidating the Journey toward Achieving Universal Health Coverage" to underscore the global and national goal of achieving universal health coverage by 2030.

In response to the high burden of malaria and under the HBHI approach, WHO supported Nigeria to develop the subnational tailoring of interventions as a means to guide program implementation.

Figure 5. Map showing malaria funding partners by state



To efficiently leverage global malaria resources, PMI coordinates closely with other international organizations, such as Global Fund, as well as the GON to provide maximum coverage of malaria interventions and to prevent duplication of efforts.

Table 3. Malaria donor-supported states in Nigeria with their target populations

Donors	Geography	States	Target Population (2023 projected)	Proportion of Target Population
GON	2 states	Anambra and Ondo	12,254,471	5%
GON through Islamic Development Bank (IDB)	5 states	Bayelsa, Edo, Enugu, FCT/Abuja, and Kogi	21,034,466	9%
GON through World Bank (WB)	6 states	Abia, Borno, Ekiti, Imo, Lagos, and Rivers	47,066,234	20%
Global Fund	13 states	Adamawa, Delta, Gombe, Jigawa, Kaduna, Kano, Katsina, Kwara, Niger, Ogun, Osun, Taraba, and Yobe	90,262,518	38%
PMI	11 states	Akwa Ibom, Bauchi, Benue, Cross River, Ebonyi, Kebbi, Nasarawa, Oyo, Plateau, Sokoto, and Zamfara	65,395,311	28%
All	**36 states + FCT**		**236,013,000**	100%

Table 4. Description of PMI investment areas for the current 11 PMI-focus states.

State	Start-Up Year	PMI Interventions								
		ITN	EM/IR[2]	IPTp	SMC*	CM[1]	iCCM	PSM	SBC	Surv[3]
Cross River	2011	X	X	X		X		X	X	X
Nasarawa	2011	X	X	X	(X)	X		X	X	X
Zamfara	2011	X	X	X	X	X	X	X	X	X
Bauchi	2012	X	X	X	(X)	X	X	X	X	X
Sokoto	2012	X	X	X	(X)	X		X	X	X
Benue	2012	X	X	X		X	X	X	X	X
Ebonyi	2012	X	X	X		X	X	X	X	X
Oyo	2012	X	X	X		X		X	X	X
Akwa Ibom	2013	X	X	X		X		X	X	X
Kebbi	2013	X	X	X	(X)	X	X	X	X	X
Plateau	2017	X	X	X	(X)	X		X	X	X

[1]CM - Case management

[2] EM/IR - Entomological monitoring and/or insecticide resistance management

[3] Surv - Strengthening HMIS/DHIS

*Parenthesis indicates SMC implementation funded by Philanthropic/GiveWell Foundation

IV. PARTNER FUNDING LANDSCAPE

PMI emphasizes the importance of partner alignment for malaria control, recognizing that different partners bring complementary expertise and resources. In recent years, PMI, the Global Fund, and the Bill & Melinda Gates Foundation (BMGF) have harmonized financial, supply chain, and programmatic data. In particular, PMI and the Global Fund agreed to a harmonized financial taxonomy to aid comparison of our investments to better identify potential overlap or gaps.

Due to the U.S. Government fiscal year budget cycle and approximate timing of annual appropriations, PMI MOP resources fund activities that largely occur during the following fiscal year. For example, this FY 2022 MOP is anticipated to largely fund implementation of activities starting in 2023. Global Fund resources are based on the calendar year and planned for a three-year grant cycle. Most partner country governments and other partners also budget based on the calendar year.

The tables below summarize contributions by key external partners and partner country governments in calendar years 2020–2022, providing insight into total country investments. Because new grants funded through the Global Fund 2021–2023 grant cycle are just beginning, or will begin later in 2021, Global Fund country investments may still evolve in some countries. The partner country government invests substantial funding into the national-to-local infrastructure and service delivery that benefits malaria programs and many others. However, it is not always possible to attribute funding for malaria specifically from the partner country government without a standardized method. There may be similar challenges for attributing other partner funds.

Table 5a. Annual budget by Level 1 category for FY 2019/CY 2020

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$23.5M	$27.7M	$2.3M	$6.1M	$2.2M	$8.2M	$70.0M
Global Fund	$50.4M	$33.3M	$36.5M	$0.2M	$3.2M	$15.5M	$139.3M
PF[4]			$11.3M				$11.3M
Total Per Category	$73.9M	$61.0M	$50.1M	$6.3M	$5.4M	$23.7M	$220.6M

Table 5b. Annual budget by Level 1 category for FY 2020/CY 2021

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$28.4M	$27.9M	$2.4M	$6.9M	$4.3M	$7.0M	$77.0M
Global Fund	$4.9M	$8.8M	$32.2M		$0.5M	$55.4M	$101.8M
PF[4]		$18.7M					$18.7M
KOICA[5]		$0.7M					$0.7M
Total Per Category	$33.3M	$56.1M	$34.6M	$6.9M	$4.8M	$62.4M	$198.2M

Table 5c. Annual budget by Level 1 category for FY 2021/CY 2022

Funder	Vector Control	Case Management	Drug-Based Prevention[1]	Supply Chain[2]	Monitoring, Evaluation & Research	Cross-cutting and HSS[3]	Total Per Funder
PMI	$23.6M	$28.3M	$2.5M	$5.0M	$2.6M	$7.0M	$69.0M
Global Fund	$5.6M	$18.6M	$43.2M		$0.7M	$119.8M	$187.9M
PF[4]			$29.8M				$29.8M
KOICA[5]			$0.7M				$0.7M
Total Per Category	$29.2M	$46.9M	$76.2M	$5.0M	$3.3M	$126.8M	$287.4M

1. Drug-based prevention, including SMC and MIP where applicable. 2. Covers management of in-country warehousing and distribution of malaria commodities, except for ITNs, which are separately captured under Vector Control. 3. HSS = health systems strengthening. 4. Philanthropic Funding. Data shared by Malaria Consortium and includes SMC commodities and operational cost for SMC campaign. 5. Korean International Cooperation Agency. Budget data shared by Malaria Consortium and includes commodities and operational cost.

Table 6a. Annual budget, breakdown by commodity, FY 2019/CY 2020

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]		$17.7M		$12.6M	$9.3M	$1.0M	$1.4M		$41.9M
Global Fund[3]		$34.0M		$13.0M	$4.9M	$0.7M	$19.1M		$71.8M
PF[4]							$5.5M		$5.5M
FCDO[6]	$1.7M						$0.9M		$2.6M
AMF[7]		$11.2M							$11.2M
Total	$1.7M	$62.9M	$0.0M	$25.6M	$14.2M	$1.7M	$26.9M	$0.0M	$133M

Table 6b. Annual budget, breakdown by commodity, FY 2020/CY 2021

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]		$22.0M		$11.3M	$8.7M	$0.7M	$1.1M		$43.9M
Global Fund[3]				$1.6M	$1.7M		$8.0M		$11.3M
PF[4]		$10.1M					$9.3M		$19.4M
KOICA[5]							$0.4M		$0.4M
AMF[7]		$13.4M							$13.4M
Total	$0.0M	$45.5M	$0.0M	$12.9M	$10.4M	$0.7M	$18.8M	$0.0M	$88.3M

Table 6c. Annual budget, breakdown by commodity, FY 2021/CY2022

Funder	ITNs *Continuous Distribution*	ITNs *Mass Distribution*	IRS[1] *Insecticide*	ACTs	RDTs	Severe Malaria	SMC-Related	IPTp-Related	Total
PMI[2]		$19.3M		$10.2M	$11.6M	$0.8M	$1.4M		$43.3M
Global Fund[3]				$7.7M	$4.2M		$17.3M		$29.2M
PF[4]		$11.8M					$12.9M		$24.7M
KOICA[5]							$0.4M		$13.4M
Total	$0.0M	$31.1M	$0.0M	$17.9M	$15.8M	$0.8M	$32.0M	$0.0M	$97.6M

Note: Categories reflect the harmonized financial taxonomy (Levels 1-3) developed by BMGF, Global Fund, and PMI in 2019, as part of a broader data harmonization initiative but may continue to evolve. 1. IRS insecticide: for PMI, commodity costs may be inextricable from IRS implementation costs in historical data – field identified as ND where this is the case. 2. PMI commodity costs are fully loaded, including costs for the ex-works price of the commodity, quality control, freight, insurance, and customs. 3. Global Fund commodity costs in the table above only include ex-works commodity value; additional costs, including quality control, freight, insurance, and customs are not included. 4. Philanthropic Funding: cost calculated from commodity data shared by Malaria Consortium. 5. Korean International Cooperation Agency. Budget data shared by Malaria Consortium and includes commodities and operational cost. 6. Foreign, Commonwealth, and Development Office: Estimated cost based on data from Malaria Consortium. 7: Against Malaria Foundation: Cost estimated from commodity quantity in the AMF agreement with Nigeria.

Global Fund COVID-19 Response Mechanism (C19RM)

As the COVID-19 pandemic continues to have a devastating effect on global health systems, the Global Fund COVID-19 Response Mechanism (C19RM) was designed to support countries across three broad categories: (1) COVID-19 control and containment interventions; (2) activities to mitigate the effects of the pandemic on HIV/AIDS, tuberculosis, and malaria; and (3) expanded reinforcement of key aspects of health and community systems, including disease surveillance and laboratory systems and community mobilization. Global Fund C19RM funding requests are based on the National Strategic Preparedness and Response Plan for COVID-19 Pillars so that they are need-based and non-duplicative.

Nigeria's C19RM phase one grant was approved to the principal recipient, National Agency for the Control of AIDS, for the period June 1, 2020–June 30, 2021, for a total of $54,867,411 to support interventions in the broad categories 2 and 3 (listed above). In May 2021, Nigeria submitted a fast-track application totaling $66,281,259 (Global Fund approved $50M) covering mostly medical oxygen. Nigeria aims to submit a phase two C19RM application for the June 30, 2021, window, with available funding for full application of $67,308,391.

Specific to mitigating the impact of COVID-19 on malaria programming, Nigeria's phase two application acknowledges the challenges and opportunities presented by the pandemic for malaria control. Some of these include fever as an entry point for increasing testing rate for COVID-19 using COVID-19 RDTs; leveraging malaria household-based activities that are intended to promote priority behaviors to identify households at risk for COVID-19 with potential for increased testing of COVID-19; SBC on COVID-19, including prevention, testing, and vaccination; and the deployment of mobile technology to improve COVID-19 surveillance activity, specifically, contact tracing.

Aspects of the C19RM funding, as relevant to malaria prevention and treatment, include risk communication to address fear and stigma associated with COVID-19, which reinforce messages on COVID-19 comorbidity with HIV/AIDS, tuberculosis, and malaria, and the importance of screening for the four diseases to make a diagnosis; and reinforce COVID-19 prevention in pregnancy and prevention of malaria in pregnancy including IPTp. Finally, effective community case management of febrile patients will be promoted to facilitate prompt detection and treatment of febrile illnesses including malaria and COVID-19. Other prioritized malaria activities include the following:

- Implementation of the 2021 Malaria Indicator Survey (MIS) with compliance to the National COVID-19 protocol for population-based activities.
- Scale-up of mobile technology in the implementation of mass campaign activities.
- Provision of personal protective equipment (PPE) for mass campaigns (SMCs and ITNs).
- Support upgrade of one laboratory per state to serve as a Malaria Quality Assurance (QA) Centre (with personnel, equipment, consumables).
- Establish Malaria Reference Lab Capabilities within selected existing Nigeria Centre for Disease Control (NCDC) molecular laboratories (personnel, equipment).

Budget for these malaria specific activities totals $19,645,524.

V. ACTIVITIES TO BE SUPPORTED WITH FY 2022 FUNDING

The FY 2022 budget tables contain a full list of activities that PMI proposes to support in Nigeria with FY 2022 funding. Please visit www.pmi.gov/resource-library/mops for these FY 2022 budget tables. Key data used for decision-making for this MOP planned investments is provided in Annex A of this document.

ANNEX A: INTERVENTION-SPECIFIC DATA

This section outlines key data that helped inform decision-making around FY 2022 MOP funding allocations to PMI-supported activities.

1. VECTOR CONTROL

NMEP Objective

Under the 2021–2025 NMSP the first objective is to "improve access and utilization of vector control interventions to at least 80 percent of the targeted population by 2025." The strategic plan includes integrated vector management, which covers entomological sentinel surveillance and insecticide resistance monitoring, universal access to ITNs, targeted IRS, and targeted LSM, if appropriate. Scaling up these vector control interventions is based on epidemiological and entomological surveillance information to guide a local government area (LGA)-level stratification.

Specifically, the 2021–2025 NMSP prevention objective targets for vector control are as follows:

- At least 70 percent of households with at least one ITN for every two people (universal coverage)
- At least 84 percent of children under five years of age sleep under an ITN
- At least 90 percent of pregnant women sleep under an ITN
- At least 90 percent of targeted population protected by IRS within the past 12 months

At least three vector surveillance sentinel sites will be established in each of the five ecological zones. The NMEP aims for universal coverage of ITNs. Due to the large population of Nigeria and the expense of IRS, use of IRS is very limited, though information on resistance patterns to IRS insecticides is monitored.

NMEP Approach

In the context of Nigeria, integrated vector management consists almost entirely of ITN distribution. Use of ITNs is the primary vector control method because IRS is not widely implemented. ITNs are distributed via rolling mass campaigns every three years, organized at the state level, with one ITN for every two persons to achieve universal coverage. In addition, Nigeria supports continuous distribution through routine ITN distribution channels, such as antenatal care (ANC) and Expanded Program on Immunizations (EPI) clinics, using the remaining balance from ITN mass campaigns. With increasingly detailed data on insecticide resistance patterns in the vectors, Nigeria is in a position to better match state-level resistance patterns with the most appropriate and cost-effective ITN product. As such, Nigeria began the transition to new types of nets by procuring and distributing piperonyl butoxide (PBO) nets in Ebonyi State in CY 2019.

PMI Objective in Support of NMEP

PMI supports ITN procurement and distribution in 11 states, in accordance with joint planning with the NMEP and the State Malaria Elimination Programs (SMEPs). PMI also supports longitudinal vector bionomics surveillance and insecticide resistance monitoring. PMI has insecticide resistance data for each of the 11 PMI-focus states, as well as providing support in some non-PMI-focus states. These data are used to make state-level ITN procurement decisions. PMI is supporting the development of an ITN procurement decision tree that will guide all ITN procurement based on insecticide resistance data, as well as supporting the development of a national vector surveillance and insecticide resistance implementation guide to assist in standardization of entomological activities in Nigeria.

PMI-Supported Recent Progress (FY 2020)

- Conducted insecticide resistance monitoring in all 11 PMI-focus states and four non-PMI-focus states (including Bayelsa, Bonny Island [Rivers], Enugu, and FCT).
- Conducted vector bionomics monitoring monthly in five PMI-focus states.
- Commenced design for enhanced entomological and epidemiological monitoring to assess the impact of Interceptor G2 and PBO net distributions in Kebbi and Sokoto states.
- Procured a total of 3.2 million nets for Sokoto, 1.6 million PBO nets for Nasarawa, 2.8 million Interceptor G2 nets (Interceptor G2) for Kebbi, and 3.7 million nets for Akwa Ibom.
- Distributed 10.8 million nets in mass campaigns in Benue, Ebonyi, Plateau, and Zamfara states.
- Supported shipping, transportation, and distribution of 3.75 million PBO nets to be procured by AMF for the mass campaign in Akwa Ibom State to occur in CY 2021.
- Supported preparations for streamlined durability monitoring of Interceptor G2 nets in Kebbi State (distribution planned for late CY 2021).
- Supported development of a national vector surveillance and insecticide resistance implementation guide.
- Procured projecting microscope for the insectary at Nasarawa State University in Keffi.
- Implemented targeted SBC to improve ownership and outcomes for long-lasting insecticide-treated net campaigns in three states (Benue, Plateau, and Zamfara), including demand creation technical support for micro-planning and implemented mid and mass media engagements to increase campaign awareness and demand generation.

PMI-Supported Planned Activities (FY 2021)

- Conduct insecticide resistance monitoring in all 11 PMI-focus states and five non-PMI-focus states (including Bayelsa, Bonny Island [Rivers], Enugu, FCT, and Kaduna).
- Conduct vector bionomics monitoring monthly in five PMI-focus states.
- Continue enhanced entomological and epidemiological monitoring to assess the impact of Interceptor G2 and PBO net distributions in Kebbi and Sokoto states.
- Support shipping, transportation, and distribution of 4.4 million PBO nets to be procured by AMF for the mass campaign in Bauchi State to occur in CY 2022.
- Procure and distribute 4.88 million PBO nets for Cross River and Ebonyi states mass campaigns to occur in CY 2022.
- Support streamlined durability monitoring of Interceptor G2 nets in Kebbi State (distribution planned for late CY 2021).
- Donate PBO nets to cover the entire population (~350,000 people) on Bonny Island in partnership with NLNG.
- Increase awareness, create demand, and improve government commitment for ITN distribution campaigns in Akwa Ibom, Kebbi, Nasarawa, Oyo, Sokoto, and Zamfara states.

1.1. ENTOMOLOGICAL MONITORING

Key Goal

Determine the geographic distribution, bionomics, and insecticide resistance profiles of the main malaria vectors in the country to inform vector control decision-making.

Key Question 1

Where is entomological monitoring taking place, what types of activities are occurring, and what is the source of funding?

Entomological monitoring in Nigeria remains a priority to ensure that vector control interventions are evidence-based. Nigeria currently supports entomological monitoring activities across five ecological zones. PMI supports insecticide resistance monitoring in 11 PMI-focus states, of which five are also vector bionomics surveillance sites, in addition to supporting some non PMI-focus states. Due to the withdrawal of UK FCDO funding for malaria in Nigeria (under the SuNMaP II project), PMI will reprogram FY 2021 funds to expand entomological monitoring support to Kaduna State sentinel site, representing an expansion to an additional non-PMI-focus state. Support to conduct entomological monitoring in Kaduna State is planned to continue with FY 2022 funds. The Global Fund also supports entomological monitoring activities in Nigeria, supporting 12 states as of 2020.

Supporting Data

Table A-1. Entomological monitoring activities

State	Site	Activities	Supported by
Adamawa	Ganye, Mubi North, Numan, Selleng, Song, Yola North	Insecticide resistance monitoring	Global Fund
Akwa Ibom	Abak, Itu, Mpat Enin, Nsit Ubium, Onna, Ukanafun	Vector bionomics monitoring Insecticide resistance monitoring	PMI
Bauchi	Darazo, Dass, Itas/Gadau, Katagun, Ningi, Toro	Insecticide resistance monitoring	PMI
Benue	Apa, Gwer, Obi, Tarkaa, Ukum, Vandeikya	Insecticide resistance monitoring	PMI
Cross River	Abi, Akamkpa, Calabar Municipality, Etung, Obudu, Ogoja	Insecticide resistance monitoring	PMI
Delta	Aniocha South, Ethiope Ease, Ika North East, Isoko North, Okpe, Ukwani	Insecticide resistance monitoring	Global Fund
Ebonyi	Abakaliki, Ebonyi, Ezza North, Ezza South, Ishielu^, Izzi, Ohaozara^, Ohaukwu, Onicha^	Vector bionomics monitoring Insecticide resistance monitoring	PMI
Gombe	Akko, Balana, Billiri, Funakaye, Gombe, Yamaltum/Deba	Insecticide resistance monitoring	Global Fund
Jigawa	Augo, Birni Kudu, Dutse, Kafin Hausa, Rigim, Taura	Insecticide resistance monitoring	Global Fund
Kano	Bunkure, Garun Mallam, Gwarzo, Kura/Warawa, Makoda, Mawal	Vector bionomics monitoring Insecticide resistance monitoring	Global Fund
Katsina	Batagarawa, Bindawa, Funtua, Kaita, Kusada, Malunfashi	Insecticide resistance monitoring	Global Fund
Kebbi	Augie, Fakai, Gwandu, Maiyama, Shanga, Suru	Vector bionomics monitoring	PMI

State	Site	Activities	Supported by
		Insecticide resistance monitoring Streamlined durability monitoring[+]	
Kwara	Asa*, Ifelodun, Illorin East, Illorin South, Illorin West, Moru*	Vector bionomics monitoring Insecticide resistance monitoring Standard durability monitoring*	Global Fund
Nasarawa	Nasarawa[^^], Nasarawa Eggon[^^], Karu[^^], Keana, Keffi, Kokona, Obi, Toto, Wamba,	Insecticide resistance monitoring	PMI
Niger	Bosso, Chachanga, Katchia, Lapai, Paikoro, Shiroro	Vector bionomics monitoring Insecticide resistance monitoring	Global Fund
Ogun	Ado Olu, Obafemi Owode, Odeda, Remo North, Shagamu, Yewa North	Insecticide resistance monitoring	Global Fund
Osun	Boripe/Egbedore, Ede, Ejigbo*, Ife North*, Oriade, Oshogbo	Vector bionomics monitoring Insecticide resistance monitoring Standard durability monitoring*	Global Fund
Oyo	Akinyele, Atiba[^^], Ibarapa North, Itesiwaju, Orelope, Saki West, Surulere	Vector bionomics monitoring Insecticide resistance monitoring	PMI
Plateau	Bassa, Bokkos, Jos-south, Kanam, Mangu, Pankshin, Shendam	Vector bionomics monitoring Insecticide resistance monitoring	PMI
Sokoto	Bodinga, Gudu, Kware, Rabah, Sokoto South, Tambuwal, Wamakko	Vector bionomics monitoring Insecticide resistance monitoring	PMI
Taraba	Ardo Kola, Balli, Donga, Gassol, Jalingo, Takun	Insecticide resistance monitoring	Global Fund
Yobe	Bade, Bursalli/Dapchi, Damaturu, Guru, Nnengere, Potiskum	Insecticide resistance monitoring	Global Fund
Zamfara	Bakura, Birnin Magaji, Bungudu, Gummi, Maradun, Maru	Insecticide resistance monitoring	PMI

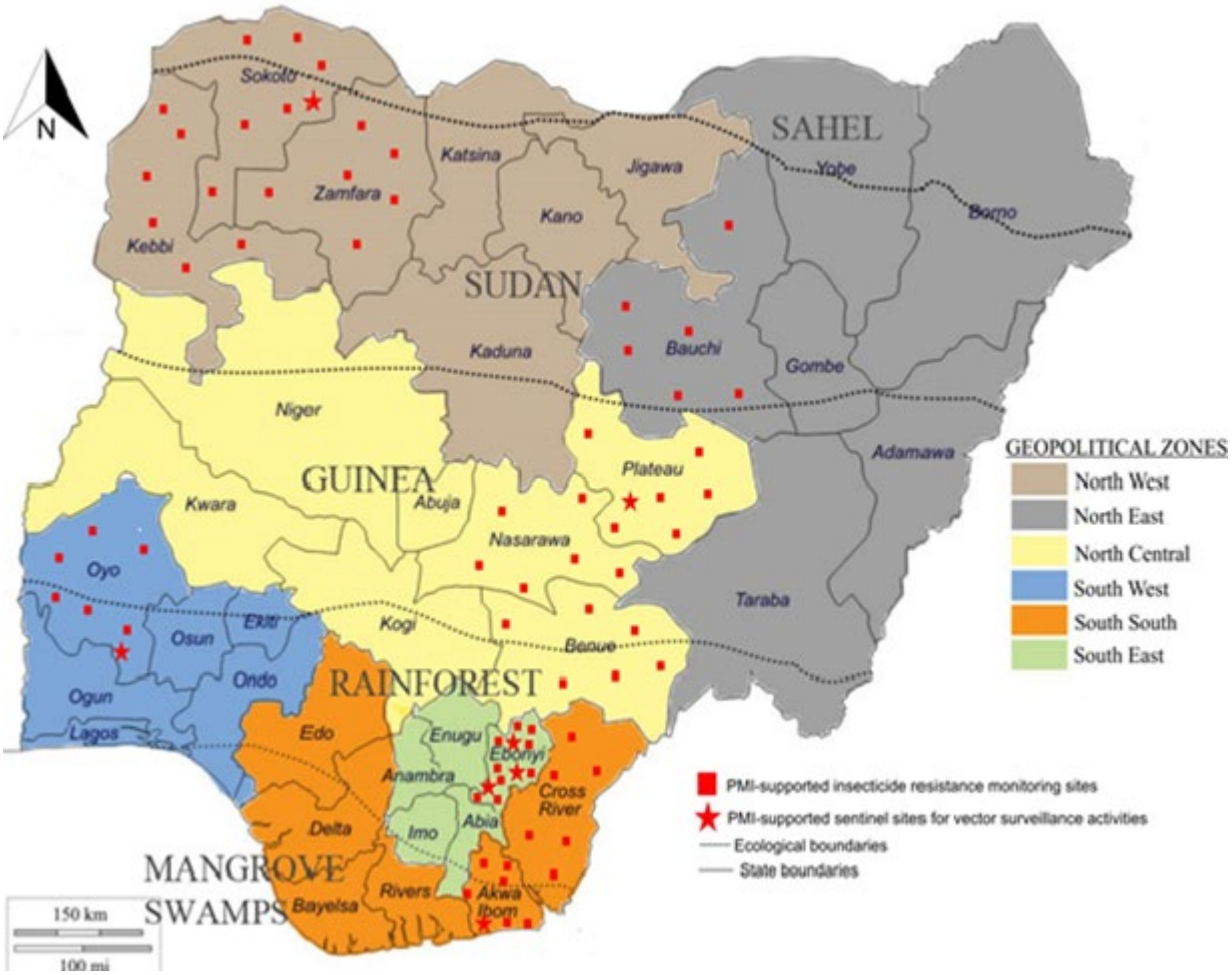
[^] Indicates expanded sites associated with an entomological and epidemiological assessment of PBO net distribution which occurred for the CY 2019 campaign in Ebonyi State. These sites have since been removed as that assessment has since been completed.

[^^] Indicates new LGA due to insecurity issues mid-work plan (Nasarawa State: Keana, Toto, and Wamba replaced with Nasarawa, Nasarawa Eggon, and Karu; Oyo State: Orelope replaced with Atiba).

[+] Site not yet determined.

* Sites for standard durability monitoring through the New Nets Project in Global Fund-focus states.

Figure A-1. Map of Nigeria showing vector bionomics monitoring sentinel sites and insecticide resistance monitoring sites



The major malaria vectors throughout Nigeria are members of the *An. gambiae* species complex. *Anopheles gambiae* s.l. was the most abundant species across all sites ranging from 51.7 percent in Oyo to 99.4 percent in Ebonyi. Across all sites, 67.1 percent were identified as *An. gambiae* s.s., 32.0 percent were *An. coluzzii,* 0.8 percent were *An. arabiensis*, and 0.1 percent was hybrid *An. gambiae/ An. coluzzii*. *Anopheles gambiae* s.s. was the dominant vector species found both indoors and outdoors in all sentinel sites, followed by *An. coluzzii*, with overall preferred resting location being indoors. A total of 11 *Anopheles* mosquito species were identified in all the five sentinel sites. *Anopheles funestus* is a minor vector in some parts of the country, but usually at very low densities, though it did represent up to 48.1 percent of the species composition at the Oyo site.

The primary vector species tend to bite late into the night and early morning hours and indoors. Biting activity generally peaks during the late rainy season in July–August, with smaller peak activity in November–December, which is a slight shift from previous years when the primary peak was in the early rainy season months (April–June). For additional information, please refer to the annual entomology reports on the PMI.gov website.

Table A-2. Distribution and bionomics of malaria vectors

Site/State	Vector*	Season (month)	Preferred Biting Location	Peak Biting Time	Preferred Resting Location	Preferred Host	Annual EIR†
Mpat Enin/Akwa Ibom	***An. gambiae* s.l.**	Nov–Dec	Indoor/ Outdoor (8.8/3.0)	1:00 a.m.–3:00 a.m.	Indoors	Human	3.0 (indoor)
Ezza North, Izzi, Ohaukwu/Ebonyi	***An. gambiae* s.l.**	June	Indoor/ Outdoor (3.2/0.3)	midnight–3:00 a.m.	Indoors	Human	4.6 (indoor)
Akinyele/Oyo	***An. gambiae* s.l.**	July	Indoor/ Outdoor (5.7/1.9)	11:00 p.m.–3:00 a.m.	Indoors	Human	0
Shendam/Plateau	***An. gambiae* s.l.**	July	Indoor/ Outdoor (21.1/4.3)	10:00 p.m.–2:00 a.m.	Indoors	Human	0
Rabah/Sokoto	***An. gambiae* s.l.**	August, Nov–Dec	Indoor/ Outdoor (14.5/6.4)	midnight–3:00 a.m.	Indoors	Human	0

*Primary vector listed first, in bold, followed by secondary vectors.

Source: The PMI VectorLink Project. January 2021. *The PMI VectorLink Nigeria Annual Entomology Report, October 2019-September 2020.* Rockville, MD. VectorLink, Abt Associates Inc.

†EIR = Entomological inoculation rate.

Key Question 2

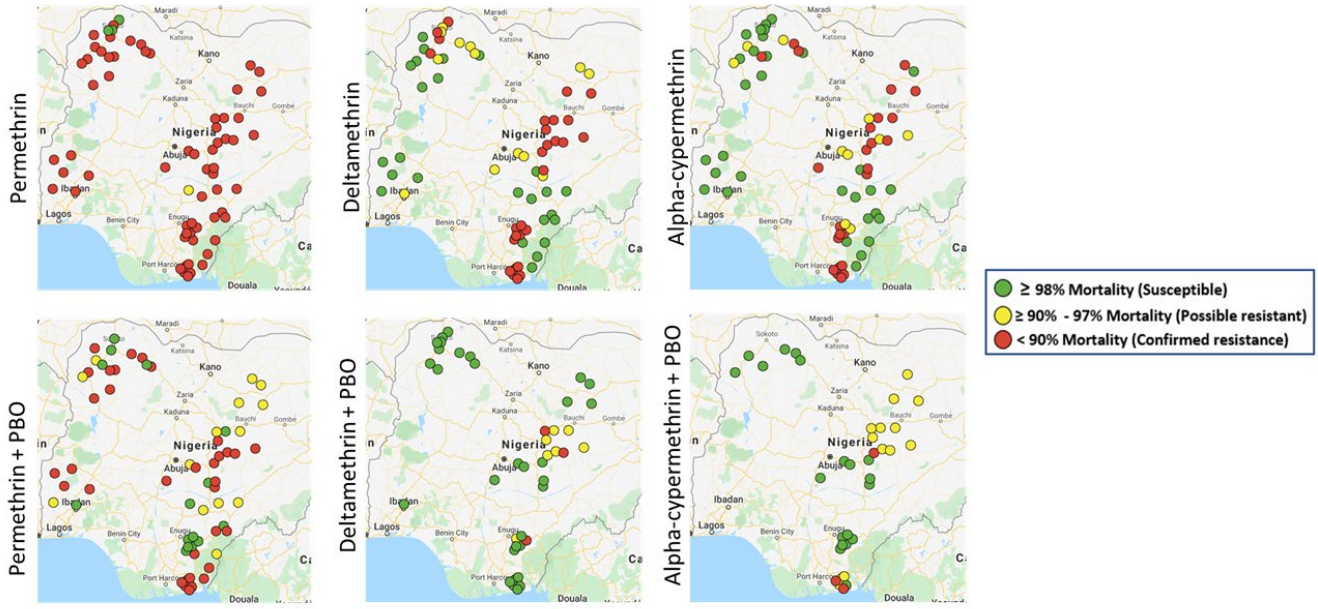
What is the current insecticide resistance profile of the primary malaria vectors?

Insecticide resistance testing was conducted in 11 PMI-focus states in 2020. Pyrethroid resistance patterns varied within and among the states. General widespread resistance to pyrethroids (permethrin, deltamethrin, and alpha-cypermethrin) was detected throughout most of the states, with resistance to all three pyrethroids in the six LGAs in Akwa Ibom, and deltamethrin and permethrin resistance in the six LGAs in Plateau. Some states recorded susceptibility to pyrethroids. Alpha-cypermethrin susceptibility was recorded from all six LGAs each in Benue, Cross River, Oyo, and Sokoto, and deltamethrin susceptibility was recorded from all six LGAs each in Benue, Cross River, and Kebbi, and five LGAs in Oyo. Pre-exposure of *An. gambiae* s.l. mosquitoes to PBO synergist before exposure to pyrethroids increased mortality at varying degrees across sites. Most notably, PBO did not restore susceptibility in the six LGAs in Plateau to all three pyrethroids. In addition, PBO did not restore susceptibility to alpha-cypermethrin in the six LGAs in Bauchi, and did not restore susceptibility to permethrin in the six LGAs each in Akwa Ibom, Cross River, Kebbi, and Nasarawa. CDC bottle bioassays conducted on *An. gambiae* s.l. showed full susceptibility to 100ul/bottle of chlorfenapyr with 100 percent mortality after 72 hours in all LGAs at all sentinel sites. These data suggest that pyrethroid only nets have very limited utility in Nigeria and that transition to PBO or dual AI ITNs be prioritized in most of the country.

While IRS has not been widely implemented for the last decade in Nigeria, it is important to track resistance patterns to insecticides that are used for IRS to continue to provide a comprehensive data set for decision-making. Susceptibility of *An. gambiae* to pirimiphos-methyl was observed in the six LGAs each in Nasarawa, Oyo, Sokoto, and Zamfara, but varied in other sites. Resistance to pirimiphos-methyl was observed in the six LGAs each in Benue, Cross River, and Plateau, and in four LGAs in Kebbi. Complete susceptibility of *An. gambiae* s.l. to clothianidin across all LGAs in all sentinel sites was observed. For clothianidin, by day 3, complete susceptibility was recorded in all LGAs with the exception of Sokoto South LGA in Sokoto and Ishielu LGA in Ebonyi. By day 5, 100 percent mortality to clothianidin was observed across all LGAs in all sentinel sites.

Supporting Data

Figure A-2. Insecticide resistance monitoring results for *An. gambiae* s.l. to Pyrethroids with and without the synergist piperonyl butoxide (PBO) in 2020



Source: The PMI VectorLink Project. January 2021. *The PMI VectorLink Nigeria Annual Entomology Report, October 2019–September 2020.* Rockville, MD. VectorLink, Abt Associates Inc.

Figure A-3. Insecticide resistance monitoring results for *An. gambiae* s.l. to pirimiphos-methyl, clothianidin, and chlorfenapyr in 2020

Sentinel Site	LGA	pirimiphos-methyl (24h mortality) (20.0 ug/bottle)	clothianidin (day 7 mortality) (26.4 mg/paper)	chlorfenapyr (72h mortality) (100 ug/ml)
Akwa Ibom	Abak	S	S	S
	Itu	PR	S	S
	Mkpat Enin	PR	S	S
	Nsit Ubium	S	S	S
	Onna	PR	S	S
	Ukanafun	PR	S	S
Bauchi	Dass	S	S	S
	Darazo	PR	S	S
	Itas/Gadau	S	S	S
	Katagun	S	S	S
	Ningi	S	S	S
	Toro	PR	S	S
Benue	Apa	R	S	S
	Gwer	R	S	S
	Obi	R	S	S
	Tarkaa	R	S	S
	Ukum	R	S	S
	Vandeikya	R	S	S
Cross River	Abi	R	S	S
	Akamkpa	R	S	S
	Calabar Municipality	R	S	S
	Etung	R	S	S
	Obudu	R	S	S
	Ogoja	R	S	S
Ebonyi	Abakaliki	S	S	S
	Ebonyi	S	S	S
	Ezza North	PR	S	S
	Ezza South	S	S	S
	Ishielu*	R	S	S
	Izzi	S	S	S
	Ohaozara*	PR	S	S
	Ohaukwu	S	S	S
	Onicha*	PR	S	S
Kebbi	Augie	R	S	S
	Fakai	R	S	S
	Gwandu	PR	S	S
	Maiyama	PR	S	S
	Shanga	R	S	S
	Suru	R	S	S
Nasarawa	Keana	S	S	S
	Keffi	S	S	S
	Kokona	S	S	S
	Obi	S	S	S
	Toto	S	S	S
	Wamba	S	S	S
Oyo	Akinyele	S	S	S
	Ibarapa North	S	S	S
	Itesiwaju	S	S	S
	Orelope	S	S	S
	Saki West	S	S	S
	Surulere	S	S	S
Plateau	Bassa	R	S	S
	Bokkos	R	S	S
	Jos-south	R	S	S
	Kanam	R	S	S
	Mangu	R	S	S
	Pankshin	R	S	S
Sokoto	Bodinga	S	S	S
	Gudu	S	S	S
	Kware	S	S	S
	Sokoto South	S	S	S
	Tambuwal	S	S	S
	Wamakko	S	S	S
Zamfara	Bakura	S	S	S
	Birnin Magaji	S	S	S
	Bungudu	S	S	S
	Gummi	S	S	S
	Maradun	S	S	S
	Maru	S	S	S

S = Susceptible, *R = Resistant*, *PR = Possibly Resistant*

*Indicates expanded sites associated with an entomological and epidemiological assessment of PBO net distribution, which occurred for the CY 2019 campaign in Ebonyi State. These sites have since been removed because that assessment has since been completed.

Source: The PMI VectorLink Project. January 2021. *The PMI VectorLink Nigeria Annual Entomology Report, October 2019–September 2020.* Rockville, MD. VectorLink, Abt Associates Inc.

Conclusions for Entomologic Monitoring Investments

With FY 2022 funding, PMI will maintain support for entomological monitoring with support for insecticide resistance monitoring in 11 PMI-focus states, five of which will also have vector bionomics monitoring. PMI will also continue to support entomological monitoring in five non-PMI-focus states (including Bayelsa, Bonny Island [Rivers], Enugu, FCT, and Kaduna). In accordance with current insecticide resistance data, PMI will continue to transition ITN procurements to PBO and dual AI ITNs, as appropriate. PMI will continue to support the expanded entomological monitoring sites in Kebbi and Sokoto states to facilitate monitoring of Interceptor G2 distribution in Kebbi State to take place in late CY 2021.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.2. INSECTICIDE-TREATED NETS (ITNs)

Key Goal

Achieve high ITN coverage and use targets with effective nets, based on insecticide resistance data in PMI-focus states; and maintain high coverage and use with consistent ITN distribution (via mass campaigns and/or continuous distribution channels).

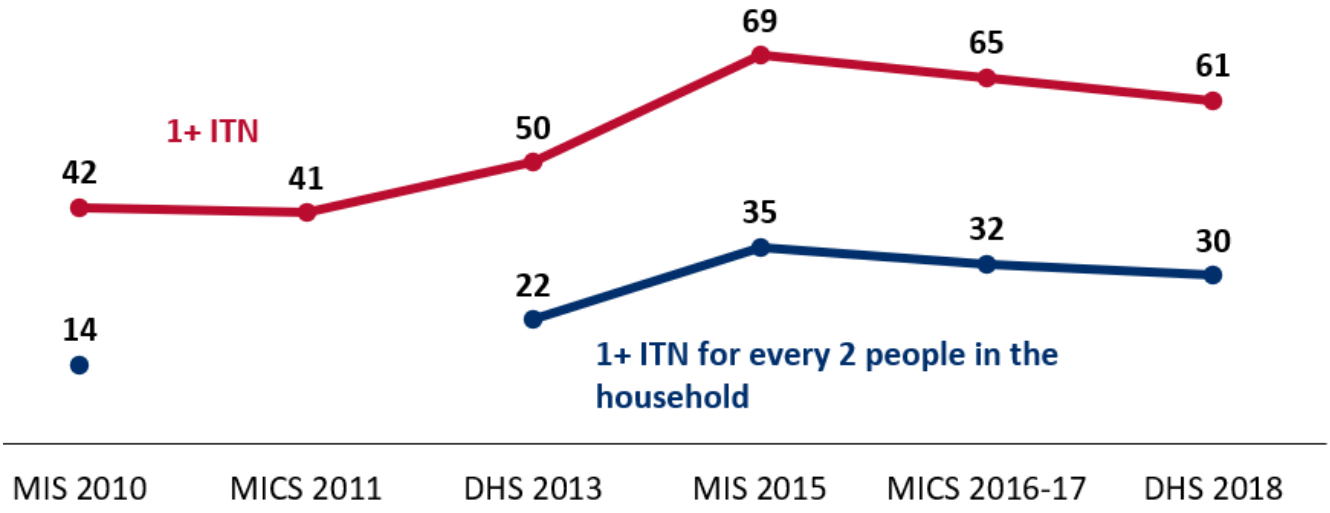
Key Question 1

How has net ownership evolved since the start of PMI in the country?

ITN ownership has plateaued and begun to slightly decrease in Nigeria. Mass ITN campaigns occur every three to four years in only 24 states, and the continuous distribution channels are not sufficient to maintain ITN coverage. Because the cost of supporting mass ITN campaigns in 11 PMI-focus states has increased due to the need for new types of nets, such as PBO and Interceptor G2 nets, PMI can no longer fully support ANC/EPI channels. PMI will continue advocating for states to procure ITNs for their continuous distribution channels. In addition, each state requires a specific ITN based on insecticide resistance profile. Therefore, nets cannot necessarily be moved across different states when gaps exist.

Figure A-4. Trends in ITN ownership

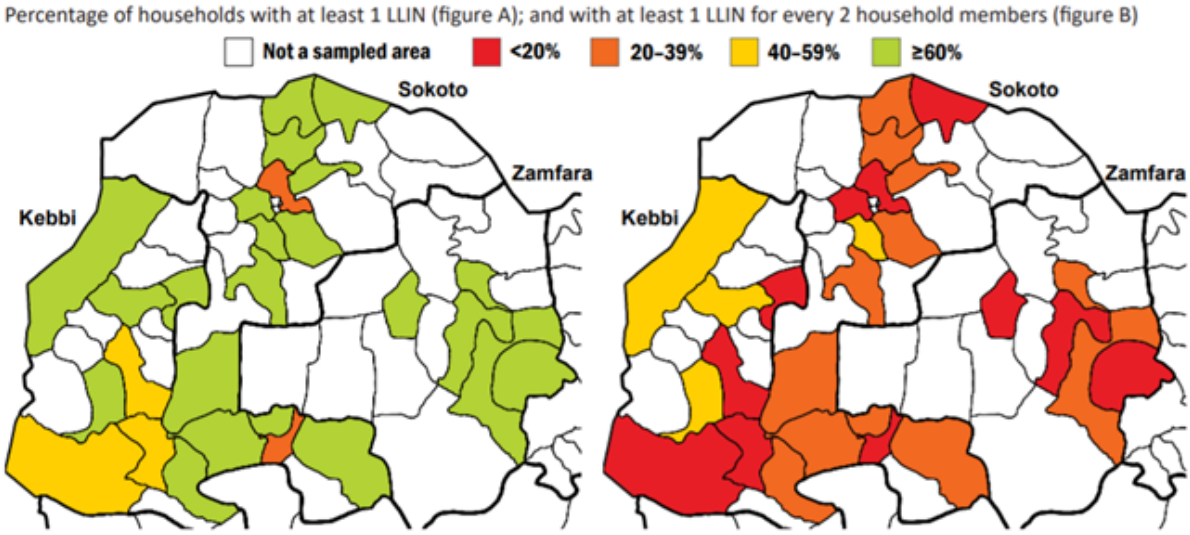
Percentage of households that own ITNs



A 2019 cross-sectional Behavioral Sentinel Survey (BSS) that sampled over 3,000 pregnant women and 3,000 women with a child under two years across 108 wards[12] in three PMI-focus states of Kebbi, Sokoto, and Zamfara found that 7 out of 10 households (71 percent) owned at least one ITN but only 22 percent had at least one net for every two household members. Households in Southwestern Kebbi had particularly low availability of sufficient ITNs for effective coverage.

[12] Selected wards were those benefiting from community-level interventions by a PMI-funded SBC program across the three states.

Figure A-5. Percentage of households that owned an ITN in sampled wards of Kebbi, Sokoto and Zamfara states



Key Question 2a

What proportion of the population has access to an ITN? Of those who have access, what proportion of the population reports using an ITN?

According to the 2018 DHS, ITN access (one ITN for every two members of a household) is 48 percent, suggesting PMI should continue investments in mass distribution of ITNs. According to the most recent ITN Access and Use Report, there has been a steady upward trend in the use:access ratio across all geographic zones with a peak in the three northern regions with the North West region having the highest ratio at 0.98, and with North East and North Central at 0.93 each. In the southern regions, the use:access ratio has increased considerably between the 2017 and 2018 household surveys with all regions having a moderate use:access ratio (South West at 0.80, South East at 0.78, and South South at 0.75). In Nigeria, use:access in urban areas increased to 0.88, while rural areas increased to a ratio of 0.94. Therefore, SBC efforts should promote maintaining consistent net use behaviors with an emphasis on year-round net use and net care.

Figure A-6. Trends in ITN access and use

Percentage of household population with access to an ITN and percentage of those who slept under an ITN the night before the survey

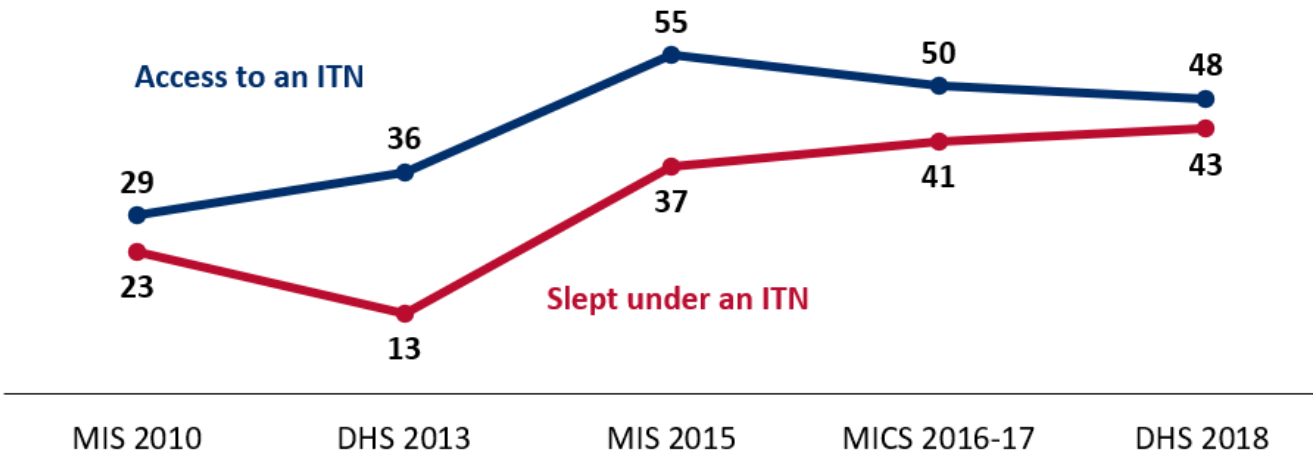
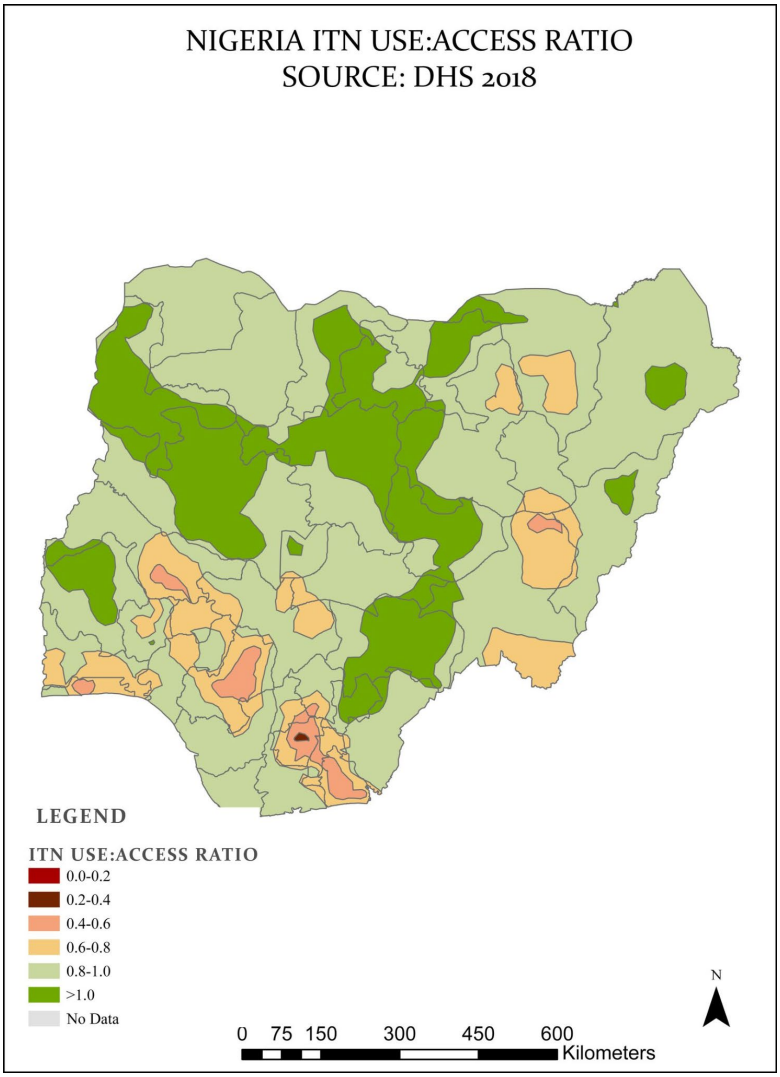


Figure A-7. Nigeria ITN use:access ratios



Key Question 2b

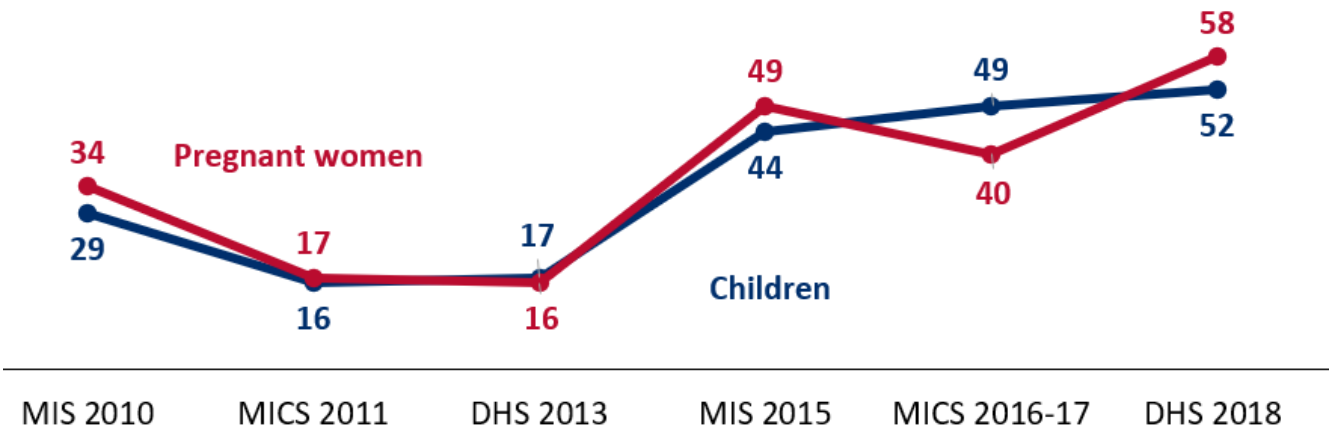
What percent of pregnant women and children under five years of age report sleeping under an ITN?

ITN use by children and pregnant women continues to increase. In households with at least one ITN, the DHS 2018 reported 52 percent of children and 58 percent of pregnant women slept under an ITN the night before the survey.

Supporting Data

Figure A-8. Trends in ITN use among children and pregnant women

Children under five years of age and pregnant women 15 to 49 years of age who slept under an ITN the night before the survey



Key Question 3

If ITN access is high but use is low, what significant structural and/or behavioral challenges affect the adoption and maintenance of ITN use and care behaviors?

Adoption and maintenance of ITN use and care is influenced by a range of barriers and facilitators, and these vary by geopolitical zones and subpopulations. A summary of key facilitators and barriers to ITN use in Nigeria—drawn from a mix of sources, including population-based surveys such as DHS 2018, MIS 2015, and end-line assessments—and a PMI co-funded 2019–2020 behavioral sentinel survey are summarized below.

Evidence suggests a mix of internal, social, and environmental factors facilitate ITN use behaviors. The PMI-funded End-line Evaluation of Health Communication Capacity Collaborative (HC3) Nigeria 2017[13] found the following results:

- Internal: Response Efficacy
  - *Belief that ITN prevents malaria* doubles the odds of ITN use (OR = 1.99)
- Social: Norms
  - *Discussing ITN use with others in the past 12 months* increases the odds of net use by 67 percent (OR = 1.67).
  - *Perception that net use was the norm in the community* increased the odds of net use by 56 percent (OR =1.56)
- Environmental: Exposure to ITN campaign messages and materials
  - *Exposure to at least one mass media campaign message on ITN use* increased the odds of self-

[13] PMI-funded malaria end-line ideational survey in three of 11 PMI-focus states only (sample size not nationally representative, limited to 3,555 households in Nasarawa, Kebbi, and Akwa Ibom states).

reported ITN use by 36 percent (OR = 1.36)

In comparison to facilitators, known barriers to ITN use are found to be mostly internal factors and more closely tied to general malaria perceptions. Data from multiple surveys found the following:

- According to the MIS 2015, the most common reason why a net was not used the night before was the "*perception that the ITN was too hot*" with the proportion of respondents citing this barrier ranging from a low of 19.9 percent in Benue State to 67.1 percent in Plateau State. The second most cited barrier was the "*belief that there were no mosquitoes around*" suggesting possible seasonality in ITN use behaviors.
- DHS 2018, however, recorded shifts in these barriers with "*perceptions that ITNs were too hot"* documented as the third most cited reason for nonuse (14 percent) after "*belief that there were no mosquitoes around*" (15 percent) and "*the net was not needed"* (29 percent). These numbers mask variations by geopolitical zones. For example, whereas only 7 percent of respondents cited the "*belief that chemicals in the ITN are unsafe*" as the reason for nonuse, this reason was mostly reported by respondents in the North West. This region has three PMI-focus states of Sokoto, Kebbi, and Zamfara.
- The PMI-funded End-line Evaluation of HC3 Nigeria 2017 documented that "low perceived severity of malaria" was a main barrier to ITN use with only 47 percent of respondents reporting that the consequences of malaria were severe.
- The 2019 BSS report identified variations in ITN use behaviors among pregnant women surveyed. Pregnant women who did not sleep under an ITN, despite having access, were more likely to be older (26 percent for 35–49 years of age vs. 15 percent for 15–24 years of age), live in larger households (17 percent in 6+ members vs. 14 percent in <3 members), or reside in Sokoto (24 percent in Sokoto vs. 13 percent in Kebbi and 12 percent in Zamfara). These data have implications for the prioritization and contextualization of SBC interventions.

Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Key Question 4

What type of nets are being distributed via which channels?

In Nigeria, PMI distributes ITNs through rolling mass campaigns every three to four years in PMI-focus states, with a target of universal coverage of one ITN per two people. Increased detailed data on mosquito resistance patterns indicates widespread resistance to pyrethroid insecticides. Because some states require new types of nets (PBO and/or dual AI) that are more expensive than standard ITNs, funding is insufficient to procure ITNs specifically for continuous distribution channels. As such, any ITNs leftover following a mass campaign are distributed through ANC/EPI channels.

Supporting Data

Table A-3. Insecticide-treated net (ITN) distribution, 2020 and 2021

State	Mass Campaign [2020 & 2021]	ANC*	EPI*	School	Community	Other
Benue	pyrethroid 2020	pyrethroid	pyrethroid			
Plateau	pyrethroid 2020	pyrethroid	pyrethroid			
Zamfara	pyrethroid 2020	pyrethroid	pyrethroid			
Bonny Island (PMI donation, NLNG distribution)	PBO 2021	PBO	PBO			
Akwa Ibom	PBO 2021	PBO	PBO			
Kebbi	dual AI 2021	dual AI	dual AI			
Nasarawa	PBO 2021	PBO	PBO			
Oyo	PBO & dual AI 2021	PBO & dual AI	PBO & dual AI			
Sokoto	PBO 2021	PBO	PBO			

* ITNs leftover following a mass campaign are distributed through ANC/EPI channels.

Key Question 5

What is the estimated need for ITNs during calendar years 2021–2023? How many, and what types, of ITNs will be procured, and by what partners? Through what channels will ITNs be distributed? Are there any projected ITN gaps?

PMI transitioned to procuring new types of nets with PBO nets for the Ebonyi State mass campaign in CY 2019. ITN needs related to CY 2020 mass campaigns in PMI-focus states were already under procurement for pyrethroid-only nets, but future campaigns in these states will be transitioned to new types of ITNs. In FY 2020, PMI Nigeria received $7 million earmarked by the U.S. Congress specifically for the procurement of new types of ITNs for CY 2021 mass ITN campaigns. In CY 2021, an estimated 16.3 million ITNs (PBO and/or dual AI) will be needed for distribution through mass campaigns in five PMI-focus states (Akwa Ibom, Kebbi, Nasarawa, Oyo, and Sokoto). The AMF will support the Akwa Ibom mass campaign by funding the procurement for the full quantity of 3.7 million PBO nets required to achieve universal coverage in the state; PMI will support the shipping, distribution, and technology for distribution of Akwa Ibom nets. Additionally, in CY 2021, PMI will donate PBO nets, to be distributed by NLNG, to cover the entire population of ~350,000 people on Bonny Island. In CY 2022, an estimated 9.7 million ITNs (PBO and/or dual AI) will be needed to support mass campaigns in three PMI-focus states (Bauchi, Ebonyi, and Cross River). Final negotiations on the agreement between the Federal Ministry of Health and AMF for the provision of 4.4 million nets needed for the Bauchi State campaign are underway; if AMF does not provide nets for Bauchi, PMI will cover the requirement, which will result in a push back of future campaigns in other states. In CY 2023, an estimated 10.9 million ITNs (PBO and/or dual AI) will be needed to support mass campaigns in three PMI-focus states (Benue, Plateau, and Zamfara). With FY 2022

funds, PMI is proposing to procure and distribute 6.6 million PBO nets for Plateau and Zamfara states. AMF included in its agreement that they "could fund" an estimated 10.2 million nets for the three states (Benue: 4.0 million, Plateau: 3.0 million, and Zamfara: 3.2 million). If the nets are funded by AMF, then PMI will fund shipping, transportation, and distribution, and thus be able to maintain campaign timelines.

Supporting Data

Table A-4. ITN Gap Analysis Table

Calendar Year	2021	2022	2023
Total country population	226,632,001	234,099,717	241,813,501
Total population at risk for malaria	226,632,001	234,099,717	241,813,501
PMI-targeted at-risk population	61,771,502	63,721,084	65,732,197
Population targeted for ITNs	61,771,502	63,721,084	65,732,197
Continuous Distribution Needs			
Channel 1: ANC	1,978,610	2,163,242	2,357,556
Channel 2: EPI	1,593,795	1,802,084	2,021,934
Channel 3: School	0	0	0
Channel 4:	0	0	0
Additional ITNs required to avoid ITN stockouts	0	0	0
Estimated Total Need for Continuous Channels	3,572,405	3,965,326	4,379,490
Mass Campaign Distribution Needs			
Mass distribution campaigns	16,379,391	8,835,900	9,985,869
Estimated Total Need for Campaigns	18,017,330	9,719,490	10,984,456
Total ITN Need: Continuous and Campaign	***21,589,735***	***13,684,816***	***15,363,946***
Partner Contributions			
ITNs carried over from previous year	0	0	0
ITNs from Government	0	0	0
ITNs from Global Fund	0	0	0
ITNs from other donors	3,875,000	4,406,800	0
ITNs planned with PMI funding	14,475,000	4,880,935	6,646,070
Total ITNs Contribution Per Calendar Year	***18,350,000***	***9,287,735***	***6,646,070***
Total ITN Surplus (Gap)	***(3,239,735)***	***(4,397,081)***	***(8,717,876)***

Key Question 6

What is the current status of durability monitoring?

No PMI-funded durability monitoring occurred in FY 2019 or FY 2020. The New Nets Project is conducting standard durability monitoring in the Global Fund-focus states Osun and Kwara on nets distributed in CY 2020. PMI is supporting streamlined durability monitoring of Interceptor G2 nets to be distributed in late CY 2021 and according to approved protocols, a pre-distribution time point will occur in CY 2021.

Supporting Data

Table A-5. Timing of durability monitoring

Campaign Date	Site	Brand	Baseline	12-month	24-month	36-month
Oct/Nov 2020	Osun State	PBO (Veeralin) & pyrethroid (Duranet)	x*	Late 2021	Late 2022	Late 2023
Nov/Dec 2020	Kwara State	Dual AI (Interceptor G2 & Royal Guard)	x*	Late 2021	Late 2022	Late 2023
Nov 2021	Kebbi State	Dual AI (Interceptor G2)	Pre-distribution 2021 Baseline early 2022	Late 2022	Late 2023	Late 2024

* New Nets Project is conducting standard durability monitoring through the 24-month study round. PMI is planning to support the 36-month study round for the standard durability monitoring under the New Nets Project with FY 2022 MOP funding.

Conclusions for ITN Investments

With FY 2022 funds, PMI plans to procure and distribute 6.6 million PBO nets for the Plateau and Zamfara campaigns planned to take place in CY 2023. FY 2022 funds will continue the enhanced monitoring of the entomological and epidemiological impact of Interceptor G2 and PBO net distributions in Kebbi and Sokoto states, as well as support streamlined durability monitoring of Interceptor G2 nets to be distributed in Kebbi State in late CY 2021. PMI also plans to support the 36-month study round of standard durability monitoring of pyrethroid (Osun), PBO (Osun), Interceptor G2 (Kwara), and Royal Guard (Kwara) nets currently taking place under the New Nets Project, which will end in CY 2022.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

1.3. INDOOR RESIDUAL SPRAYING (IRS)

PMI does not currently support IRS activities in Nigeria and planned investment remains at zero.

2. HUMAN HEALTH

2.1. CASE MANAGEMENT

NMEP Objective

The Nigerian National Guidelines for Diagnosis and Treatment of Malaria are aligned with the WHO recommendations on universal diagnostic testing and treatment with artemisinin-based combination therapy (ACTs). The NMSP 2021–2025 outlines Nigeria's priorities in the area of case management. The objectives for case management are "to ensure chemoprevention, diagnosis, and appropriate treatment for 80 percent of the target populations at risk by 2025."

NMEP Approach

The case management objective in the NMSP 2021–2025 will be achieved through the following strategies:

- Deployment of parasitological based diagnosis for care-seeking persons with suspected malaria.
- Ensure appropriate treatment for individuals with confirmed malaria with effective antimalarial medicine.
- Strengthen systems for continuous availability of medicines and health products for the chemoprevention, diagnosis, and treatment of malaria.
- Intensify appropriate information on malaria treatment practices for increased access to and demand for malaria chemoprevention, treatment, and management services.
- Scale-up provider behavior improvement interventions for improved quality of care in the management of fever and malaria cases for improved access to treatment services.
- Build capacity of personnel for malaria case management in public and private health facilities, and at the community level through iCCM.
- Strengthen capacity of public and private facilities for the management of severe malaria.
- Implement a comprehensive national strategy for effective participation of the private sector in malaria case management.
- Strengthen systems for quality assurance and quality control (QA/QC) of malaria diagnostic services.
- Conduct antimalarial therapeutic efficacy studies (TES).

The national guideline for diagnosis and treatment of malaria (2020) recommends parasitological diagnosis for all suspected malaria cases. The guideline states that the signs and symptoms of malaria are non-specific. However, clinical suspicion is based on fever or history of fever in the last 24 hours and/or the presence of anemia. Malaria microscopy requires laboratory scientists who are highly trained and requires continuous capacity-building to maintain accurate diagnostic skills. The NMEP considers secondary and tertiary hospitals and large health centers with inpatient beds as the facilities where microscopy should be available. The NMEP expects RDTs to be used at all facilities where microscopy is not available, and to complement microscopy in secondary facilities and in certain outpatient clinics of tertiary facilities.

ACTs are the recommended treatment for all uncomplicated *P. falciparum* malaria including children weighing less than five kilograms and pregnant women in all trimesters of pregnancy. The recommended ACTs for use in Nigeria are artemether-lumefantrine (AL), artesunate-amodiaquine (ASAQ), dihydroartemisinin-piperaquine (DP) and artesunate-pyronaridine. All ACTs are widely available in both public and private sectors, and can be purchased as over-the-counter medications. In 2012, the NMEP changed the first-line treatment for severe malaria from quinine to IAS, consistent with WHO treatment guidelines. The recommended pre-referral treatment for severe malaria is intramuscular or rectal artesunate, intravenous quinine, or intravenous artemether.

Data from 2018 DHS shows that among children with fever for whom advice for treatment was sought, 58 percent went to the private sector and only 37 percent went to the public sector. This is consistent with several data sources that show the majority of febrile cases present to private sector facilities. While the program seeks adherence to one national guideline by private providers, the availability of ACTs, cost of diagnostics, poor quality of diagnostics, and lack of incentive for quality diagnosis suggests low parasitological testing in the private sector with overtreatment with ACTs. There are also several non-recommended antimalarials including non-quality-assured ACTs in the private sector.

The Nigeria health leadership recently initiated the Community Health Influencers, Promoters and Services (CHIPS) Programme, aimed at contributing to maternal and child mortality reduction in the country by expanding access to basic healthcare services and creating demand for essential primary healthcare services. The CHIPS

agent's scope includes provision of services (inclusive of malaria service delivery through iCCM approach with mRDT testing) in hard-to-reach areas under supervision. The program is structured formally to pay pre-determined monthly stipends of an agreed amount to the agents, depending on the state. Currently, the CHIPS program is being rolled out in various states and there are no exact numbers of personnel across the country. The NMEP is collaborating with federal and state agencies to align implementation of iCCM into the CHIPS program.

Supervision of health workers is conducted by both the Ministry of Health (MOH) and primary healthcare (PHC) development agencies. There are approved tools for integrated supportive supervision (ISS) and malaria is included in the ISS. Some donors/implementers support onsite training and supportive supervision which is focused on improving outcomes for malaria case management at facilities.

PMI Objective in Support of NMEP

PMI supports the NMEP objective in case management through TA at the federal level and in the 11 PMI-focus states. PMI's support has been directed at the following key areas: procurement and distribution of diagnostic and treatment commodities; training and supervision of laboratory and clinical care personnel in accurate malaria diagnostics and appropriate treatment; and implementation of QA systems for malaria diagnostics.

- At the federal level, support through the case management technical working group (TWG) is aimed at developing critical case management technical resources, including policies, guidelines, training materials, and job aids.
- At the regional level, PMI procures RDTs and ACTs that are distributed from regional hubs directly to targeted health facilities within PMI-focus states.
- At the state level, PMI supports state staff to monitor case management activities at the facilities. To improve adoption of policies, PMI provides TA to state ministries of health and related agencies to develop, update, and adapt federal policies and guidelines. PMI is supporting the development of state malaria diagnostic QA centers so that each state will own the QA system.
- At the LGA level, PMI supports supervision and on-the-job training of PHC staff, as well as analysis and use of case management data to identify poor performing facilities and better target technical support.
- At the health facility level, PMI supports capacity-building of health workers to provide quality malaria service delivery. Additional support is given to health workers for data analysis and use to inform malaria service delivery.
- At the community level, PMI supports service delivery aimed to increase access to malaria case management in select states. This includes provision of malaria commodities, training and supervision of community health workers on febrile case management, and reporting. This is implemented with other maternal and child health programs.

PMI-Supported Recent Progress (FY 2020)

- Procured and distributed 13 million RDTs and 16.8 million ACTs to health facilities in the 11 PMI-focus states.
- Trained/retrained 182 frontline health workers on parasite diagnosis (mRDT and microscopy). Training on basic microscopy was conducted in collaboration with Walter Reed Army Institute of Research Nigeria.

- Improved the capacity of health workers in the management of uncomplicated and severe malaria at facility and community levels through facility mentoring and on-the-job capacity-building.
- Using the behavioral economics (BE) approach, implemented provider behavior change pilots and scaled up successful prototypes to improve provider adherence to malaria case management guidelines.
- Continued to strengthen positive provider attitudes, beliefs, and practices through peer-to-peer networks among providers of malaria, and labor and childbirth services in supported primary health facilities through the Officers-in-Charge (OIC) cluster meetings.
- Strengthened quality assurance for malaria diagnostics at the facility level through facilitated QA monitoring visits and implementation of diagnostic Standard Operating Procedures (SOPs).
- Supported the development of state malaria diagnostic QA centers in three states. Nigeria has a Malaria Diagnostic External Quality Assurance Operational Guideline for the EQA system in the country. This includes guidance on EQA team composition at national and state levels and required infrastructure and consumables for QA centers. The document also provides information on required capacity-building, tools for assessment/monitoring, and data management.

There were delayed implementations due to COVID-19, which impacted in-person meetings and disrupted the supply chain for essential commodities.

PMI-Supported Planned Activities (FY 2021)

- Provide training/retraining (including on-the-job capacity training) and supervision of frontline health workers on parasite diagnosis (mRDT and microscopy).
- Implement targeted support (mainly capacity-building) on malaria case management through private health facilities.
- Improve the capacity in the management of uncomplicated and severe malaria at the facility and community levels.
- Implement integrated community case management in select communities in at least two states with a focus on Kebbi.
- Strengthen QA for malaria diagnostics at the facility level through facilitated QA monitoring visits and implementation of diagnostic SOPs.
- Expand the support and implementation of state malaria diagnostic QA centers with addition of select private sector labs where feasible.
- Expand engagement with providers through cluster meetings, clinical meetings, and meetings with professional bodies
- Collaborate with service delivery partners to scale up the BE design to additional health facilities.

Key Goal

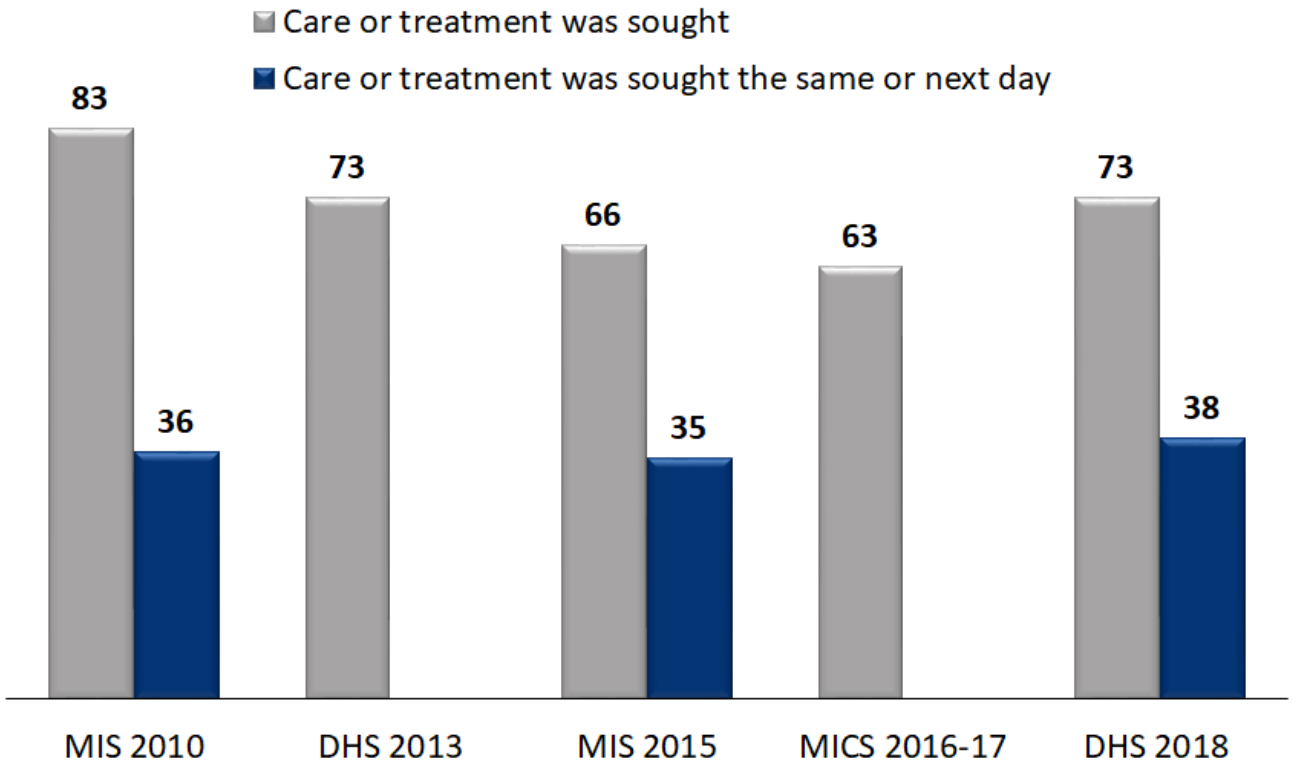
Improve access to and use of timely, quality, and well-documented malaria testing and treatment by providing facility- and community-based health workers with training, supervision, and malaria commodities to provide quality, effective care.

Key Question 1a

What is the status of care-seeking and/or access to care for children under five years of age with fever?

Figure A-9. Trends in care-seeking for fever

Among children under five years of age with fever in the two weeks before the survey, percentage for whom advice or treatment was sought



*Excludes treatment or advice from a traditional practitioner.

The 2019 cross-sectional BSS—which sampled over 3,000 pregnant women and 3,000 women with a child under two years of age across 108 wards currently benefitting from a PMI-funded community-level malaria SBC activity in Kebbi, Sokoto, and Zamfara states—found low care-seeking, diagnosis, and treatment practices for sick children under two years of age. Only about one-third of children under two years of age with fever, diarrhea, or respiratory symptoms (cough with difficult or rapid breaths) obtained care from a formal medical source (34 percent, 34 percent, or 39 percent, respectively).

Conclusion:

The national level data demonstrates that care-seeking for fever increased after a progressive drop over several years, but remains suboptimal. There is no improvement in those seeking prompt care with particular concern in the significant difference between the percentage of individuals who sought care and the percentage of individuals who sought prompt (within 24 hours) care. In the 2018 DHS, there was a 35 percentage point difference between those individuals who sought care and those who sought care promptly. These data do suggest a need for increased SBC activities promoting prompt care-seeking. The primary barriers and facilitators to care-seeking appear to be a mix of internal and social factors, many of which are amenable to SBC interventions.

Key Question 1b

What significant structural and/or behavioral challenges affect prompt care-seeking?

Facilitators and barriers to care-seeking behaviors include a mix of internal, social, environmental, and structural factors. Factors vary by whether care is sought from formal or informal medical sources, just as they are dependent on the type of services sought (e.g., fever, diarrhea, pneumonia). Care-seeking preferences and choices of where to seek care are also influenced by socioeconomic factors (e.g., wealth), literacy levels, perceptions of health providers (e.g., trust), response efficacy (of treatment), and distance to the health facility. Finally, general ideation (e.g., knowledge and perceived severity) about care-seeking for sick children (either for fever, diarrhea, or pneumonia) as well as perception of service quality have been shown to have influence on care-seeking behaviors for febrile children. Below is an outline of these factors and data sources:

Facilitators to prompt care-seeking for fever among children under five years of age:

- Internal factors
  - High general malaria ideation[14] (Source: 2017 PMI-funded end-line evaluation of HC3 Nigeria)
    - Specifically, two malaria ideations—perceived severity of malaria and knowledge of the cause of malaria—were most predictive of care-seeking behaviors.
    - Caregivers with high scores on these two ideations were 1.8 and 1.6 times more likely to seek prompt care for febrile children.
  - Beliefs about health services (Source: 2019 BSS in selected wards of Sokoto, Kebbi, and Zamfara)
    - Among women with children under two years of age who sought care for their sick children, provider trust and perceptions of health service readiness (e.g., availability of essential medicines) were found to be factors that influence care-seeking.
    - Women who believed a health provider is the best person to talk to for a sick child were 1.9 times as likely to take a child with fever to formal care (2.2x and 2.5x as likely for a sick child with diarrhea and respiratory symptoms respectively) and 1.6x as likely to get a febrile child tested for malaria.
    - Women who believed health facilities often have medicines needed for sick children were 1.3 times as likely to take a child with fever to formal care and (2.2x likely for a sick child with respiratory symptoms).
  - Social: Norms (Source: 2017 PMI-funded end-line evaluation of HC3 Nigeria)
    - Caregivers who perceived that prompt care-seeking was the norm were 55 percent (or 1.55 times) more likely to seek prompt care for febrile children.

The 2019 BSS also found that preferences for the choice of treatment location were influenced by provider trust, nearby location, and perceived treatment effectiveness (response efficacy). Women who sought care for their sick children from non-formal drug shops, chemists, or Patent and Proprietary Medicine Vendors (PPMVs) more commonly cited short wait time, nearby location, and low cost as enablers while those seeking formal care from government hospitals and PHCs cited provider trust, effective treatment, and respectful care as enablers of child care-seeking behaviors.

[14] General malaria ideation is an index of six ideational variables (knowledge, perceived threat/susceptibility, perceived response efficacy, perceived self-efficacy, perceived social support, and interpersonal communication) about malaria-related outcomes.

Further, facilitators influencing demand for and uptake of malaria testing among caregivers are both internal and emotional. According to the 2019 BSS, among pregnant women and women with a child under two years of age, sampled in selected wards in Sokoto, Kebbi, and Zamfara states:

- Emotional: Self-Efficacy
  - Women who felt confident that they could convince their husbands to seek formal care for a sick child were 3.6 times as likely to have a febrile child tested for malaria.
- Internal: Knowledge
  - Women who believed blood tests were the only way to know if a person has malaria were 2.4 times as likely to have a febrile child tested for malaria.

Barriers to care-seeking for children under five years of age include the following mix of internal, social, and structural factors:

- Internal: Beliefs about health services
  - Literature suggests that generally, but more in the North, poor perception of the quality of services in the public sector was a barrier to prompt care-seeking. In Kebbi State, for example, the literature suggests there is distrust in public facility-based care, especially free medicines. (Source: Breakthrough Action Maternal, Newborn, Child, Health, and Nutrition [MNCHN] and Malaria Literature Review, 2018)
- Social: Gender Norms
  - Gender norms that limit female participation in household decision-making or those that require women to seek and obtain spousal consent before accessing care from the formal health sector is a barrier to care-seeking. Again, this was found to be more generally applicable in Northern Nigeria. For example, in Kebbi, gender norms that restrict women's movement and social interactions were found to be a major barrier to child care-seeking. (Source: Breakthrough Action MNCHN and Malaria Literature Review, 2018)
  - Whereas the 2019 BSS reported that most respondents (81 percent) cited spouses as main influencers of decisions to seek care for a sick child (fever, diarrhea, and pneumonia), regression analyses did not find spousal influence to be significantly associated with sick child care-seeking, diagnosis, or treatment behaviors.
- Environmental/Structural: High cost associated with care-seeking
  - Literature suggests that costs prior to reaching the facility (distance and transportation cost) and costs related to obtaining service (cost of consultation, tests, drugs, wait time, etc.) are barriers to prompt care-seeking. (Source: Breakthrough Action MNCHN and Malaria Literature Review, 2018)
  - One-third of respondents surveyed in the 2019 BSS in Kebbi, Sokoto, and Zamfara states cited healthcare costs as a main reason for not seeking care for a sick child (fever, diarrhea, and pneumonia inclusive). Other reasons included fatalism *("Up to God")* and non-severe symptoms.

These data have implications for the prioritization and contextualization of SBC interventions. Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

Key Question 2a
What proportion of patients are being tested and appropriately treated for malaria?

Figure A-10. Trends in diagnosis and treatment of children with fever

Among children under five years of age with fever in the two weeks before the survey and with fever in the two weeks before the survey who received any antimalarial

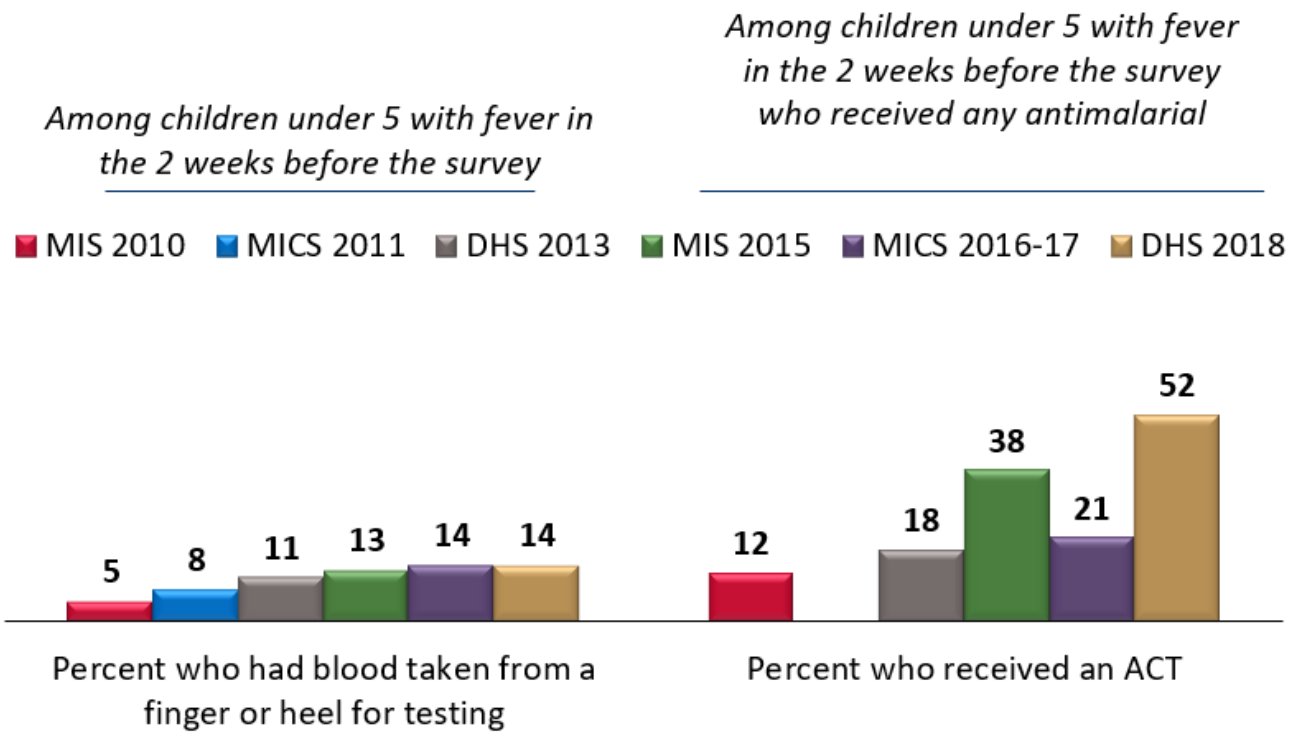


Figure A-11. HMIS reported trends in malaria diagnosis

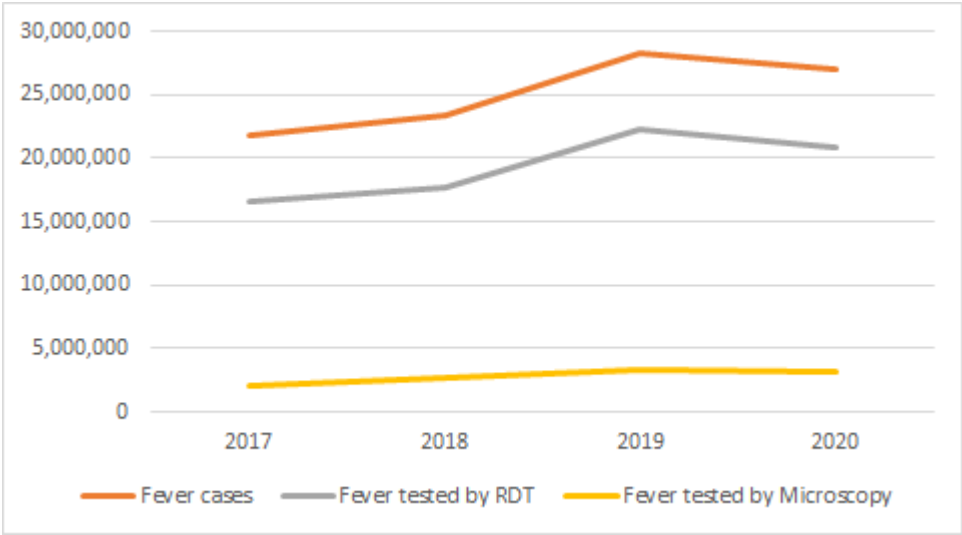
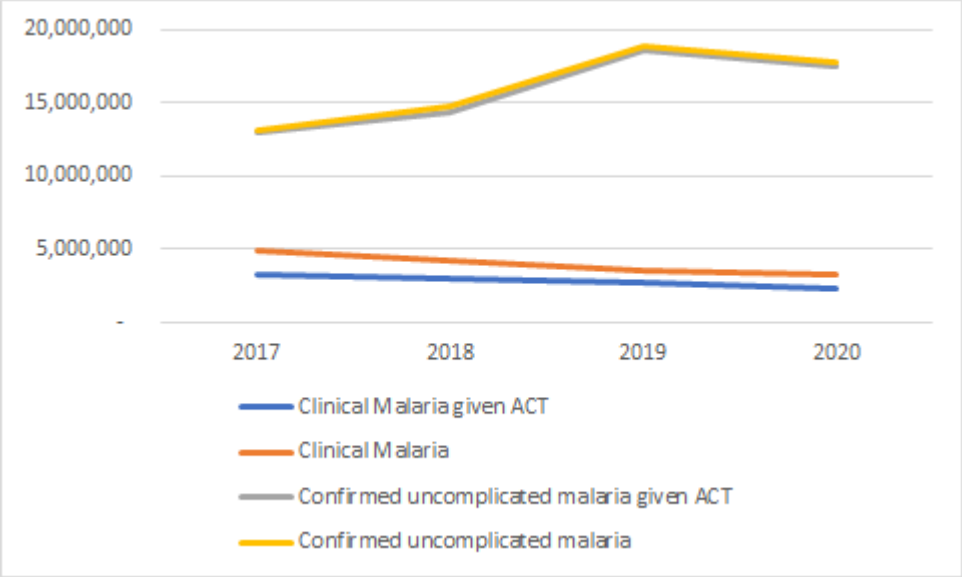


Figure A-12. HMIS Reported trends in malaria treatment



Conclusion:

Household survey data trends in malaria diagnosis and treatment do not appear to reflect what is happening at the health facility level. HMIS data reported through the DHIS2 show improving trends in testing every fever by RDT for malaria, and if a fever case is confirmed as malaria, nearly every case is treated with an ACT. Household survey data includes cases of fever that are presented at private facilities and drug shops with poor testing while HMIS data is mainly from public sector facilities where there are higher testing rates. More effort is required to promote and improve testing through private health facilities where people seek care. Monitoring visits also indicate that the greatest challenge in case management is providers ignoring negative malaria test results, leading to overtreatment with ACTs.

Key Question 2b

What significant structural and behavioral challenges affect testing and treatment practices among providers?

Adherence to national malaria testing and treatment guidelines by health providers remains suboptimal. The testing and treatment guidelines require that health providers (or health workers) test all febrile cases or cases with a history of fever for malaria before administering the recommended treatment. In 2018, a PMI-funded behavioral diagnosis[15] or BE study documented structural and internal facilitators of provider adherence to testing and treatment practices including the following:

- Structural/Environmental: Scarcity mindset
  - Providers, especially those in PMI-focused high-volume facilities, seem to operate under a "scarcity" mindset in which inadequate resources, including time, negatively impact cognition and decision-making causing providers to "tunnel," or intently focus on seeing as many clients as possible instead of adhering to case management protocols during consultations. Hence, consulting large numbers of clients diminishes the quality of provider consultations. Additionally, the logistics involved with testing (e.g., waiting for clients to return with results, etc.) may dissuade some providers from testing febrile clients for malaria.
- Internal: Low perception of efficacy
  - The 2018 BE study found that providers think RDT results are not reliable. This discourages them from testing their clients and contributes to nonadherence to test results in their treatment recommendations. Providers' lack of trust in the validity of RDTs for malaria is often attributed to a perceived lack of RDT sensitivity to malaria in its early stages, its inability to detect different strains of malaria, concerns about test kits storage, or worries about tests being old or past their date of expiration.
- Internal: High perception of self-expertise to clinically diagnose cases of malaria
  - Providers hold strong identities as clinical experts and are less sure of testing and treatment guidelines when test results contradict their clinical assessment. This prevalent "mental model of diagnosis" in which test results are considered a tool to complement expert medical opinions and not as one essential to forming a diagnosis. "Overconfidence" in clinical assessment skills outweighs confidence in the accuracy of the test.

Two of three key diagnoses factors are internal, suggesting amenability to SBC interventions. Please refer to Section 3.4 for information on how SBC interventions will be directed to address the challenges identified above.

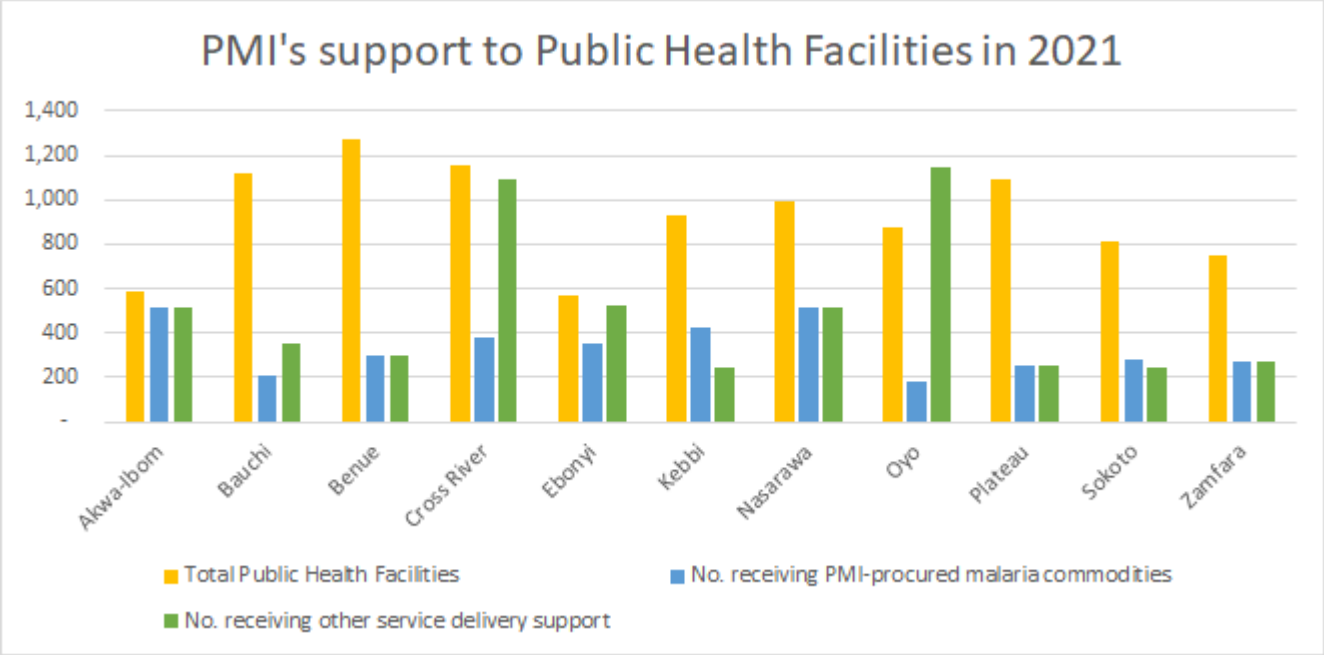
Key Question 3

What is the current and planned support for case management at health facilities and in the communities by CHWs?

[15] Sample size includes 32 different cadres of providers from 12 facilities, facility observations, and 24 client interviews in three of 11 PMI-focus states of Akwa-Ibom, Nasarawa, and Kebbi.

Supporting Data

Figure A-13. Number and type of PMI supported health facilities by state



Conclusion:

There are a total of 10,149 public health facilities in the 11 PMI-focus states. Of this number, 5,461 (54 percent) receive other service delivery support like capacity-building on case management and support for HMIS while 3,690 (36 percent) receive malaria commodities. Therefore, there are more than 50 percent of public health facilities in each state not receiving the full complement of malaria program support in most of the states. The plan for supporting community health workers is under review and will be finalized in collaboration with state health authorities. PMI is exploring working with the CHIPS program in the supported states.

Key Question 4

What is the estimated need for RDTs during calendar years 2021–2023? Are there any projected RDT gaps based on anticipated partner contributions compared to estimated needs?

Supporting Data

Table A-6. RDT **Gap** Analysis **Table**

Calendar Year	2021	2022	2023
Total country population	226,632,001	234,099,717	241,813,501
Population at risk for malaria	226,632,001	234,099,717	241,813,501
PMI-targeted at-risk population	61,771,502	63,721,084	65,732,197
RDT Needs			
Total number of projected fever cases seeking care in Public sector	20,528,699	21,176,609	21,844,968
% of fever cases tested (public sector)	91%	91%	91%
Percent of fever cases tested with an RDT	87%	87%	87%
RDT Needs (tests)	**16,311,963**	**16,826,787**	**17,357,861**
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tests)			
RDTs from Government	*0*	*0*	*0*
RDTs from Global Fund	0	0	0
RDTs from other donors	0	0	0
RDTs planned with PMI funding	33,254,025	17,000,000	10,000,000
Total RDT Contributions per Calendar Year	***33,254,025***	***17,000,000***	***10,000,000***
Stock Balance (tests)			
Beginning Balance	6,245,550	19,649,262	19,822,475
- Product Need	16,311,963	16,826,787	17,357,861
+ Total Contributions (received/expected)	29,715,675	17,000,000	10,000,000
Ending Balance	19,649,262	19,822,475	12,464,614
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	8,155,981	8,413,394	8,678,930
Total Surplus (Gap)	***11,493,281***	***11,409,081***	***3,785,684***

Conclusion

The Gap Analysis for RDTs estimates 50,496,611 RDTs as total need from CY 2021–2023 across the 11 PMI-focus states. This assumes that 87 percent of all suspected malaria cases would be diagnosed with RDT. Of the total need, PMI plans for 49,500,000 during the three-year period. There is no confirmation of RDT from any other source in the supported states. The PMI procurement plan is designed to ensure RDTs at all levels of the supply chain. Because PMI does not support every health facility within the 11 PMI-focus states, the actual procurement plan will be determined by consumption patterns and commodity pipeline analysis. PMI/Nigeria is exploring expanding RDT support to select private facilities as a strategy to increase diagnostics of suspected malaria in all sectors.

Key Question 5

What is the estimated need for ACTs during calendar years 2021–2023? Are there any projected ACT gaps?

Supporting Data

Table A-7. ACT **Gap** Analysis **Table**

Calendar Year	2021	2022	2023
Total country population	226,632,001	234,099,717	241,813,501
Population at risk for malaria	226,632,001	234,099,717	241,813,501
PMI-targeted at-risk population	61,771,502	63,721,084	65,732,197
ACT Needs			
Total number of fever cases	20,528,699	21,176,609	21,844,968
Number of fever cases tested	18,711,941	19,302,512	19,911,722
Number of confirmed malaria cases	14,022,161	14,464,717	14,921,240
Number of confirmed malaria negatives not compliant to negative result	1,536,510	1,585,004	1,635,029
Number of undiagnosed fever cases	1,816,759	1,874,098	1,933,246
Total ACT Needs (treatments)	***17,375,430***	***17,923,819***	***18,489,516***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	*0*	*0*	*0*
ACTs from Global Fund	*0*	*0*	*0*
ACTs from other donors *[specify donor]*	*0*	*0*	*0*
ACTs planned with PMI funding	25,086,240	17,000,000	12,000,000
Total ACTs Contributions per Calendar Year	***25,086,240***	***17,000,000***	***12,000,000***
Stock Balance (treatments)			
Beginning Balance	9,376,308	17,087,118	16,163,300
- Product Need	17,375,430	17,923,819	18,489,516
+ Total Contributions (received/expected)	25,086,240	17,000,000	12,000,000
Ending Balance	17,087,118	16,163,300	9,673,784
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	8,687,715	8,961,909	9,244,758
Total Surplus (Gap)	***8,399,404***	***7,201,390***	***429,026***

Conclusion

The Gap Analysis for ACTs estimates 53,788,764 ACTs would be needed to treat confirmed malaria in the 11 PMI-focus states from CY 2021–2023. Of the total need, PMI plans to procure 54,086,240. ACTs would be procured from other sources but the quantities are not available at this time. The PMI plan will result in ACTs at all levels of the supply chain and actual procurement would be determined by consumption pattern. PMI does not support every health facility within the 11 PMI-focus states and will monitor the commodity pipeline to make decisions on adjusting the supply plan. PMI/Nigeria is currently working with all the states to gradually reactivate sustainable drug supply systems like drug revolving funds for secondary and tertiary health facilities. In a phased approach, PMI will provide a one-time donation of seed stock to the facilities operating a Drug Revolving Fund

(DRF) and use excess ACTs to reach additional primary care facilities. There are no plans to provide ACTs to private facilities at this time.

Key Question 6

What is the estimated need for definitive treatment and pre-referral treatment for severe malaria during calendar years 2021–2023? Are there any anticipated gaps?

Supporting Data

Table A-8. Inj. Artesunate **Gap** Analysis **Table**

Calendar Year	2021	2022	2023
Injectable Artesunate Needs			
Projected number of severe cases	434,687	448,406	462,558
Projected number of severe cases among children	86,937	89,681	92,512
Average number of vials required for severe cases among children	3.125	3.125	3.125
Projected number of severe cases among adults	347,750	358,725	370,047
Average number of vials required for severe cases among adults	3.125	3.125	3.125
Total Injectable Artesunate Needs (vials)	***1,358,397***	***1,401,269***	***1,445,495***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	0	0	0
Injectable artesunate from other donors [specify donor]	0	0	0
Injectable artesunate planned with PMI funding	211,163	552,917	350,000
Total Injectable Artesunate Contributions per Calendar Year	***211,163***	***552,917***	***350,000***
Stock Balance (vials)			
Beginning Balance	105,766	0	0
- Product Need	1,358,397	1,401,269	1,445,495
+ Total Contributions (received/expected)	211,163	552,917	350,000
Ending Balance	-1,041,468	-848,352	-1,095,495
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	679,198	700,635	722,748
Total Surplus (Gap)	***(1,720,666)***	***(1,548,987)***	***(1,818,243)***

Conclusion

The Gap Analysis for Injectable Artesunate (IAS) estimates 4,205,161 IAS vials would be needed to treat confirmed malaria in the 11 PMI-focus states from CY 2021–2023. That estimate includes 12.5 percent as forecast for pre-referral treatment of suspected severe malaria. Of the total need, PMI plans to procure 1,114,080 vials. There is no confirmed procurement of IAS from other sources at this time. The PMI plan is about 25 percent of the estimated need because of low utilization of IAS by health facilities. In the past two years, the

average yearly consumption of IAS was about 200,000 doses in the 11 PMI-supported states. For the 2021–2023 period, the annual consumption is expected to increase to 370,000 as service delivery partners intensify on-the-job capacity-building efforts at secondary and tertiary health facilities. The gap indicated at the end of each year may not be a real gap until we understand the true patterns of use of IAS. PMI/Nigeria is not planning to procure any pre-referral treatment for severe malaria at this time.

Key Question 7

What is the estimated need for any other standard antimalarial drug used in the country (e.g., primaquine for *P. vivax*) during calendar years 2021–2023? Are there any anticipated gaps?

Supporting Data

Not applicable.

Conclusion

PMI/Nigeria is not planning to procure any other standard antimalarial and Nigeria guidelines do not recommend use of primaquine.

Key Question 8

Are first-line ACTs effective and monitored regularly?

Supporting Data

Table A-9. Recently completed and ongoing antimalarial therapeutic efficacy studies

Year	Sites	PMI Funded Y/N	Treatment Arms	PCR-Corrected ACPR>90%	Location Molecular Resistance Work Completed or Planned
2015	Bayelsa, Anambra, Imo, Adamawa, Kwara, Kano, Sokoto, Oyo	N	AL, ASAQ, DP	97.4%, similar for the three medicines)	Completed at Redeemers' University
2018	Enugu, Kano, Plateau	N	AL, ASAQ, DP	AL: 98.2% ASAQ: 98.9% DP: 100%	Redeemers' University, Nigeria
2020	Cross River, Adamawa, Sokoto	Y	AL, ASAQ, PA	Pending	Ongoing at Redeemers' University, Nigeria
2021	Imo, Kaduna, Kwara, Lagos	Y	AL, ASAQ, DP, PA	Pending	Planned for CDC Atlanta

ACPR: adequate clinical and parasitological response; AL: artemether-lumefantrine; ASAQ: amodiaquine-artesunate; DP: dihydroartemisinin-piperaquine.

Supporting Data

As of 2018, AL, ASAQ, and DP remain efficacious in Nigeria. The 2020 TES results are being finalized and will be available before the end of 2021. Planning for 2021 TES has commenced with enrollment planned for July 2021 during the peak malaria season. With PMI support, TES will be conducted on a yearly basis in at least three sites. PMI/Nigeria plans to engage local research institutions to implement TES in Nigeria.

Key Question 9

Are there other areas (e.g., lab strengthening, private sector support, etc.) that should be considered for PMI support?

Supporting Data

The quality of malaria microscopy is very poor in most secondary and tertiary health facilities. To address this, in CY 2021 PMI/Nigeria trained 182 laboratory scientists drawn from the public secondary and tertiary health facilities in the 11 PMI-focus states and plans to strengthen QA of malaria diagnostics including procurement of microscopy reagents/consumables, conducting laboratory supervision, and slide rechecking. For the private health facilities and laboratories, the plan is to improve malaria parasite diagnosis through training and linkage to the malaria diagnosis QA program at the state level. PMI/Nigeria will also consider supplying RDTs and microscopy supplies to participating private laboratories aimed at improving malaria case management practices.

Conclusions for Case Management Investments

With FY 2022 funding, PMI will continue to support capacity-building in malaria case management. PMI will expand malaria diagnostic QA efforts to all supporting states strengthening ownership though state-level malaria diagnostic QA centers. The current federal-led effort resulted in QA activities occurring once every one to two years, rather than quarterly as designed, and little evidence of improved malaria diagnostics. QA will be a state responsibility rather than dependent on outside expertise. State QA will incorporate microscopy and RDTs into one unified QA system involving multiple health agencies. When functioning well, private sector labs will be added to the system. PMI will expand its support to community-based services, strengthening iCCM within the new CHIPS program.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2. DRUG-BASED PREVENTION

NMEP Objective

Drug-based prevention is included in Objective 2 of the 2021–2025 NMSP, which states, "Ensure provision of chemoprevention, diagnosis, and appropriate treatment for 80 percent of the target populations at risk by 2025." The strategy is to deploy chemopreventive interventions to eligible populations.

All pregnant women are targeted for IPTp with sulphadoxine-pyrimethamine (SP); all eligible children (defined as children between 3 and 59 months of age living in SMC areas) are targeted for SMC. There is a planned pilot of intermittent preventive treatment for infants (IPTi) in select areas.

NMEP Approach

Drug-based prevention (referred to as chemoprevention) will be deployed to all at-risk populations through IPTp and SMC for eligible children. A pilot study will be developed on IPTi based on the epidemiological information available. The deployment of IPTp will be extended via community delivery (cIPTp) actively linked to ANC services.

The national MIP guideline recommends at least four doses of SP to all pregnant women attending ANC. To strengthen coordination, the MIP Technical Working Group (TWG) consisting of the Reproductive Health Unit, National Primary Health Care Development Agency, and other stakeholders was established. The MIP-TWG is headed by the Reproductive Health Focal Officer and supported by NMEP-MIP Focal point. The MIP-TWG meets monthly to share experience and strategize on scheduled activities. The cIPTp strategy is to address the challenge of poor ANC attendance and allow the use of communities as one of the service delivery points for those who do not attend ANC. The cIPTp strategy also seeks to create awareness and sensitize pregnant women on the need to attend ANC. The recently updated National Guideline for Diagnosis and Treatment of Malaria (2020) recommends ACTs for treatment of malaria in all trimesters of pregnancy.

SMC implementation began in 2015 through the ACCESS SMC Project in Sokoto and Zamfara states with 800,000 eligible children. The Nigeria SMC Guideline recommends four monthly cycles of SMC per year in all eligible states. This recommendation has not changed since 2015 when Nigeria began implementing SMC. Prior to 2020, SMC was recommended for nine states in the Sahel-savannah region, with 114 LGAs targeting 11 million children. With the recent malaria risk stratification, SMC is now recommended for 21 states with 395 LGAs and targeting about 23 million children. For 2021–2022, three states with 1.5 million children target population do not have support for SMC. The major funders for SMC in Nigeria are Global Fund, Malaria Consortium, and PMI.

PMI Objective in Support of NMEP

- PMI supports implementation of IPTp with SP in all 11 PMI-focus states. The support includes developing policies/guidelines and training/mentoring health facility workers to improve MIP services.
- PMI began SMC support to Zamfara State in CY 2019 with the provision of commodities (sulfadoxine-pyrimethamine + amodiaquine [SPAQ]) but in CY 2020, provided both commodities and operational cost to Zamfara State. PMI also provides partial operational support for SMC microplanning in other SMC eligible states within the PMI-focus states.
- Eight of the 11 PMI-focus states are eligible for SMC with a target population of 10.6 million children, but PMI supports only one state (Zamfara) with a target population of 1.1 million children.

PMI-Supported Recent Progress (FY 2020)

- PMI strengthened IPTp at federal, state, and facility levels. At the federal level, PMI supported the revision of guidelines, SOPs, and job aids to address barriers to uptake of IPTp. At the state and health facility level, PMI funded integrated supportive supervision and training of health workers to administer, document, and report SP doses appropriately. PMI continued to advocate to federal and state authorities to procure SP using domestic resources.
- PMI procured and distributed 4,693,369 SPAQ treatments and reached 1,159,258 children in Zamfara State during four cycles of SMC implementation. This was an integrated campaign with ITNs in August

2020.

- PMI donated 486,866 doses of SPAQ to fill commodity gaps for CY 2020 SMC cycle 2 in Borno State.
- PMI provided additional TA to NMEP to coordinate implementation of SMC activities and to plan for SMC in CY 2021.
- PMI supported targeted advocacy efforts at the community level to improve outcomes for the SMC campaign in Zamfara State.
- PMI developed a rumor and crisis management plan in the context of COVID-19 and supported the coordination of rumor response activities during the integrated SMC campaign in Zamfara State.

PMI-Supported Planned Activities (FY 2021)

- Support the development of a micro plan and budget for CY 2022 SMC implementation in Zamfara State. The micro plan budget guides resource mobilization by the state for SMC implementation.
- Procure 4.5 million doses of SPAQ for CY 2022 SMC implementation in Zamfara State. Will also provide operational costs for the implementation of the four cycles of SMC.
- Provide TA for the review of CY 2021 SMC implementation and share lessons with the NMEP and partners.
- Support strengthening coordination structures for MIP in collaboration with the MOH Reproductive Health Division.
- Continue advocacy to the states and federal health authorities to procure SP for IPTp in the supported facilities.
- Increase awareness, create demand, and improve government commitment for SMC distribution campaign in Zamfara State.

Please see FY 2022 MOP budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2.1. MALARIA IN PREGNANCY (MIP)

Key Goal

Support the national strategy for MIP, which includes provision of ITNs at the first antenatal care (ANC1) visit, a minimum of three monthly doses of IPTp in malaria endemic areas starting at 13 weeks gestational age, and effective case management of malaria per WHO guidelines.

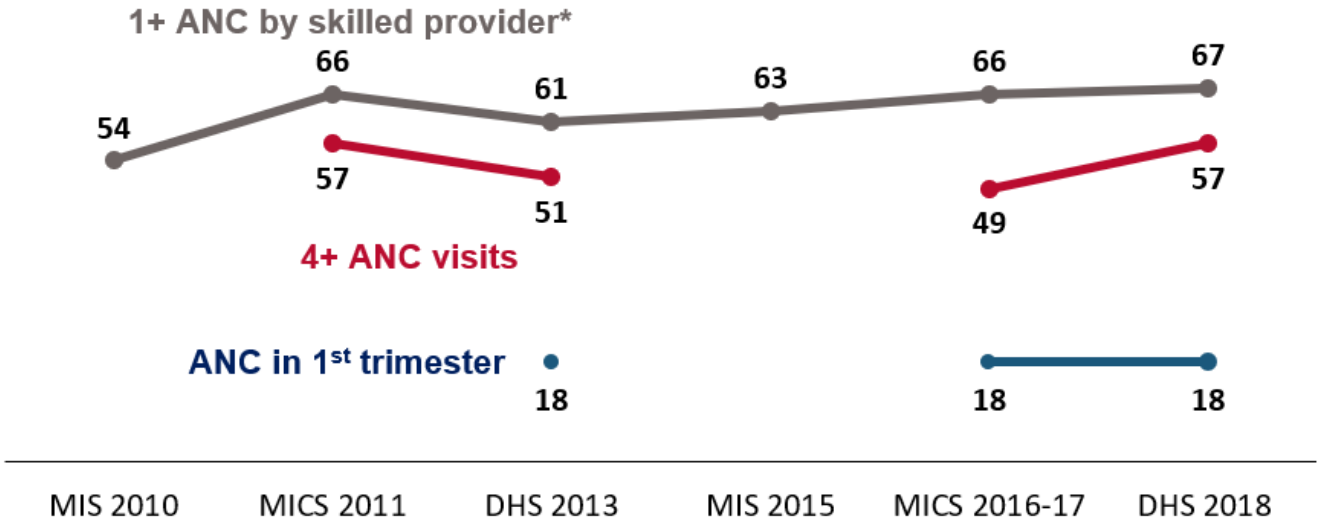
Key Question 1a

What proportion of pregnant women are accessing ANC early and frequently (as recommended by national and/or WHO strategies) during their pregnancy?

Supporting Data

Figure A-14. Trends in ANC coverage

Women 15 to 49 years of age with a live birth in the five years before the survey (most recent birth)



**Skilled provider includes doctor, nurse, or midwife.*

Key Question 1b

Are there important health system and/or behavioral barriers to ANC attendance at health facilities?

While the uptake of ANC1 continues to improve, albeit slowly, and with variations across regions and states, early booking or timing of ANC1 remains a challenge as only 18 percent of women register in their first trimester. Consequent upon late registration and other factors, the gap between ANC1 and ANC4 uptake remains. Below are some of the known facilitators and barriers to uptake of early and regular ANC attendance.

Facilitators to uptake of ANC services include a mix of internal, social, and structural factors. For example:

A. Internal factors
   - High malaria ideation in pregnancy—perceived susceptibility and perceived severity improved attitudes toward ANC/IPTp (2017 PMI-funded End-line Evaluation of HC3 Nigeria).
   - Knowledge—women who knew at least one ANC benefit, knew to go to ANC at least four times during pregnancy, and knew to initiate ANC in the first trimester were 3.2, 2.1, and 1.2 times more likely to attend ANC at least four times than those who didn't (2019 BSS in Kebbi, Sokoto, and Zamfara states).
   - Self-efficacy—women who had confidence in their ability to get to a facility for ANC were 2.5 times as likely to attend ANC at least four times (2019 BSS in Kebbi, Sokoto, and Zamfara states).

   Distribution of the three most important internal factors for improving women's attendance of ANC at least four times during pregnancy varies across and within states. For example:
   - In Kebbi State, the median percentile for women who knew the benefits of ANC and knew to attend four or more ANC visits during pregnancy was 77 percent and 34 percent, respectively.

Women residing in four LGAs sampled (spread across Kebbi South and Kebbi Central) were less likely (below the median percentile) to hold this knowledge. Women residing in LGAs in Kebbi Central were less likely to feel confident in their ability to access a facility for ANC (median percentile at 75 percent).
        - In Sokoto State, the median percentile for women who knew the benefits of ANC and knew to attend four or more ANC visits during pregnancy was 84 percent and 40 percent respectively. However, women residing in three of 11 LGAs sampled had knowledge below the median percentile. Two of these LGAs are in Sokoto South.
    - Beliefs—women who believed ANC was effective or perceived health services to be of quality for childbirth were significantly more likely to attend ANC at least four times (2019 BSS in Kebbi, Sokoto, and Zamfara states)
B. Social factors: Spousal Support
    - Women whose spouses supported their decision to attend ANC were 1.2 times more likely to attend ANC at least four times (Source: 2019 BSS in Kebbi, Sokoto, and Zamfara states).

Similarly, known barriers to ANC services include:

A. Internal factors
    - A 2018 review of malaria literature found that a lack of perceived need for ANC is a factor related to the underutilization of ANC services, especially in the first trimester. ANC is misperceived to be a curative and not preventive service.
    - The 2019 BSS in Kebbi, Sokoto, and Zamfara states strengthens this position when it found that 40 percent, 25 percent, and 34 percent of respondents believed pregnant women need ANC only when sick, that only first-time pregnant women need ANC, and that it is better to use traditional providers than a health facility for ANC, respectively.
B. Social: Spousal Opposition
    - The literature documents gender norms such as those that restrict women's movements and social interactions and require them to obtain spousal consent before they leave their homes as a major barrier to (timely) uptake of ANC services.
    - Similarly, the 2019 BSS reported that the second most cited reason (25 percent of respondents) for ANC nonuse as spousal opposition.
C. Structural: Wealth Gaps
    - The 2019 BSS found that women in lower wealth quintiles were seven times less likely to attend ANC at least four times than those in the top wealth quintiles; this was perhaps the single most important barrier to ANC uptake.

Key Question 2

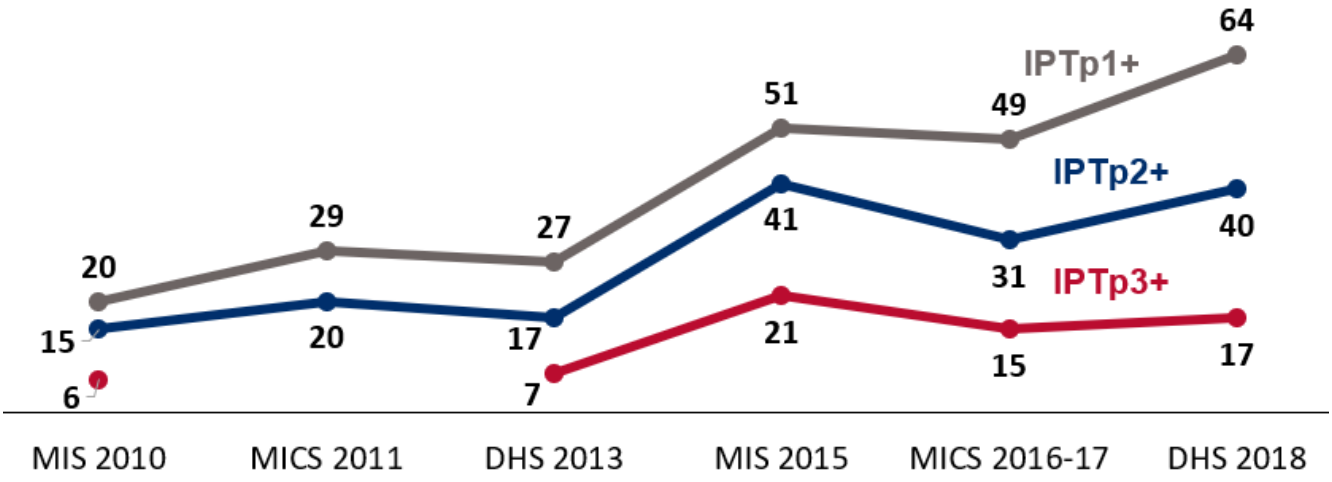
What proportion of pregnant women are receiving the recommended doses of IPTp?

There has been a steady increase in the proportion of women who received one dose of IPTp in Nigeria but no increase for IPTp2 or IPTp3 since 2015. Early ANC attendance, awareness of the benefits of IPTp, and availability of SP at health facilities, among others, are important determinants needed to improve IPTp uptake.

Supporting Data

Figure A-15. Trends in IPTp

Women 15 to 49 years of age with a live birth in the two years before the survey who received the specified number of doses of SP/Fansidar during their last pregnancy



Note: IPTp3 baseline uses the first survey available after the recommendation was updated to three or more doses.

Key Question 3a

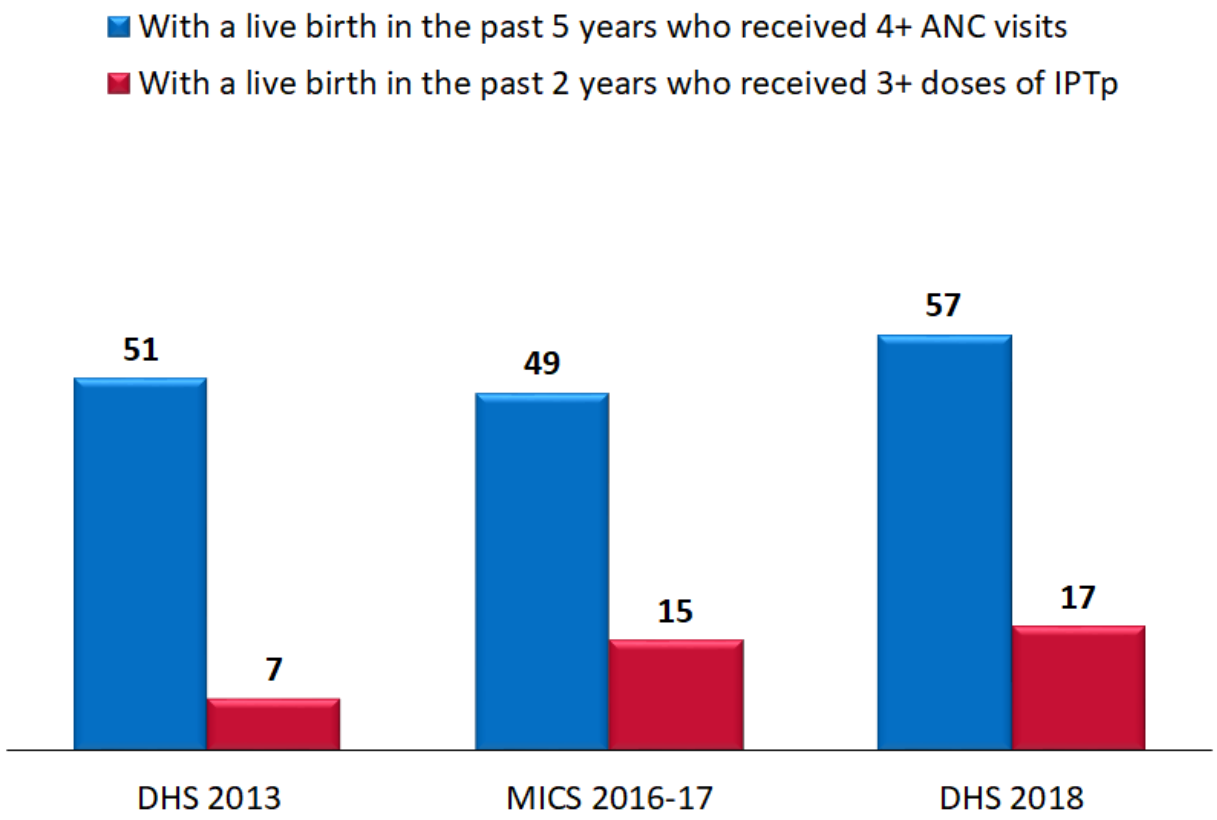
What is the gap between ANC attendance and IPTp uptake (i.e., missed opportunities for giving IPTp at ANC)?

The gap between ANC attendance and IPTp uptake has remained wide over the years. In the 2018 DHS, there was a 40 percent difference between ANC4 and women who received IPTp3+ doses.

Supporting Data

Figure A-16. Trends in missed opportunities for IPTp

Percentage of women 15 to 49 years of age



Key Question 3b

What significant health system and/or behavioral challenges affect provider delivery of MIP services (e.g., IPTp and ITN distribution at ANC)?

A 2017 assessment of malaria interventions in four PMI-focus states suggested gaps in understanding health providers' perspectives on low uptake of IPTp. There are also system- and structural-level factors such as non-availability of SP, cost of SP, and in some cases availability of water and cups, which contribute to challenges affecting provider delivery of SP. In some facilities, where SP was available, tablets were kept at a different dispensing point from other routine medicines outside the ANC area. A 2012 study concluded that factors driving missed opportunities for increasing IPTp coverage are structural and not demand side factors such as ANC attendance, appropriate timing of ANC attendance, and perceptions about side effects. PMI investments will be channeled through service delivery implementing partners to address knowledge deficits on the protocol through retraining and supportive supervision. More data is needed to comprehensively understand provider-level factors that influence providers' ability to deliver SP (e.g., knowledge of MIP guidelines, attitudes toward SP, provider norms, etc.).

The 2019 BSS in Kebbi, Sokoto, and Zamfara states found that IPTp uptake is closely associated with ANC attendance and pregnancy-related ideation, rather than specific malaria knowledge or beliefs. Among women who did not receive IPTp in their last pregnancy, the most commonly cited reasons were respondent opposition (28 percent) and spousal opposition (22 percent). However, women who knew the following facts were approximately 1.2 times more likely to receive IPTp than those who did not:

- They should have at least four ANC visits during pregnancy.
- They should attend their first ANC visit during the first trimester (or as soon as they think they are pregnant).
- IPTp is a benefit of ANC attendance.
- A child being born too early is a potential risk of malaria in pregnancy.

Additionally, respondents who believed that pregnant women who attend ANC at least four times have safer pregnancies and were 1.3 times more likely to have received IPTp during their last pregnancy, while those who thought only sick pregnant women needed ANC were 23 percent less likely to have received IPTp during their last pregnancy. Finally, women with a stated intent to use IPTp during their next pregnancy were 6.7 times more likely to have received IPTp in their last pregnancy than those without that intent.

Key Question 4

Does the national ANC program or health information system collect data and track the proportion of pregnant women with fever, those tested for malaria, those found to have malaria infection, and those who are treated?

Supporting Data

The HMIS version 2019 tools collects disaggregated data that includes pregnant women with fever, testing, confirmed malaria in pregnant women, and treatment. The tool also collects data on severe malaria among pregnant women.

Key Question 5

What is the estimated need for SP during 2021–2023? Are there any anticipated SP gaps? Are there gaps in other IPTp commodities?

PMI no longer supports SP procurement for Nigeria. There is a GON policy that bans the import of SP and other medicines into the country and instead relies on domestic production of SP. PMI will include procurement of SP in state MOUs and also leverage other in-country mechanisms to procure SP for the malaria program in Nigeria.

Supporting Data

Table A-10. SP Gap Analysis Table

Calendar Year	2021	2022	2023
Total Country Population	226,632,001	234,099,717	241,813,501
Total Population at Risk for Malaria	226,632,001	234,099,717	241,813,501
PMI Targeted at Risk Population	61,771,502	63,721,084	65,732,197
SP Needs			
Total Number of Pregnant Women	3,088,575	3,186,054	3,286,610
Total Number of Pregnant Women expected to visit public sector ANC	2,179,982	2,248,784	2,319,759
Proportion of women expected to attend ANC1 at 13 weeks or greater	64%	68%	72%
Proportion of women expected to attend ANC2	59%	59%	59%
Proportion of women expected to attend ANC3	39%	39%	39%
Proportion of women expected to attend ANC4	15%	15%	15%
Total SP Needs (treatments)	***3,872,772***	***4,081,242***	***4,299,012***
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
SP from Government	0	0	0
SP from Global Fund	0	0	0
SP from Other Donors	0	0	0
SP planned with PMI funding	0	0	0
Total SP Contributions per Calendar Year	***0***	***0***	***0***
Stock Balance (treatments)			
Beginning balance	466,700	0	0
- Product Need	3,872,772	4,081,242	4,299,012
+ Total Contributions (Received/expected)	0	0	0
Ending Balance	-3,406,072	-4,081,242	-4,299,012
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	1,936,386	2,040,621	2,149,506
Total Surplus (Gap)	***(5,342,458)***	***(6,121,862)***	***(6,448,518)***

Conclusions for MIP Investments

PMI's investment in MIP will remain the same but there will be intensified efforts advocating to states to procure SP for IPTp. As part of facility support, service delivery partners will continue to support facility management to provide SP at ANC and to remind ANC providers of the importance of SP toward a successful pregnancy outcome. For SBC interventions, PMI will leverage MNCH funds in four states (Kebbi, Sokoto, Bauchi, and Ebonyi) to address behavioral barriers to ANC and IPTp uptake.

Please see FY 2022 MOP budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2.2. SEASONAL MALARIA CHEMOPREVENTION (SMC)

Key Goal

Support the national strategy for SMC targeting relevant geographic areas and age groups, which includes four cycles of 3 to 59 months, in accordance with WHO recommendations.

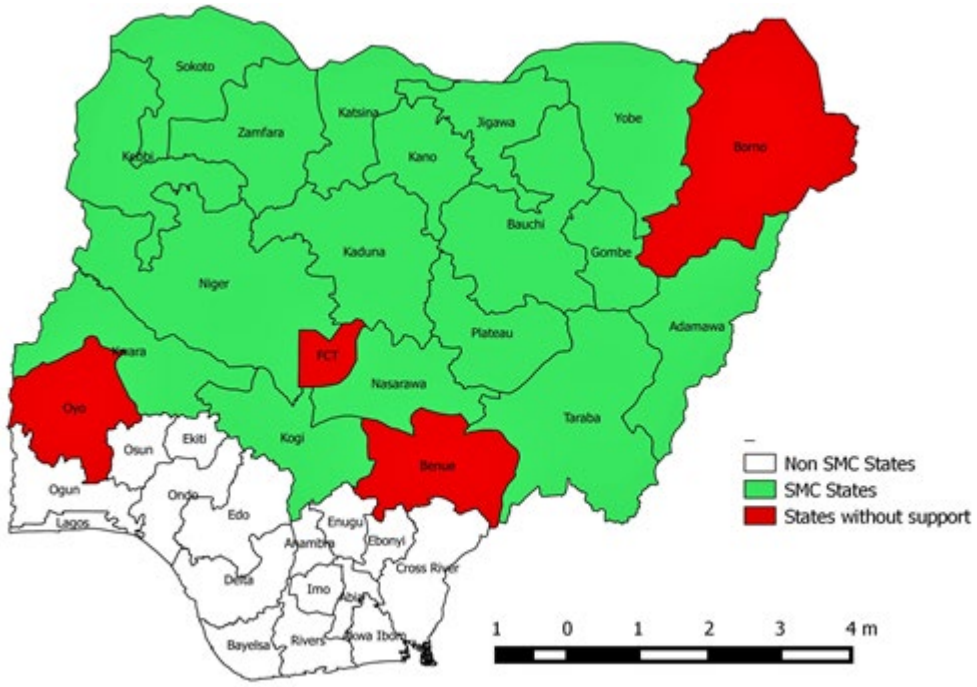
Key Question 1

What is the estimated need for SMC drug (SPAQ) during calendar years 2021–2023? Are there any projected SPAQ gaps?

The gap analysis table shows that a total of 12,378,790 treatment doses of SPAQ will be required for SMC in CYs 2021–2023. This estimate is for Zamfara State only.

Supporting Data

Figure A-17. Map of areas targeted with SMC



Note: There are 21 states (384 LGAs) within Nigeria that are eligible for SMC. Eight of 11 PMI focus states: Bauchi (10), Benue (8), Kebbi (21), Nasarawa (13), Oyo (6), Plateau (17), Sokoto (23), and Zamfara (14) are eligible. PMI currently only supports SMC in Zamfara State.

Table A-11. States and LGAs eligible/implementing SMC in 2021

SN	State	Total LGAs	SMC Eligible LGAs	Funder(s)
1	Adamawa	21	19	Global Fund
2	Bauchi*	20	20	PF & KOICA
3	Benue*	23	8	None
4	Borno**	27	27	PMI/PF
5	FCT	6	6	None
6	Gombe	11	11	Global Fund
7	Jigawa	27	27	Global Fund
8	Kaduna	23	23	Global Fund
9	Kano	44	44	Global Fund
10	Katsina	34	34	Global Fund
11	Kebbi*	21	21	PF
12	Kogi	21	9	PF
13	Kwara	16	11	Global Fund
14	Nasarawa*	13	13	PF
15	Niger	25	25	Global Fund
16	Oyo*	33	6	None
17	Plateau*	17	17	PF
18	Sokoto	23	23	PF
19	Taraba	16	9	Global Fund
20	Yobe	17	17	Global Fund
21	Zamfara*	14	14	PMI
	TOTAL	**452**	**384**	

*PMI-focus states.

**PMI donated some SPAQ to Borno but PF provides SPAQ and operational funding.

KOICA-Korea International Cooperation Agency; PF-Philanthropic Funding; PMI-US President's Malaria Initiative.

Table A-12. SMC Gap Analysis Table

Calendar Year	2021	2022	2023
Total population in the SMC targeted age range	5,259,204	5,427,499	5,601,179
Population in the SMC targeted age range in Zamfara state	1,051,841	1,085,500	1,120,236
SMC Drug (SP+AQ) Needs			
PMI population 3-11 months targeted for SMC	189,331	195,390	201,642
PMI population 12-59 months targeted for SMC	809,917	835,835	862,582
Total PMI population targeted for SMC	*999,249*	*1,031,225*	*1,064,224*
Total SP+AQ Needs (co-blisters) (Zamfara State)	***3,996,995***	***4,124,899***	***4,256,896***
Partner Contributions (co-blisters, national)			
SP+AQ carried over from previous year	104,409	607,414	982,515
SP+AQ from Government	0	0	0
SP+AQ from Global Fund	0	0	0
SP+AQ from other donors	0	0	0
SP+AQ planned with PMI funding	4,500,000	4,500,000	4,256,896
Total SP+AQ Contributions per Calendar Year	*4,604,409*	*5,107,414*	*5,239,411*
Total SP+AQ Surplus (Gap)	*607,414*	*982,515*	*982,515*

Key Question 2

What are the estimated non-commodity resources needed to properly deliver SMC over the next three years (e.g., staffing, SBC, etc.)?

Supporting Data

In addition to SPAQ, PPE is also required for SMC campaigns in the COVID-19 context in compliance with national guidelines. Because PMI does not provide these items, the country has added the PPE requirements into the Global Fund C19RM. The non-commodity costs cover microplanning, training costs, transportation of SPAQ, communication and transportation allowances for Community Drug Distributors, logistics for monitoring and supervision of implementation, and conduct of an end-of-round coverage survey. There are also situations where SBC activities are required to improve adherence to second and third day treatment as well as adherence to children who are referred to health facilities. The budget for the non-commodity resources required for SMC is developed during each year's microplanning exercise.

Key Question 3

If refusal or adherence to full dosing of SMC is a challenge, what behavioral challenges affect SMC acceptance and adherence?

There is limited data on household refusal of SMC in Zamfara State; after six years of implementing SMC, acceptance and adherence rates are expected to remain high. The report of the CY 2020 combined ITN and SMC campaign in Zamfara State indicated that household acceptance of the SMC medicines improved with the issuance of net cards in the first round, although it is unclear if there were refusals, and to what scale in subsequent cycles. One reason these caregivers have refused SMC in the past was due to beliefs that the drugs were harmful. Anecdotal evidence also suggests that SBC initiatives such as lead mothers, mass media jingles, town announcements, and community mobilization by volunteers resulted in increased caregivers' uptake and improved adherence to the SMC regimen. Additionally, an impact analysis of the CY 2019 SMC campaign in Zamfara indicated that over 90 percent of children whose caregivers refused SMC suffered a malaria episode motivating some caregivers to become advocates of the SMC campaign in CY 2020. Stories of such personal advocates have been documented as success stories because they greatly motivated uptake of SMC among their peers in CY 2020.

Conclusions for SMC Investments

With FY 2022 funding, PMI will continue to support SMC in Zamfara State. Other partners cover SMC needs in six SMC eligible PMI-supported states. With the stratification exercise, Nigeria has expanded the number of eligible states. PMI has prioritized expansion into another PMI-supported state (likely Benue) if additional resources become available.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

2.2.3. ADDITIONAL DRUG-BASED PREVENTIVE STRATEGIES

Nigeria is not a designated country for near-term pre-elimination or elimination and there is no PMI support planned for such work.

3. CROSS-CUTTING AND OTHER HEALTH SYSTEMS

3.1. SUPPLY CHAIN

NMEP Objective

Supply chain underlies the key objectives of the 2021–2025 NMSP and is reflected in eight specific strategies under the five NMSP objectives:

- Strategy 1.4: Strengthen systems for continuous availability of medicines and health products for the prevention of malaria through vector control.
- Strategy 2.4: Strengthen systems for continuous availability of medicines and health products for the chemoprevention, diagnosis and treatment of malaria.
- Strategy 3.6: Develop a functional Pharmaceutical Management Information System to strengthen evidence-based decision-making for malaria programming.
- Strategy 3.7: Collaborate with the National Product Supply Chain Management Program (NPSCMP) and the National Agency for Food and Drug Administration and Control (NAFDAC) for integrated supportive supervision activities and promote QA for malaria medicines/ commodities across all facilities

(public and private) respectively.

- Strategy 4.4: Strengthen private sector collaboration and participation for delivery of quality malaria services.
- Strategy 5.1: Strengthen capacity for budget tracking, internal controls, and financial reporting at national and subnational levels.
- Strategy 5.2: Scale up domestic resource mobilization.
- Strategy 5.3: Reinforce policy makers and legislature engagement for increased funding allocation and release for malaria management at all levels.

NMEP Approach

Nigeria established an integrated system to manage donated commodities under the NPSCMP, Food and Drug Services Department of MOH. The integrated system was endorsed by the national health council and has the support of the NMEP and other development partners in Nigeria including the Global Fund. The system is a public–private partnership with government-owned, private-sector managed warehouses at the central and regional/axial level, and distribution outsourced to private logistics providers—from central to the axial warehouses and from the axial warehouses to health facilities. The integrated supply chain system is coordinated at the national level by the NPSCMP, at the state level by the Logistics Management Coordination Unit (LMCU), Department of Pharmaceutical Services, State Ministry of Health, and at the local government level by the local government LMCU.

PMI Objective in Support of NMEP

PMI supports supply chain coordination activities at all levels of government (national and subnational) in Nigeria (NPSCMP at the national level and the LMCUs in the 11 PMI-focus states). PMI has supported the pharmaceutical supply chain management TWGs at the federal level and in all 11 PMI-focus states. PMI supported the development of the National Health Supply Chain Strategy and Implementation Plan 2021–2025.

PMI supported the harmonized national forecast for malaria commodities. As a result, state-specific quantifications and gap analyses have been developed and used to inform commodity planning by partners and as advocacy tools for resource mobilization. PMI supported other TWGs of NMEP and SMEPs with supply chain data to inform effective decision-making.

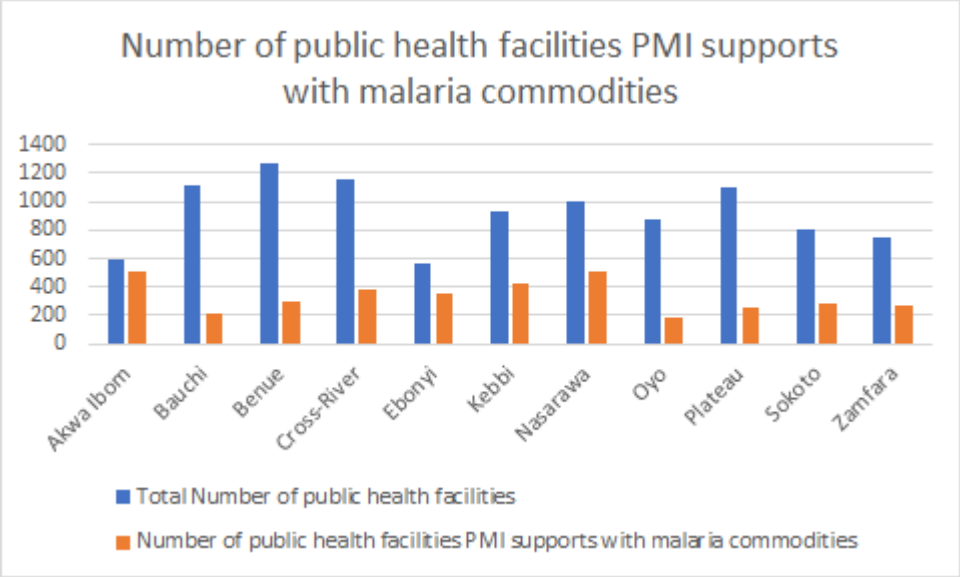
PMI continues to support the roll out and enhancements of the national health logistics management information system (NHLMIS), the electronic logistics management information system (eLMIS) platform for supply chain data for all public health supply chain data in Nigeria.

PMI has supported the design and implementation of the Drug Revolving Fund (DRF) scheme in focus states. The activities start with strengthening the governance structure, providing TA on warehouse renovations, developing various SOPs, training, and rolling out the DRF scheme at the health facilities level. PMI plans to migrate ACTs to the DRF scheme starting with all secondary health facilities within each state. Once a health facility is capitalized with PMI ACTs as seed stock, PMI will no longer supply ACTs to that facility, but will continue to monitor availability of ACTs provided through the DRF scheme. This will free up ACTs to expand malaria commodities support to more PHCs, especially in the rural areas.

PMI will reach more health facilities with malaria commodities through the DRF scheme. This will improve the current level where on average only 36 percent of public health facilities are supported with malaria commodities up to an estimated 85 percent of facilities.

PMI funds warehousing and distribution through the integrated system to facilities in the PMI-focus states.

Figure A-18. Number of public health facilities supported malaria commodities by PMI in 11 focus states



PMI will continue to support medicines regulatory, QC, and QA activities with the national medicines regulatory agencies and pharmaceutical manufacturers in Nigeria.

PMI-Supported Recent Progress (FY 2020)

Supply Chain Coordination: PMI has supported supply chain activities at national, state, and LGA levels in FY 2020. The GON coordination structures supported are as follows:

- NPSCMP and PSM Branch (NMEP), at the national level
- LMCU at the state level
- Local government LMCU at the LGA

PMI supported activities were mainly carried out through virtual meetings and embedded staff because of the COVID-19 pandemic that restricted in-person training. PMI supported various malaria PSM subcommittees and TWGs at national, regional, and state levels virtually.

Drug Revolving Fund (DRF) Scheme: PMI supported preparatory activities for the implementation of the DRF scheme in the 11 PMI-focus states. An assessment of the readiness of the states to start the DRF scheme was carried out. A dashboard was created to track implementation activities and monitor progress. Bauchi, Nasarawa, and Sokoto states have signed bills/laws establishing the Medicines Management Agencies that would

coordinate the operations of the DRF schemes. ACTs were migrated to the DRF scheme in secondary health facilities in Zamfara State, which has a functional DRF scheme.

Storage and distribution: GON- and donor-procured commodities flow from two national pharmaceutical grade warehouses (Abuja and Lagos) to regional/axial stores and then directly to health facilities, bypassing state warehouses. The warehouse management and distribution is outsourced to private logistics providers. The regional distribution system is meant to be a medium-term solution. As states upgrade to pharmaceutical-grade warehouses, distribution can again take place from the state level directly to the health facilities, coordinated by the state medicines and health commodities management agency (called Medicines Management Agency in some states) and the LMCU. PMI provided TA on warehouse renovations to Bauchi, Nasarawa, and Benue states in FY 2020.

Data management: PMI supported the enhancements and operations of eLMIS known as the national health logistics management information service (NHLMIS). The NHLMIS is the logistics data reporting platform for all public health programs (malaria, HIV/AIDS, family planning, MNCH, and tuberculosis) in Nigeria. Currently, only PMI supported health facilities are using the eLMIS; implementation of the DRF scheme will enable additional health facilities to use the eLMIS.

PMI supported one round of an End-Use Verification (EUV) survey in FY 2020. PMI has been triangulating eLMIS and HMIS data (from NHLMIS and DHIS2 platforms). This has resulted in a decline in the ACT use/reported case ratio in the 11 PMI-focus states. Under-reporting of malaria cases through the HMIS is a contributing factor to the discrepancy in consumption versus reported cases. PMI will use malaria commodities support to leverage for more accurate HMIS reporting in all PMI supported states; supporting and improving use of LMIS tools that capture malaria dispensing data will allow for further triangulation with HMIS.

Medicines quality and regulation: PMI supported medicines regulatory and quality control and assurance activities. Below is a list of activities supported in FY 2020:

- Promoted NAFDAC systems improvement activities toward WHO Global Benchmark Tool certification.
- Earned ISO 17025 annual reaccreditation of four NAFDAC and one National Institute for Pharmaceutical Research and Development QC laboratories; also supporting laboratories to achieve WHO prequalification certification.
- Supported the efforts of the Pharmacists Council of Nigeria to improve the regulation and quality of medicines at the state and community levels. Carried out an assessment of medicine sales outlets in three states (Bauchi, Ebonyi, and Sokoto).
- Trained 74 pharmaceutical inspectors and developed SOPs for training community pharmacies and PPMVs on effective management of medicines in sales outlets.
- Three Nigeria pharmaceutical manufacturers (Emzor, May and Baker, and Swipha) prepared ACT dossiers for the WHO prequalification certification evaluation team.
- Two Nigeria pharmaceutical manufacturers (Emzor and Swipha) prepared SP dossiers for the WHO prequalification certification evaluation team.

PMI-Supported Planned Activities (FY 2021)

In FY 2021, PMI plans to:

- Strengthen the state medicines management agencies' capacity to coordinate all supply chain activities at the state and health facility levels. PMI-focus states will be supported to establish medicines management agencies to coordinate all DRF/supply chain activities.
- Support state medicines management agencies to manage integrated warehousing and last mile distribution contracts at the state level.
- Support state medicines management agencies to procure ACTs and SPs for DRF from local, qualified pharmaceutical manufacturers and wholesalers.
- Continue to distribute malaria commodities (excluding ITNs) through the regional/axial stores while strengthening the capacities of some state medicines management agencies to coordinate integrated storage and distribution of malaria commodities at the state level.
- Continue to support the enhancement (integration of warehouse management system) and use of the NHLMIS for real-time decision-making. Inclusion of all health facilities (including non-PMI supported health facilities) in each of the PMI-focus states will be supported at the state level. PMI will advocate for feasible integration of the eLMIS and DHIS2 systems for improved data quality for decision-making and forecasting needs.
- Continue to support the QA and regulatory activities of the national drug regulatory agencies at national and subnational levels. This includes support for post-marketing surveillance and global standards for traceability of malaria medicines and additional support to pharmaceutical manufacturers' quality assurance processes to produce quality malaria medicines in Nigeria.
- Support state-level medicines quality assurance processes with PPMVs and community pharmacies through the Pharmacists Council of Nigeria's pharmaceutical Inspection Committees. Community pharmacies and PPMVs links to manufacturers, wholesalers, and distributors of quality malaria medicines will be strengthened.

Key Goal

Ensure continual availability of quality products needed for malaria control and elimination (ACTs, RDTs, SP, IAS, and ITNs) at health facilities and community level.

Key Question 1

Has the central level, (or subcentral level, if appropriate) been stocked according to plan for ACTs, RDTs, SP, and IAS over the last year (2020)? If not, have they been under, over, or stocked out?

Malaria commodities were stocked below the established maximum-minimum level at the central level. COVID-19 pandemic movement restrictions affected manufacturing and shipment of malaria commodities from countries of origin resulting in low central-level stock of malaria commodities in FY 2020. Congestion at ports of entry was another significant factor that affected availability of malaria commodities at the central level. Nigeria ensured that public health supply chain operations were declared essential, allowing for the movement of commodities even during lockdowns. Even with central-level shortages, Nigeria was generally able to maintain the ability to treat confirmed malaria cases at the health facility level, with just two quarters when the ability to treat dropped to 80 percent. The situation improved toward the end of the fiscal year.

Key Question 2

What are the trends in service delivery point stockout rates for ACTs (including ability to treat), RDTs, IAS, and SP over the last year (if tracked)? Is there a seasonal or geographic difference in stockout rates?

There was no established seasonal or geographic trend for stockout rates of malaria commodities in FY 2020. The stockouts of malaria commodities were due to COVID-19 movement restrictions in countries of origin of pharmaceutical manufacturers and port congestion in Nigeria. The central-level low stock due to COVID-19 delays led to higher facility-level stockouts across ACT presentations but ability to treat remained high. Stockout rates have improved in the past quarter.

PMI has stopped procurement of SP for IPTp due to Nigeria's importation ban on the medicine and reliance on local production. The GON is responsible for the procurement of SP through the DRF scheme. PMI will continue to support effective implementation of the DRF scheme to ensure availability of SP in focus states.

Key Question 3

What is the difference between quantities for ACTs consumed and malaria cases, and RDTs consumed and numbers tested? What is driving any differences seen?

There continues to be significant differences between ACTs consumed and confirmed positive malaria cases. More ACTs are consumed than reported malaria cases as seen from eLMIS and HMIS data triangulations from various states. The differences could be due to presumptive treatment of fever cases as malaria infection, poor data (HMIS or eLMIS) quality, and misaligned periods of data reporting (eLMIS data are reported every two months while HMIS are reported every month).

There are no significant differences between RDT consumed and numbers tested. There were huge differences between ACTs and RDTs consumed, but this is gradually improving as can be seen from the data below. More ACTs are consumed than RDT. Efforts are being made to reverse the trend in favor of RDTs.

Supporting Data

Figure A-19. ACT and RDT consumption, March/April 2021

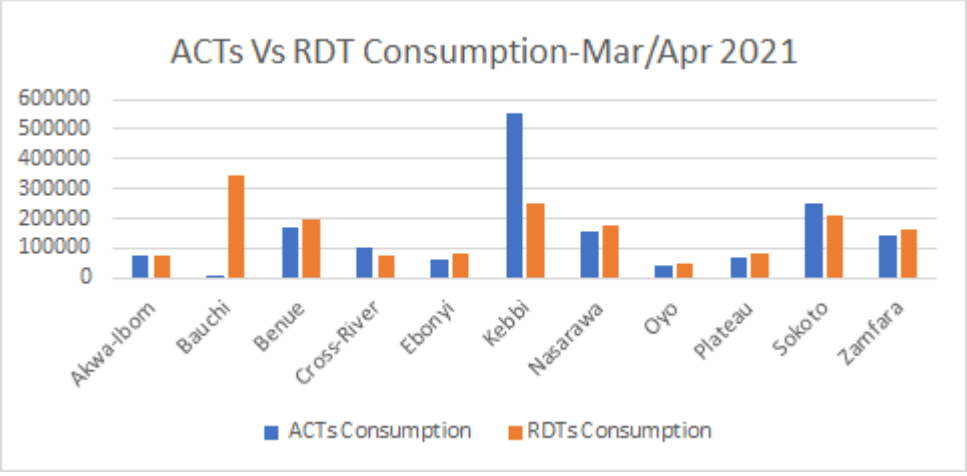
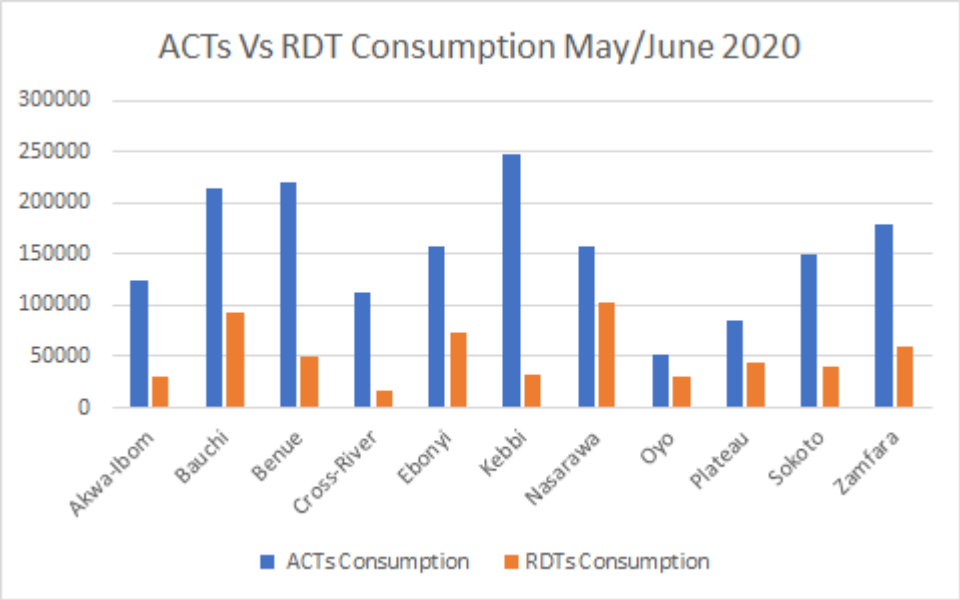


Figure A-20. ACT and RDT consumption, May/June 2020



Key Question 4

To what extent does a functional LMIS provide visibility into timely and quality logistics data from various levels of the system? To what extent is commodity data visibility dependent on surveys or supervisory data rather than routine data reported by an LMIS?

The NHLMIS provides visibility into timely and quality logistics data from PMI-supported health facilities. Paper forms are input into the NHLMIS by the state LMCU, though some secondary facilities report directly into the system. The eLMIS data from supported health facilities are used for supply chain decision-making across the various levels and the reporting rates have ranged above 90 percent across the states, with a slight dip in one quarter due to COVID-19. EUVs are carried out twice a year to provide additional information to the supply chain system. Routine eLMIS data are reported every two months, so commodity data visibility is less dependent on surveys.

As PMI migrates malaria commodities to the DRF scheme, there is a risk that health facilities will no longer report into the eLMIS. PMI will continue to provide technical support on collecting routine LMIS data from all health facilities in the state regardless of source of the commodity.

Key Question 5

What are the main supply chain TA functions supported by PMI? Are there additional investments that PMI should make (e.g., increasing visibility of demand at health facilities) to ensure continual availability of quality products needed for malaria control and elimination at health facilities and the community level? In areas performing well, is it dependent on PMI/donor funding (e.g., PMI and Global Fund pay for warehousing and distribution)? Should more be done to foster self-reliance in domestic systems and, if so, what approaches should be considered?

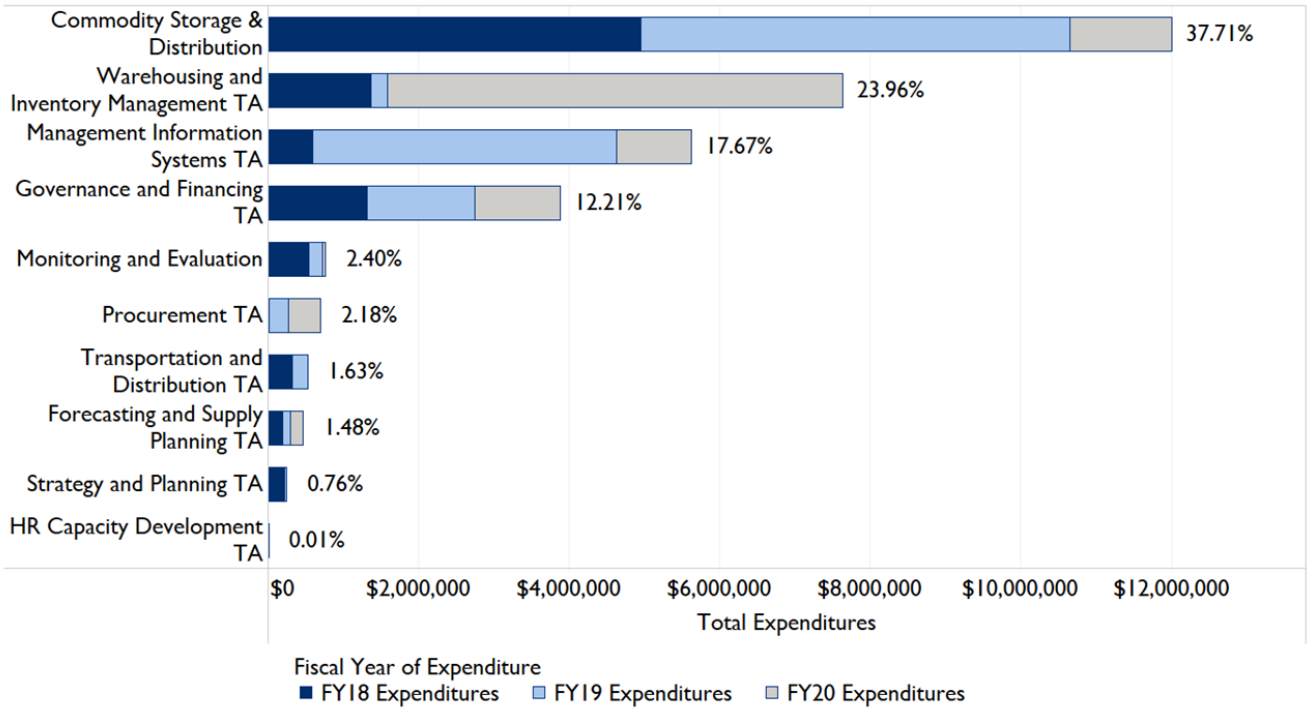
PMI's main supply chain TA functional support has been on procurement, warehousing, and distribution. Additional investment should be made on technical areas that will foster host country self-reliance on domestic systems. Strengthening the DRF scheme in the public sector, focusing on the private sector health service providers, and iCCM may ensure sustainability of domestic systems.

Nigeria needs support in the following supply chain TA areas: governance and financing, forecasting and supply planning, procurement, warehousing, distribution, outsourcing, contract management, human resources capacity development, and supply chain information management systems. PMI will begin shifting its support from direct commodity procurement, warehousing, and distribution to supporting states to manage DRFs and outsourcing warehousing and distribution.

PMI will focus on direct support to state managed procurements, warehousing, and distribution functions as malaria commodities are gradually migrated to host country systems through the DRF scheme.

Supporting Data

Figure A-21. PMI supply chain investment by technical area



Through the PMI-supported analysis of the root cause of stockouts in Nigeria, a number of key interventions were identified. These include improving appropriate use of ACTs and RDTs at the health facilities, expanding access to quality ACTs through a combination of expanding the DRF to secondary facilities and expanding the PHCs receiving commodity support, and strengthening supervision and on-the-job training. These have been reflected in MOP FY 2022 plans.

Key Question 6

Are there any other considerations that impact funding allocation in this category?

The funding allocation is based on current realities in the country as they relate to malaria program management. This consideration should change as Nigeria's health interventions, like the Basic Health Care Provision Fund, mature. Health facilities would have increased access to funding for commodities and other basic needs through health insurance schemes and the DRF.

Conclusions for Supply Chain Investments

COVID-19 pandemic movement restrictions affected malaria commodity availability from countries of origin resulting in significant low inventory levels at the central level in Nigeria. A strengthened supply chain system would better withstand emergencies such as the COVID-19 pandemic.

With FY 2022 funds, PMI will invest in strengthening the DRF scheme, medicine quality and regulation, and linkages that improve availability and access to malaria medicines in private sector health service providers at the community level. PMI will migrate malaria commodities to the DRF scheme starting with secondary health facilities, refocusing on reaching more primary health facilities with commodities, while migrating PHCs that meet the criteria to the DRF scheme in a phased approach.

PMI will decrease commodities (except ITNs) procurement, warehousing, and distribution while strengthening host government systems through core supply chain TA support and DRF.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.2. SURVEILLANCE, MONITORING, AND EVALUATION (SM&E)

NMEP Objective

The specific objective relevant to surveillance, monitoring, and evaluation (SM&E) is Objective 3 of the 2021–2025 NMSP: "To improve generation of evidence for decision-making and impact through reporting of quality malaria data and information from at least 80 percent of health facilities (public and private) and other data sources including surveillance, surveys, and operations research by 2025." SM&E provides timely and reliable information for assessing progress toward the global and national targets and ensures quality impact of malaria interventions.

NMEP Approach

The approach of SM&E is to coordinate all activities via the SM&E TWG with support and participation from a broad group of NMEP partners including PMI, the Global Fund, WHO, World Bank, UNICEF, and local nongovernmental organizations. A collaborative effort by the TWG will address the following key topics:

- Strengthening collaborations with the Department of Planning, Research, and Statistics and other ministries, departments, and agencies on the HMIS and monthly HMIS/DHIS data analysis and feedback to states.
- Continuing to increase the timeliness and completeness of reporting over the five years of NMSP (2021–2025).
- Use of information and communication technology for improving data quality and establishment of the NMDR to improve data use for decision-making.

- Poor government funding of SM&E and OR activities at all levels, including delayed conduct of Data Quality Assurance (DQA) and Integrated Monitoring and Supervision at the states, especially in the 13 non-partners supported states.

Furthermore, the SM&E efforts will strengthen the generation and reporting of malaria data from community health providers, including Community-Oriented Research Persons (CORP)s and CHIPs, PPMVs and community pharmacists, surveillance, surveys, evaluations, and operational research. Coordinate nationally representative, population-based household surveys. Greater efforts will be channeled toward direct reporting from the health facilities, especially secondary, tertiary, and private health facilities, into DHIS2 through the use of mobile technology. The use of mobile technology for reporting has been piloted by DPRs and HIV programs and was found effective in improving timeliness and completeness of reporting. It is currently being deployed in Lagos and Kaduna states to cover some health facilities.

PMI Objective in Support of NMEP

The PMI objectives are to support malaria surveillance system strengthening and M&E of malaria interventions as stated in the country's National M&E Strategy Plan (2021–2025). Below are key data elements that PMI will support:

- Strengthen the generation and reporting of quality malaria data through routine and non-routine sources; improve data flow from public health facilities (primary, secondary, and tertiary) and strengthen data flow from private health facilities.
- Strengthen data flow from community health providers (PPMVs, community pharmacists, and CORPs).
- Strengthen DQA and broader surveillance systems assessments.
- Improve generation of evidence from evaluations, TES, and entomological surveillance studies to guide strategic deployment of interventions.
- Strengthen data generation from evaluations, sharing, and use.
- Improve the generation of evidence by conducting program reviews at different levels.
- Improve integration of malaria data and surveillance systems and build capacity of M&E and malaria program officers at all levels of SM&E.

PMI-Supported Recent Progress (FY 2020)

PMI supported the EUV survey in February 2020. Through the use of data on malaria disease burden, the strategic plan, available funding, funding gaps, and impact scenarios (with models) with current funding and increased funding, PMI helped to drive NMEP and partner advocacy at the highest levels of government including at the national (president, Senate, and House of Representatives) and state levels (governors and health commissioners) to prioritize malaria and communicate the need to increase budgetary allocation for health in general and malaria in particular. PMI also supported NMEP to strengthen the routine surveillance system and ensured that the surveillance system was able to collect data from both the public and private sector. This was necessary to properly measure program performance at the national level, increase capacity for data analysis and use at all levels, and to inform program planning, implementation, and monitoring. The FY 2020 funding of PMI Nigeria's SM&E activities improved the reliance on routine malaria data (HMIS and LMIS), surveys (household, health facility, and other), and information from partners.

PMI-Supported Planned Activities (FY 2021)

In partnership with key stakeholders including NMEP, WHO, and other technical partners, PMI will continue to monitor and coordinate quality collection, collation, and analysis of malaria data and the development of new knowledge through OR to generate evidence and guide policy decisions to address program objectives or priorities. The support by SM&E stakeholders is coordinated through the SM&E Technical Subcommittee, chaired by PMI. This subcommittee meets at least monthly to review and discuss malaria related data from the national system including data in the NMDR. The subcommittee provides technical advisory inputs to malaria SM&E issues in Nigeria.

FY 2021 activities are focused on the following areas of activities:

- Strengthening data flow from all public health facilities (primary, secondary, and tertiary).
- Providing harmonized data collection tools and ensure timely data flow from private health facilities to the national health information system.
- Implementing the recommendation and lessons from past surveillance to improve the integration of malaria surveillance systems at the subnational level.
- Updating the DQA checklists and strengthening DQA monitoring at every level of healthcare services.
- Sustaining the maintenance of NMDR servers and providing technical support to build capacity and strengthen the usage of NMDR.
- Providing the TA required to ensure the strengthening of SM&E coordination at both national and subnational levels.
- Providing TA and logistic support toward the upcoming MIS and dissemination of results to stakeholders.

Additionally, PMI will work at the state level to streamline systems and improve the entry of secondary facility data into DHIS2 and develop quarterly malaria bulletins. At the federal level, PMI will provide support to the SM&E branch at the NMEP to assist in the harmonization of data collection tools, HMIS strengthening approaches, and developing monitoring/supervision tools and checklists. PMI will encourage NMEP to use routine data for monitoring malaria trends and programmatic implementation at the state level to more effectively target support.

PMI contributes to the Program Design and Learning budget for USAID Nigeria. Program Design and Learning funds contribute to the Mission-wide M&E services contract that supports PMI implementing partners to develop performance management plans, update activity performance data on the web-based reporting system, train mission staff or implementing partner staff on relevant M&E topics, and conduct data quality assessments of PMI indicators. Please see Table 2 for a detailed list of proposed activities with FY 2022 funding.

Key Goal

To support the NMEP's capacity to conduct surveillance as a core malaria intervention using high- quality data from both surveys and routine health information systems.

Key Question 1

Which data sources are available to inform estimates of intervention coverage, service availability and readiness, and morbidity and mortality?

Key data sources are household surveys, health facility surveys, malaria surveillance, and routine system information support. See details below on supporting data.

Supporting Data

Table A-13. Available malaria surveillance sources

Source	Data Collection Activity	2019	2020	2021	2022	2023	2024
Household Surveys	Demographic Health Survey (DHS)					P*	
Household Surveys	Malaria Indicator Survey (MIS)			X			P
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies (TES)		X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to HMIS	X	X	X	P	P	P
Malaria Surveillance and Routine System Support	Support to Integrated Disease Surveillance and Response (IDSR)*	X*	X*	X*	P*	P*	P*
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System (eLMIS)	X	X	X	P	P	P
Other	End-Use Verification (EUV)	X	X	X	P	P	P
Other	Entomologic Monitoring Surveys	X	X	X	P	P	P

*Asterisk denotes non-PMI funded activities, X denotes completed activities, and P denotes planned activities.

Key Question 2

What HMIS activities have been supported? What current priorities will be supported with FY 2022 MOP funding?

Supporting Data

PMI will provide continued support at district and national levels for implementation of HMIS, including data review and analysis, through the continuation of quarterly review meetings, production and dissemination of malaria bulletins, and routine data quality monitoring performed by the district health offices. PMI support for this activity is part of a broader HMIS strengthening effort supported by USAID, Global Fund, and other partners. PMI will provide a third year of support for a malaria-specific M&E course to build capacity in-country. PMI support will also enable four regional staff to participate in this five-day, in-country course, which includes both malaria control and elimination modules. With FY 2022 funds, PMI will also provide support for the maintenance and scaling up of the NMDR database.

Key Question 3

Are there specific outcomes of past/current HMIS strengthening efforts that can be identified?

Key PMI SM&E priorities strengthen HMIS by including the provision of technical support to both NMEP and SMEPs with malaria intervention activities. These efforts scaled up reporting from secondary and tertiary hospitals

with PMI provision of reporting tools. While the outcomes focus on closing the surveillance gap due to inadequate reporting from private facilities by training private sector workers. PMI continues to support the retraining of health facility staff on HMIS tools to build a sustained capacity.

The HMIS strengthening efforts also incorporated training and use of digital tools to facilitate data collection and use for both CHIPs and health facility workers, this improved digital tools utilization to advance the collection of real-time data.

Supporting Data

Table A-14. Outcomes of HMIS strengthening efforts

	Indicator	2019	2020
Timeliness	% of reports received on time	72.4%*	28.4%* 39.4%⁺
Completeness**	"Confirmed malaria cases for children under five years of age" *[Note that the reported percent of facility-months was calculated based on number of facilities expected to report, which this varies from month to month.]*	80.4%*	31.6%* 43.3%⁺
Accuracy	Populate with most recent DQA data:	N/A	N/A

*NHMIS Monthly Summary (version 2013) ⁺NHMIS Monthly Summary (version 2019), N/A = Not available.
** Data from HMIS/DHIS2 using the WHO Data Quality Tool.

Conclusions for Surveillance, Monitoring, and Evaluation Investments

With FY 2022 funds, PMI will continue to prioritize support for SM&E efforts in Nigeria with activities that include the following:

- Strengthening the generation and reporting of quality malaria data through routine and non-routine sources.
- Improving data flow from public health facilities (primary, secondary, and tertiary) and strengthening data flow from private health facilities.
- Strengthening data flow from community health providers (PPMVs, community pharmacists, and CORPs).
- Strengthening DQA and broader surveillance systems assessments.
- Improving generation of evidence from evaluations, TES, and entomological surveillance studies to guide strategic deployment of interventions, share among key stakeholders, and promote increased use.
- Improving data quality by conducting thorough program reviews at the different levels of the program.
- Improving integration of malaria data and surveillance systems and building capacity of M&E and malaria program officers at all levels of SM&E.

In FY 2020 and FY 2021, PMI efforts included the initiating and operationalizing of NMDR, including the training of national and state officers to use the NMDR, as well as the digitalization of the DQA process. Nigeria supported a malaria stratification and intervention mix analysis to guide program implementation and monitoring. The NMEP also supported rollout of tools and the implementation of direct reporting from secondary and tertiary facilities to the DHIS2. In CY 2020, NMEP developed a Malaria-COVID-19 National Malaria Operations Research Agenda (NMORA) with other stakeholders, and developed a Surveillance, Monitoring, and Evaluation/Operational Research Contingency Plan for 2021 (to ensure continuity during the COVID-19 pandemic).

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.3. OPERATIONAL RESEARCH

NMEP Objective

The NMEP objective for operational research is included under Objective 3 of the 2021–2025 NMSP, which states: "To improve generation of evidence for decision-making and impact through reporting of quality malaria data and information from at least 80 percent of health facilities (public and private) and other data sources including surveillance, surveys and operations research by 2025." Specifically, strategies 3.3, 3.4, and 3.5 address the important areas ranging from the capacity to conduct OR to data use for decision-making. The goal of the 2021–2025 NMSP is to reduce malaria morbidity to less than 10 percent parasite prevalence and mortality attributable to malaria to less than 50 deaths per 1,000 by 2025. A key element in achieving this goal is the need for well-tailored Malaria Operational Research to implement the most impactful interventions. The NMEP in collaboration with its partners developed a National Malaria Operations Research Agenda (NMORA).

NMEP Approach

The goal of the NMORA is to provide a situational analysis of the progress in malaria research and guide researchers, academic institutions, program implementers, health development partners, donors, policy makers, nongovernmental organizations, and other stakeholders to identify malaria research priorities by thematic areas for Nigeria. However, implementation of the NMORA has been slow due to the absence of a critical framework to coordinate and communicate the NMORA priorities for improved uptake by research institutions.

- The implementation framework for the NMORA includes coordination, resource mobilization, engagement with stakeholders, capacity-building, review, monitoring and evaluation of the NMORA, and dissemination of research findings. To address these challenges, the NMEP included the funding of the OR agenda coordination in the Global Fund request for the 2018–2020 Malaria grant.
- An OR stakeholder prioritization meeting was held on July 23–24, 2019. The meeting was coordinated by NMEP alongside partners to achieve the following objectives:
    - Prioritize areas in the project cycle that may require operations research to optimize delivery.
    - Promote awareness of OR priorities for malaria among researchers in Nigeria.
    - Strengthen mechanisms for establishing linkages and coordination between NMEP and research institutions.
    - Explore resource mobilization options to support the malaria OR agenda.
    - Establish systems that will enhance the translation of malaria OR into use for decision-making.

Most of the prioritized OR questions set by NMEP and its partners were not implemented with only 12 percent (4 out of 33) of the prioritized questions in the NMORA having been answered between 2014 and 2019, as reported to NMEP.

In May 2020, the NMEP revised the NMORA to incorporate research questions on COVID-19 and the updated list was shared with malaria partners.

PMI Objective in Support of NMEP

PMI continues to support the NMEP to identify OR priorities and topics of interest for PMI funding support.

PMI supports FETP malaria-focused residents and assists in identifying programmatically relevant research topics.

PMI-Supported Recent Progress (FY 2020)

No PMI PE/OR studies were undertaken in FY 2020.

PMI-Supported Planned Activities (FY 2021)

No PMI PE/OR studies were undertaken in FY 2021.

PMI Goal

PMI will conduct PE/OR that helps to evaluate coverage of population at-risk, intervention quality, or delivery efficiency; study reducing malaria transmission and disease burden; test effectiveness of new or evolved priority interventions and strategies; or explore new metrics and mechanisms to assess intervention impact.

Key Question 1

In consultation with the NMEP, have technical challenges or operational bottlenecks in program interventions been identified that require PE/OR? How have they been prioritized?

All OR and evaluation decisions are done in consultation with the NMEP. Priorities for OR are determined during a yearly OR stakeholders meeting. The list of prioritized malaria and COVID-19 Research questions was developed in 2020 and is available on the NMEP website.

Supporting Data

Table A-15. Ongoing program evaluation and operational research

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
PMI, Global Fund, BMGF	Nigeria CDC, Institute of Human Virology/Nigeria, CDC Atlanta	Analysis of malaria prevalence among all age groups, serological markers of exposure, parasite transmission dynamics, and HRP2 gene deletions	Completed
UNITAID	Jhpiego	Transforming Intermittent Preventive Treatment for Optimal Pregnancy (TIPTOP)	Ongoing
CDC	International Federation of Red Cross and Red Crescent Societies	Evaluation of strategies for mass distribution of insecticide treated mosquito nets for malaria control in the context of COVID-19	September 2020–August 2021

Key Question 2

Are there specific challenges in any intervention areas that merit further exploration or research with the potential of establishing strategies or interventions applicable in the near future?

PMI is considering targeted alternative approaches to malaria control in Kebbi State given the sustained high malaria burden (see callout box in Section 2, Malaria Situation and Progress).

Supporting Data

Despite the North West region of Nigeria having a high ITN use:access ratio (0.91), according to a 2019 cross-sectional behavioral survey (see Section 1.2), households in southwestern Kebbi State had particularly low availability of sufficient ITNs for effective coverage. Kebbi State is planning to conduct a mass ITN campaign in late CY 2021 with Interceptor G2s being procured and distributed as the most appropriate ITN given the vector resistance profile from that sentinel site. PMI is supporting an impact assessment of Interceptor G2 nets in Kebbi State evaluating entomological and epidemiological indicators, along with supporting durability monitoring of this new type of ITN. One of the alternative approaches, due to the predominance of agriculture in Kebbi State, includes the planned reprogramming of FY 2021 funds to conduct a one-year feasibility assessment/pilot for targeted LSM. A pilot project design and a PMI OR concept note will be developed in consultation with relevant stakeholders, and will be submitted to the PMI OR committee for review.

Key Question 3

Are there any other considerations that impact your funding allocation in this category?

The NMEP is not a research institution. Research institutions of varying skills exist in Nigeria (Nigerian Institute of Medical Research [NIMR], NCDC, universities). NMEP staff and partners develop and prioritize research

questions, but the NMEP has not developed strong, consistent working relationships with other agencies and institutions. PMI has used entomological monitoring and TES as an opportunity to foster improved collaboration between NMEP, NIMR, and NCDC.

Supporting Data

None.

Conclusions for Program Evaluation and Operational Research Investments

PMI will continue to facilitate partnerships among NMEP, partners, and in-country research institutions, as well as building staff capacity. Given the sustained high malaria burden in Kebbi State, PMI is considering alternative approaches to malaria control. One of these alternatives includes planned reprogramming of FY 2021 funds to conduct a feasibility pilot for targeted LSM in Kebbi State. Findings from the LSM pilot will be used to determine whether the targeted LSM approach should be continued.

No PMI PE/OR is planned to take place using FY 2022 funds.

3.4. SOCIAL AND BEHAVIOR CHANGE (SBC)

NMEP Objective

The goal of 2021–2025 NMSP is to achieve a parasite prevalence of less than 10 percent and reduce mortality attributable to malaria to less than 50 deaths per 1,000 live births by 2025. To reach this goal, the 2021–2025 NMSP articulates five objectives that bear relevance to all components of the malaria program, including ACSM. In Nigeria, ACSM is used interchangeably as SBC. SBC contributes to improved access and utilization of vector control interventions, generates demand for the uptake of chemoprevention, promotes diagnosis and appropriate malaria treatment products and services, contributes to the evidence for decision-making and impact, promotes coordination and collaboration amongst technical areas and partners, builds strategic partnerships for efficiency and effectiveness, and drives domestic resourcing.

NMEP Approach

The 2021–2025 NMSP was developed in October 2020. Following this, Nigeria's National Strategic Framework and Implementation Guide for Malaria ACSM supported by PMI in 2014 is currently being revised to align with shifts and new evidence reflected in the NMSP. Nonetheless, the 2021–2025 NMSP emphasizes implementation at both the national and subnational levels and across the individual, service delivery, community, and policy levels. The 2021–2025 NMSP positions ACSM/SBC as a supportive cross-cutting strategy to achieve the following objectives: promote the desired change or positive behaviors for the prevention and control of malaria at all levels, and keep malaria high on the political agenda through sustained, result-oriented advocacy, at all levels and in line with Pillar 1 of the HBHI approach.

The 2021–2025 NMSP places emphasis on data-driven SBC that is tailored toward localities and beneficiary populations and affects behaviors at the following four levels or domains:

1. Policy – to increase political commitment through budget allocation and improved release of funds for malaria; evidence-based policy reviews/adaptation.
2. Services or Systems – to improve providers knowledge, attitude, and behaviors; service communication; create an enabling environment; and improve demand for testing and ANC for IPTp.
3. Community – to increase commitment and ownership through community groups, associations, and Community Health Workers/CHIPS, and to promote positive norms for malaria control.
4. Household and Individual – to increase knowledge, change in social norms and/or beliefs, and increased demand and use for products and services.

ACSM strategies will contribute to Objectives 1 and 2 of the 2021–2025 NMSP through communication and behavioral interventions that address knowledge and practice gaps for malaria priority behaviors, and that can be contextualized to states. For example, the 2021–2025 NMSP notes the need to intensify messaging on the promotion of early ANC attendance among pregnant women, which should result in an increased uptake of three or more doses of IPTp. ACSM's support to the attainment of Objectives 3–5 of the 2021–2025 NMSP is hinged on interventions that strengthen the capacity of the ACSM to coordinate, plan, network, manage data, mobilize resource mobilization, and build alliances for effective delivery of SBC interventions at the national and subnational levels. ACSM will also support the development of advocacy tools for improved funding as well as those to increase coordination between service delivery and SBC to align demand and supply factors and efforts. The subcommittee supports the ACSM branch to coordinate and provide technical oversight to SBC activities at the federal and state level. In PMI-focus states, malaria focal persons are supported by state-level ACSM technical committees, which were established with PMI support. However, staff strength, technical, and coordination capacity vary significantly across states.

Another important ACSM relevant inclusion in the 2021–2025 NMSP is the formal recognition of the CHIPS program, which aims to facilitate task sharing and improve coordination of community health services. CHIPS are designed to deliver actionable information and non-prescriptive PHC services, including those for malaria.

PMI Objective in Support of NMEP

PMI's SBC support to the NMEP fully aligns with and contributes to the attainment of all five objectives at the national, state, local government, ward, and community levels. PMI's support to Objectives 1 and 2 is achieved through data-shaped, coordinated communication and non-communication interventions deployed across eleven PMI focus-states. Through partnerships with local media organizations, community-based organizations, and collaboration with community volunteers, PMI supports the NMEP's efforts to expand mass media and community-level interpersonal communication (IPC) activities aimed at increasing correct and consistent ITN use and care, prompt care-seeking for fever, uptake of RDT tests and IPTp, and provider adherence to diagnostic results for treatment with ACTs. At the federal and state levels, and much in line with Objective 4 of the 2021–2025 NMSP, PMI provides TA and support for capacity strengthening activities including for coordination, and the development of materials and relevant guidelines, such as the ACSM Strategy (2014). PMI is currently supporting ongoing efforts to revise the 2014 ACSM Strategy and other relevant guidelines to align with the 2021–2025 NMSP. At the state level, PMI continues to support 11 of 36 states to adapt the national ACSM Strategy to state contexts, develop work plans and materials, and support partner coordination efforts. Finally, in support of 2021–2025 NMSP Objective 3, PMI supports the generation, analysis, and translation of malaria SBC evidence, through

waves of behavioral sentinel surveys in selected program areas of Kebbi, Sokoto, and Zamfara states into easily digestible formats, tailored to multiple audiences and informing near real-time adaptations to ongoing malaria SBC program implementation.

PMI-Supported Recent Progress (FY 2020)

In FY 2020, PMI continued multi-channel delivery of messages to address select ideational determinants of malaria prevention, diagnosis, and treatment behaviors at the individual, household, and community levels across all 11 PMI-focus states. PMI also continued to fund the provision of SBC TA to service delivery partners to scale up the implementation of behavioral prototypes to improve provider adherence to malaria case management guidelines. PMI also supported the ongoing revision of Nigeria's National Strategic Framework and Implementation Guide for Malaria ACSM to align with shifts and new evidence reflected in the NMSP. Specifically, key activities and outputs included the following:

- **More than 200 episodes of malaria shows aired at no cost to PMI:** Technical assistance, using a media partnership approach, to 37 government and privately owned and 11 community radio stations to produce more than 200 episodes of radio shows, aired at no cost to PMI, to extend the reach of the national "malaria-free" campaign. These shows are complemented by PMI-supported radio spots, each focused on a priority behavior and aired over 12,285 times at a discounted rate across local media stations. An additional 9,227 complementary radio spots valued at $68,522 were contributed by local media partners.
- **Omnibus survey results show an increase in reported exposure to mass media messages:** About 78 percent of respondents in the integrated states reported exposure to "Albishirin Ku!" compared with 50 percent in FY 2019. "Albishirin Ku!" is the integrated SBC umbrella campaign that deploys a life-stage approach to messaging on a range of priority health behaviors including malaria prevention, diagnosis, and treatment behaviors. Similarly, about 50 percent of respondents in the malaria-focal states reported exposure to malaria centerpiece spots compared with 33 percent in FY 2019.
- **Over 1.5M people were reached through interpersonal communication channels:** Despite COVID-19 causing suspension of community level activities in the second half of FY 2020, contact was made with an estimated 1.5M people across 334 wards across 11 states through community dialogues, compound meetings, and household visits to promote appropriate malaria prevention (ITN use and care), diagnosis (testing before treatment), and treatment (prompt care-seeking for fever) behaviors. Of these, 719,475 were reached in malaria-only states while 861,030 people contacts were made in three integrated states. Over 73,700 and 4,200 referrals were made from children under five years of age with fever and pregnant women for IPTp and about 32 percent of these referrals were completed.
- **Concluded behavioral economics fever case management pilot:** Feasibility pilot testing of four fever case management design prototypes in Kebbi, Akwa Ibom, and Nasarawa in collaboration with NMEP, state government representatives, and PMI service delivery partners. The results showed three promising outcomes, which included improved adherence to malaria test results by providers, increased provider trust in mRDTs, and improved quality of ACT consumption data. These designs or prototypes have been finalized and handed over to service delivery partners, who have initiated scaling up to hundreds of facilities with SBC technical support.
- **Created peer networks and shared norms on adherence to case management guidelines:** PMI reached 1,283 providers through 36 peer cluster and professional association meetings to strengthen

peer-to-peer networks, generate discourse, and promote shared norms and group problem-solving to address provider biases regarding use of malaria RDTs for testing and treatment decisions. PMI also partnered with the community health faculty of the West African College of Physicians and with the national leadership of professional associations (Nigerian Medical Association, Association of Public Health Physicians of Nigeria, and Nigerian Association of Nurses and Nurse Midwives) to disseminate instructional videos on fever case management, especially in the context of COVID-19.

- **Targeted advocacy and SBC support contributes to improved ownership and outcomes for the first-ever combined ITN and SMC campaigns in Zamfara State:** The demand creation component of the combined ITN and SMC campaign in Zamfara State trained over 2,900 personnel for community mobilization, provided mass media support and conducted targeted advocacies to key stakeholders. Through the facilitated advocacy activities, Zamfara State government and media partners spent about $359,425 during the implementation of the campaign. This represents about 3 percent of matching funds to PMI's investment in the campaign. Overall, SBC activities also contributed to demand for nets with 2,957,848 ITNs distributed, which represents about 96 percent redemption rate, and demand for SMC medicines with 1,102,226 eligible children receiving the preventative dose of SMC medicine during the first cycle.
- **Women Empowerment Groups (WEG) organically expands across pilot wards:** PMI leveraged MNCH funding streams to establish four Women Empowerment Groups (WEGs) as part of human-centered design activities to provide safe spaces for women to discuss MNCH behaviors, including ITN use and care, care-seeking for fever and demand for testing before treatment in Kebbi, Sokoto, and Bauchi states. These WEGs have organically expanded from initial four groups to 29, with a total of 784 women enrolled in the WEGs. This expansion, driven by the women themselves, points to sustainability and the high value they place on the groups. In FY 2020, the women have raised a total of N9,076,950 ($25,213.75) and made loan transactions of up to N7,283,800 ($20,232.78) for empowerment, while they have spent about N165,000 ($458.33) on skill acquisition and N241,000 ($669.44) was spent on emergency health support for their members.

PMI-Supported Planned Activities (FY 2021)

- Coordinate and implement evidence-based SBC activities in states pre-, during, and post- (Nasarawa and Akwa Ibom) and after (Sokoto and Kebbi) ITN mass campaigns.
- Continue implementation of IPC activities, including community dialogues, compound meetings, and household visits in the 11 PMI-focus states.
- Continue TA to local media stations for the production and airing of radio shows and spots with messages to address priority ideational factors to improve the practice of malaria prevention and treatment behaviors, as well as the uptake of malaria products and services.
- Continue TA to service delivery partners for the scaling up of all four refined behavioral design prototypes to all PMI-supported primary and select secondary facilities across 11 states and explore the possibility of assessing continued utility and impact of BE prototypes.
- Sustain peer-to-peer engagement and group problem-solving through provider cluster and professional association meetings to promote provider behavior change regarding the use of RDTs for testing and treatment decisions.
- Provide ongoing, on-the-job TA to improve the capacity of ACSM units at national and state levels to plan and coordinate SBC activities.

- Support revisions to malaria ACSM guidelines, annual operational and M&E plans in line with the 2021–2025 NMSP.
- Support the growth of SBC communities of practice at the state level and build the capacity of such communities to serve as a venue for peer-to-peer SBC learning, networking, and exchange of best practices.
- Strengthen linkages between local media organizations and the technical programs of the NMEP and SMEPs.

Key Goal

Through the use of SBC interventions and in alignment with a country's national malaria control communication strategy, PMI supports the uptake and correct and consistent use of malaria interventions, thereby improving the overall quality of malaria control efforts that will contribute to reductions in malaria.

Key Question 1

What behaviors is PMI proposing to prioritize through its SBC programming? What data support this prioritization? Will support be geographically targeted or national?

Table A-16. Prioritized behaviors with FY 2022 funds

Behavior	Target Population	Geographic Focus	Justification
Prompt care-seeking for fever for children under five years of age	Caregivers of children under five years of age	All 11 PMI-focus states	In the 2018 DHS, there was a 35% difference between those individuals who sought care (73%) and those who did so promptly (38%). Evidence suggests a mix of internal and social factors that could facilitate or create barriers to prompt care-seeking, most of which may be amenable to SBC interventions.
Consistent ITN use/maintenance and care	All members of a household	Akwa Ibom, Kebbi, Nasarawa, Oyo, and Sokoto (CY 2021) Bauchi, Ebonyi, and Cross River (CY 2022)	Nigeria's use:access ratio varies widely across regions. Several states will be prioritized for SBC efforts aimed at promoting net use and care because they are slated to receive PMI support for ITN mass campaigns in FY 2021 and FY 2022. For states in the North Central (Nasarawa), North East (Bauchi), and North West (Sokoto and Kebbi) regions where the use:access ratios are 0.93, 0.93, and 0.98, respectively, SBC efforts will focus on maintaining ITN use and care. In the South West (Oyo) and South South (Akwa Ibom, Cross River, Ebonyi) regions where the use:access ratio is 0.80 and 0.75, respectively, efforts will be intensified to promote uptake and net use. Messages will be carefully crafted to address the ideational barriers.

Behavior	Target Population	Geographic Focus	Justification
Adherence to case management guidelines	Health facility-based providers (across cadres)	All 11 PMI-focus states	Nationally, health worker adherence to diagnostic and treatment guidelines at facilities where malaria diagnostics and treatment were available is generally low. The DHS 2018 found that only 14% of children presenting with fever were tested using mRDT. The behavioral factors summarized in Key Question 2 below influence provider decisions to test and treat only positive cases with ACTs.

Key Question 2a

For prompt care-seeking for fever for children under five years of age, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

The available data indicates there is a continued need to promote prompt care-seeking (within 48 hours). Drawing on this data, PMI proposes prioritizing interventions to address the behavioral barriers to prompt care-seeking using FY 2022 funds. To the extent feasible and within funding limits, community- and household-level IPC will be the primary channels for SBC messages to increase prompt care-seeking. This approach is supported by evidence from a PMI-funded end-line evaluation of HC3 Nigeria in 2017, which found that caregivers in community intervention areas of 10 wards were 67 percent more likely to seek care promptly than those in non-intervention wards. IPC coverage will be informed by data on intra-state variations in prompt care-seeking. The HC3 study also found that exposure to mass media interventions was associated with a significant increase in general malaria ideation. This suggests the need for sustained mass media interventions to deliver messages to improve general malaria ideation, especially perceived severity of malaria. Further analysis of the end-line data also showed that women exposed to media messages were more likely to believe that women should participate in household decisions about child health. Therefore, mass media messages, especially in the northern states where participation is low, will continue to focus on women's participation in household decision-making as a cross-cutting normative factor for improving care-seeking for child health services, including but not limited to fever.

Messages will be tailored to address context-specific barriers and strengthen facilitators. For example, improving perceived and actual health services quality is also critical for raising formal care-seeking and appropriate treatment rates for febrile children and will be a component of community engagement sessions. This will be reinforced through PMI's investments in improving service communication efforts to improve the quality of client-provider interactions and provider behavior change efforts to improve adherence to case management guidelines as well as investments in malaria case management quality improvement efforts. Finally, messages will be crafted to prime clients who promptly seek care to demand a test to confirm whether fever is caused by malaria before treatment is issued and accepted. Finally, to address cost factors, PMI will continue to leverage ongoing implementation of self-sustaining community-based savings/support schemes aimed at increasing women's financial agency for improved uptake of services, including care-seeking for fever, in Bauchi, Sokoto, Kebbi, and Ebonyi states.

Key Question 2b

For consistent ITN use/maintenance and care, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

The data shown under the ITN Section (1.2) indicates the key behavioral factors influencing ITN use, resulting in variations in the use:access ratios across geopolitical zones. This evidence shaped the prioritization and proposed PMI-supported SBC activities. Using post-ITN campaign end process data, LGAs with the lowest hanging and use rates will be targeted through a mix of channels including mass media, community-based IPC channels, and digital channels. The proposed channel mix is supported by evidence that exposure to mass media messages and materials significantly increased the odds of ITN use by 36 percent. IPC channels will be designed to mutually reinforce media messages and increase skills to improve the use of ITNs.

From available evidence, response efficacy, social norms, self-efficacy, positive attitudes about ITNs, and descriptive norms on ITN use are strong ideational predictors of ITN use, so messages will seek to increase the prevalence of these factors among target populations, especially in the south. Similarly, SBC interventions will continue to deploy enhanced audience segmentation approaches to further prioritize and enhance coverage of subpopulations. For example, BSS findings suggest the need to prioritize older pregnant women (35 to 49 years of age), living in larger households (6+ members) and residing in Sokoto who despite access, did not sleep under an ITN. Seasonal variations in net use and perceptions about the absence of mosquitos are also a challenge. To address these factors and encourage year-round use of ITNs especially in PMI-focus states in the North West (Sokoto, Kebbi, and Bauchi states), SBC activities will be intensified (e.g., increased dose of messages prior to and at the onset of the malaria transmission season as well as at the outset of same/onset of the dry season).

While living in large households could potentially indicate fewer sleeping areas available to hang nets, it is unclear how this affects ITN use. Additional qualitative research would be helpful to understand the specific barriers to net use among this subpopulation. Data will inform the development of targeted messaging and enhanced audience segmentation approaches. The third and final wave of the BSS scheduled for CY 2022 might present an opportunity to explore these and related questions.

Key Question 2c

For adherence to case management guidelines, what gaps exist in understanding the barriers to the adoption and maintenance of malaria prevention and treatment behaviors?

Another priority area is improving and sustaining provider adherence to case management guidelines. As noted in the Case Management Section (2.1) adherence to case management guidelines is currently suboptimal. Behavioral factors play a role in provider's decisions to test using RDTs and base their treatment decisions on test outcomes. SBC prototypes to address the key behavioral and structural factors outlined in Section 2.1 were initially designed and piloted in FY 2019 while SBC investments in FY 2020 and FY 2021 focused on providing TA support to service delivery partners for the scale-up of successful provider behavior change prototypes as part of their work plans. In FY 2022, PMI will continue to support the provision of TA to service delivery partners to reach a 100 percent implementation scale across all 11 PMI-focus states.

Specifically, PMI's investments will support the scale-up of behavioral prototypes/solutions to improve provider adherence across all 11 PMI-focus states, as well as process assessments to understand outcomes, and the

continued utility of prototypes over time. This will be helpful to shape future investments at the facility and community levels.

Key Question 3

What is the country's capacity to design, implement, and monitor SBC interventions at the national and subnational level?

NMEP in collaboration with the Roll Back Malaria Partnership to End Malaria in Nigeria commissioned a review to assess the progress made toward the implementation of the 2014–2020 NMSP. One of the objectives was to review the capacity of the NMEP to implement planned activities during the period under review and make appropriate recommendations toward the optimal capacity for program implementation.

The review identified enablers including the following:

- Existence of a private sector engagement strategy as well as ample possibility and willingness to involve the private sector to contribute toward malaria elimination efforts including SBC.
- The availability of financial and technical support from SBC partners in-country.
- The existence of a coordination structure for the ACSM, which includes the subcommittee, working groups, and content design teams helping to monitor and coordinate partners' activities, including at the subnational level.
- The vast and evolving landscape of the country's digital technology and availability of media organizations provides an opportunity to expand the reach of malaria SBC messages.

Constraints identified included the following:

- Inadequate funding, high reliance on partners, and poor prioritization of ACSM, coupled with non-release of funds poses a challenge to effective coordination and supervision/monitoring of SBC activities up to the subnational level.
- The inadequacy of technical expertise and staff attrition poses a challenge to effective coordination of national and subnational ACSM activities.
- The lack of documentation and working tools to capture, archive, and showcase ACSM activities poses a problem of knowledge management, which may have been able to reduce the effect of staff attrition.
- Due to lack of adequate OR for malaria, except in some donor-funded states, ACSM activities in several states are not evidence-based and thus may not contribute to improved SBC outcomes. PMI plans to incorporate the malaria SBC module into future MIS (2020 round was delayed by COVID-19) to begin to address this gap.

There is a need for continued SBC capacity-building at both the national and subnational levels, with increased level of effort at the state level. To bolster the NMEP and SMEP ACSM capacity for the planning, design, implementation, and evaluation of SBC activities, PMI will continue to support the following activities:

- Coordination at the national level through targeted support to improve the effectiveness of the ACSM subcommittee.
- State-specific NMEP ACSMs to increase coordination and ensure the impact of SBC investments, specifically

- Strengthening capacity of key players for effective SBC design, implementation, and evaluation.
- Support for the development of annual operational/work plans, SM&E plans, and other instruments of an effective ACSM subcommittee.
- Alignment of SBC implementation efforts with country SM&E plans, specifically:
  - Support to revise the ACSM guidelines to align its SM&E framework with the improved ACSM components of the 2021–2025 NMSP performance framework.
  - Capacity-building for ACSM staff on the use of data (e.g., from the expanded SBC module in MIS) or BSS to inform SBC program priorities and strategies.

Conclusions for SBC Investments

With FY 2022 funds, PMI will continue to support multi-channel delivery of SBC activities to address select ideational determinants of malaria prevention (ITN use and care), diagnosis (testing before treatment) and treatment (prompt care-seeking and uptake of ACT) behaviors at the individual, household, and community levels across all 11 PMI-focus states. Additionally, PMI funds will expand SBC TA support to service delivery partners to expand the scale of deployment of behavioral prototypes or solutions that increase provider trust in mRDTs and improve overall adherence to malaria case management treatment guidelines.

Further, PMI FY 2022 funds will continue to strengthen SBC capacity at both national and state levels but with a greater level of effort at subnational level. Capacity-building efforts will focus on improving coordination, planning, design, and evaluation of SBC programs; development and operationalization of annual operational and SM&E plans; and data analysis and use capacity for ACSM staff to inform SBC program priorities and strategies.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.

3.5. OTHER HEALTH SYSTEMS STRENGTHENING

NMEP Objective

Objective 5 of the national malaria strategic plan 2021–2025 states, "Improve funding for malaria control by at least 25 percent annually through predictable and innovative sources to ensure sustainability at national and subnational levels." This function is shared across all the three tiers of the federal government of Nigeria. To achieve Universal Health Coverage, Nigeria is currently scaling up inputs required to improve service delivery in 10,000 PHC facilities, one per each ward. While all 774 LGAs that exist in Nigeria are the constitutionally designated providers of primary healthcare, they are the weakest level of the healthcare system and provide limited quality malaria services.

The National Malaria Strategic Plan (2021–2025) lists the following core functions of the Program:

- Formulation of policies and guidelines on Malaria Control.
- Coordination of the activities of partners and other stakeholders on malaria control activities.
- Provision of technical support to implementing bodies including states, LGAs, and other stakeholders, and mobilization of resources.
- Monitoring and evaluating progress and outcomes in malaria control efforts.

NMEP Approach

As part of the MOH, the NMEP consists of about 120 staff members and is divided into six branches: Program Management; Procurement and Supply Management; Integrated Vector Management; Case Management; Surveillance, Monitoring, and Evaluation; and Advocacy, Communication, and Social Mobilization. At the national level, the NMEP is responsible for establishing policies, developing guidelines, coordinating partners and activities, and monitoring program implementation. Each state has an SMEP, with a coordinator and staff, and each LGA has a Malaria Program Officer (a local civil servant), who oversees malaria activities in their area.

PMI Objective in Support of NMEP

To strengthen the technical capacity of NMEP to support the states to implement evidence-based malaria control activities.

PMI-Supported Recent Progress (FY 2020)

Through FY 2020, the total number of public health facilities in the 11 PMI-focus states is around 10,150, of which PMI had supported 3,690 with both commodities and service delivery and about 1,750 facilities with service delivery only. All health facilities in Nigeria receive support from the states and LGAs. PMI support for states, LGAs, and facilities is intended to fill critical gaps without becoming a substitute for resources from the GON. The focus and level of funding of PMI support in each state is guided by the availability of other donors and the capacity of the state and national governments to provide resources for malaria. PMI works closely with each state, as well as other partners, to assess needs and set priorities, which vary from state to state.

PMI-Supported Planned Activities (FY 2021)

PMI continues to support capacity-building of the NMEP through conference and workshop attendance at both the national and international level by providing logistical and operational support to the TWGs. PMI support includes WHO/National Professional Officers), health finance, leadership and governance, strengthening capacity of local nongovernmental organizations to implement malaria control efforts and support to NMEP to enable program and supportive supervision at the district level (unless that supervision is intervention-specific), etc. PMI also provides technical support for program evaluations related to HSS implementation.

PMI will continue training of two new advanced FETP students to support the NMEP's program planning, management, and M&E unit to strengthen malaria surveillance at the national and subnational levels. PMI will also support two National Youth Service Corps malaria volunteers to coordinate volunteers' malaria activities throughout the country. One volunteer may be embedded with a PMI implementing partner at the national or regional level and PMI will also support small project grants for which volunteers can submit applications.

Key Goal

Assist the NMEP and SMEP to strengthen coordination structures for malaria service delivery and health systems strengthening.

Key Question 1

PMI will continue to leverage efforts to improve surveillance data quality and use, case management training, and building capacity through programs such as FETP to assist in not only decreasing malaria burdens, but also to better address wide-ranging health issues in Nigeria to ensure a resilient health system.

Supporting Data

Since 2011, the PMI Program in Nigeria, in conjunction with the Global AIDS Program and subsequently the Global Health Security Agenda and Global Immunization Division, has provided support to the two-year competency-based FETP and several residents of this program have learned key aspects of outbreak investigation and surveillance system evaluation as it relates to malaria and the NMEP at the Nigeria MOH. The two-year training focuses on epidemiological investigations, outbreak investigations, and SM&E of malaria. Residents have engaged in malaria-related activities including support for data analysis, research, HMIS, and surveillance. The most recent cohort (Cohort 11) was recruited in August 2019 and comprises 60 residents.

Graduates of the program are now supporting NMEP (5 graduates), university (1), state commissioner (1), state malaria coordinators (2), CDC-NSTOP Malaria Frontline project State Coordinators (2), and central-level project coordinators (1), while 12 are state epidemiologists. To date, Nigeria FETP residents have worked on 44 research projects that include case management (11), MIP (13), ITNs/IRS (10), and laboratory/diagnostics (10).

In CY 2021, 24 residents are currently supporting malaria control programs in PMI-focus states.

Conclusions for Additional Health Systems Strengthening Investments

The states and LGAs are the operational levels of the malaria elimination program in Nigeria where implementation and service delivery happen. The most important program outcomes occur at the state level, making the strengthening of state and LGA-level management and technical capacity essential to any programmatic success. Consequently, with FY 2022 funding, PMI will continue such support at all three levels—national, state, and LGA—to effectively and efficiently plan, implement, coordinate, monitor, and evaluate malaria control program interventions. At the state level, PMI will support malaria coordination at state and LGA level, training of health workers, supportive supervision, and data validation and use meetings. This will include continued support for the two-year advanced FETP course and the malaria short course. PMI will continue to support the strengthening of QA for malaria diagnostics. This support will assist in the implementation of the Malaria Diagnostic External Quality Assurance Operational Guidelines that includes both microscopy and RDTs in PMI-focus states. This activity is closely linked with the on-the-job training and supervision of healthcare providers at the facility level.

Please see FY 2022 PMI budget tables for a detailed list of proposed activities with FY 2022 funding.