Assessment of Malaria Interventions in Four Nigerian States

Final Report

August 2017

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U.S. President's Malaria Initiative

MEASURE Evaluation

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MEASURE Evaluation

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ABBREVIATIONS

ACT	artemisinin combination therapy
AL	artemether lumefantrine
AMURT	Ananda Marga Universal Relief Team
ANC	antenatal care
ARI	acute respiratory illness
CI	confidence interval
DHS	Demographic and Health Survey(s)
FMOH	Federal Ministry of Health
GDP	gross domestic product
HMIS	health management information system(s)
IPTp	intermittent preventive treatment in pregnancy
IRS	indoor residual spraying
ITN	insecticide-treated net
KII	key informant interview
LGA	local government area
LLIN	long-lasting insecticidal net
M&E	monitoring and evaluation
MAPS	Malaria Action Program for States
MIA	malaria implementation assessment
MIS	Malaria Indicator Survey(s)
MSF	monthly summary form
NBS	National Bureau of Statistics
NMEP	National Malaria Elimination Programme
NMSP	National Malaria Strategic Plan

NPC	National Population Commission
PHC	primary healthcare
PMI	President's Malaria Initiative
PPMV	proprietary patent medicine vendors
RDT	rapid diagnostic test
SFH	Society for Family Health
SMEP	State Malaria Elimination Programme
SMOH	State Ministry of Health
SP	sulphadoxine-pyrimethamine
TOT	training of trainers
TSHIP	Targeted States High Impact Project
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VF	verification ratio

EXECUTIVE SUMMARY

Background

Malaria is a major public health burden in Nigeria, with the entire population at risk for contracting the disease. In 2014, the country reported more than 7.8 million confirmed cases of malaria and more than 6,000 malaria-related deaths. About 21 percent of deaths among children under five years of age are caused by malaria in the country. To reduce the malaria burden, the National Malaria Elimination Programme (NMEP) of the Federal Ministry of Health (FMOH)—in collaboration with partners—has been working to significantly expand key malaria control interventions, including insecticide-treated nets (ITNs), targeted indoor residual spraying (IRS), intermittent preventive treatment in pregnancy (IPTp), and effective case management. The NMEP's current National Malaria Strategic Plan (2014–2020) outlines the country's strategies for reducing the malaria burden and achieving pre-elimination status by 2020.

Nigeria became a President's Malaria Initiative (PMI) country in 2010, with support beginning in 2011. It has been a key partner in the government's efforts to expand malaria control intervention coverage. PMI has since expanded its initial support from 3 to 11 states in the country (expanding coverage from approximately 10.3 million to 50.1 million), focusing its efforts in prevention through ITNs, IRS, and IPTp; diagnosis and treatment through procurement and distribution of key malaria commodities—rapid diagnostic tests (RDTs), artemisinin-based combination therapy (ACT), and sulfadoxine-pyrimethamine (SP); training of health workers in malaria case management and malaria in pregnancy; support for the strengthening of the health management information system; and behavior change communication activities. Between 2010 and 2016, PMI provided Nigeria US$420 million for malaria control efforts. In 2015, PMI requested MEASURE Evaluation—a project funded by the United States Agency for International Development (USAID) and PMI—to assess the progress of malaria interventions and outcomes in Cross River, Ebonyi, Nassarawa, and Sokoto States between 2008 and early 2016. The main aim of the assessment is to provide information to guide and streamline future PMI support and strategies for malaria control and elimination in Nigeria.

Methods

The malaria intervention assessment (MIA) used a mixed-methods approach, consisting of secondary data collation, primary data collection, document review, and secondary analysis of existing household survey data. The assessment used a combination of nonexperimental and quasi-experimental designs. The nonexperimental design component was a pre- and post-intervention assessment that examined trends in key malaria indicators using data from health facilities, the routine health information system, and household surveys. This was complemented by a document review of malaria interventions and contextual factors over the assessment period. The quasi-experimental design component compared quality of care, trends in key malaria indicators, and routine data quality between PMI-supported and non-PMI-supported primary healthcare facilities (PHCs) in the four selected states. Each of the four states was treated as an individual case study; no comparisons across states were included as part of the assessment.

Secondary data collation and analysis was conducted for routine malaria data from PHC facilities and referral hospitals, program documents and data, and household surveys (the 2008 and 2013 Demographic and Health Surveys [DHS] and the 2015 Malaria Indicator Survey) and assessed trends in key malaria indicators between

2008 and early 2016. The primary data collection consisted of client exit interviews to assess quality of care, key informant interviews to understand program implementation and external contextual factors, and observations of malaria commodities at PHC facilities. The data collation and collection were carried out by a research firm, Nielsen Nigeria, with technical support and guidance from the MEASURE Evaluation project, the NMEP, and the U.S. Agency for International Development President's Malaria Initiative (USAID/PMI). In total, 560 PHCs were sampled across the four states, of which half received direct PMI support and the other half did not. All the hospitals that serve as referral hospitals of the selected PHC facilities were included in the sample. Additionally, 24 key informant interviews (KIIs) were conducted with stakeholders at the different levels of the health system, and 2,458 client exit interviews were conducted across the four states. The fieldwork was conducted between February and June 2016.

Key Findings

Cross River

Between 2008 and early 2016, coverage of many malaria prevention and control interventions improved in Cross River. ITN household ownership rose to above 80 percent by 2015; ITN use among children under five, pregnant women, and the general population all improved over the assessment period; and IPTp coverage (2+ doses) increased significantly to 56 percent by 2015. No significant improvements in coverage of malaria case management among children under five with fever were observed, however, during the assessment period, and diagnostic testing, care-seeking, and coverage of any antimalarial treatment and ACTs remained stable. PHC routine data do suggest, though, an improvement toward the end of the assessment period in diagnostic testing and treatment with ACTs for confirmed malaria, and show a reduction in the provision of treatment based on clinical diagnosis only.

Substantial improvements in the availability of malaria commodities was observed in the latter half of the assessment period: there was high availability of trained health workers in malaria case management and malaria in pregnancy, and high coverage of antenatal care (ANC) services, laboratories, and functional microscopes at PHC facilities. Overall quality of care for malaria case management was high in PHCs, and moderate for malaria in pregnancy care. Improvements in PHC data quality were evident in the latter half of the assessment period; however, discrepancies in the transfer of data across the different reporting levels were apparent. Positive changes were observed in both PMI- and non-PMI-supported PHCs; however, PMI-supported PHCs had higher availability of malaria commodities and trained staff and provided higher quality of care.

Changes in malaria morbidity and mortality were difficult to assess due to limited data available; parasitemia prevalence was relatively high (26 percent via microscopy) and severe anemia prevalence was 7 percent as of 2015. Hospital data suggest no reductions in severe malaria cases, malaria case-fatality rates, nor in the proportion of deaths due to malaria. However, the results should be interpreted with caution given issues related to data quality. There were only a few positive changes in contextual factors between 2008 and 2015, thus they likely had minimal influence on child survival and malaria risk during the assessment period.

Ebonyi

There were substantial improvements observed in malaria prevention and control in the state. ITN household ownership increased to just under 90 percent by 2015, ITN use improved significantly in children under five, pregnant women, and the general population and IPTp coverage (2+ and 3+ doses) improved to around 40 percent by 2015. However, diagnostic testing and care-seeking for children with fever remained unchanged, and only a small improvement in the proportion of children that received ACTs (of those that received any antimalarial drug) was observed between 2008 and 2015. PHC routine data suggest a decline in provision of ACTs based on clinical diagnosis only, a high diagnostic testing rate, and high coverage of ACT treatment for confirmed malaria.

Substantial improvements in the availability of malaria commodities were observed in the latter half of the assessment period; there was high availability of trained health workers in malaria case management and malaria in pregnancy, and high coverage of ANC services. Quality of care for malaria case management was high; it was moderate for malaria in pregnancy care in the PHCs. Improvements in PHC data quality were evident in the latter half of the assessment period; however, there were discrepancies observed in the transfer of data across the different reporting levels. There were positive changes observed in both PMI- and non-PMI-supported PHCs, but overall PMI-supported PHCs had higher availability of malaria commodities and trained staff, and provided higher quality of care compared to non-PMI PHCs.

Changes in malaria morbidity and mortality were difficult to assess due to limited data available during the assessment period; parasitemia prevalence was relatively high (30 percent via microscopy) and severe anemia prevalence was 8 percent as of 2015. Hospital data suggest no reductions in severe malaria cases, malaria case-fatality rates, nor in the proportion of deaths due to malaria. There were some positive changes in contextual factors between 2008 and 2015, which may have had an influence on child survival and malaria risk during the assessment period.

Nassarawa

Many improvements were observed in malaria prevention and control in the Nassarawa. ITN household ownership increased to 76 percent by 2015, ITN use improved significantly in children under five, pregnant women, and the general population and IPTp coverage (2+ doses) increased to around 30 percent by 2015. Coverage of diagnostic testing for children with fever reached only 25 percent by 2015, care-seeking remained high throughout the assessment period (above 80 percent), while a significant reduction in coverage of treatment with any antimalarial and with ACTs was observed between 2013 and 2015. PHC routine data suggest a reduction in the provision of ACTs based on clinical diagnosis only, moderately high coverage of ACTs for confirmed malaria, and low treatment of confirmed malaria with other antimalarial drugs.

Improvements were observed in the availability of malaria commodities toward the end of the assessment period, though availability of long-lasting insecticidal nets (LLINs) was low in the PHCs. There was high availability of trained health workers in malaria case management and malaria in pregnancy, and high coverage of ANC services, laboratories, and functional microscopes in the PHCs. Quality of care for malaria case management was high and moderately high for malaria in pregnancy care in the PHCs. Improvements in PHC data quality were evident in the latter half of the assessment period, however, there were some large

discrepancies observed in the transfer of data across the different reporting levels. Overall, there were positive changes observed in both PMI- and non-PMI-supported PHCs; however, PMI PHCs had higher availability of malaria commodities and trained staff, and provided higher quality of care.

Changes in malaria morbidity and mortality were also difficult to assess in Nassarawa; parasitemia prevalence was high (36 percent via microscopy) and severe anemia prevalence was around 7 percent as of 2015. Hospital data suggest no reductions in severe malaria cases, but some fluctuations in malaria case-fatality rates and the proportion of deaths due to malaria, which were hard to interpret. There were few positive changes in contextual factors between 2008 and 2015, thus they likely had minimal influence on child survival and malaria risk during the assessment period.

Sokoto

Some improvements in malaria prevention and control occurred during the assessment period in Sokoto. ITN household ownership increased to just under 80 percent by 2015, ITN use improved significantly in children under five, pregnant women, and the general population and IPTp coverage (2+ doses) rose to 28 percent by 2015. Coverage of diagnostic testing and care-seeking for children with fever remained very low (5 percent and 24 percent, respectively in 2015), while treatment with any antimalarial and ACTs also remained low and unchanged during the assessment period. Trends in PHC data on malaria diagnostic testing and treatment were not assessed due to low reporting rates.

Observations of malaria commodities showed high availability of RDTs and ACTs across the PHCs, and in PMI-supported PHCs, good availability of SP and LLINs. PHC routine data, however, did not show any improvements in the reduction of stockout of malaria commodities during the assessment period. There was high availability of treated health workers in malaria case management and diagnosing malaria-using RDTs, while only half of the PHCs had staff trained in malaria in pregnancy. Generally, there was low coverage of laboratories and functional microscopes at the PHCs. Quality of care for malaria case management was high, and moderate for malaria in pregnancy. Improvements in PHC data quality were observed, however, there were discrepancies in the transfer of data across the different reporting levels. Overall, positive changes occurred in both PMI- and non-PMI-supported facilities, but were greater in PMI facilities.

As in the other states, changes in malaria morbidity and mortality were also difficult to examine over the assessment period; parasitemia prevalence and severe anemia prevalence were both high in 2015, 47 percent (via microscopy) and 19 percent, respectively. Hospital data suggest a small reduction in severe malaria cases, while fluctuations in malaria case-fatality and in the proportion of deaths due to malaria made it difficult to discern any trends. There were very few positive changes in contextual factors between 2008 and 2015, thus they likely had minimal influence on child survival and malaria risk during the assessment period.

Conclusion

Between 2008 and early 2016, significant improvements in malaria intervention coverage were made across all four states. Each of the states received substantial technical assistance and support from the FMOH, the State Ministry of Health (SMOH)/State Malaria Elimination Programme (SMEP), and other partners to expand their malaria control efforts. The greatest gains observed during this time were in increased availability of key

malaria commodities and improved supply chain management, increased availability of national treatment guidelines and training of health workers in malaria case management and malaria in pregnancy, and improvements in malaria data reporting at the PHCs. These interventions contributed to improved ITN ownership and use, in IPTp coverage, and improved quality of care for malaria in facilities. The findings also demonstrated that overall in each of the four states there was greater availability of malaria commodities, trained health workers, and other necessary inputs (e.g., laboratories, microscopes, national malaria treatment guidelines); higher quality of care; and generally better data quality in PHC facilities supported by PMI compared to those that did not receive any direct PMI support.

Recommendations

Table 1 summarizes the recommendations for each examined component area based on the key findings from the assessment.

Table 1. Recommendations for each component area

Component Area	Summary of Recommendations
1. Coverage of malaria control interventions	**ITN coverage** • Continue carrying out LLIN distribution using mass campaigns and targeted distribution where gaps in access remain. • Regularly review routine data to monitor LLIN distribution through routine channels. • Consider a rapid survey to quantify the real gaps in access to LLINs. **Diagnostic testing and treatment coverage** • Carry out operational research or further analysis of existing data to understand factors associated with low coverage of diagnostic testing and treatment. • Tailor information, education, and communication/behavior change communication (IEC/BCC) messages at the community level to reinforce timely care-seeking and uptake of testing and treatment for fever at PHCs. **IPTp coverage** • Reinforce supervision at health facilities with a focus on IPTp treatment. • Consider conducting a qualitative study to better understand health providers' perspectives on low uptake of IPTp.
2. Malaria commodity availability	• Develop improved commodities tracking system/tool that more accurately predicts and monitors commodity supply and demand based on malaria surveillance data.
3. Quality of malaria case management and malaria in pregnancy care; availability of trained health workers	• Continue routine supervision, provision of guidelines, and refresher trainings to maintain high quality of malaria case management. • Focus short-term training efforts on ensuring adequate coverage of trained health provider in malaria in pregnancy care at PHCs that offer ANC services. • Integrate routine monitoring of quality of care into supervisory visits conducted at PHCs to ensure quality is maintained and to better target mentoring and refresher training efforts. • Set up mechanism for periodic external rapid assessments of quality of care. • Incorporate messaging around importance of asking the health provider for malaria test results in IEC/BCC community-level activities.
4. Routine malaria data quality	• Conduct regular data quality assessment at PHCs that incorporate data verification tracing through the different levels of the reporting system. • Further, investigate the main sources of error in the transfer to data across the different levels of the reporting system. • Review and revise existing data quality assurance tools and procedures. • Assess capacity of NMEP, SMEP, and LGA-level staff in malaria surveillance and monitoring and evaluation (M&E) to identify gaps and areas for improvement. • Consider producing regular bulletins (weekly/biweekly) to track and share progress with key stakeholders, and monitor and improve data quality and use. • Consider setting up a mobile phone reporting system to improve health facilities reporting rate. • Consider setting up a center(s) of excellence for malaria surveillance and M&E, which would serve to champion and enhance quality malaria surveillance and M&E at the substate levels.

1. BACKGROUND

1.1 Country Level

1.1.1 Overall Country Context

Nigeria has the largest population in Africa, with a current population of approximately 186.9 million (United Nations, 2017). The country comprises six geopolitical regions, 36 states, and the Federal Capital Territory (Figure 1). Nigeria is ranked 152 out of 188 countries in the 2015 United Nations Development Program (UNDP) Human Development Index and is categorized as a low middle-income country (UNDP, 2015). In 2015, the gross domestic product (GDP) was US$481 billion and annual GDP growth was 2.7 percent [3]. In terms of the overall health, under-five mortality is estimated at 128 per 1,000 live births and maternal mortality at 576 per 100,000 live births, and the average life expectancy at birth is 53 for males and 56 for females (World Bank, 2016; National Population Commision, 2014).

Nigeria's public health system is divided into three tiers among the federal, state, and local government area (LGA) levels. The federal government is responsible for tertiary healthcare and formulates health policies through the Federal Ministry of Health (FMOH). The state governments provide secondary healthcare through state general hospitals, while the LGAs are responsible for primary healthcare (PHC) services. As of December 2011, the FMOH directory recorded a total of 34,173 health facilities in Nigeria of which 30,098 (88.1 percent) are PHC facilities, 3,992 (11.7 percent) are secondary level facilities, and 83 (0.2 percent) are tertiary facilities. Of these, more than 66 percent of the facilities are government owned; however, the private sector provides 65 percent of healthcare in Nigeria (Affordable Medicines Facility–malaria Independent Evaluation Team, 2012).

In 2011, the country instituted the Primary Health Care Under One Roof (PHCUOR) policy to integrate the management of PHC services and structures under one state body, the State Primary Health Care Development Agency or Board (SPHCDA) (National Primary Health Care Development Agency, 2015; Sokpo & McKenzie, 2013). The reform is based on the principle of "Three Ones"—one management body (the SPHCDA), one plan, and one monitoring and evaluation (M&E) system (National Primary Health Care Development Agency, 2015), and was aimed at addressing the fragmented delivery of PHC services. As of 2015, 28 of the 36 states had instituted the policy and developed a SPHCDA; however, a scorecard assessment reveals that many of those states are facing challenges with its implementation (National Primary Health Care Development Agency, 2015).

Figure 1. Map of Nigeria

1.1.2 Malaria in the Country

In Nigeria, malaria is a major public health burden, with the entire population at risk for contracting the disease. In 2014, the country reported more than 7.8 million confirmed cases of malaria and more than 6,000 deaths (World Health Organization [WHO], 2015b). It is estimated that 21 percent of deaths among children under five years of age are caused by malaria in the country (WHO, 2015a). Malaria accounts for approximately 60 percent of outpatient visits and 30 percent of hospitalizations among children under five (United States Embassy in Nigeria, 2011). Malaria is a large burden on the health system in the country and has severe social and economic costs, costing approximately 480 billion naira in out-of-pocket treatments, prevention costs, and loss of labor productively (FMOH & Roll Back Malaria, 2014).

1.1.3 Malaria Epidemiology

In Nigeria, *Plasmodium falciparum* is the predominant parasite species (> 95 percent), followed by *P. malariae* (9.8 percent), and *P. ovale* (5.8 percent) (WHO, 2012). Approximately 85 percent of Nigerians live in areas of mesoendemic transmission, while about 15 percent live in areas of hyper-holoendemic transmission (National Malaria Elimination Programme [NMEP], National Population Commission of Nigeria [NPCN], National Bureau of Statistics [NBS], & ICF International, 2016). In 2015, the national prevalence of malaria among children under five years of age was 27 percent (via microscopy) (NMEP, et al., 2016). However, there are wide geographical differences, with the percentage of children under five with malaria (via microscopy) as high as 64 percent and 63 percent in Kebbi and Zamfara States in the northwest, as low as 5 percent in Imo and Kogi States in the southeast and north-central regions, and zero prevalence in Lagos (NMEP, et al., 2016).

1.1.4 Key Milestones of National Malaria Control Strategy

The National Malaria Elimination Programme (NMEP) of the FMOH, in close collaboration with other key stakeholders in Nigeria, plays a key role in formulating policy and coordinating efforts nationwide to scale up effective malaria control interventions. The current National Malaria Strategic Plan (NMSP) 2014–2020, outlines the country's current efforts to scale up malaria interventions significantly to achieve its set goals of attaining pre-elimination status and reducing malaria-related deaths to zero by 2020. The NMSP 2014–2020 is the fourth developed by the country to guide its efforts in malaria control. Table 2 below outlines the key milestones in Nigeria's malaria control strategy, beginning in 1999 when the NMEP began collaboration with the Roll Back Malaria Partnership.

Table 2. Key milestones in Nigeria's malaria control strategy

Year	Milestone
1999	NMEP began collaboration with Roll Back Malaria Partnership
2000	Abuja Declaration was signed
2001	First National Malaria Strategic Plan (2001–2005) adopted
2004	Intermittent preventive treatment in pregnancy (IPTp) adopted as a policy
2005	NMEP adopted artemisinin-based combination therapy (ACT) as the first-line treatment for uncomplicated malaria
2006	Second National Malaria Strategic Plan (2006–2010) adopted ACTs were made available over the counter
2007	Rapid diagnostic tests (RDTs) adopted
2008	Demographic and Health Survey conducted Artemisinin and other monotherapies banned, and testing before treatment recommended by NMEP
2009	Third National Malaria Strategic Plan (2009–2013) adopted; new plan changed its focus from covering vulnerable groups to universal coverage
2010	Nigeria became a President's Malaria Initiative (PMI)country First Malaria Indicator Survey conducted Affordable Medicines Facility – malaria (AMFm) launched in Nigeria
2011	PMI began supporting malaria control interventions in Nigeria
2013	Demographic and Health Survey conducted
2014	Fourth National Malaria Strategic Plan (2014–2020) adopted NMEP adopted one ITN for every two people in a household strategy IPTp 3+doses policy adopted
2015	Second Malaria Indicator Survey conducted

1.1.5 Overview of PMI-Supported Activities in Nigeria

Nigeria became a PMI country in 2010, with support beginning in 2011. PMI has been a key player in the government's efforts to expand malaria control intervention coverage. The initial focus of PMI support was in the states of Cross River, Zamfara, and Nassarawa, but since 2011, it has expanded its support to 11 states.[1] PMI works with the states to support a proportion of health facilities, and focuses its efforts in the following key areas: 1) prevention through insecticide-treated nets (ITNs)/long-lasting insecticidal nets (LLINs), indoor residual spraying (IRS), and IPTp; 2) diagnosis and treatment through procurement and distribution of RDTs, ACTs, and sulfadoxine-pyrimethamine (SP); 3) training of health workers in malaria

[1] The 11 states supported include Akwa Ibom, Bauchi, Benue, Cross River, Ebonyi, Kebbi, Kogi, Nassarawa, Oyo, Sokoto, and Zamfara.

diagnosis, malaria treatment, and IPTp; 4) support for M&E, including capacity building in M&E within the NMEP and state malaria programs and the strengthening of the health management information system (HMIS); and 5) behavior change communication activities to increase demand and use of malaria control interventions. PMI also has provided support for program management at the national and state levels, including supporting coordination structures, providing supportive supervision, and health governance. Between 2010 and 2016, PMI provided Nigeria US$420 million for malaria control efforts (PMI, 2016).

1.2 State-Level Context and Malaria Epidemiology

1.2.1 Cross River State

Cross River State is located in the southern region of the country. The state consists of 18 LGAs and the state capital is Calabar. The state's population is estimated at around 3.7 million (PMI, 2014). The state has diverse ecological zones that range from mangrove and swamp forests near the coast, tropical rain forests further inland, and savannah woodlands in the northern part of the state, and experiences heavy rainfall during the rainy season from April to November (Cross River State Ministry of Health, 2010; USAID Deliver Project, 2015a). The main economic growth sector in the state is agriculture. The state's health system consists of 692 primary health facilities, 15 secondary health facilities, and two tertiary health facilities (Cross River State Government, 2010). In Cross River, malaria is a major cause of mortality among pregnant women and infants. Malaria parasitemia prevalence among children ages 6–59 months in the state was 26 percent (measured through microscopy) as of 2015 (NMEP, et al., 2016). The state experiences heavy rainfall between April and November.

1.2.2 Ebonyi State

Ebonyi State is located in the southeast region of the country. It consists of 13 LGAs, and Abakaliki is the state capital. The population is estimated around 2.7 million (PMI, 2014). Ecologically, the state lies in the less wet humid tropics with a marked rainy season and frequent floods from April to October (Ebonyi State Government, 2010; USAID Deliver Project, 2015d). Ebonyi State is primarily an agricultural region, with nearly 75 percent of the population engaged in subsistence agrarian economic activities (Ebonyi State Government, 2010; Ebonyi State Ministry of Health, 2015). About 56 percent of the population lives below US$1 per day . The state's health facilities include 415 primary health facilities, 13 secondary health institutions or hospitals, one tertiary health institution, six faith-based hospitals, and 148 private health facilities Ebonyi State Ministry of Health, 2015). The leading cause of morbidity and mortality in Ebonyi State is malaria Ebonyi State Government, 2010. Malaria parasitemia prevalence among children ages 6–59 months is high in the state—at 47 percent in 2015 (NMEP, et al., 2016). The rainy season typically runs from April to October (Ebonyi State Ministry of Health, 2015).

1.2.3 Nassarawa State

Nassarawa State is located in the north-central region of Nigeria, known as the Middle Belt. It consists of 13 LGAs and the state capital is Lafia. The population of the state is estimated at more than 2.4 million (PMI, 2014). The state lies within the Guinea Savannah eco-geographical zone, and experiences moderate to high rainfall from April to November, with peak rains between July and October (Nassarawa State Government,

2010; USAID Deliver Project, 2015e). The majority of people who reside in the rural areas are predominantly subsistence farmers (Sokoto State Govern,emt. 2010). Malaria is one of the top causes of mortality and morbidity in Nassarawa. In 2010, there were 59,716 cases of malaria and 332 malaria deaths reported in the general population (Nassarawa State Government, 2010). A quarter of the population experiences a serious episode of malaria annually, accounting for a large burden of outpatient cases in the state (Nassarawa State Government, 2010). As of 2015, 36 percent of children ages 6–59 months were infected with malaria (based on microscopy) (NMEP, et al., 2016). The rainy season lasts from April to November, with the peak rain between July and October (Nassarawa State Government, 2010).

1.2.4 Sokoto State

Sokoto State is located in the northwest region of Nigeria. Sokoto is the state capital and the state consists of 23 LGAs. The population is estimated at over 4.7 million (PMI, 2014). The state lies within the Sudanian Savannah eco-geographical zone and experiences its rainy season from June to October (Sokoto State Government, 2010; Aregheore, 2009). The state is predominantly agricultural, with more than 90 percent of the population engaged in subsistence farming (USAID Deliver Project, 2015f). The state's health infrastructure consists of 45 PHC centers, 501 clinics, and 38 private health facilities. Hospitals in the state include the Noma Children Hospital, Maryam Abacha Women and Children Hospital, Army General Hospital, and Police Hospital (Sokoto State Government, 2010). Malaria is one of the major causes of morbidity and mortality in the Sokoto. As of 2015, 47 percent of children ages 6–59 months were infected with malaria (based on microscopy) (NMEP, et al., 2016).

2. MALARIA IMPLEMENTATION ASSESSMENT: BACKGROUND AND METHODOLOGY

2.1 Background

2.1.1 Context

In 2015, PMI requested MEASURE Evaluation to document the progress of malaria interventions and outcomes in four PMI-supported states between 2008 and early 2016. The aim of this documentation was to provide information to guide and streamline future PMI support and strategies on malaria control and elimination in the country. The documentation of this progress was targeted at the different levels of the healthcare system from the primary level to the central level; however, the primary focus was on the public health sector.

2.1.2 Goal and Objectives

The goal of the malaria implementation assessment (MIA) was to document progress in malaria control interventions between 2008 and 2015 in Cross River, Ebonyi, Nassarawa, and Sokoto states, with the following specific objectives:

1. Document and describe state-level malaria interventions in the four states.
2. Document trends in key malaria prevention and case management indicators.

3. Assess quality of care among the PMI-supported and non-PMI-supported PHC facilities.
4. Document trends in malaria morbidity and mortality at the hospital level.
5. Assess the quality of monthly malaria data at health facilities.
6. Document changes in the contextual factors likely to affect malaria interventions and outcomes.

The overall aim of the MIA is to provide the NMEP and PMI with information and understanding of what has occurred and been achieved in the four states regarding the coverage of malaria interventions at the state level and the quality of malaria case management at the facility level. It also provides information about the quality of the routine data at health facilities, the quality of the facility data in the district health information system (known as DHIS 2), and areas that need to be strengthened. The MIA will allow the NMEP and PMI to draw lessons learned from the documented experiences in the four states and strengthen the design and implementation of future interventions in Nigeria.

2.2 Methods

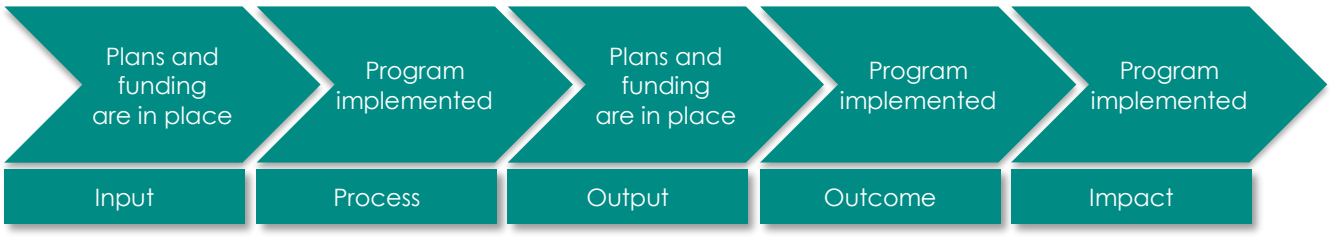
2.2.1 Design

The MIA used a mixed-methods approach, consisting of secondary data collation, primary data collection, document review, and secondary data analysis of existing survey data. The assessment design is a combination of nonexperimental and quasi-experimental designs. The nonexperimental design component is a pre- and post-intervention assessment that examined trends in key malaria indicators between 2008 and early 2016 in the four selected states, using data from the health facilities, routine information systems, and household surveys. This was complemented by a detailed documentation of the malaria interventions implemented and contextual factors to provide information to interpret changes in the key malaria indicators over the implementation period. The quasi-experimental design component compared quality of malaria case management and malaria in pregnancy care, trends in key malaria indicators, and routine data quality between PMI-supported and non-PMI-supported PHCs in each of the four states.

2.2.2 Framework and Questions

The theoretical framework used to guide the development of the assessment questions and indicators is shown in Figure 2. It demonstrates how malaria interventions contribute to changes in malaria morbidity and mortality.

Figure 2. Theoretical framework for MIA assessment



The key questions of the assessment were:

1. To what extent were appropriate plans and funding in place?
2. To what extent did the implementation of malaria interventions happen as planned?
3. Did availability of and access to malaria services improve?
4. Did service utilization and coverage improve?
5. What results occurred since USAID/PMI started support?

6. To what extent can we document any changes in malaria morbidity and mortality?
7. What are the most important factors that affected the implementation of malaria interventions?

2.2.3 Sampling Method

State Selection

Four states were included in the assessment, Cross River, Ebonyi, Nassarawa, and Sokoto. The criteria used to select the states included the following: (1) received supported by PMI; (2) received PMI support for malaria interventions for at least one-and-a-half to two years; (3) had available information on malaria interventions; and (4) were accessible and politically stable.

Sampling of Health Facilities

To select the PHC facilities included in the sample, a list of all the PHCs in each state was developed using information from the Nigerian DHIS 2. A list of 2,584 PHCs across the four states served as the sampling frame. A stratified random sample using probability proportional to size was used to select 140 PHCs in each state, of which 70 were PMI-supported PHCs and 70 were non-PMI-supported PHCs, for a total of 560 PHCs across the four states. All the hospitals that serve as referral hospitals of the selected PHC facilities were also include in the sample. The PHC sample size was powered to detect a difference of 20 percent in one of the key indicators selected for the assessment—the proportion of confirmed malaria cases (RDT or microscopy) that received ACT.

Sampling of Clients for Exit Interviews

In each selected PHC, five patients were randomly selected and screened for exit interviews, for a total of 700 per state (350 in PMI-supported PHCs and 350 in non-PMI-supported PHCs) and an overall total of 2,800. The sample size was powered to detect a 15 percent difference in the patient-level indicators with 80 percent power. Clients either presenting with fever at the PHC or pregnant women in their second or third trimester attending an ANC visit were selected for inclusion in the sample.

2.2.4 Study Instruments

The study developed and used four data collection tools for the assessment: 1) PHC data collation and data quality assessment tool; 2) hospital data collation and data quality assessment tool; 3) client exit interview questionnaire; and 4) key informant interview (KII) guides. The PHC and hospital data collation and data quality assessment tools and the client exit interview questionnaire were scripted using the SurveyToGo platform to allow for mobile data entry (see Annexes 1–4 in Section 8 for the paper-based versions of the tools). All tools were pilot-tested during a training of trainers (TOT) and during state-level trainings with the fieldwork teams, with feedback from the pilot tests incorporated into the final tools. For the client exit interviews, the interviews were first conducted using the paper-based tool and then the responses were entered in the provided mobile tablets.

2.2.5 Data Collation and Collection

The research firm, Nielsen Nigeria, was responsible for conducting the secondary data collation and primary data collection with technical support provided by MEASURE Evaluation, the NMEP, and PMI/Nigeria. Prior to the fieldwork, a four-day TOT was conducted for state supervisors and exit interviewers. The TOT

covered the survey objectives and methodology, the sampling and selection procedures, a review and hands-on practice with the study instruments, and a pretest of the study tools at select facilities. Upon completion of the TOT, individual state-level trainings were conducted for all members of the field teams. The state-level trainings also included a pretest of the tools.

The fieldwork, including the secondary data collation at the PHCs and referral hospitals, the observations and client exit interviews, and KIIs across all four states, was carried out between February and June, 2016. For the fieldwork, Nielsen liaised with the LGA office, facilities, and hospitals to ensure officers-in-charge at the facilities were aware of the visit and had the necessary documents and personnel ready for the field teams when they arrived. In each state, three field teams consisting of five team members each (one supervisor, three data collators, one exit interviewer) carried out the data collation and collection. Additionally, each state had two independent quality control members, a field manager, back-up exit interviewers, and a MEASURE Evaluation consultant. The quality control supervisors accompanied the field teams to review and oversee the data collation and collection, making rotations across the different field teams throughout the duration of the fieldwork. Additionally, a select number of PHCs were randomly selected and re-contacted to verify the information provided during the visit.

During the fieldwork, 49 PHCs initially sampled were replaced across the four states due to various reasons: (1) the facility did not exist or no longer was functional; (2) the facility did not meet the eligibility requirements (for instance, it was not a PHC-level facility); and (3) other challenges, including issues with security.

2.2.6 Secondary Data Collation Methods

Household Surveys

Trends in malaria intervention coverage, malaria morbidity, and contextual factors at the state level were analyzed using the 2008 DHS, the 2013 DHS, and the 2015 MIS population-based household surveys. The 2010 MIS survey was excluded from the analysis because the survey was not designed to provide representative estimates at the state level.

Routine Data at Primary Healthcare Facilities

The objective at the PHCs was to collate data between 2008 and early 2016 on key malaria indicators, including receipt and distribution of LLINs, diagnostic and treatment services, and ANC services for malaria in pregnancy. The PHC registers and monthly summary forms (MSFs) were also reviewed for availability, completeness, accuracy, and consistency across the two reporting forms. Additionally, data from the PHCs and MSFs were compared to the data in the DHIS 2 (the national health information management system of Nigeria) for those specific facilities to assess the consistency in reporting across the two levels.

Routine Data at Referral Hospitals

At the referral hospital level, data on all-cause inpatient and outpatient cases, malaria cases, and malaria deaths among children less than 5 years of age was collated between 2008 and early 2016.

Document Review

A document review was conducted to gather background information on the malaria interventions implemented in the four states between 2008 and 2015 and on other important contextual factors that could

have had an influence on the implementation of those interventions and on malaria outcomes. The four states and the NMEP were asked to provide relevant resources to be reviewed by the study team. Additional documents were gathered and reviewed, including from the USAID/DELIVER Project, the Malaria Action Program for States (MAPS) project, the Targeted States High Impact Project (TSHIP), the Global Fund malaria grants. These and other relevant federal- and state-level government documents/policies provided further information on the implementation of the malaria interventions and malaria commodities and distribution across the four states.

2.2.7 Primary Data Collection Methods

Observations at Primary Healthcare Facilities

At each of the PHCs, the field teams conducted observations to assess the availability of key malaria commodities including RDTs, ACTs, SP, and LLINs, and national guidelines on malaria case management and malaria in pregnancy. The field teams also assessed the availability of trained health workers in malaria case management, diagnosis of malaria-using RDTs, and in malaria in pregnancy.

Client Exit Interviews at Primary Healthcare Facilities

The field teams conducted interviews with patients that came to the facility with a fever or pregnant women in the second or third trimester who came for antenatal care (ANC). For the clients under age 15, the interview was conducted with the parent or guardian who brought the child to the facility. The field team asked a series of screening questions to determine eligibility before administering the main questionnaire. The interviews included a series of questions to assess the quality of care received by the patient during the visit, specific to the quality of malaria case management and malaria in pregnancy care. Interviews took approximately 10 minutes to complete.

Key Informant Interviews

KIIs were conducted to better understand the process of implementation of the malaria interventions and other contextual factors in the PHC facilities in the four states. A total of 38 KIIs were carried out with stakeholders at the different levels of the health system (Table 3). Each interview took approximately an hour, and was recorded and transcribed after obtaining consent.

Table 3. Key informant interviews conducted

Stakeholders	Number of Interviews
National: NMEP directors	2
State-level: State Malaria Elimination Program Representatives (SMEP)	4 states x 1 person = 4 interviews
LGA-level: Malaria focal person, representative or M&E officer	4 states x 2 people = 8 interviews
Facility level: Health worker in charge	4 states x 6 people = 24 interviews (12 from PMI-supported and 12 from non-PMI-supported facilities)
Total	**38 interviews**

2.2.8 Data Analysis

Analysis was conducted for each state independently, with no comparison between states. However, the results are presented side by side for reference. Table 4 outlines the analytic methods for the different data sources included in the assessment.

Table 4. Analytic methods used in MIA

Data Source	Analytic Methods
Household surveys	• Trend analysis of malaria intervention coverage, malaria morbidity, and contextual factors between 2008 and 2015. Percent estimates and 95 percent confidence interval (CI) were calculated for each indicator.
Routine PHC data and observations	• Trend analysis of malaria diagnostic and treatment indicators in PMI and non-PMI PHCs between 2008 and early 2016. • Percent estimates calculated and chi-square test conducted to compare PMI and non-PMI-supported PHCs for select indicators (e.g., availability of commodities, quality of malaria case management, and malaria in pregnancy). • Assessment of data quality by examining availability, completeness, and accuracy. • Comparison of consistency between PHC registers and MSFs and calculation of verification ratios. • Comparison of availability and consistency between PHC register and MSF data and the DHIS 2 data for select indicators and calculation of verification ratios.
Routine hospital referral data	• Trend analysis of malaria morbidity and mortality between 2008 and early 2016.
Government and program documents	• Document review of key government and other background documents for information on implementation of malaria interventions (inputs, processes, and outputs) and information on commodities procurement and distribution.
Client exit interviews	• Percent estimates calculated and chi-square test conducted to compare PMI and non-PMI PHCs for indicators related to background characteristics of clients, and indicators related to quality of malaria case management and malaria in pregnancy.
Key informant interviews	• Content analysis of transcribed interviews.

2.2.9 Ethical Considerations

The protocol and tools were submitted to and approved by the National Health Research Ethics Committee of Nigeria and the Institutional Review Board of ICF, a partner organization in the MEASURE Evaluation project.

The study carried minimal risk to all participants. The client exit interviews carried some risk because respondents were asked to disclose personal information about the medical treatment they received at the heath facility. The following actions were taken to mitigate the risk: (a) No identifiable information was collected, (b) interviews were conducted in a private location outside the health facility, and (c) analysis was conducted at an aggregate level. For the KIIs, no identifiable information was recorded nor included in transcripts. Respondents were not asked for personal information; they were asked only about their

perceptions of the malaria control programs and other contextual factors in their state and health facility. Other study procedures consisted of historical record reviews and secondary data analysis, which did not include identifiable information and, therefore, presented no risk to subjects.

A verbal informed consent form was administered to all participants in the local language. These forms, read out loud to participants, included a full description of voluntary participation, the right to withdraw from the study at any time, and the right to not answer any question. The forms also addressed the risks, benefits, and purpose of the study. Interviewees were requested to provide verbal consent to be interviewed. All interviewers were trained extensively on the consent procedures, and each form was signed by the interviewer and verified by a team member to ensure all participants provided consent.

2.2.10 Limitations of the Assessment

There are a few important limitations to note in the assessment. First, for the analysis of trends in the PHC routine data, a 50 percent reporting rate threshold was used for reporting the annual data. This threshold may have affected the trends observed in routine data. Furthermore, some indicators were not calculated because the PHC did not meet the reporting rate threshold, potentially introducing selection bias. Thus, these trends must be interpreted with caution. Second, PMI purposively selected and targeted high turnover PHCs or PHCs with historically higher patient attendance to receive its support. In Cross River, Nassarawa, and Sokoto states, the number of health facility staff in PMI-supported PHCs were significantly higher compared to non-PMI-supported facilities, thus the facilities were not entirely comparable. Last, non-PMI facilities may have received support from other partners or indirectly through PMI efforts. This information was not collected nor accounted for in the analysis.

3. MALARIA INTERVENTION ASSESSMENT: RESULTS

3.1 Implementation of Malaria Interventions in the Four States from 2008 to 2016

A review of federal and state government reports, various partner project documents and reports, and relevant journal articles was conducted to assess the implementation of malaria control interventions across the four states during the assessment period. The key milestones in malaria control and commodity distribution between 2008 and early 2016 are presented below for each of the states.

3.1.1 Cross River State

The malaria control strategy in Cross River State is aligned with the NMSP, with a focus on the distribution of LLINs, provision of prompt and effective case management, and IPTp to combat malaria (Cross River State Ministry of Health, 2010). The FMOH and several partners and projects supported the implementation of malaria interventions in the state between 2008 and early 2016, including Global Fund, USAID/PMI, Canadian Red Cross, International Federation of Red Cross, Nigeria Red Cross, and the NetWorks, MAPS, and DELIVER projects. A summary of the key malaria interventions and commodity distribution milestones implemented between 2008 and 2016 by the different partners is presented in Table 5.

Table 5. Summary of the implementation of malaria control interventions and commodity distribution by partners in Cross River, 2008–2016

Year	Malaria control intervention and commodity distribution milestones
2008	• Global Fund supported LLIN and ACT distribution • USAID, Canadian Red Cross, and Global Fund supported a targeted LLIN distribution campaign for children under five (through 2009) • NMEP distributed ACTs and SP (through 2010)
2009	• Global Fund supported procurement and distribution of ACTs to the state • Federal government distributed SP in the state • NetWorks began distribution of ITNs through schools and health facilities (through 2014)
2010	• The PMI-funded MAPS project began to support treatment and diagnostic commodity distribution • PMI began distribution of LLINs
2011	• The PMI-funded MAPS and DELIVER projects began supporting ACT, RDT, and SP distribution • PMI conducted a laboratory assessment to determine the coverage malaria diagnostic testing through RDTs and developed a training curriculum for malaria diagnosis testing
2012	• International Federation of the Red Cross and Nigerian Red Cross implemented an LLIN campaign with PMI funding • MAPS, DELIVER, and other partners began providing technical assistance and trainings in LLIN distribution, malaria diagnosis and case management, IPTp, malaria commodity logistics, and data collection, analysis, and use around malaria interventions, and managing severe cases of malaria • PMI distributed its first shipment of ACTs • NetWorks distributed LLINs with PMI funding
2013	• DELIVER began conducting bimonthly review meetings for malaria consumption and resupply data • PMI developed a framework for diagnostic quality assurance that was implemented in the state • PMI supported the NMEP and SMEP in the harmonization of the HMIS and DHIS 2
2014	• DELIVER distributed RDTs and ACTs, and began distribution of SP • State adopted the one ITN for every two people in a household strategy
2015	• State adopted IPTp 3+ doses policy • DELIVER and MAPS distributed RDTs and ACTs with Global Fund funding and coordination support from the NMEP • DELIVER distributed resupply commodities and supported the distribution of SP and LLINs with Global Fund funding • PMI provided LLINs for a mass campaign
2016	• PMI provided LLINs for the continuous distribution through health facilities and schools

Sources: Cross River State Ministry of Health, 2010; FMOH, 2008; FMOH, 2015; MAPS, 2011; MAPS, 2012; PMI, 2010; PMI, 2011; PMI, 2012; PMI, 2013; PMI, 2014; USAID Deliver Project, 2014; USAID Deliver Project, 2015c; USAID NetWorks Project, 2015

Table 6 presents the number of malaria commodities distributed in Cross River between 2008 and 2015 by the different partners. Overall, the greatest number of commodities were procured and distributed in 2015 across the state. Between 2008 and 2015, over 1.1 million RDTs, 3.5 million ACTs, 6.9 million LLINs, and 463,000 SP were procured and distributed throughout the state with support of all the partners.

Table 6. Summary of malaria commodity distribution in Cross River, 2008–2015

Partner		2008	2009	2010	2011	2012	2013	2014	2015	Total
NMEP/ FMOH	RDTs								11,404	**11,404**
	ACTs			5,670					253,045	**258,715**
	SP	174,269	174,269	7,555						**356,093**
	LLIN				556,540*					**556,540**
DELIVER Project	RDTs							277,175	202,275	**479,450**
	ACTs							218,805	307,180	**525,985**
	SP							34,900	48,200	**83,100**
	LLINs							198,100	57,800	**255,900**
MAPS Project	RDTs								441,289	**441,289**
	ACTs								2,126,233	**2,126,233**
	SP									
	LLIN					559,504	87,249		3,200	**649,953**
Global Fund	RDTs								170,510	**170,510**
	ACTs	220,800		208,000					226,738	**655,538**
	SP								24,550	**24,550**
	LLINs	36,833		36,833						**73,666**
PMI/USAID	LLINs		676,877**	649,000		1,200,000			1,727,493	**4,253,370**
NetWorks	LLINs					8,444	20,545	21,149		
CRS	LLINs	560,800		560,00						**1,120,800**
Total Number	**RDTs**							**277,175**	**825,478**	**1,102,653**
	ACTs	**220,800**		**213,670**				**218,805**	**2,913,196**	**3,566,471**
	SP	**174,269**	**174,269**	**7,555**				**34,900**	**72,750**	**463,743**
	LLIN	**597,633**	**676,877**	**1,245,833**	**556,540**	**1,759,504**	**87,249**	**198,100**	**1,788,493**	**6,910,229**

Notes: NMEP/FMOH = National Malaria Elimination Programme/Federal Ministry of Health; MAPS = Malaria Action Program for States; PMI/USAID = President's Malaria Initiative/US Agency for International Development; CRS = Catholic Relief Services; RDT = rapid diagnostic test; ACT = artemisinin-based combination therapy; SP = sulfadoxine-pyrimethamine; LLINs = long-lasting insecticidal nets. *LLINs were distributed with assistance from USAID and The Red Cross; **USAID and CRS collaborated and distributed the LLINs between late 2008 and 2009. Blank cells indicate that the partner did not distribute the commodity during the respective year.

Sources: Federal Ministry of Health, PMI, Cross River State Government, DELIVER and MAPS Projects, NetWorks

3.1.2 Ebonyi State

The malaria control strategy in Ebonyi State is aligned with the NMEP's NMSP, with a focus on the distribution of LLINs, provision of prompt and effective case management, and IPTp to combat malaria (PMI, 2014; Ebonyi State Government, 2010; Ebonyi State Ministry of Health, 2015). The FMOH and several partners and projects supported the implementation of malaria interventions in the state between 2008 and early 2016: Global Fund, USAID/PMI, the Carter Center, Yakubu Gowon Centre (YGC), Society for Family Health (SFH), the MAPS project, the DELIVER Project, and the Ananda Marga Universal Relief Team (AMURT). Table 7 presents a summary of the key malaria interventions and commodity distribution milestones implemented between 2008 and 2016 by the different partners.

Table 7. Summary of the implementation of malaria control interventions and commodity distribution by partners in Ebonyi, 2008–2016

Year	Malaria control intervention and commodity distribution milestones
2008	• Global Fund began providing support for malaria interventions • Global Fund provided LLINs in 2008–2011 • NMEP coordinated distribution of SP in Ebonyi through 2009
2010	• Society for Family Health (SFH) began providing implementation support for malaria interventions
2011	• The YGC with Global Fund funding began providing implementation support for malaria interventions • The MAPS and DELIVER projects began distribution of LLINs, ACTs, RDTs, and SP with PMI funding • LLIN mass distribution campaign implemented with PMI funding
2012	• MAPS supported LLIN distribution through ANC facilities • MAPS, DELIVER, and other partners provided technical assistance and trainings in LLIN distribution, malaria diagnosis and case management, IPTp, and malaria commodity logistics • PMI and other partners began a pilot truck delivery system for malaria commodities
2013	• PMI conducted a TOT for case management of severe malaria • PMI supported a training of proprietary patent medicine vendors in iCCM between 2013 and 2014 • The MAPS project began community distribution of LLINs • PMI supported the NMEP and SMEP in the harmonization of the HMIS and DHIS 2
2014	• PMI introduced RDTs to the private sector to improve case management • The DELIVER Project distributed RDTs, ACTs, SPs, and LLINs and performed data quality assessments on distribution methods • State adopted the one ITN for every two people in a household strategy
2015	• The DELIVER Project with coordination support from the NMEP distributed RDTs and ACTs with Global Fund funding • PMI completed five supplementary supply runs to distribute ACTs and RDTs • The MAPS and DELIVER projects conducted monitoring support and supervisory visits to health facilities • State adopted IPTp 3+ doses policy • The DELIVER Project distributed SP and LLINs to health facilities (PMI and Global Fund) and conducted distribution training for LLINs • MAPS conducted an LLINs mass replacement campaign.
2016	• Ebonyi SMEP together with the MAPS project implemented a malaria case management training for healthcare providers

Sources: Ebonyi State Campaign Implementation Team, 2015; Ebonyi State Ministry of Health, 2015; Ebonyi State Ministry of Health, 2016; FMOH, 2008; FMOH, 2009; FMOH, 2011; MAPS, 2012;

MAPS, 2014; PMI, 2012; PMI, 2013; PMI, 2014; USAID Deliver Project, 2014; USAID Deliver Project, 2015b; USAID Deliver Project, 2015d

Table 8 presents the number of malaria commodities distributed in Ebonyi between 2008 and early 2016 by the different partners. The greatest number of commodities were procured and distributed in 2014 and 2015 across the state. Between 2008 and early 2016, more than 700,000 RDTs, 1.3 million ACTs, 5.4 million LLINs, and just under 500,000 SP were procured and distributed throughout the state with support of all the partners.

Table 8. Summary of malaria commodity distribution in Ebonyi, 2008–2016

Partner		2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
NMEP/ FMOH	RDTs								8,687		**8,687**
	ACTs								103,988	20,400	**124,388**
	SP	131,115	131,114								**262,229**
	LLIN									1,475,742	**1,475,742**
DELIVER Project	RDTs							390,530	303,297		**693,827**
	ACTs							637,045	435,769		**1,072,814**
	SP							117,600	96,112		**213,712**
	LLINs							229,250	56,400		**285,650**
MAPS Project	RDTs										
	ACTs										
	SP										
	LLIN					90,250	41,861		1,448,242		**1,580,353**
Global Fund	RDTs										
	ACTs								154,566		**154,566**
	SP								19,779		**19,779**
	LLINs	36,833		968,082	942,148						**1,947,063**
SFH	LLINs			2,850			45,597	84,959			**133,406**
AMURT	LLINs						3,000				**3,000**
EBSG	LLINs							15,000			**15,000**
Total Number	**RDTs**							**390,530**	**311,984**		**702,514**
	ACTs							**637,045**	**694,323**	**20,400**	**1,351,768**
	SP	**131,115**	**131,114**					**117,600**	**115,891**		**495,720**
	LLIN	**36,833**	**0**	**970,932**	**942,148**	**90,250**	**90,458**	**329,209**	**1,504,642**	**1,475,742**	**5,440,214**

Notes: NMEP/FMOH = National Malaria Elimination Programme/Federal Ministry of Health; MAPS = Malaria Action Program for States; SFH = Society for Family Health; AMURT = Ananda Marga Universal Relief Team; EBSG = Ebonyi State Government; RDT = rapid diagnostic test; ACT = artemisinin-based combination therapy; SP = sulfadoxine-pyrimethamine; LLINs = long-lasting insecticidal nets. Blank cells indicate that the partner did not distribute the commodity during the respective year.

Sources: Federal Ministry of Health, Ebonyi State Government, PMI, the DELIVER and MAPS Projects, Global Fund

3.1.3 Nassarawa State

The malaria control strategy in Nassarawa State is aligned with the NMEP's NMSP, with a focus on the distribution of LLINs, provision of prompt and effective case management, and IPTp to combat malaria (PMI, 2014). Malaria control efforts began earlier than 2008, with the FMOH providing support for the distribution of ITNs and LLINs in the state since 2004. The FMOH and several partners and projects have provided support for the implementation of malaria interventions in the state between 2008 and early 2016, including UNICEF, Global Fund, USAID/PMI, and the NetWorks, MAPS, and DELIVER projects. A summary of the key malaria interventions and commodity distribution milestones implemented between 2008 and 2016 by the different partners is presented in Table 9.

Table 9. Summary of the implementation of malaria control interventions and commodity distribution by partners in Nassarawa, 2008–2016

Year	Malaria control intervention and commodity distribution milestones
2008	• NMEP distributed ACTs from 2008–2009
2010	• PMI began working in the state • NMEP and the MAPS project distributed LLINs; MAPS also supported provided training in using an LLIN tracking tool to improve supply management of LLINs
2011	• UNICEF partnered with FMOH and MAPS to distribute LLINs • PMI through DELIVER, MAPS, FMOH, and SMOH began supporting the distribution of LLINs, ACTs, RDTs, and SP • PMI supported IRS in two LGAs (through 2012) under the Africa Indoor Residual Spraying Project
2012	• PMI, the NMEP, and other partners provided technical assistance and training for health workers in malaria in pregnancy, malaria diagnosis and case management, and malaria commodities and logistics • MAPS conducted an assessment on facility LLIN distribution through ANC clinics
2013	• MAPS collaborated with NetWorks in LLIN distribution; MAPS also evaluated the LLIN delivery channel • USAID, PMI, and Global Fund began distributing RDTs and ACTs • DELIVER and the SMOH conducted bimonthly malaria consumption and resupply data review meetings • PMI developed and implemented a continuous distribution system for LLINs • PMI supported the NMEP and SMEP in the harmonization of the HMIS and DHIS 2
2014	• DELIVER started providing LLINs, RDTs, ACTs, and SPs with Global Fund to PMI-supported health facilities and distributed commodity logistic system tools • NMEP, DELIVER, MAPS, PMI, NetWorks, and Global Fund distributed LLINs • State adopted the one ITN for every two people in a household strategy
2015	• The NMEP, Global Fund, and PMI contributed to commodity distribution • DELIVER distributed LLINs, SP, RDTs, and ACTs and provided training on the malaria commodity logistics system • State adopted IPTp 3+ doses policy • PMI and MAPS distributed LLINs to the state • SMEP conducted trainings for health workers on managing uncomplicated and severe malaria
2016	• PMI supported facilities with RDTs and ACTs; DELIVER supported the distribution of SP

Sources: Kilian, Opawale, Obi Onyefunafoa, Baba, & Boulay, 2012; FMOH, 2008; FMOH, 2010; FMOH, 2011; MAPS, 2011; MAPS, 2012; MAPS, 2013; MAPS, 2014; MAPS, 2015; NMEP, 2015; Nassarawa State Malaria Elimination Programme, 2015; PMI, 2012; PMI, 2013; PMI, 2014; PMI Africa Indoor Residual Spraying (AIRS) Project, 2013; USAID Deliver Project, 2014; USAID Deliver Project, 2015c; USAID Deliver Project, 2015e; USAID Deliver Project, 2016; USAID NetWorks Project, 2015

Table 10 presents the number of malaria commodities distributed in Nassarawa between 2008 and 2016 by the different partners. The greatest number of commodities were procured and distributed in 2014 and 2015 across the state. Between 2008 and 2016, just under 700,000 RDTs and 1.2 million ACTs were procured and distributed, and more than 8.6 million LLINs and 425,000 SP throughout the state with support from the different partners.

Table 10. Summary of malaria commodity distribution in Nassarawa, 2008–2016

Partner		2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
NMEP/	RDTs								7,081		**7,081**
FMOH	ACTs	60,264	60,264						88,859		**209,387**
	SP	72,738	72,738								**145,476**
	LLIN	11,000		838,853	200,000			**1,659,150**			**2,709,003**
DELIVER	RDTs							328,100	285,800	3,000	**616,900**
Project	ACTs							411,685	377,355	3,050	**792,090**
	SP							134,350	114,050	604	**249,004**
	LLINs							199,500	186,100		**385,600**
MAPS	RDTs										
Project	ACTs										
	SP										
	LLIN			**842,324**			44,350	**1,656,301**	1,617,399		**4,160,374**
Global	RDTs						55,743		16,275		**72,018**
Fund	ACTs						131,150			55,595	**186,745**
	SP								30,700		**30,700**
	LLINs							80,420			**80,420**
PMI/USAID	LLINs							1,300,000			**1,300,000**
MDG	LLINs	11,000									**11,000**
Total	**RDTs**						**55,743**	**328,100**	**309,156**	**3,000**	**695,999**
Number	**ACTs**	**60,264**	**60,264**				**131,150**	**411,685**	**466,214**	**58,645**	**1,188,222**
	SP	**72,738**	**72,738**					**134,350**	**144,750**	**604**	**425,180**
	LLIN	**22,000**		**1,681,177**	**200,000**		**44,350**	**4,895,371**	**1,803,499**		**8,646,397**

Notes: NMEP/FMOH = National Malaria Elimination Programme/Federal Ministry of Health; MAPS = Malaria Action Program for States; PMI/USAID = President's Malaria Initiative/US Agency for International Development; MDG = Millennium Development Goals; RDT = rapid diagnostic test; ACT = artemisinin-based combination therapy; SP = sulfadoxine-pyrimethamine; LLINs = long-lasting insecticidal nets. Blank cells indicate that the partner did not distribute the commodity during the respective year.

Sources: Federal Ministry of Health, PMI, Nassarawa State Government, DELIVER and MAPS Projects, MDG

3.1.4 Sokoto State

The malaria control strategy in Sokoto State is aligned with the NMEP's NMSP, with a focus on the distribution of LLINs, provision of prompt and effective case management, IPTp to combat malaria, and more recently seasonal malaria chemoprevention (SMC) (PMI, 2014; Sokoto State Government, 2010). The FMOH and several partners and projects have provided support for the implementation of malaria interventions in the state between 2008 and 2015, including Global Fund, UNICEF, USAID/PMI, UNITAID, the International Federation of the Red Cross, the DELIVER Project, and TSHIP. A summary of the key malaria interventions and commodity distribution milestones implemented between 2008 and 2015 is presented in Table 11.

Table 11. Summary of the implementation of malaria control interventions and commodity distribution by partners in Sokoto, 2008–2016

Year	Malaria control intervention and commodity distribution milestones
2008	• The Global Fund began support to Sokoto, including the distribution of ACTs • NMEP provided SP through 2009
2009	• UNICEF began support for malaria interventions, including the distribution of LLINs
2010	• The DELIVER Project and TSHIP began supporting malaria interventions • TSHIP began distribution of LLINs, RDTs, ACTs, and SP
2011	• PMI through DELIVER began providing technical assistance and trainings on LLIN distribution, malaria diagnosis and case management, IPTp, and the malaria logistics system • PMI performed a preliminary malaria laboratory assessment
2012	• MAPS and DELIVER began distribution of LLINs, RDTs, ACTs, and SP in Sokoto
2013	• PMI and the Global Fund conducted a universal coverage LLIN distribution campaign • PMI supported the NMEP and SMEP in the harmonization of the HMIS and DHIS 2
2014	• PMI trained health workers on malaria prevention and case management • DELIVER implemented a direct delivery and information capture system, provided technical assistance to the NMEP for tool development, and supported transitioning to ANC, PNC, and community distribution • DELIVER and the NMEP conducted a mass replacement campaign of LLINs • State adopted the one ITN for every two people in a household strategy
2015	• NMEP with DELIVER distributed RDTs, ACTs, and LLINs • DELIVER supported distribution of GF commodities to GF supported facilities • DELIVER and Global Fund provided SPs • State adopted IPTp 3+ doses policy • DELIVER began a monitoring program to assess consumption of malaria commodities • UNITAID through the Achieving Catalytic Expansion of Seasonal Malaria Chemoprevention in the Sahel (ACCESS SMC) project supported the delivery of SMC

Sources: ACCESS SMC, 2015; FMOH, 2008; FMOH, 2009; FMOH, 2015; MAPS, 2011; MAPS, 2012; PMI, 2010; Mohammed, Orobaton, & Mohammed, 2016; PMI, 2012; PMI, 2013; PMI, 2014; TSHIP, 2015; USAID Deliver Project, 2014; USAID Deliver Project, 2015c

Table 12 presents the number of malaria commodities distributed in Sokoto between 2008 and 2015 by the different partners providing support to the state. The greatest number of commodities were procured and distributed in 2015 across the state. Between 2008 and 2015, more than 1 million RDTs, 5.2 million ACTs, 900,000 SP, and 2.6 million LLINs were procured and distributed throughout the state with support from the different partners.

Table 12. Summary of malaria commodity distribution in Sokoto, 2008–2015

Partner		2008	2009	2010	2011	2012	2013	2014	2015	Total
NMEP/ FMOH	RDTs								15,217	**15,217**
	ACTs								1,700,399	**1,700,399**
	SP	144,600	144,599							**289,199**
	LLIN								70,185	**70,185**
DELIVER Project	RDTs								784,250	**784,250**
	ACTs								2,365,450	**2,365,450**
	SP								465,700	**465,700**
	LLINs							1,282,150	22,950	**1,305,100**
MAPS Project	RDTs									
	ACTs									
	SP									
	LLIN									
Global Fund	RDTs								247,865	**247,865**
	ACTs	230,400							983,180	**1,213,580**
	SP								150,200	**150,200**
	LLINs	41,145								**41,145**
PMI/USAID	LLINs								**32,000**	**32,000**
UNICEF	LLINs		1,195,467							**1,195,467**
Total Number	**RDTs**								**1,047,332**	**1,047,332**
	ACTs	**230,400**							**5,049,029**	**5,279,429**
	SP	**144,600**	**144,599**						**615,900**	**905,099**
	LLIN	**41,145**	**1,195,467**					**1,282,150**	**125,135**	**2,643,897**

Notes: NMEP/FMOH = National Malaria Elimination Programme/Federal Ministry of Health; MAPS = Malaria Action Program for States; PMI/USAID = President's Malaria Initiative/US Agency for International Development; UNICEF = United Nations Children; RDT = rapid diagnostic test; ACT = artemisinin-based combination therapy; SP = sulfadoxine-pyrimethamine; LLINs = long-lasting insecticidal nets. Blank cells indicate that the partner did not distribute the commodity during the respective year.

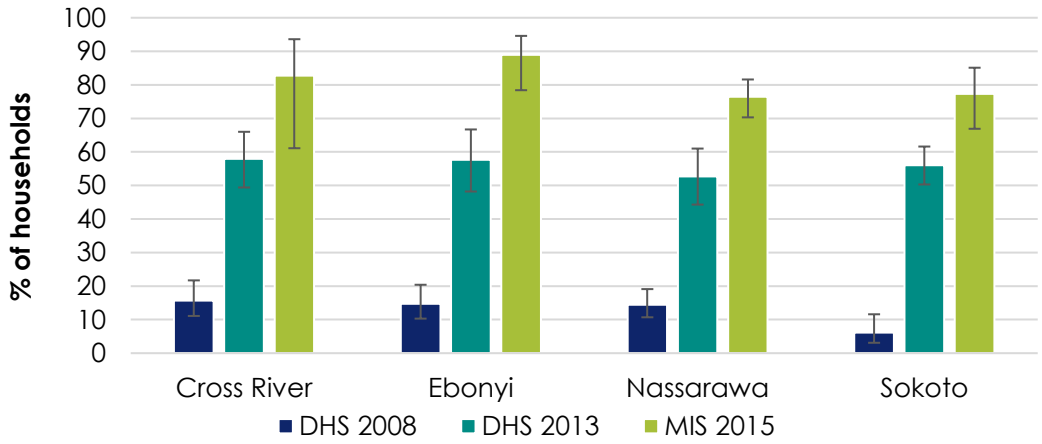
Sources: Federal Ministry of Health, PMI, Sokoto State Government, DELIVER and MAPS Projects, UNICEF

3.2 State-Level Results: Trends of Key Malaria Indicators

3.2.1 ITN Ownership and Use

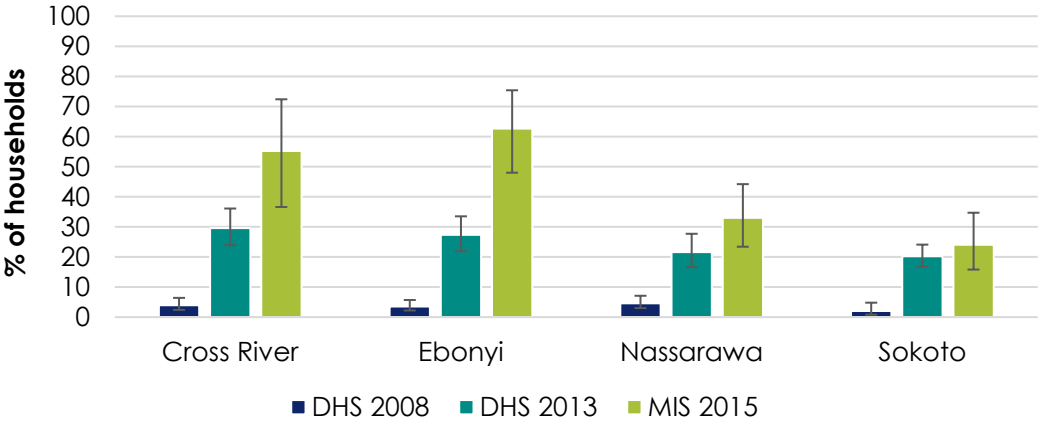
Household ownership of at least one ITN improved significantly between 2008 and 2015 across all four states, with coverage ranging from 76 percent (95% CI: 70%–82%) in Nassarawa to as high as 89 percent (95% CI: 75%–95%) in Ebonyi state (Figure 3). The percentage of households with at least one ITN for every two people similarly showed significant improvement between 2008 and 2015 in all four states; however, the increase was greatest in Ebonyi state—from 4 percent (95% CI: 2%–6%) in 2008 to 63 percent (95% CI: 48%–75%) in 2015—and smallest in Sokoto—from 2 percent (95% CI: 1%–5%) in 2008 to 24 percent (95% CI: 16%–35%) in 2015 (Figure 4).

Figure 3. Percentage of households with at least one ITN by state, 2008–2015



Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

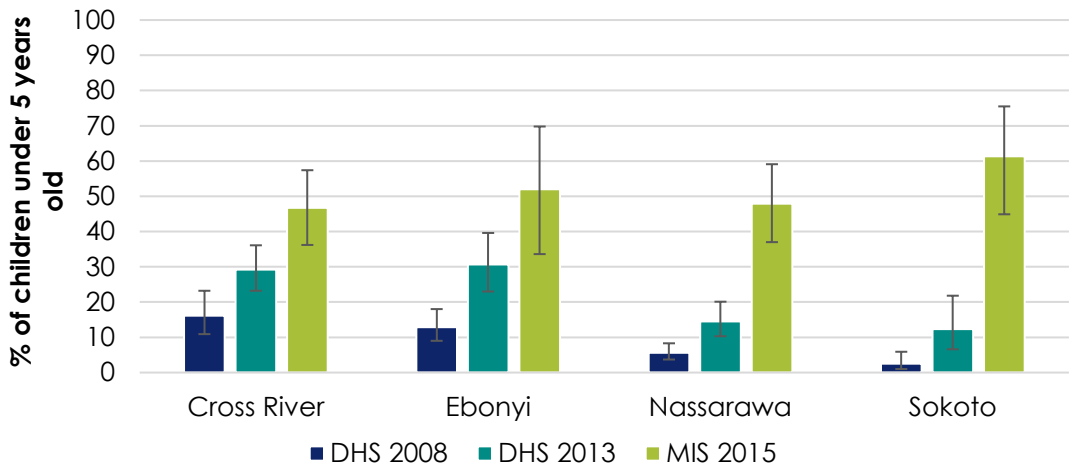
Figure 4. Percentage of households with at least one ITN for every two people by state, 2008–2015



Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

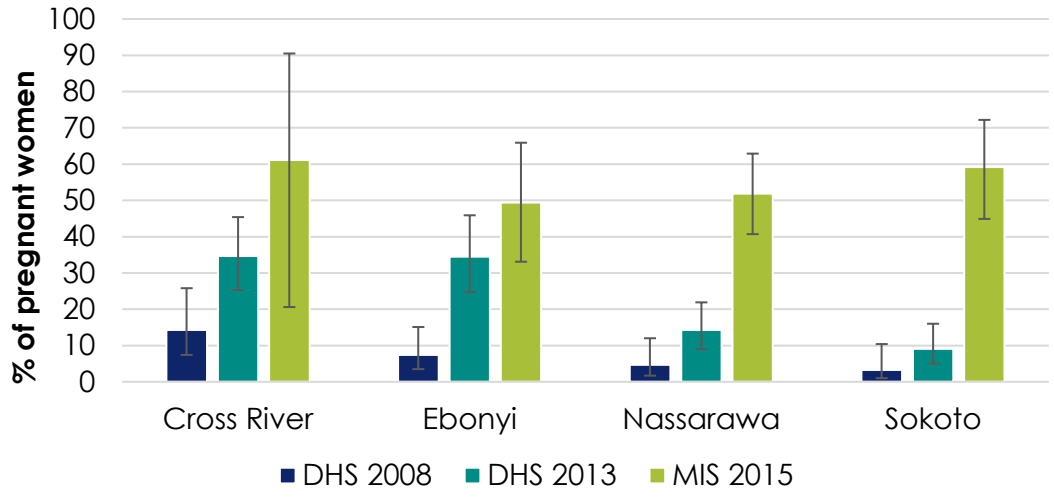
ITN use among children under five years of age, pregnant women, and the general population improved across all four states between 2008 and 2015. Among children under five years of age, the greatest improvement in ITN use was observed in Sokoto, from 3 percent (95% CI: 1%–6%) to 61 percent (95% CI: 45%–76%) between 2008 and 2015, while in Cross River ITN use increased from 16 percent (95% CI: 11%–23%) in 2008 to 47 percent (95% CI: 36%–57%) by 2015 (Figure 5). Among pregnant women, ITN use the previous night improved the most in Cross River—from 14 percent (95% CI: 7%–26%) to 61 percent (95% CI: 21%–91%)—and Sokoto—from 3 percent (95% CI: 1%–10%) to 59 percent (95%: 45%–72%)—between 2008 and 2015, while in Ebonyi and Nassarawa States, ITN use reached about 50 percent by 2015 (Figure 6). Among the general population, ITN use the previous night improved overall between 2008 and 2015, with use ranging from 44 percent in Nassarawa by 2015 to around 50 percent in each of the other three states (Figure 7).

Figure 5. Percentage of children under 5 years old who slept under an ITN the previous night, by state, 2008–2015



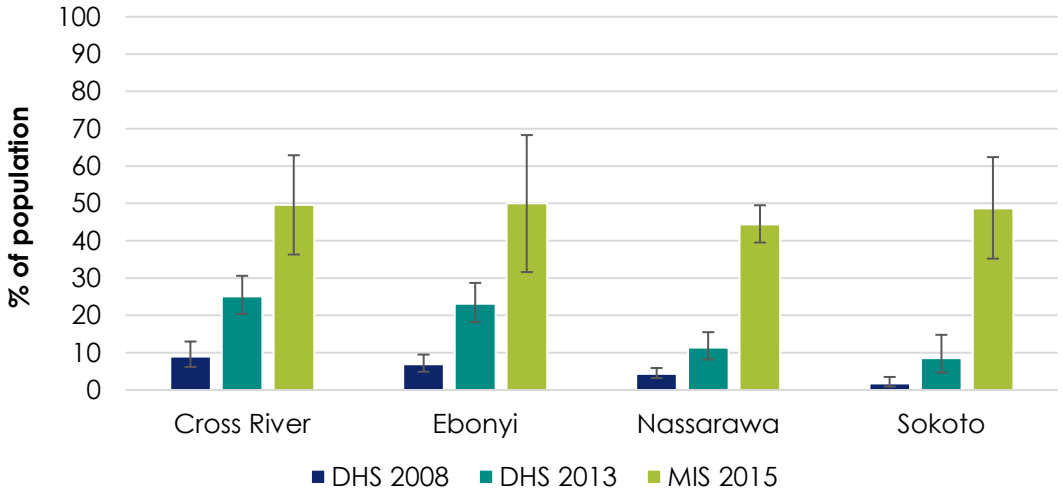
Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

Figure 6. Percentage of pregnant women who slept under an ITN the previous night, by state, 2008–2015



Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

Figure 7. Percentage of population who slept under an ITN the previous night, by state, 2008–2015



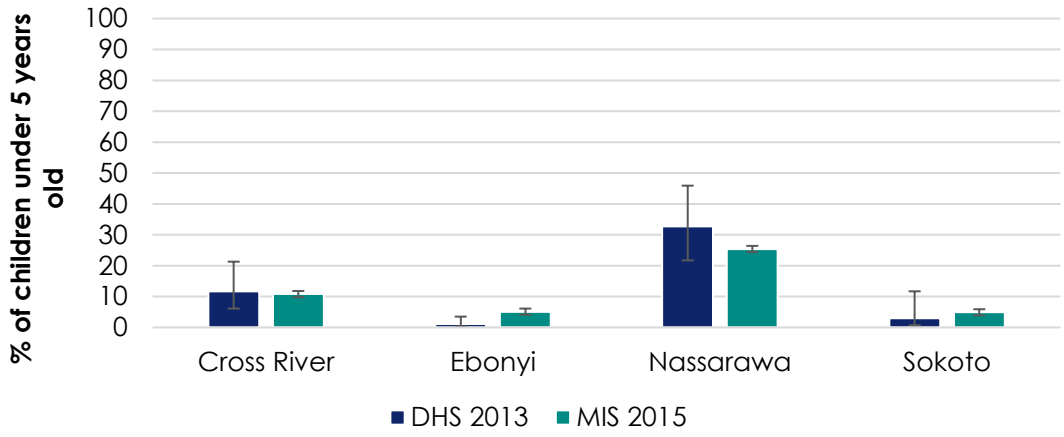
Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

3.2.2 Case Management

In the DHS and MIS surveys, mothers are asked to report the history of fever in children under five years of age during the two weeks prior to the survey. Among children who experienced fever, a series of further questions are asked about care-seeking, including the source of advice or treatment, whether the child received a finger or heel stick (only available in the 2013 DHS and 2015 MIS), the treatment received, and the type of antimalarial used, in order to assess case management of malaria. Figures 8–11 present the results across the four states on case management of children with fever.

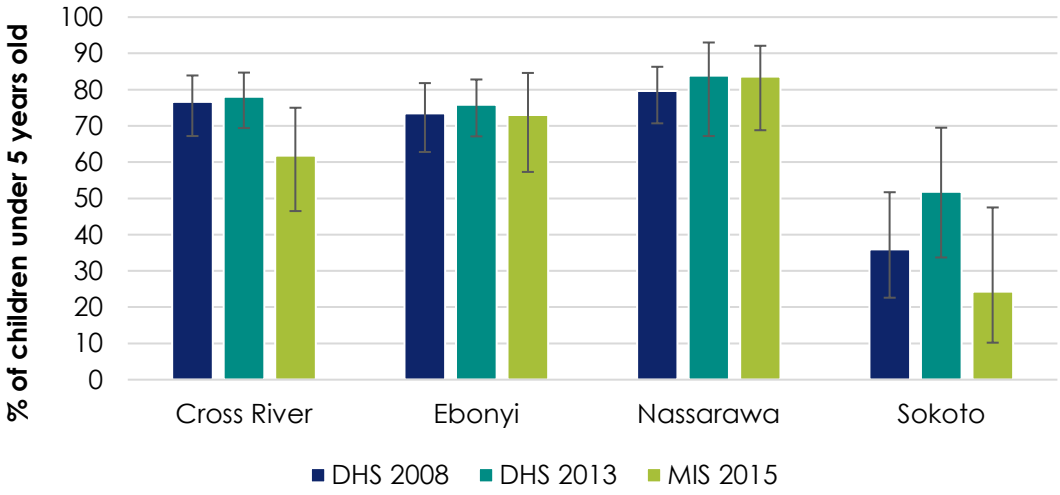
The percentage of children under five with fever in the past two weeks who had a finger or heel stick overall remained stable and low between 2013 and 2015 across all four states (Figure 8). By 2015, coverage ranged from as low as 5 percent (95% CI: 2%–13%) in Ebonyi and Sokoto states, to 11 percent (95% CI: 3%–35%) in Cross River, and 25 percent (95% CI: 20%–31%) in Nassarawa State. Care-seeking from a health facility or provider for children with fever also remained relatively stable between 2008 and 2015 across the four states (Figure 9). In Cross River, Ebonyi, and Nassarawa coverage ranged from approximately 60 percent to 85 percent over the 2008–2015 period, and overall was highest in Nassarawa State. In Sokoto, care-seeking was overall lower across all survey years, at only 24 percent (95% CI: 10%–48%) in 2015.

Figure 8. Percentage of children under five years old with fever in the past two weeks who had a finger or heel stick, by state, 2013–2015



Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey; data not available for DHS 2008

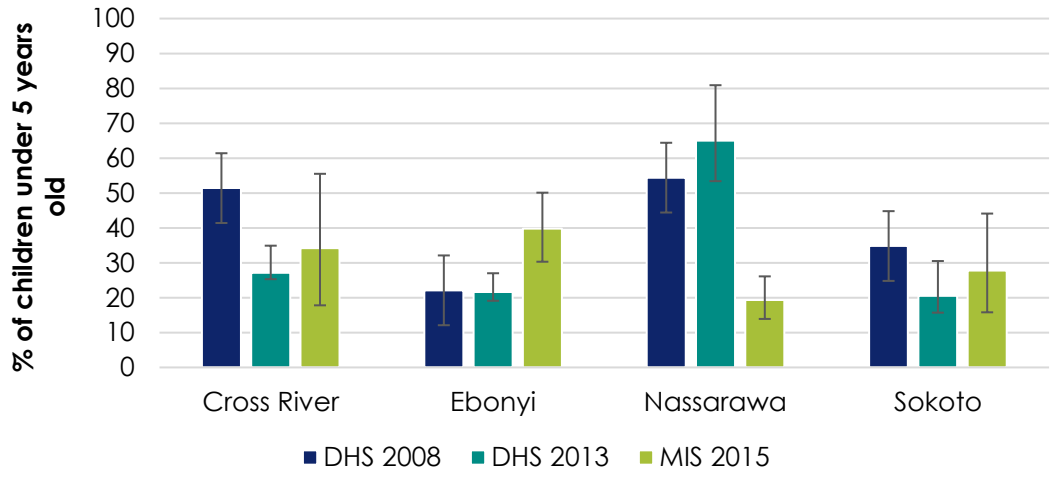
Figure 9. Percentage of children under five years old with fever in the past two weeks for whom advice or treatment was sought from a health facility or provider, by state, 2008–2015



Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

The percentage of children with fever who received any antimalarial treatment varied considerably across the three survey years and across the four states (Figure 10). In Cross River, receipt of any antimalarial treatment declined significantly between 2008 and 2013, at 51 percent (95% CI: 39%–64%) and 27 percent (95% CI: 22–33%), respectively, and then remained relatively stable between 2013 and 2015. In Ebonyi, coverage increased from 22 percent (95% CI: 14%–33%) in 2008 to 40 percent (95% CI: 30%–50%) in 2015. In Nassarawa, coverage slightly improved between 2008 and 2013—54 percent (95% CI: 42%–67%) and 65 percent (95% CI: 50%–77%), respectively—and then declined significantly to 19 percent (95% CI: 14%–26%) in 2015. In Sokoto, coverage remained relatively stable between 2008 and 2015—35 percent (95% CI: 21%–52%) and 28 percent (95% CI: 16%–44%), respectively.

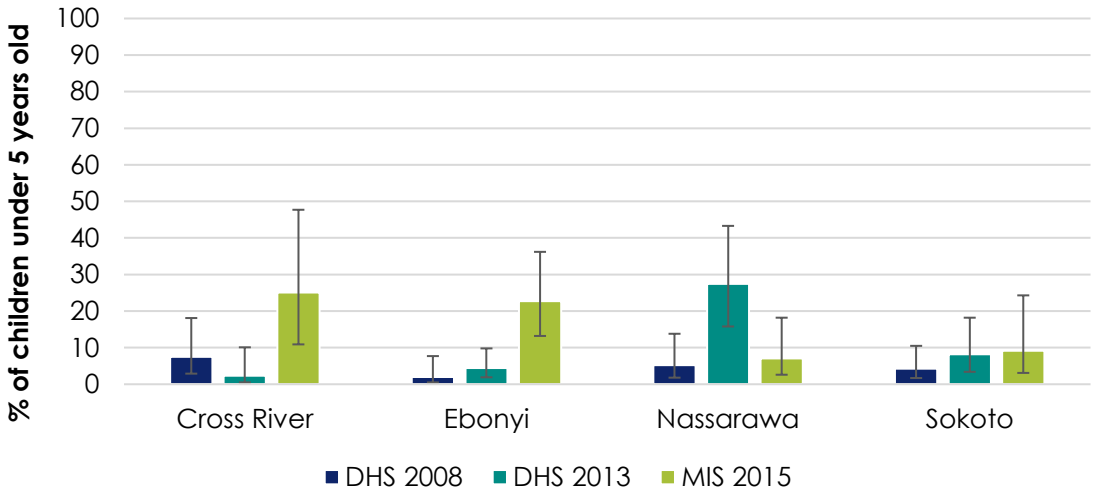
Figure 10. Percentage of children under five years old with fever in the past two weeks who received any antimalarial treatment, by state, 2008–2015



Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

The percentage of children that received ACTs, out of those that received any antimalarial drugs showed slight improvements in Cross River and Ebonyi between 2008 and 2015, reaching 25 percent and 23 percent respectively by 2015 (Figure 11). In Nassarawa, coverage improved from 5 percent (95% CI: 2%–14%) in 2008 to 27 percent (95% CI: 16%–43%) in 2013, then declined to 7 percent (95% CI: 3%–18%) in 2015. In Sokoto, coverage remained stable across the three survey years, reaching only 9 percent (95% CI: 3%–24%) in 2015.

Figure 11. Percentage receiving first-line treatment among children under five years old with fever in the past two weeks who received any antimalarial drugs, by state, 2008–2015

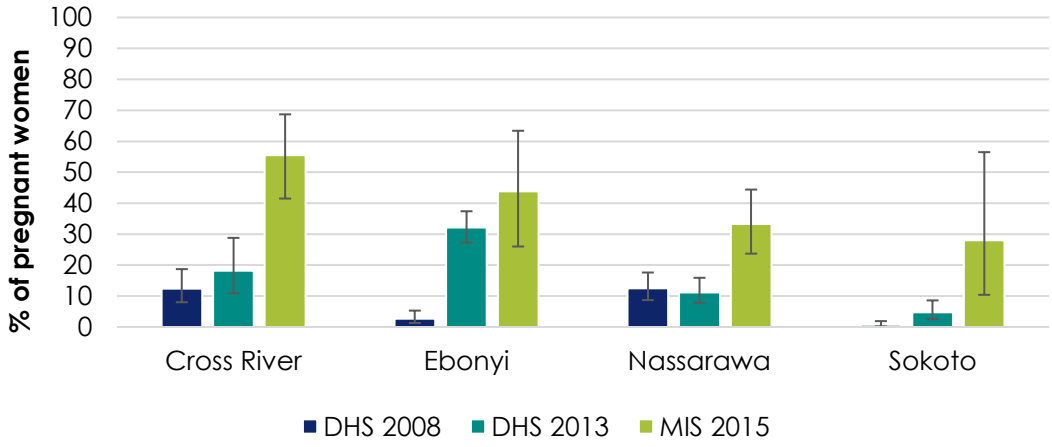


Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

3.2.3 Intermittent Preventive Treatment in Pregnancy

Coverage of IPTp (two or more doses) during ANC visits among women 15–49 years old with a live birth in the past two years improved significantly across all four states between 2008 and 2015 (Figure 12). The greatest improvement in coverage was observed in Cross River and Ebonyi, increasing from 12 percent (95% CI: 8%–19%) and 3 percent (95% CI: 1%–5%) in 2008 to 56 percent (95% CI: 42%–69%) and 44 percent (95% CI: 26%–63%) by 2015, respectively, for the two states. In Nassarawa and Sokoto, coverage with two or more doses of IPTp reached 33 percent and 28 percent, respectively, by 2015.

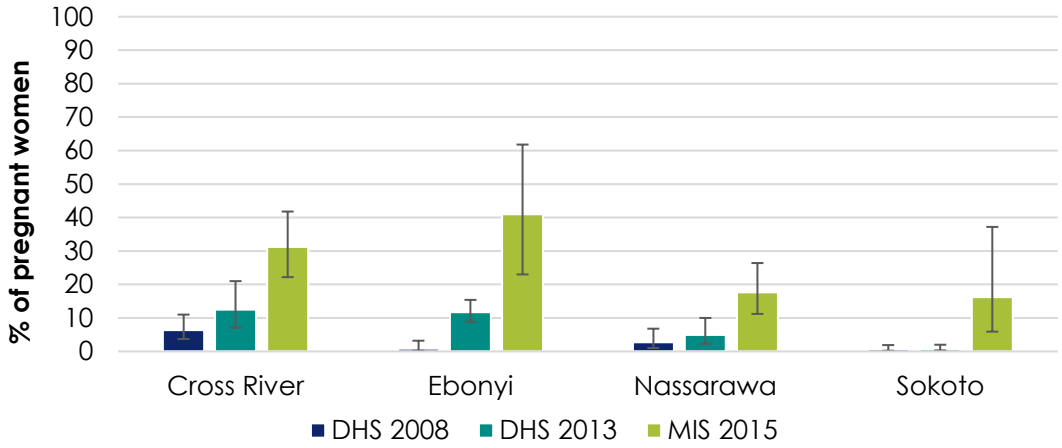
Figure 12. Percentage of women who received 2+ doses for intermittent preventive treatment for malaria during ANC visits during their last pregnancy, by state, 2008–2015



Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

Coverage of IPTp (three or more doses) also improved between 2008 and 2015 across all four states, but coverage levels did not reach as high. In Ebonyi and Cross River, coverage reached 41 percent (95% CI: 23%–62%) and 31 percent (95% CI: 22%–42%), respectively, by 2015, while in Nassarawa and Sokoto, coverage reached just below 20 percent in both states by 2015 (Figure 13).

Figure 13. Percentage of women who received 3+ doses for intermittent preventive treatment for malaria during ANC visits during their last pregnancy, by state, 2008–2015



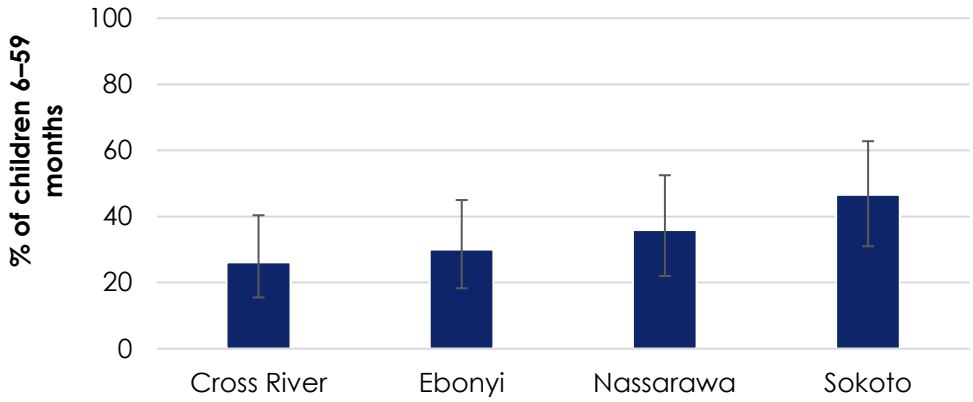
Note: DHS=Demographic and Health Survey, MIS=Malaria Indicator Survey

3.2.4 Morbidity

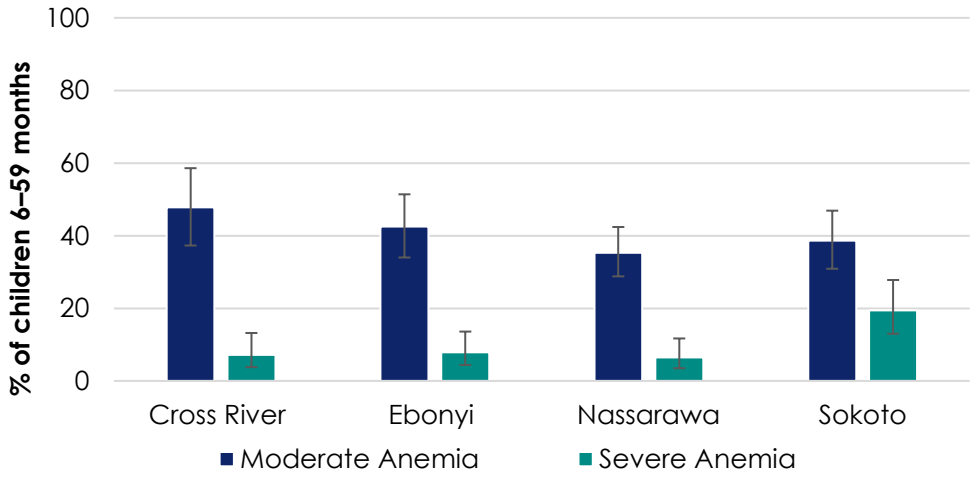
The 2015 MIS was the only survey available that measured parasitemia and anemia prevalence in children 6–59 months of age at the state level; the 2010 MIS only provides parasitemia and anemia estimates at the regional level, therefore no earlier data are available to assess trends over the 2008–2015 period for these indicators. Malaria parasitemia prevalence measured via microscopy was highest in Sokoto State, at 47 percent (95% CI: 31%–63%) and lowest in Cross River State, at 26 percent (95% CI: 16%–40%) (Figure 14a). Moderate anemia prevalence in children 6–59 months ranged from 35 percent (95% CI: 29%–42%) in Nassarawa to as high as 48 percent (95% CI: 37%–59%) in Cross River, while severe anemia prevalence in children 6–59 months of age ranged from 7 percent to 8 percent in Cross River, Ebonyi, and Nassarawa, and was 19 percent in Sokoto in 2015 (Figure 14b).

Figure 14. Percentage of children ages 6–59 months with malaria morbidity, by state, 2015

a. Malaria parasite prevalence based on microscopy



b. Moderate (hemoglobin 8–9.9 g/dL) and severe anemia (hemoglobin <8g/dL)



3.3 Facility-Level Results: Routine Data Trends and Facility Observations

3.3.1 Characteristics of Health Facilities: MIA PHCs and Referral Hospitals

Maps of the selected PHC facilities, including PMI and non-PMI-supported, and referral hospitals that were included in the final sample are shown in Figure 15.

Figure 15. Maps of sampled MIA PHCs and referral hospitals across the four states

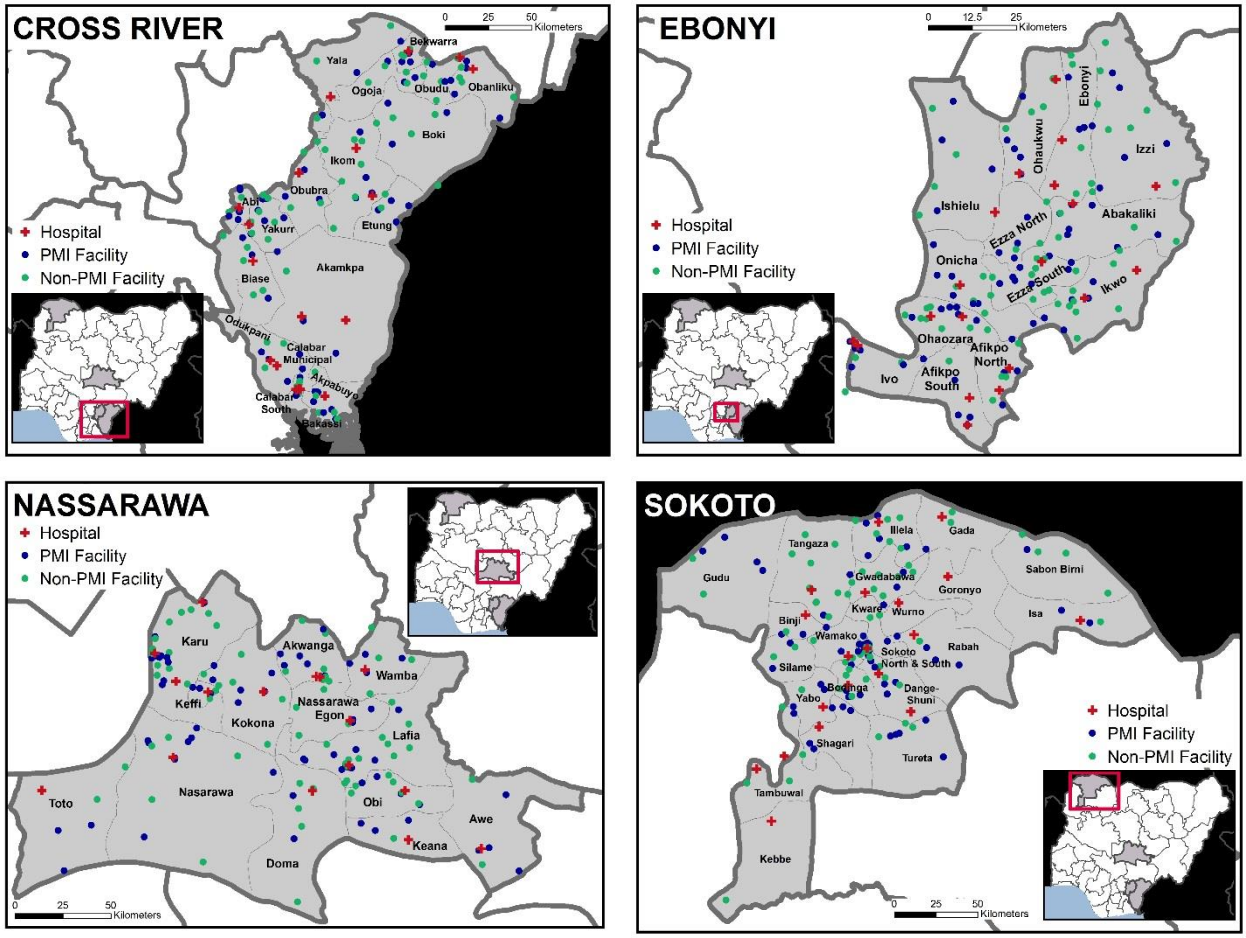


Table 13 presents an overview of the characteristics of the PHC facilities that were included in the final sample, by state and type of facility (PMI- or non-PMI-supported). In Cross River, Ebonyi, and Nassarawa, 70 PMI- and 70 non-PMI-supported states were included in the final sample, while in Sokoto, 69 PMI- and 71 non-PMI-supported PHCs were included. The majority of PHCs, across all four states and facility type, began operations before the year 2008. In Cross River, there was a significant difference between the year that facilities started to operate, with more PMI-supported PHCs beginning before 2008 (90 percent), compared to non-PMI PHCs (61 percent). Overall across the four states, there were more health facility staff in the PMI-supported PHCs compared to non-PMI PHCs, with significant differences observed in Cross River ($p < 0.001$), Nassarawa ($p < 0.05$) and Sokoto ($p < 0.001$). In general, the majority of PMI and non-PMI PHCs across all four states did not have a medical doctor at the facility.

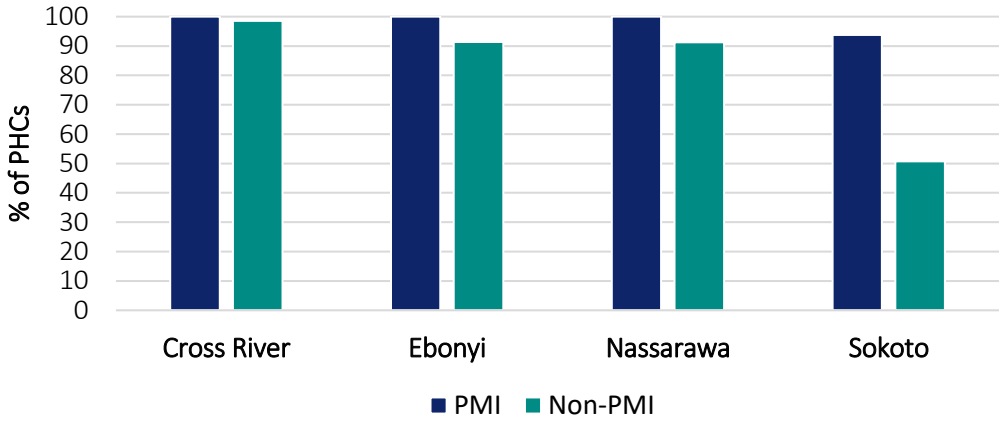
Table 13. Descriptive characteristics of PHC facilities, by state and type of facility

	Cross River (%)			Ebonyi (%)			Nassarawa (%)			Sokoto (%)		
	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*
Year facility started to operate												
Before 2008	90.0	61.4	<0.001	65.7	68.6	0.682	91.4	85.7	0.561	81.2	73.2	0.086
2008–2011	5.7	10.0		11.4	7.1		7.1	11.4		14.5	11.3	
2012–2014	4.3	28.6		22.9	24.3		1.4	2.9		4.3	15.5	
# of health facility staff												
1–3	14.3	60.0	<0.001	25.7	38.6	0.117	7.1	17.4	0.012	7.8	38.8	<0.001
4–6	32.9	27.1		34.3	38.6		14.3	23.2		15.6	28.4	
7–9	20.0	7.1		24.3	8.6		7.1	17.4		7.8	13.4	
10–12	11.4	4.3		5.7	4.3		20.0	13.0		14.1	4.5	
≥13	21.4	1.4		10.0	10.0		51.4	29.0		54.7	14.9	
# of medical doctors												
0	85.7	95.7	0.083	86.8	89.7	0.705	92.9	96.8	0.095	78.8	88.6	0.228
1	10.0	1.4		7.4	7.4		0.0	0.0		1.5	0.0	
≥2	4.3	2.9		5.9	2.9		7.1	1.4		19.7	11.4	
# of PHC facilities	**70**	**70**		**70**	**70**		**70**	**70**		**69**	**71**	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value

Additionally, the assessment looked at whether the PHCs offered ANC services, had a laboratory, and had a functional microscope at the time of the visit. Almost all PMI-supported PHCs across the four states offered ANC services (above 90%). Similarly, the majority of non-PMI-supported PHCs in Cross River, Ebonyi, and Nassarawa offered ANC services, while only half of the non-PMI PHCs in Sokoto did (Figure 16). A significant difference in coverage of ANC services was found between PMI and non-PMI PHCs in Ebonyi, Nassarawa, and Sokoto ($p < 0.05$).

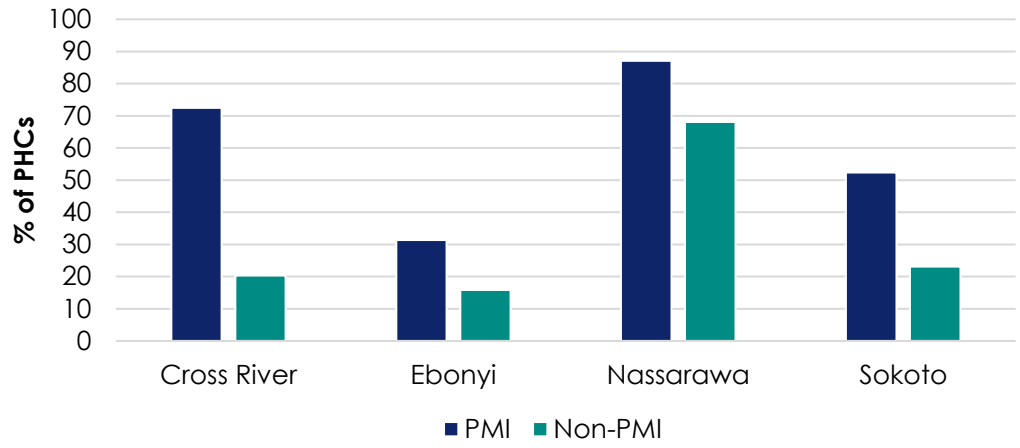
Figure 16. Percentage of PHC facilities that offered ANC services, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities were significant for Ebonyi, Nassarawa, and Sokoto at the $p < 0.05$ level.

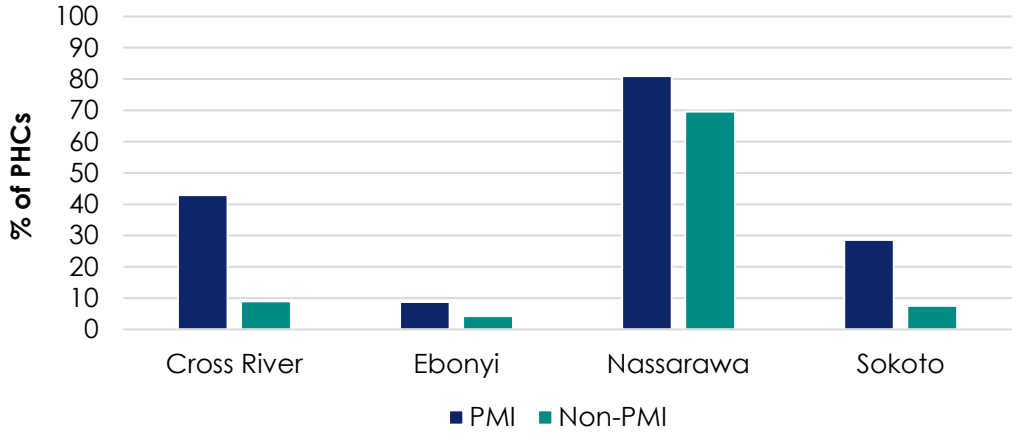
Overall, more PMI-supported PHCs had a laboratory and a functional microscope than non-PMI-supported PHCs, though coverage varied considerably across the four states (Figures 17–18). In Nassarawa and Cross River, 87 percent and 73 percent of PMI-supported PHCs had a laboratory, and 81 percent and 43 percent had a functional microscope, respectively. Coverage was lower in Sokoto and Ebonyi states; for example, 52 percent and 31 percent of the PMI-supported PHCs had a laboratory and 29 percent and 9 percent had a functional microscope. Significant differences in coverage of PHCs with a laboratory between PMI and non-PMI PHCs were found in all four states ($p < 0.05$), while significant differences in coverage of PHCs with a functional microscope between the two types of facilities were only found in Cross River and Sokoto ($p < 0.01$).

Figure 17. Percentage of PHC facilities that had a laboratory, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities were significant for Cross River, Ebonyi, Nassarawa, and Sokoto at the $p < 0.05$ level.

Figure 17. Percentage of PHC facilities that have a functional microscope, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities were significant for Cross River and Sokoto at the $p < 0.05$ level.

Table 14 presents the characteristics of the referral hospitals included in the final sample. Across all four states, the majority of the referral hospitals had begun operations before 2008. The size of the hospitals in terms of the number of staff were relatively similar in Ebonyi and Sokoto, with the majority of the hospitals employing fewer than 50 staff members—90 percent (18/20) and 95 percent (19/20), respectively. In Nassarawa, 75 percent (12/16) of the hospitals had fewer than 50 staff and just under 20 percent (3/16) of the hospitals had between 50–100 staff. In Cross River, 44 percent (8/18) of hospitals had fewer than 50 staff, 39 percent (7/18) had between 50 and 100, and 17 percent (2/18) had 100 or more staff.

Table 14. Distribution of referral hospitals based on background characteristics by state

	Cross River	Ebonyi	Nassarawa	Sokoto
Year that hospital started to operate				
Before 2008	13	18	16	15
2008–2011	0	0	0	1
2012–2014	1	0	0	2
Missing	4	2	0	2
Number of hospital staff				
≤ 50	8	18	12	19
50–100	7	0	3	1
100–199	1	1	0	0
≥200	2	1	1	0
Percentage public hospitals	**13**	**13**	**16**	**20**
Total number of hospitals	**18**	**20**	**16**	**20**

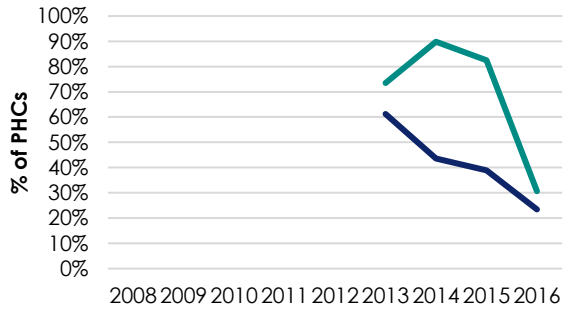
3.3.2 Trends in Stockouts of Malaria Commodities from Monthly Summary Forms

Trends in stockouts of RDTs, ACTs, SP, and LLINs in the past year were assessed in PMI- and non-PMI-supported PHCs from 2008 to early 2016. The assessment set a threshold reporting rate for PHCs at 50 percent; thus, if less than 50 percent of the PHCs reported data for a specific year, the data from that year were not included. For most of the indicators assessed, the PHCs across all four states did not meet the reporting rate threshold before the year 2013.

Figure 19 a–d presents the trends in stockouts of RDTs in the past year by type of PHC (PMI- versus non-PMI-supported) for each of the states. Across Cross River, Ebonyi, and Nassarawa there was a declining trend in stockouts of RDTs in both PMI- and non-PMI-supported PHCs from 2013 to 2016, with PMI PHCs generally performing better. Stockouts of RDTs in Sokoto remained relatively stable in both PMI and non-PMI PHCs between 2014 and 2016.

Figure 18 a–d. Percentage of PHCs that experienced stockouts of RDTs in the past year, by PMI and non-PMI facilities for each state

a. Cross River



b. Ebonyi

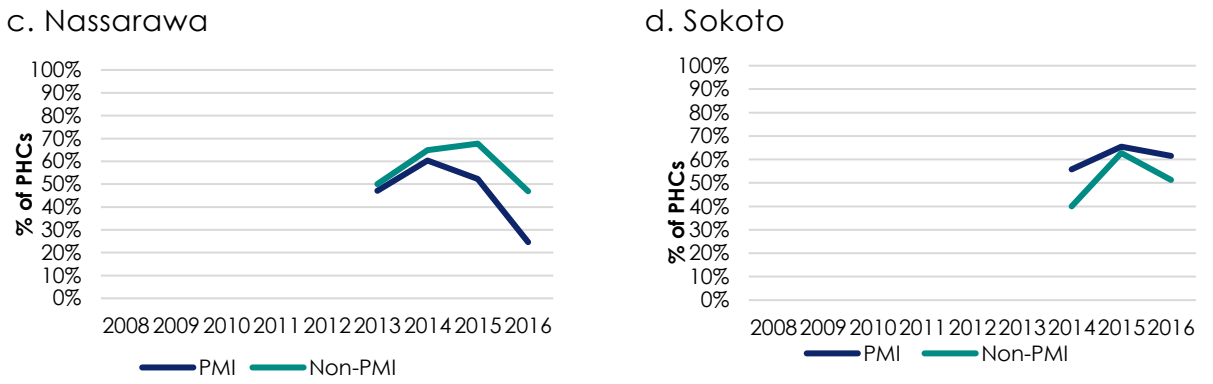


Figure 20 a–d presents the trends in stockout of ACTs in the past year across the four states. In Cross River and Ebonyi, there was a declining trend in stockout of ACTs in PMI-supported PHCs between 2013 and 2016. In Nassarawa and Sokoto, stockouts remained relatively stable in both PMI and non-PMI PHCs up to 2015 and then suggest a decline occurring in 2016. Except for Sokoto, stockouts of ACTs were generally lower in PMI than in non-PMI PHCs.

Figure 20 a–d. Percentage of PHCs that experienced stockouts of ACTs in the past year, by PMI and non-PMI facilities for each state

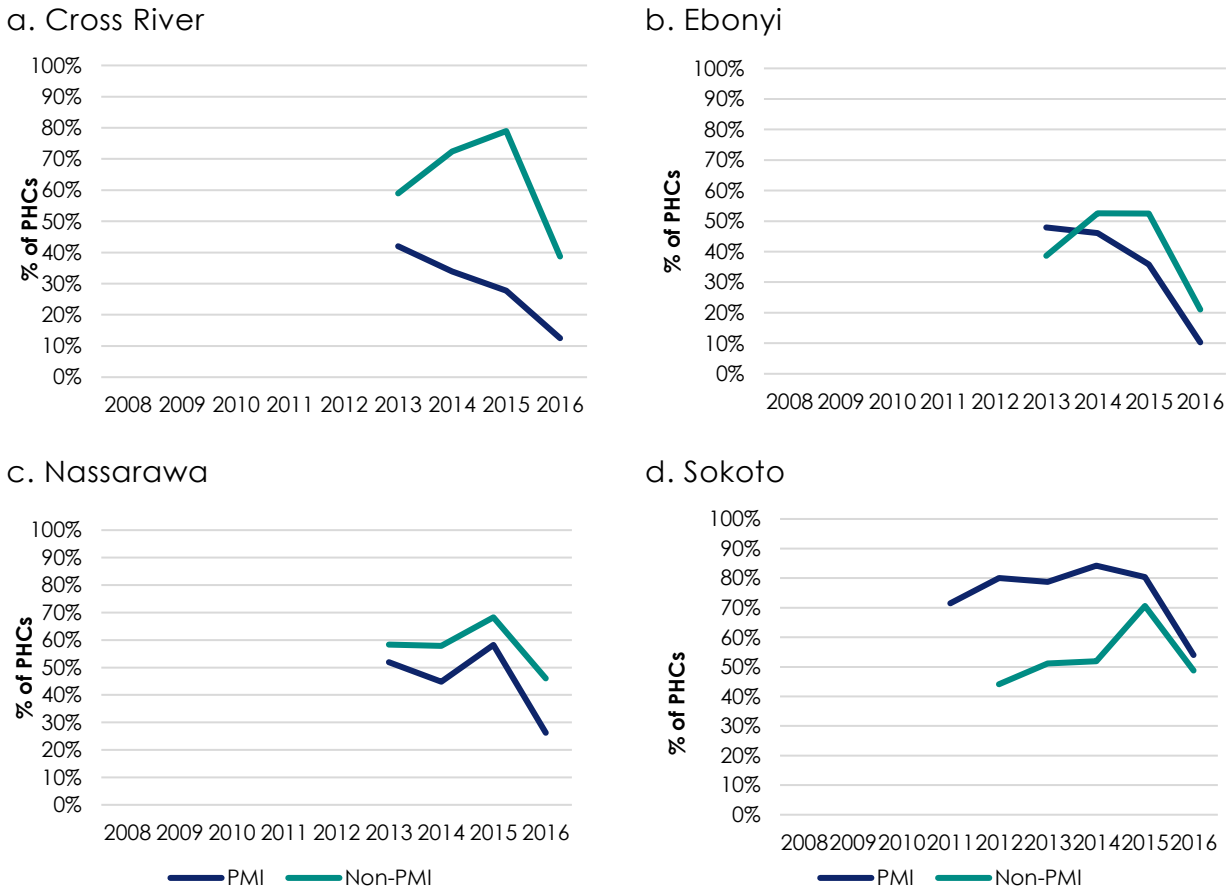


Figure 21 a–d presents trends in stockouts of SPs in the past year across the four states. In Cross River and Ebonyi, there was a general decline observed in stockouts of SP between 2013 and 2016 in both PMI- and non-PMI-supported PHCs, with PMI PHCs overall performing better than non-PMI PHCs. In Nassarawa, stockouts remained relatively stable in both types of PHCs between 2013 and 2015, with a suggested decline occurring in 2016; though PMI-supported PHCs had overall fewer stockouts. In Sokoto, there are fewer data points available to assess the trend, particularly since the data for 2016 are not complete for the entire year.

Figure 21 a–d. Percentage of PHCs that experienced stockouts of SPs in the past year, by PMI and non-PMI facilities for each state

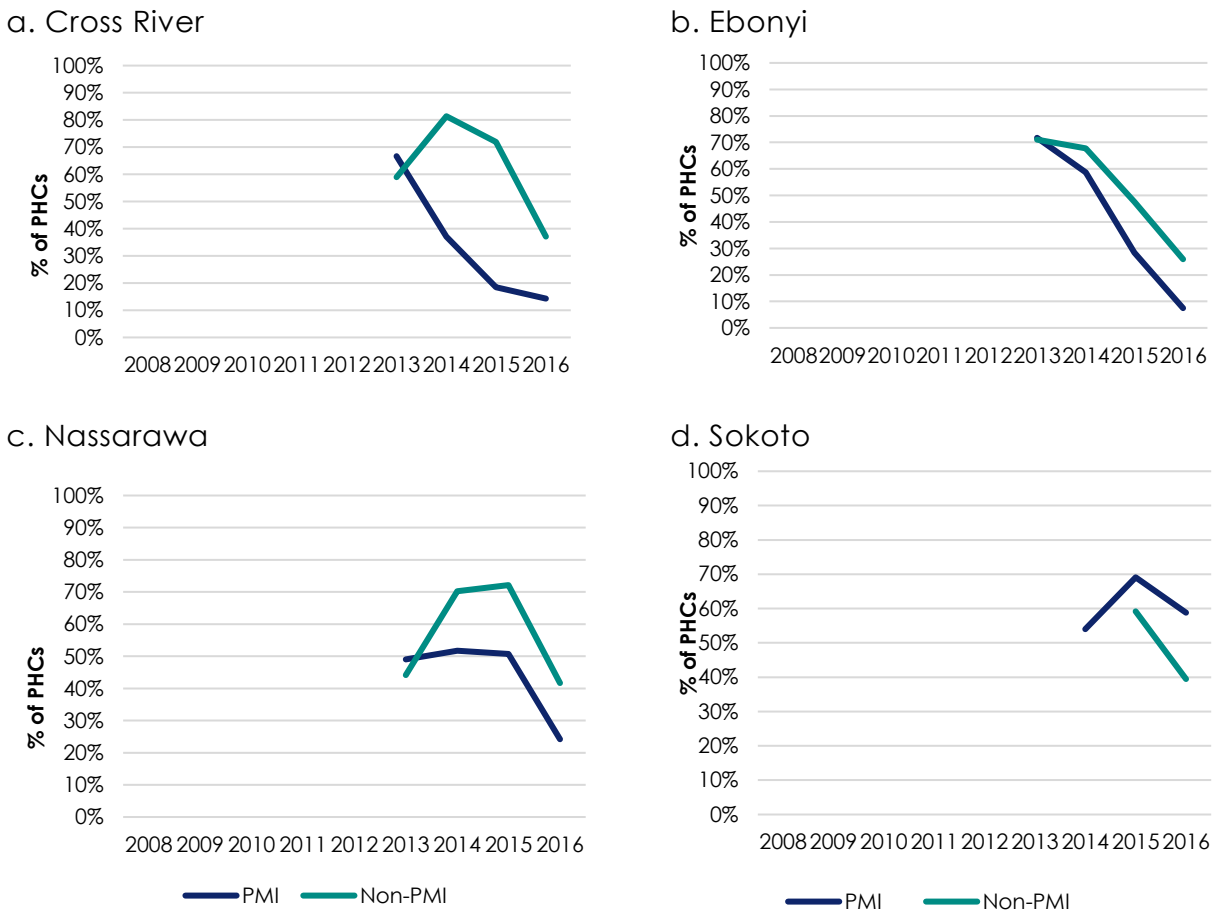
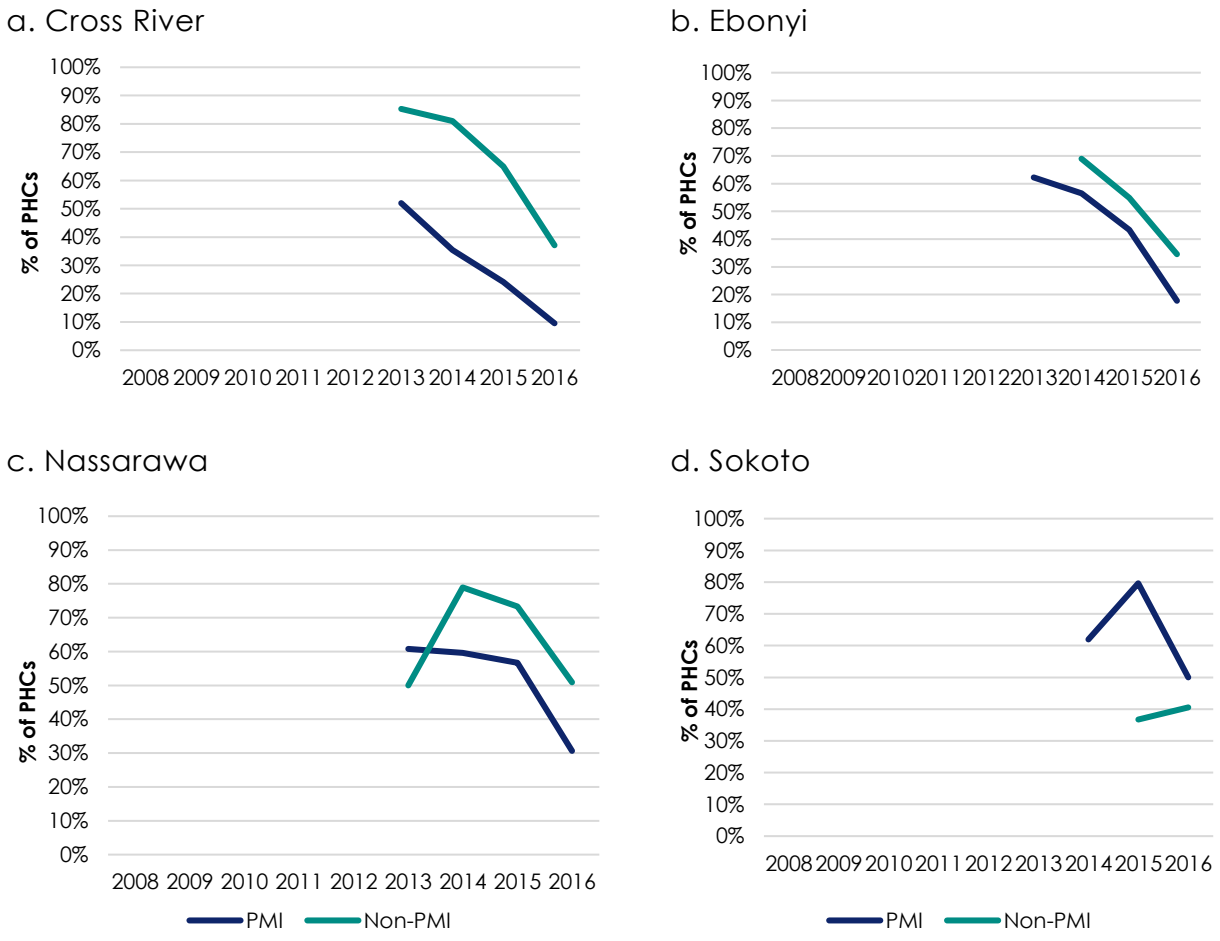


Figure 22 a–d presents the trends in stockout of LLINs in the past year across the four states. Similarly, with the other commodities, there was a general declining trend in stockouts of LLINs in both PMI- and non-PMI-supported PHCs between 2013 and 2016 in Cross River, Ebonyi, and Nassarawa, with PMI PHCs performing better overall than non-PMI PHCs. As with SP, the data points for Sokoto are too limited to determine a trend in stockouts of LLINs during the assessment period.

Figure 19 a–d: Percentage of PHCs that experienced stockout of LLINs in the past year, by PMI and non-PMI facilities for each state

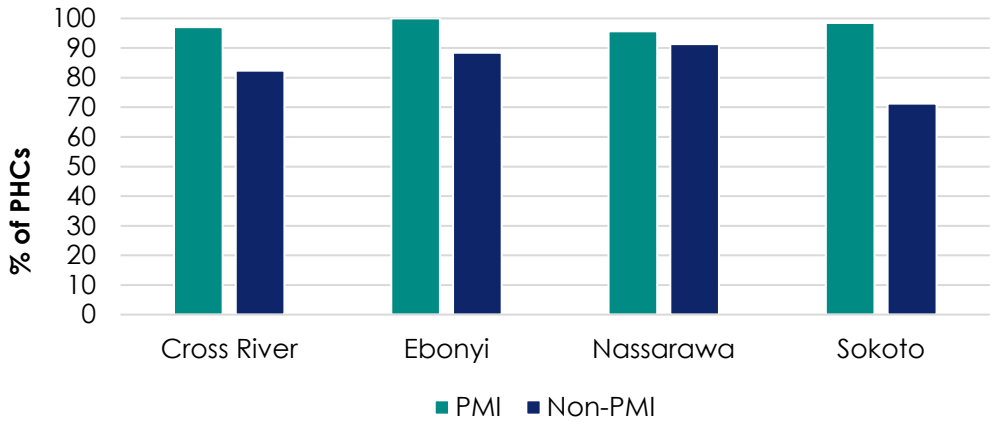


3.3.3 Availability of Malaria Commodities at Time of Visit to PHCs

Observations of the availability of key malaria commodities—RDTs, ACTs, SP, and LLINs—were conducted at the time of the field assessment team's visits to the PHCs. Availability of commodities was determined based on whether any stock of the specific commodity was available at the PHC during the time of the visit. For ACTs specifically, this was determined based on whether there was any stock of either artemether-lumefantrine (e.g., Coartem) or artesunate-amodiaquine (ASAQ) available at the PHC at the time of the visit.

Availability of RDTs was higher overall in PMI-supported PHCs compared to non-PMI PHCs (Figure 23), with significant differences observed in Cross River, Ebonyi, and Sokoto ($p < 0.05$). Overall, availability in PMI PHCs ranged between 96 percent and 100 percent across the four states; while in non-PMI-supported PHCs, availability ranged from 71 percent in Sokoto to as high at 91 percent in Nassarawa.

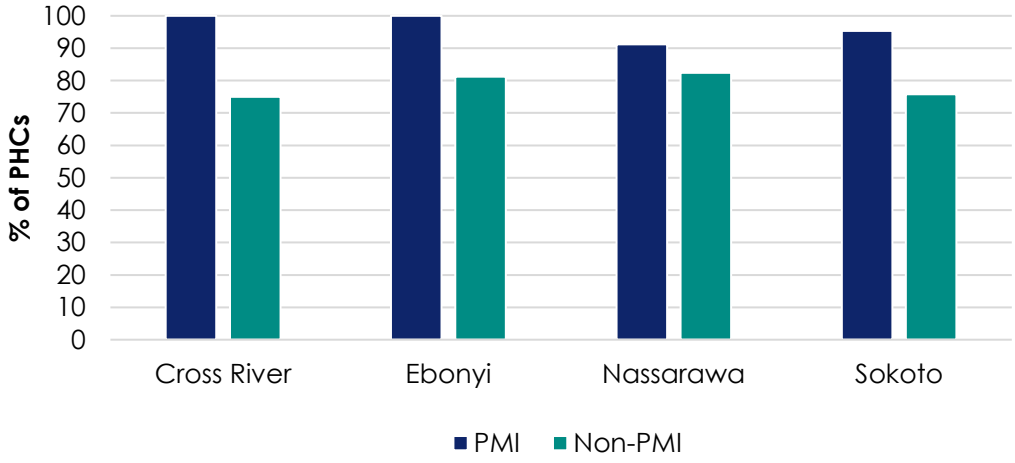
Figure 23. Percentage of PHCs that had RDTs, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities were signifcant for Cross River, Ebonyi, and Sokoto States at the $p < 0.05$ level.

Availability of ACTs was also high across PMI-supported PHCs in the four states, with 100 percent availability in Cross River and Ebonyi states, 95 percent in Sokoto, and 91 percent in Nassarawa (Figure 24). Availability of ACTs in non-PMI-supported PHCs ranged from 75 percent in Cross River to 82 percent in Nassarawa; significant differences in availability of ACTs between PMI and non-PMI PHCs were observed in Cross River, Ebonyi, and Sokoto ($p < 0.05$).

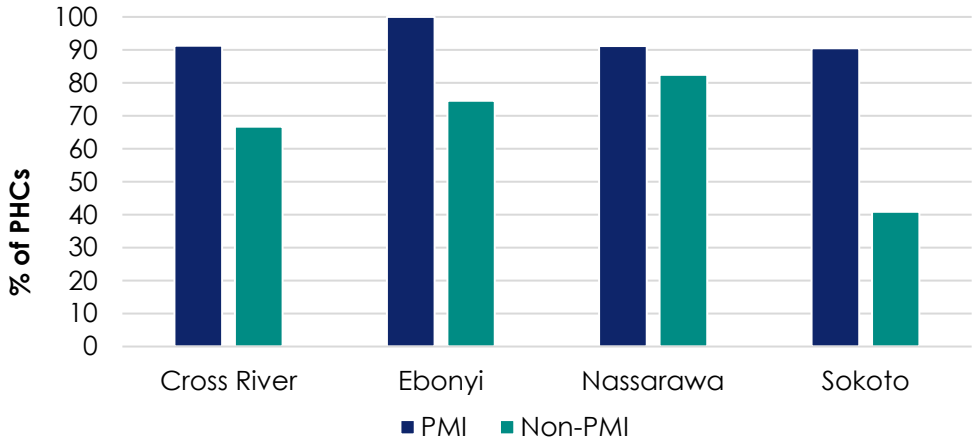
Figure 24. Percentage of PHCs that had ACTs, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities were signifcant for Cross River, Ebonyi, and Sokoto States at the $p < 0.05$ level.

Availability of SP in PMI-supported PHCs was high—ranging from 91 percent to 100 percent across the four states—while SP availability varied considerably across the four states in non-PMI PHCs, from only 41 percent in Sokoto to 82 percent of PHCs in Nassarawa (Figure 25). Significant differences in availability of SP were found between PMI and non-PMI PHCs in Cross River, Ebonyi, and Sokoto ($p < 0.001$).

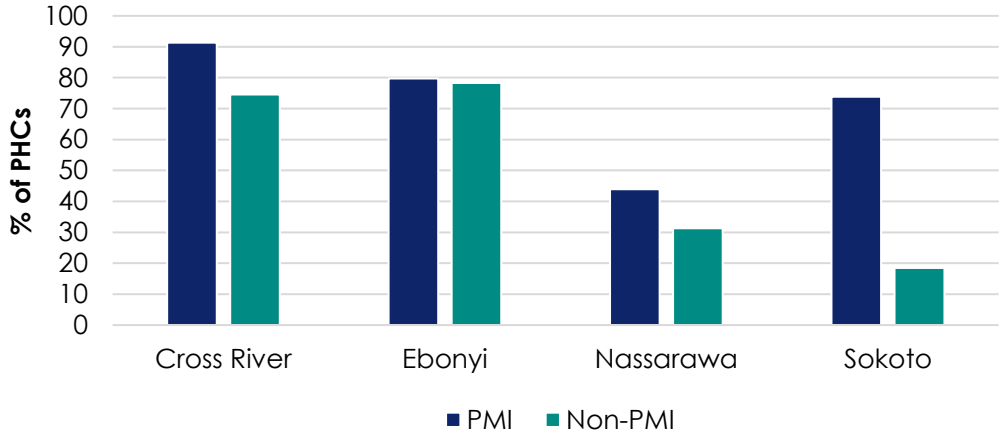
Figure 25. Percentage of PHCs that had SP, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities was signifcant for Cross River, Ebonyi, and Sokoto States at the $p < 0.05$ level.

Overall availability of LLINs was lower across all PHCs and states compared to other malaria commodities (Figure 26), but was still higher among PMI-supported PHCs. Availability of LLINs in PMI-supported PHCs ranged from as low as 44 percent in Nassarawa to 91 percent in Cross River, and from as low as 19 percent in Sokoto to as high as 78 percent in Ebonyi. Significant differences in availability between PMI and non-PMI PHCs were observed in Cross River and Sokoto.

Figure 26. Percentage of PHCs that had LLINs, by PMI and non-PMI facilities for each state



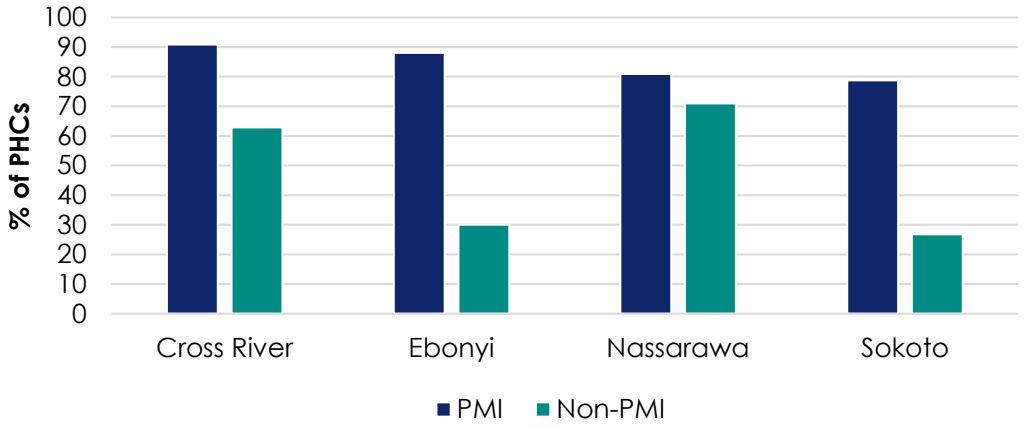
Note: Differences between PMI and non-PMI facilities were significant for Cross River and Sokoto states at the $p < 0.05$ level.

3.3.4 Availability of Guidelines at Time of Visit to PHCs

Observations of the availability of the National Guidelines for Diagnosis and Treatment of Malaria and the National Guidelines and Strategies for Malaria Prevention and Control During Pregnancy documents (hereafter referred to the national guidelines for malaria treatment and the national malaria in pregnancy guidelines) were conducted at all the selected PHCs. As with the availability of malaria commodities, the availability of the national malaria treatment and malaria in pregnancy guidelines was greater in PMI-

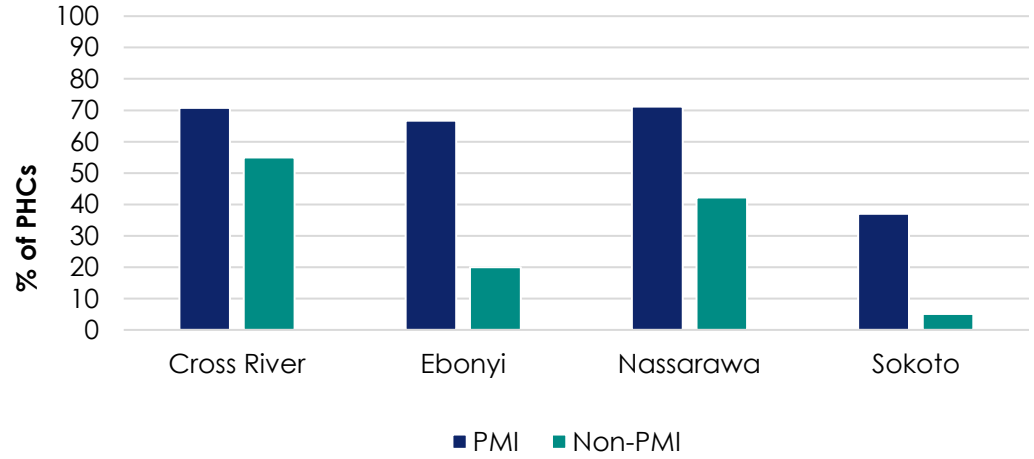
supported PHCs than in non-PMI PHCs across all four states (Figures 27–28). Availability of the national malaria treatment guidelines in PMI PHCs ranged from 79 percent in Sokoto to 91 percent in Cross River, and in non-PMI PHCs from 27 percent in Sokoto to 71 percent in Nassarawa. Significant differences in availability between PMI and non-PMI PHCs were observed in Cross River, Ebonyi, and Sokoto ($p < 0.001$). Overall, availability of malaria in pregnancy guidelines was lower across all PHCs in the four states; with availability in PMI PHCs ranging from 37 percent in Sokoto to 71 percent in Nassarawa and in non-PMI PHCs from only 5 percent in Sokoto to 55 percent in Cross River (significant differences between PMI and non-PMI PHCs were observed in Ebonyi, Nassarawa, and Sokoto at the $p < 0.05$ level).

Figure 27. Percentage of PHCs that had national malaria treatment guidelines available, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities were signifcant for Cross River, Ebonyi, and Sokoto States at the $p < 0.05$ level.

Figure 28. Percentage of PHCs that had malaria in pregnancy guidelines available, by PMI and non-PMI facilities for each state

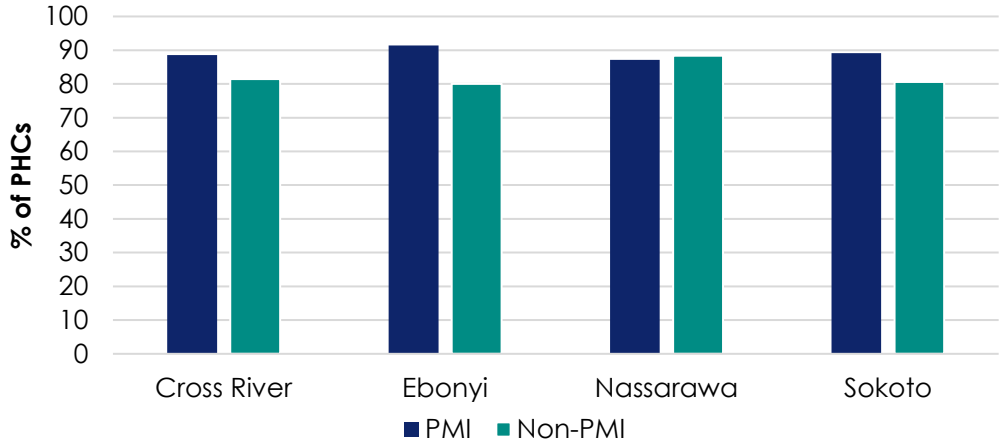


Note: Differences between PMI and non-PMI facilities were signifcant for Ebonyi, Nassarawa, and Sokoto States at the $p < 0.05$ level.

3.3.5 Training of Health Workers at Time of Visit to PHCs

The availability of trained health workers in malaria case management, malaria in pregnancy, and diagnosis of malaria through RDTs was assessed in all the PHCs. Overall the availability of at least one health worker trained in malaria case management was high across all four states, with PMI-supported PHCs showing slightly higher availability in Cross River, Ebonyi, and Sokoto, although no significant differences were detected. Availability in PMI-supported PHCs ranged from 87 percent in Nassarawa to 91 percent in Ebonyi, and in non-PMI PHCs it ranged from 80 percent in Ebonyi to 88 percent in Nassarawa (Figure 29).

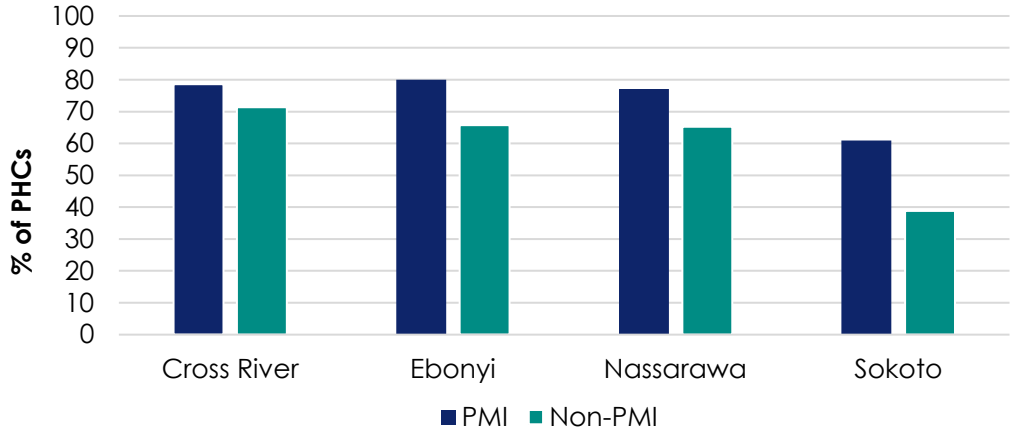
Figure 29. Percentage of PHCs that had at least one health worker trained in malaria case management, by PMI and non-PMI facilities for each state



Note: No significant differences between PMI and non-PMI facilities were observed across the four states.

Overall, availability of at least one health worker trained in malaria in pregnancy was lower across all PHCs in the four states (Figure 30). Availability of at least one trained health worker in PMI-supported PHCs ranged from 61 percent in Sokoto to 80 percent in Ebonyi and in non-PMI PHCs from 39 percent in Sokoto to 71 percent in Cross River. Significant differences in availability between PMI and non-PMI PHCs were observed only in Sokoto ($p < 0.05$).

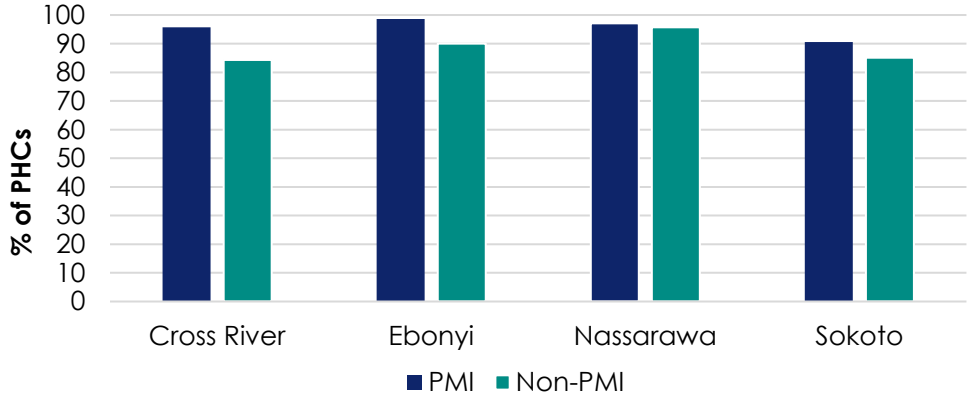
Figure 30. Percentage of PHCs that had at least one health worker trained in malaria in pregnancy, by PMI and non-PMI facilities for each state



Note: Differences between PMI and Non-PMI facilities were significant for Sokoto state at the $p < 0.05$ level.

Availability of personnel trained in using RDTs for diagnosing malaria was high across all PHCs in the four states (Figure 31); however, it was higher overall in PMI-supported PHCs. In PMI PHCs, availability ranged from 90 percent in Sokoto to 99 percent in Ebonyi and in non-PMI PHCs, availability ranged from 84 percent in Cross River to 96 percent in Nassarawa. Significant differences in trained personnel between PMI and non-PMI PHCs were observed in Cross River and Ebonyi ($p < 0.05$).

Figure 20. Percentage of PHCs that had personnel trained in using RDTs for diagnosing malaria, by PMI and non-PMI facilities for each state



Note: Differences between PMI and non-PMI facilities was significant for Cross River and Ebonyi States at the $p < 0.05$ level.

3.36 Trends in Malaria Case Management

Trends in diagnostic testing and treatment among children under five and persons of all ages were examined using the PHC register and MSF from 2008 to early 2016. It is important to note that if the PHC reporting rate was below 50 percent for the type of facility (PMI- and non-PMI-supported) in each of the states, the data were not reported.

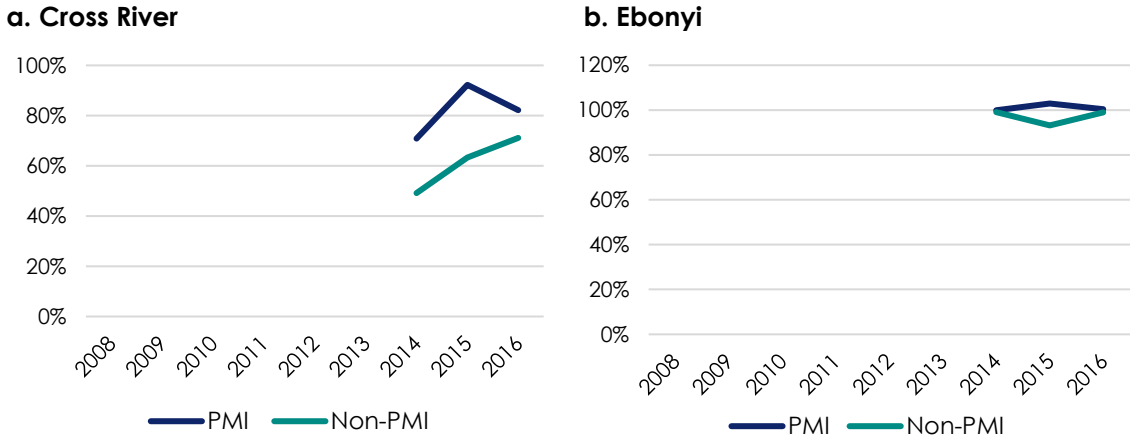
Diagnostic Testing

Figures 32 a–d and 33 a–d present the trends in children under five and persons of all ages who presented with fever and were tested by RDT for each state. Due to low reporting rates, data prior to 2014 were not included in any of the states. In Cross River, there was a general improvement observed in both PMI- and non-PMI-supported PHCs between 2014 and 2016 in testing among children under five, with slightly better performance in PMI PHCs. For persons of all ages, the percent tested was high and remained stable from 2014 to early2016 in PMI PHCs, and showed a large improvement during the same period in non-PMI PHCs.

In Ebonyi, both PMI and non-PMI PHCs had close to 100 percent of children and all persons tested. In Nassarawa, the percentage of children and persons of all ages that got tested remained relatively stable in PMI PHCs from 2014 to 2016 (above 90 percent) and showed a general improvement in non-PMI PHCs during the same period (this was over-reported in children under five in 2016, however). In Sokoto, too few data points were available to assess the trends.

Trends in testing via microscopy in children under five and persons of all ages that presented with a fever were also examined. Data were only available for review in Cross River, Ebonyi, and Nassarawa from 2014 to 2016 due to low reporting rates (no data were available for Sokoto). The percentage of children under five and persons of all ages was very low across all three of the states during this time frame and across both PMI- and non-PMI-supported PHCs (figures not shown).

Figure 32 a–d. Percentage of children under five who presented with fever and were tested by RDT, by PMI and non-PMI facilities for each state



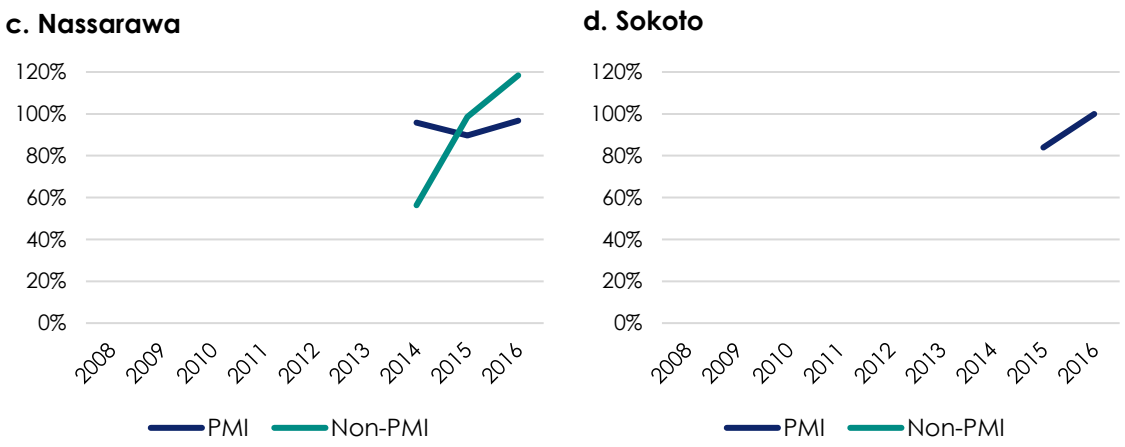
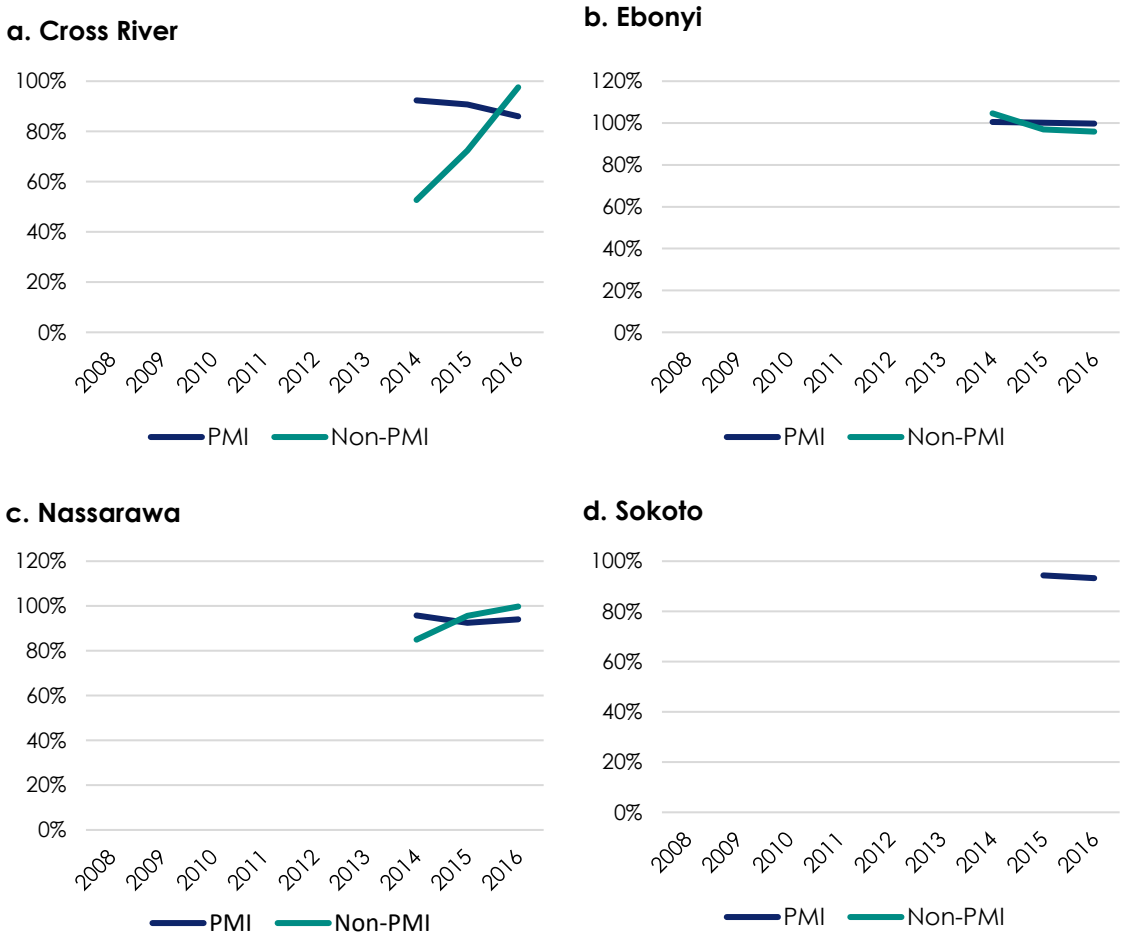


Figure 33 a–d. Percentage of persons (all ages) who presented with fever and were tested by RDT, by PMI and non-PMI facilities for each state



Treatment

The percentage of children under five and persons of all ages treated with ACT on the basis of clinical diagnosis only showed an overall declining trend in Cross River, Ebonyi, and Nassarawa from 2014 to 2016 in both PMI and non-PMI PHCs; however, overall performance was better in PMI-supported PHCs than in non-PMI PHCs (Figures 34 a–c and 35 a–c). In Nassarawa, among children under five in the non-PMI PHCs, the percent treated remained relatively stable between 2014 and 2016. Due to low reporting rates, no data were available to review in Sokoto for children under five and persons of all ages.

Figure 34 a–c. Percentage of children under five treated with ACT on the basis of clinical diagnosis only, by PMI and non-PMI facilities for each state

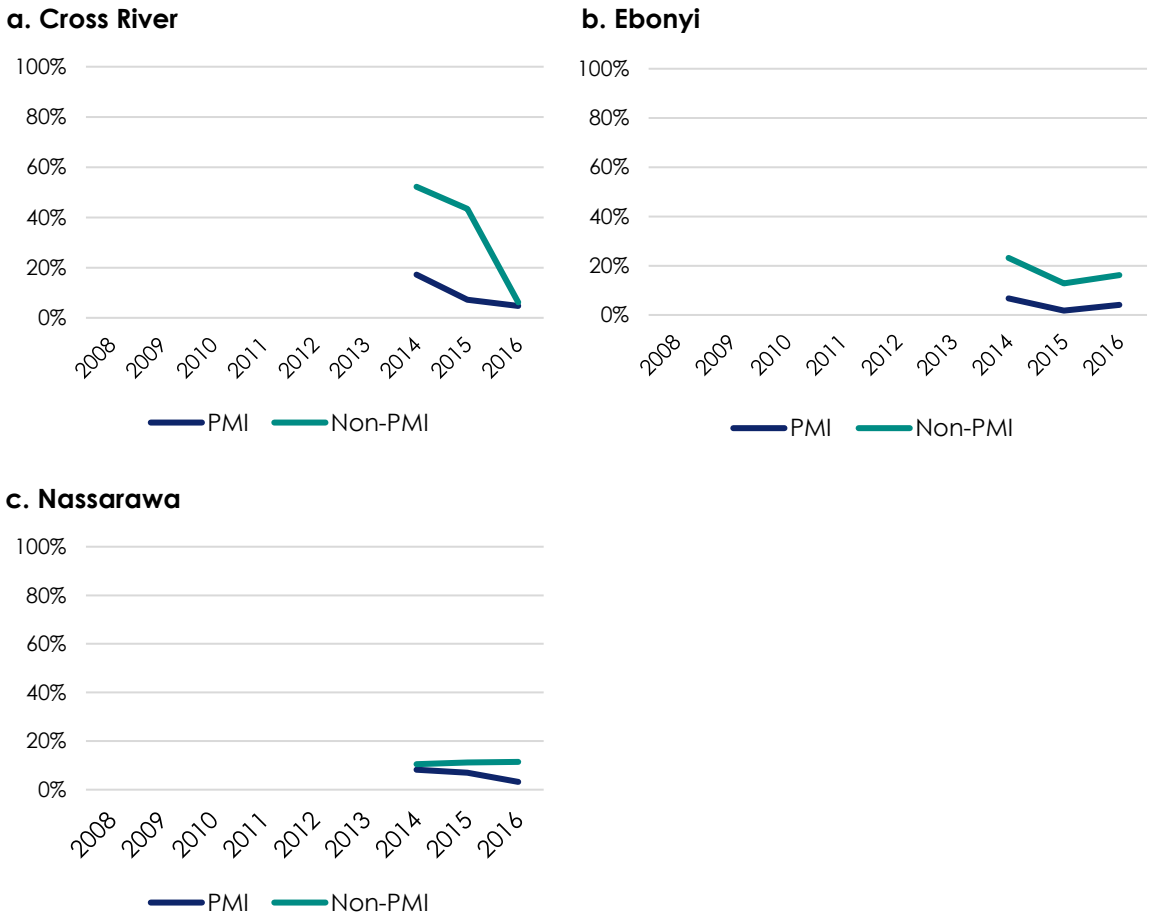
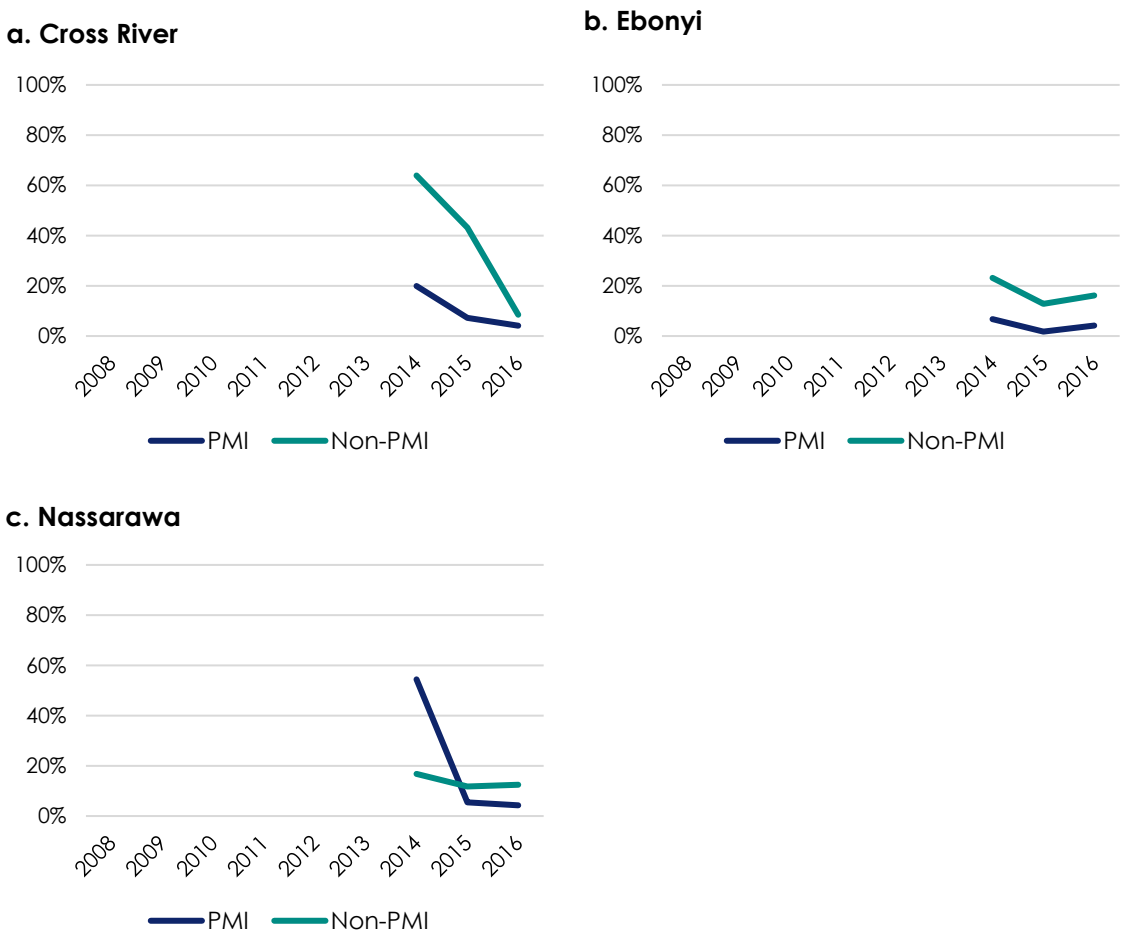


Figure 35 a–c. Percentage of persons (all ages) treated with ACT on the basis of clinical diagnosis only, by PMI and non-PMI facilities for each state



The percentage of children under five and persons of all ages with confirmed uncomplicated malaria that received ACTs from 2014 to 2016 remained at around 100 percent in Cross River, Ebonyi, and Nassarawa (Figures 36 a–c and 37 a–c). Some of the results across the years and states were above 100 percent indicating either issues with the data quality or overtreatment with ACTs. Due to low reporting rates, no data were available to assess from Sokoto.

Figure 36 a–c. Percentage of children under five with confirmed uncomplicated malaria receiving ACT, by PMI and non-PMI facilities for each state

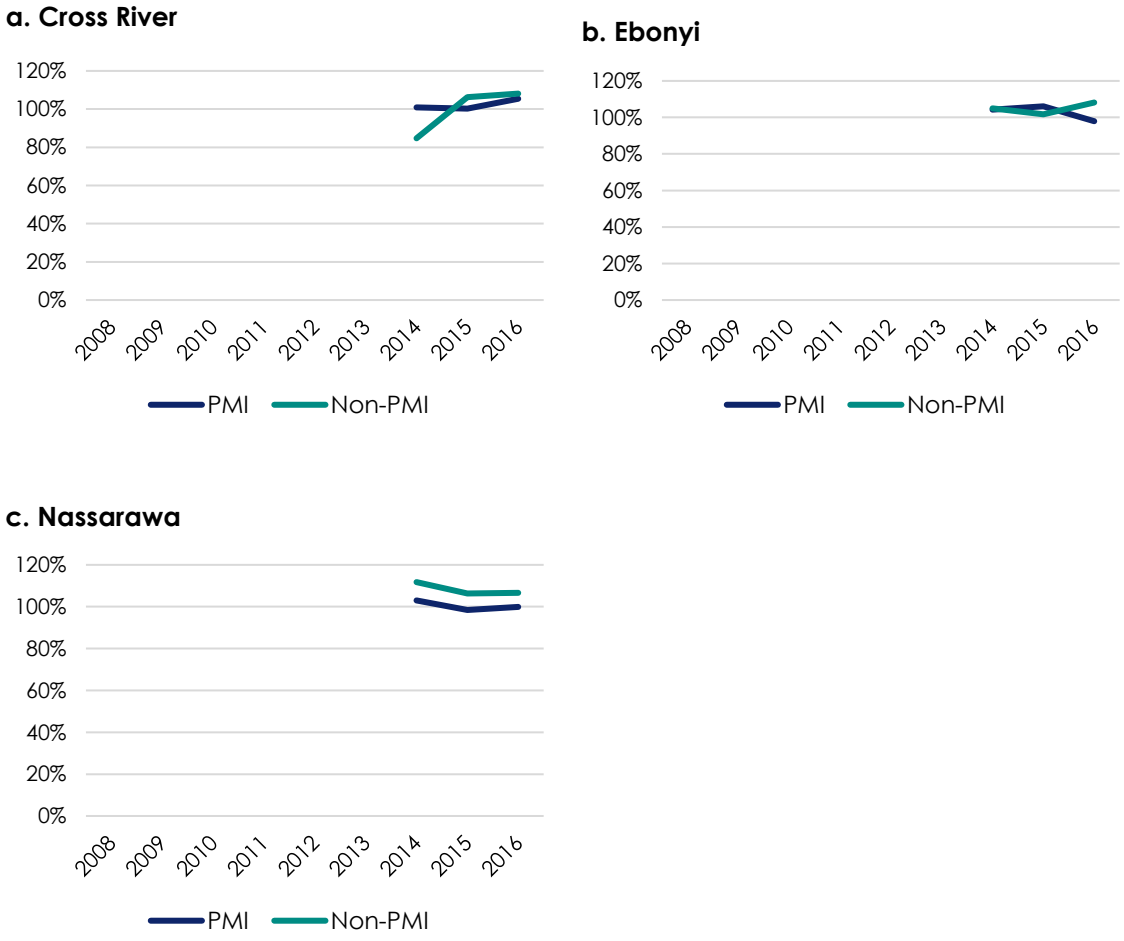
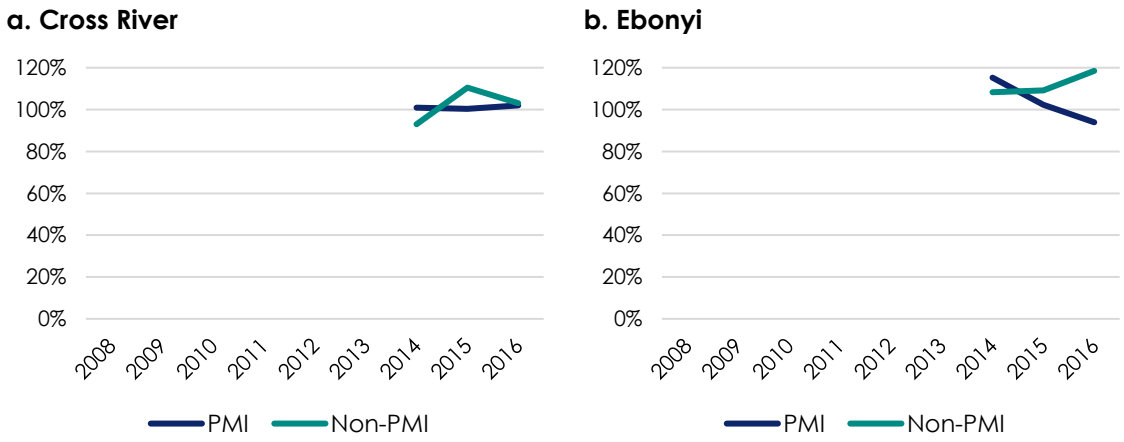
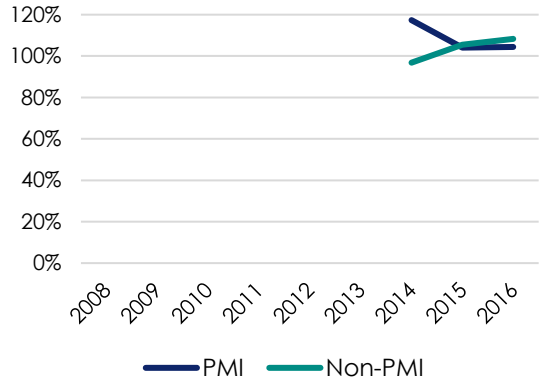


Figure 37 a–c. Percentage of persons (all ages) with confirmed uncomplicated malaria receiving ACT, by PMI and non-PMI facilities for each state



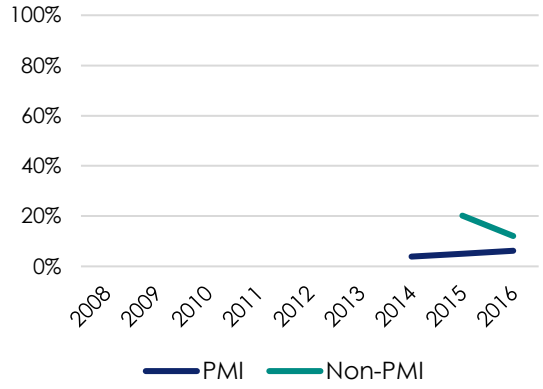
c. Nassarawa



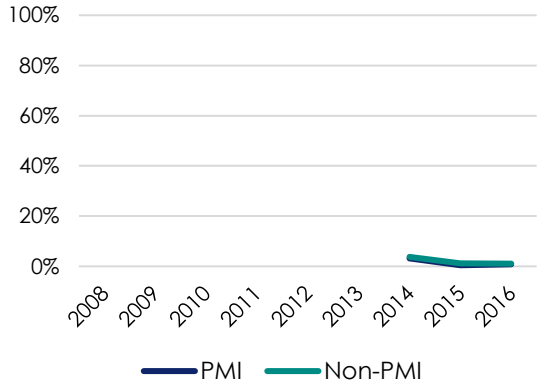
The percentage of persons all ages with confirmed uncomplicated malaria that were treated with other antimalarial drugs was overall very low in Cross River, Ebonyi, and Nassarawa and similar in PMI-supported and non-PMI-supported PHCs between 2014 and early 2016 (Figure 38 a–c). As with the other treatment indicators examined, due to low reporting rates, no data were available to assess from Sokoto.

Figure 38 a–c. Percentage of persons (all ages) with confirmed uncomplicated malaria treated with other antimalarial drugs, by PMI and non-PMI facilities for each state

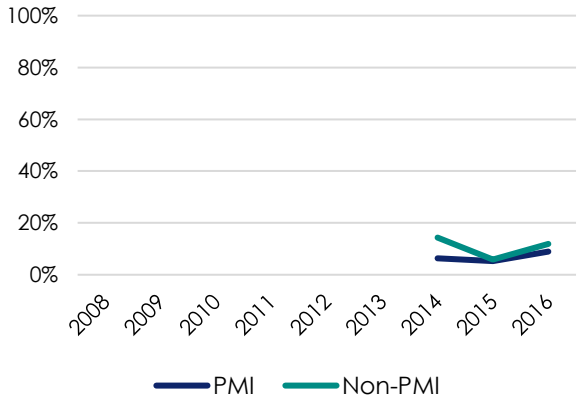
a. Cross River



b. Ebonyi



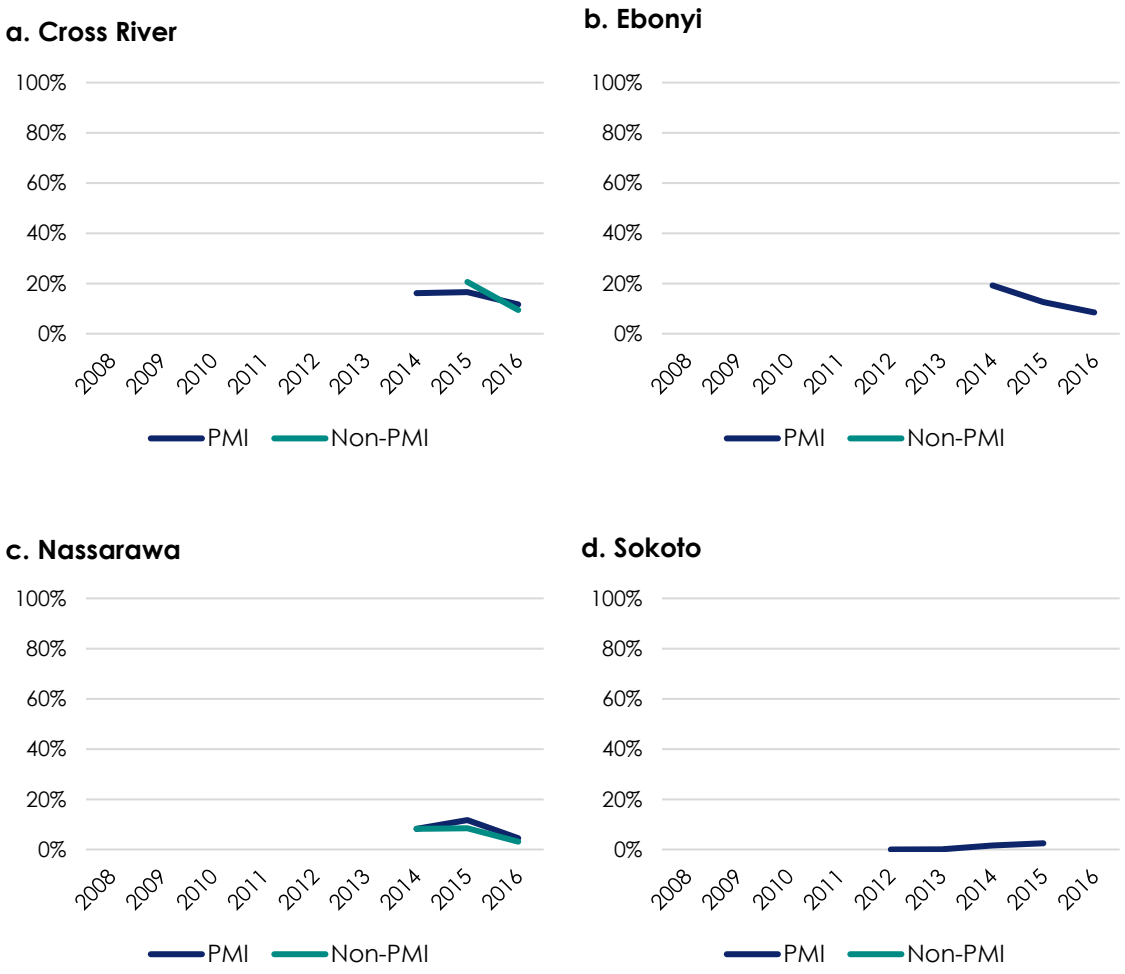
c. Nassarawa



3.3.7 Trends in LLIN Distribution

Overall, the trends in the percentage of children under five who received an LLIN across the four states remained relatively low between 2014 and 2016, just under 20 percent in Cross River, Ebonyi, and Nassarawa, and close to none in Sokoto between 2012 and 2015 (Figure 39 a–d). In Ebonyi and Sokoto, due to low reporting rates in non-PMI PHCs, only data from PMI-supported PHCs were available to examine for a select number of years.

Figure 39 a–d. Percentage of children under five who received LLIN, by PMI and non-PMI facilities for each state



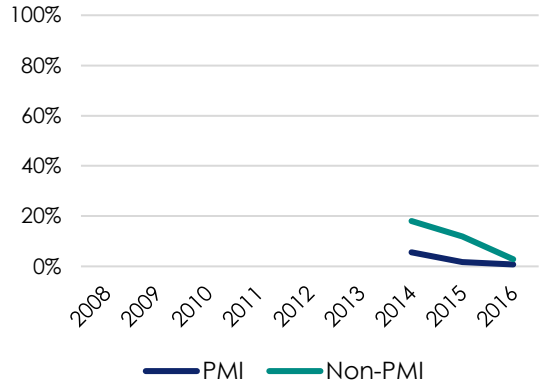
3.3.8 Trends in Malaria Cases from PHCs

The assessment examined trends in clinically diagnosed malaria and confirmed malaria (via RDT or microscopy) in children under five and persons of all ages between 2008 and early 2016. In both children under five and persons of all ages, the percent with clinically diagnosed malaria showed a general decline between 2014 and 2016 in both PMI- and non-PMI-supported PHCs in Cross River, Ebonyi, and Nassarawa,

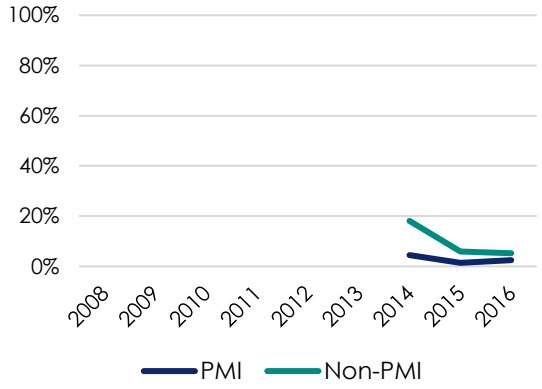
with slightly lower percentages in PMI PHCs compared to non-PMI PHCs (Figures 40 a–c and 41 a–c) No data were available to assess in Sokoto during the period due to low reporting rates.

Figure 40 a–c. Percentage of children under five with clinically diagnosed malaria, by PMI and non-PMI facilities for each state

a. Cross River



b. Ebonyi



c. Nassarawa

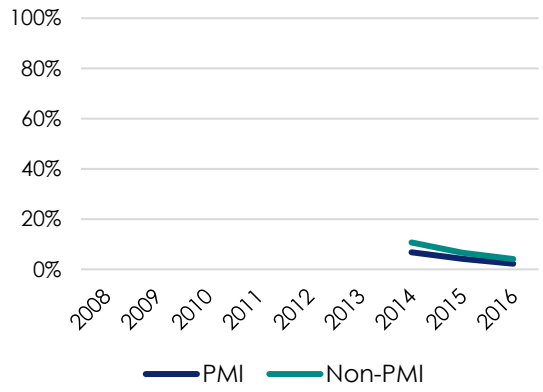
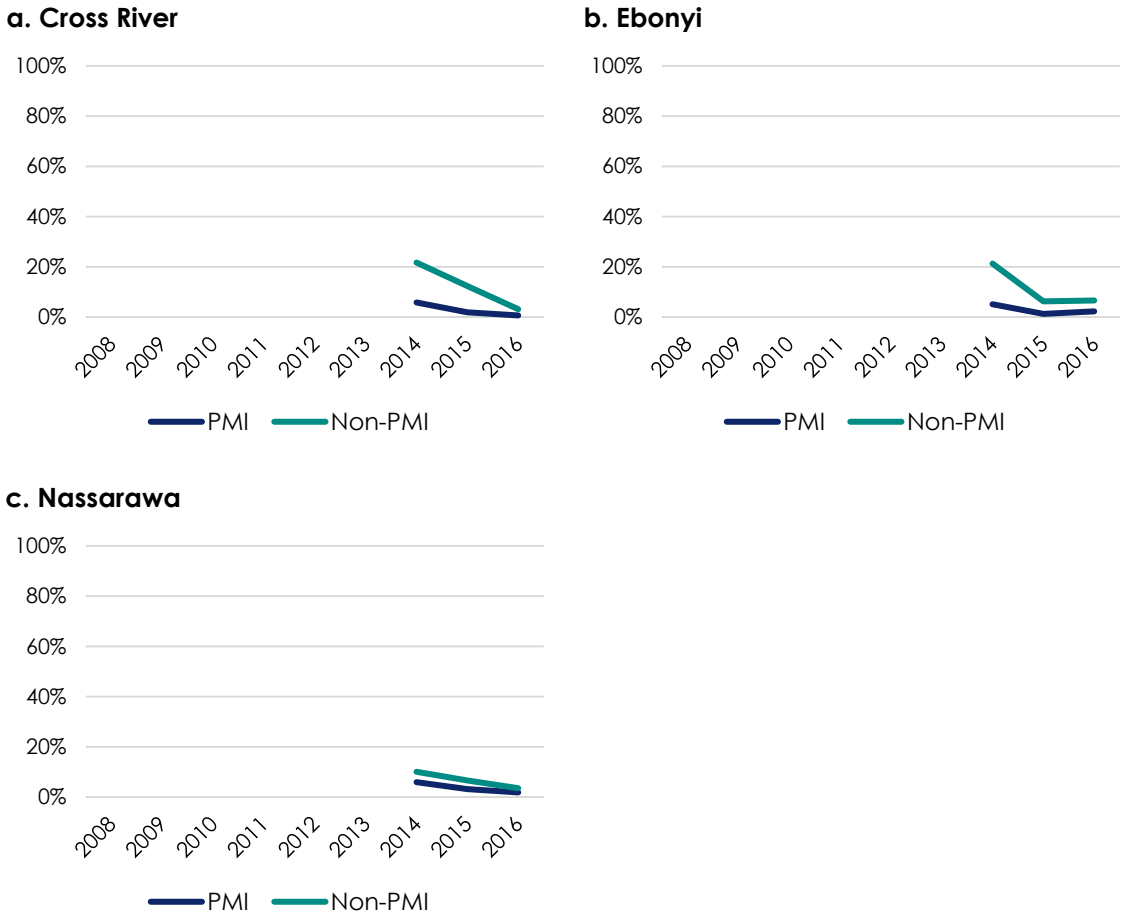
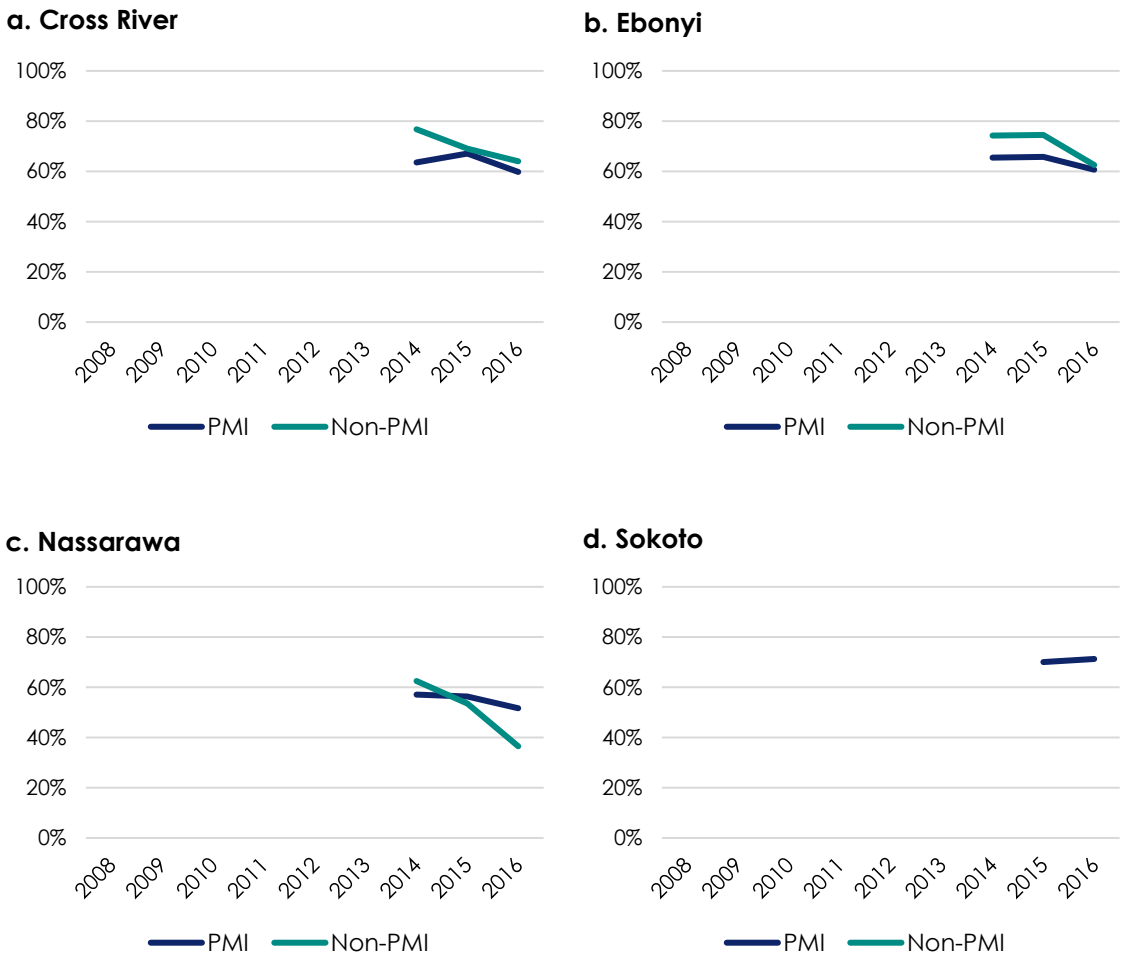


Figure 41 a–c. Percentage of persons (all ages) with clinically diagnosed malaria, by PMI and non-PMI facilities for each state



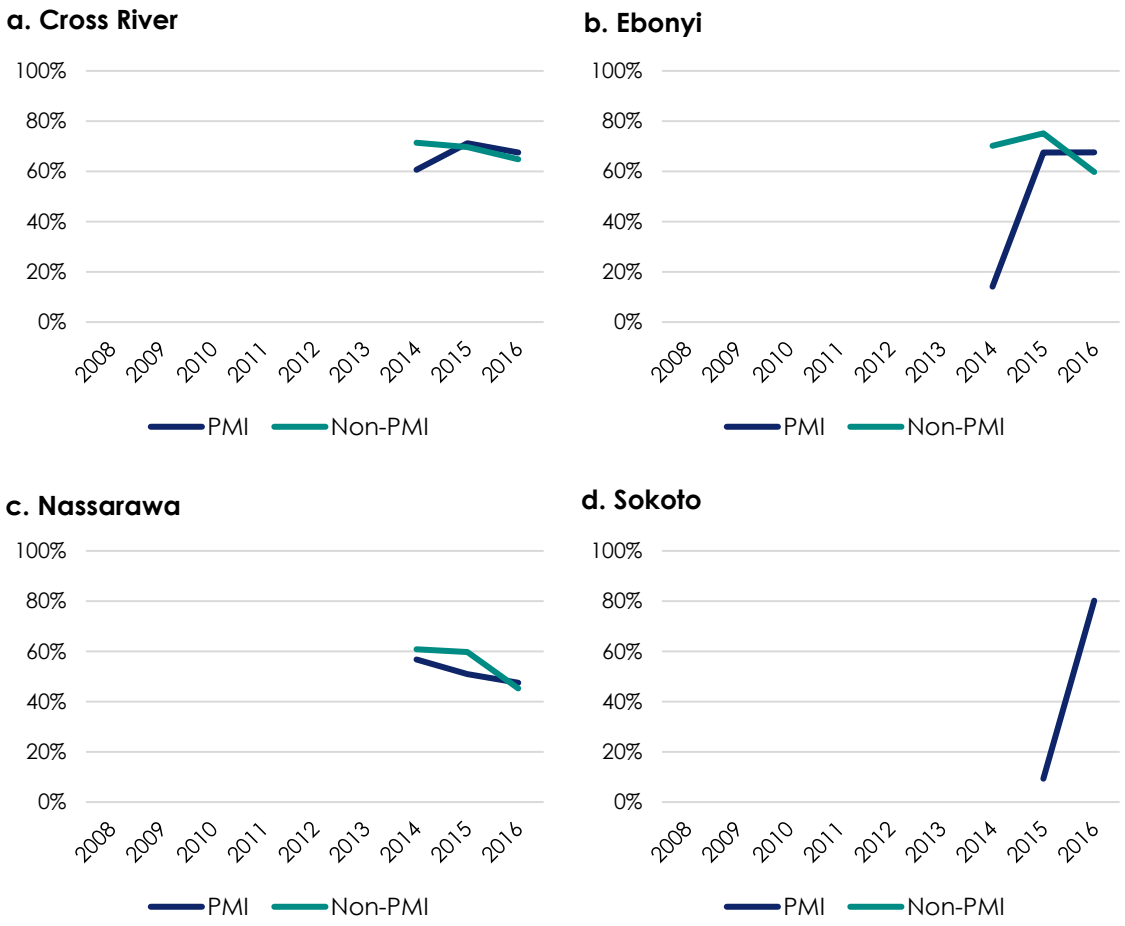
The percentage of children under five with confirmed malaria showed relatively small declines in both PMI- and non-PMI-supported PHCS between 2014 and 2016 in Cross River, Ebonyi, and Nassarawa (Figure 42 a–d), with slightly fewer children in PMI-supported PHCs with confirmed malaria, compared to non-PMI PHCs, with the exception of Nassarawa between 2015 and 2016. In Cross River and Ebonyi, the percentage of children with confirmed malaria ranged between 60 percent and 76 percent, and just under 40 percent to 63 percent in Nassarawa. Trends were not able to be assessed in Sokoto due to low reporting rates for most years.

Figure 42 a–d. Percentage of children under five with confirmed malaria (RDT or microscopy), by PMI and non-PMI facilities for each state



Among persons of all ages, the percentage with confirmed malaria in non-PMI PHCs showed a general decline between 2014 and 2016 in Cross River, Ebonyi, and Nassarawa (no data were available to assess from Sokoto) (Figure 43 a–d). In PMI-supported PHCs in Cross River, the percentage remained relatively stable, with a slight increase between 2014 and 2015. In PMI PHCs in Ebonyi, there was a large increase observed between 2014 and 2015, and then it remained stable in 2016. In Nassarawa's PMI-supported PHCs, there was a general decline in the percentage with confirmed malaria between 2014 and 2016, and in Sokoto, a dramatic increase was observed between 2015 and 2016; however, since there were limited data from 2016 and no other data points were available, this result should be interpreted with caution.

Figure 21 a–d. Percentage of persons (all ages) with confirmed malaria (RDT or microscopy), by PMI and non-PMI facilities for each state



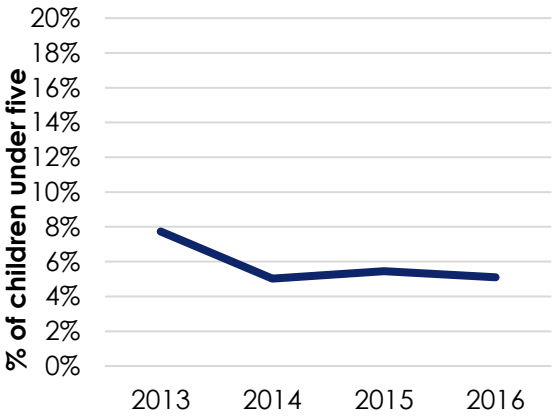
3.3.9 Trends in Severe Malaria and Mortality in Referral Hospitals

Trends in severe malaria cases and malaria mortality among children under five were assessed using the data from the selected referral hospitals in each of the states. Data prior to 2013 were not available for review, thus trends for the different indicators assessed are presented for 2013–2016.

Figure 44 a–d presents the percentage of children under five with severe anemia, out of all the inpatient cases in the hospital between 2013 and 2016. In Cross River, Ebonyi, and Nassarawa there was a very small decline in the proportion of severe anemia cases; in Sokoto, there was a decline observed between 2013 and 2014, but an increase between 2014 and 2016.

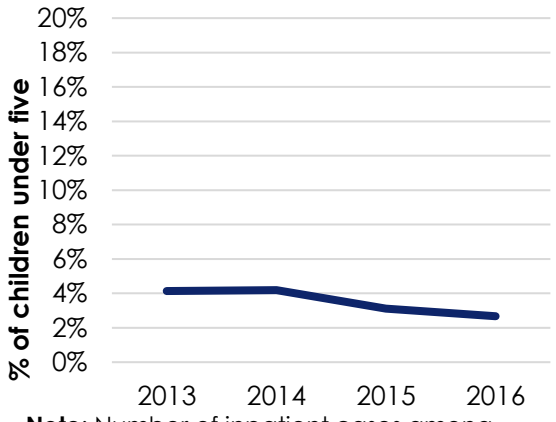
Figure 22 a–d. Proportion of children under five with severe anemia out of all inpatient cases from 2013–2016, by state

a. Cross River



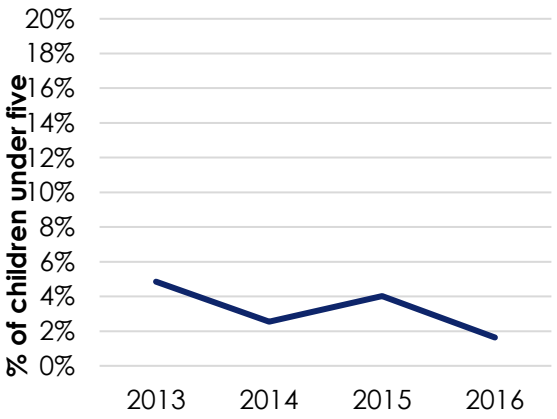
Note: Number of inpatient cases among children under five: 2013=11,966; 2014=8,451; 2015=19,347; 2016=8,825.

b. Ebonyi



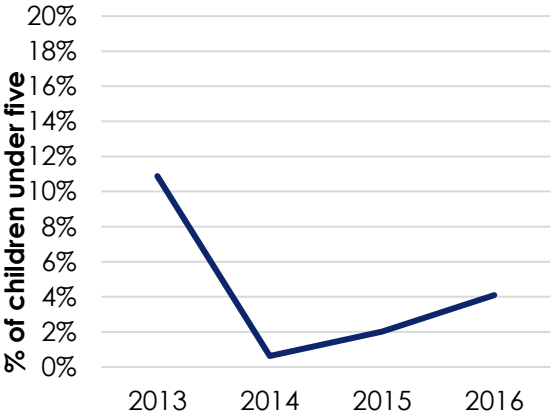
Note: Number of inpatient cases among children under five: 2013=2,300; 2014=10,244; 2015=18,552; 2016=6,589.

c. Nassarawa



Note: Number of inpatient cases among children under five: 2013=4,907; 2014=30,056; 2015=24,430; 2016=8,876.

d. Sokoto

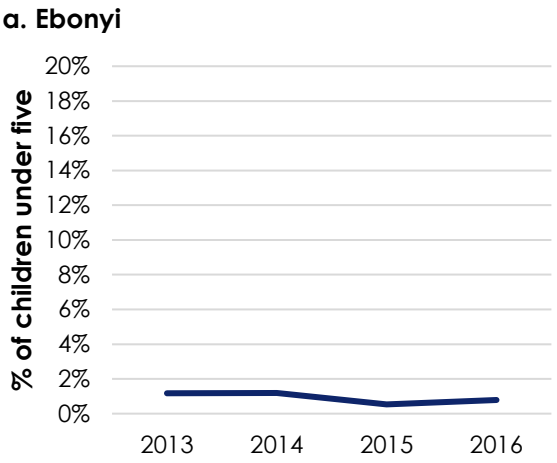


Note: Number of inpatient cases among children under five: 2013=3,650; 2014=28,006; 2015=22,036; 2016=7,372.

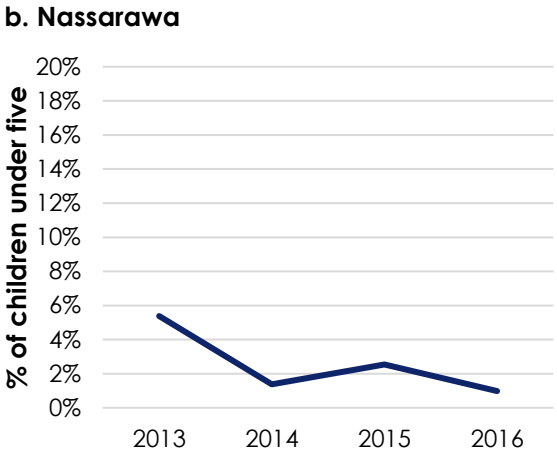
Source: Referral hospital records

The percentage of children under five who had a blood transfusion was low overall in Ebonyi, remaining around 1 percent of all inpatient cases between 2013 and 2016 (Figure 45a), while in Nassarawa, the percent declined from around 5 percent in 2013 to 1 percent in 2016 (Figure 45b). It should be noted that data on blood transfusion were difficult to extract, therefore trends should be interpreted with caution. No data on blood transfusions were available in Cross River or Sokoto.

Figure 23 a–b. Percentage of children under five who had a blood transfusion from 2013–2016, by state



Note: Number of inpatient cases among children under five: 2013=2,300; 2014=10,244; 2015=18,552; 2016=6,589.

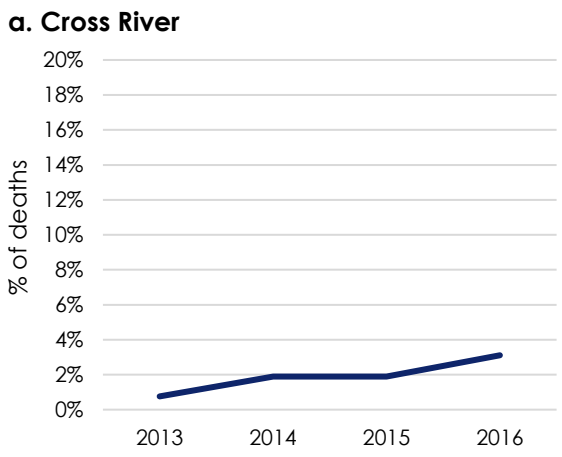


Note: Number of inpatient cases among children under five: 2013=4,907; 2014=30,056; 2015=24,430; 2016=8,876.

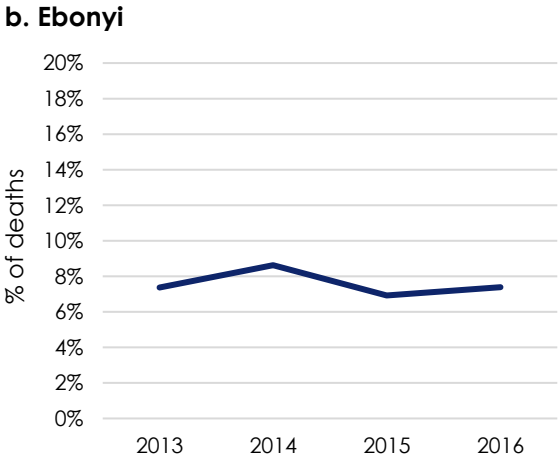
Source: Referral hospital records

Trends in malaria case-fatality rates among children under five are presented in Figure 46 a–d. The percentage of deaths among children with severe malaria showed a small increase in Cross River between 2013 and 2016, from about 1 percent to 3 percent, remained relatively stable in Ebonyi (ranging from around 7%–8%), showed a large fluctuation across the four years spiking to around 20 percent in 2015 in Nassawara, and showed a relative decline in Sokoto from 2014 to 2016.

Figure 24 a–d. Percentage of deaths among children with severe malaria from 2013 to 2016, by state

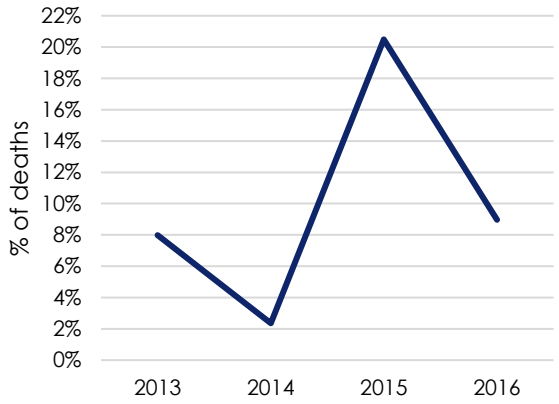


Note: Number of severe malaria cases among children under five: 2013=929; 2014=424; 2015=1,055; 2016=452.



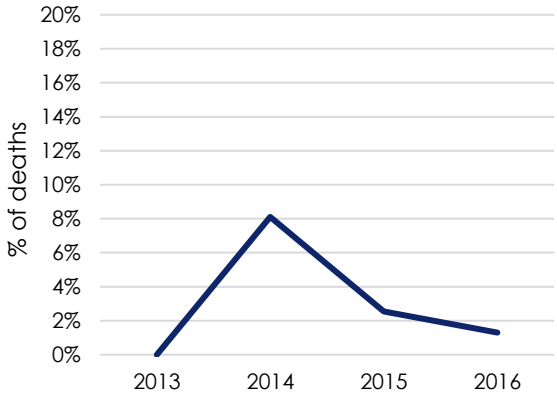
Note: Number of severe malaria cases among children under five per year: 2013=95; 2014=429; 2015=578; 2016=176.

c. Nassarawa



Note: Number of severe malaria cases among children under five per year: 2013=238; 2014=764; 2015=981; 2016=145.

d. Sokoto



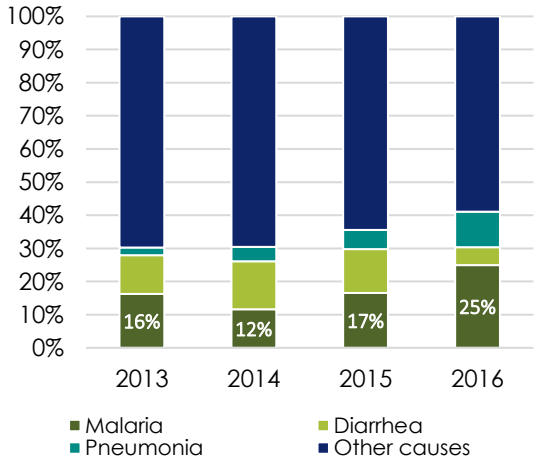
Note: Number of severe malaria cases among children under five per year: 2013=424 2014=203; 2015=355; 2016=230.

Source: Referral hospital records

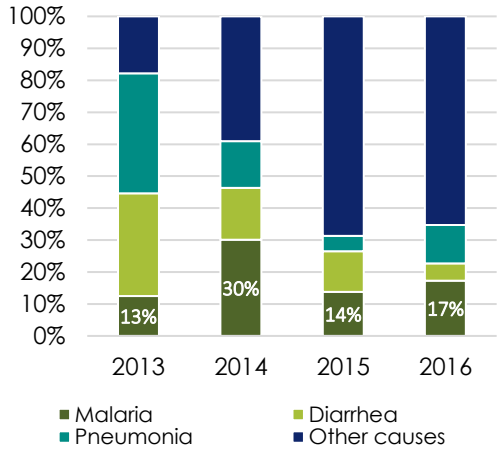
Trends in the distribution of causes of death among children under five are presented in Figure 47 a–d. In Cross River, the percentage of deaths due to malaria showed an overall increase between 2013 and 2016 from 16 percent to about 25 percent. In Ebonyi, Nassarawa, and Sokoto, the percentage of deaths due to malaria fluctuated between 2013 and 2016, with no discernable trend. Due to the small sample sizes across the four states, the trends in under-five deaths should be interpreted with caution.

Figure 47 a–d. Trends in the distribution of causes of death among children under five from 2013 to 2016, by state

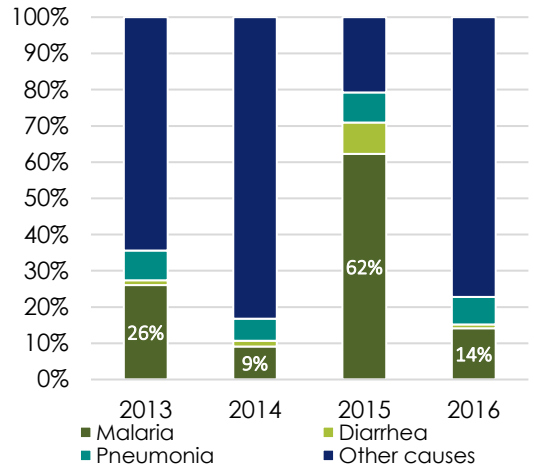
a. Cross River



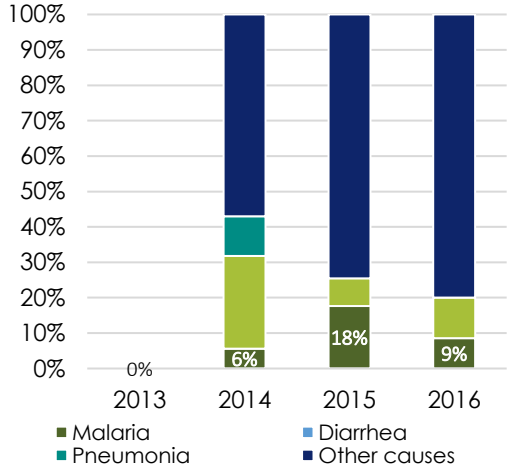
b. Ebonyi



c. Nassarawa



d. Sokoto



Source: Referral hospital records

3.4 Result from Client Exit Interviews

To assess perceived quality of care, client exit interviews were conducted in each of the selected PHCs. Clients that had come to the PHC due to fever or were attending an ANC visit were targeted for the interviews, to assess quality of malaria case management and malaria in pregnancy care. The proposed number and the number completed is provided in Table 15; of the 2,800 proposed client interviews, 2,458 were completed (88 percent).

Table 15. Results of client exit interviews

	Cross River	Ebonyi	Nassarawa	Sokoto	Total
Proposed # of client exit interviews at PHCs (5 per PHC)	700	700	700	700	2,800
% of client exit interviews at PHCs completed	83% (580/700)	86% (600/700)	98% (686/700)	85% (592/700)	88% (2,458/2,800)

3.4.1 Characteristics of Respondents

Table 16 and 17 present an overview of key demographic characteristics of the respondents from the client exit interviews that had fever and for those pregnant attending an ANC visit, respectively. In Ebonyi, Nassarawa, and Sokoto, the majority of the clients with fever were adults, age 16 and above; in Cross River, the majority of the clients were children 15 and below. No significant differences were observed by age between PMI and non-PMI PHCs in each of the four states. The level of education of clients with fever[2] varied considerably across the four states, with the majority having received no education in Cross River and

[2] For children 15 years of age and below, the education level of the caregiver with whom the child came to the PHC was assessed.

Sokoto, about half with no education in Nassarawa, and between 32 percent and 40 percent of those in Ebonyi. Significant differences between PMI and non-PMI PHCs in the highest level of education achieved by clients were observed in Ebonyi and Sokoto ($p < 0.05$). Across all states, the majority of clients lived within 30 minutes walking distance to the PHCs, with only significant differences observed between PMI and non-PMI PHCs in Cross River, where more clients lived closer to the facility in non-PMI PHCs compared to PMI PHCs.

Table 16. Demographic characteristics of respondents with fever, by PMI and non-PMI facilities for each state

	Cross River			Ebonyi			Nassarawa			Sokoto		
	PMI N=184	nPMI N=157	*p*	PMI N=103	nPMI N=137	*p*	PMI N=229	nPMI N=234	*p*	PMI N=194	nPMI N=223	*p*
Age (Years)												
< 5	61.8	44.9	0.123	21.6	24.4	0.138	20.4	26.5	0.468	33.5	29.2	0.428
5–15	10.3	15.5		3.2	5.0		13.8	17.8		2.1	3.8	
16–40	19.8	22.5		51.7	63.0		58.9	47.7		11.7	21.5	
> 40	8.1	17.1		23.5	7.7		6.9	8.0		52.8	45.5	
Highest level of education												
None	68.5	64.2	0.554	40.4	31.5	**0.043**	48.0	50.8	0.632	79.9	87.8	**0.038**
Primary	15.0	14.6		23.0	22.7		19.5	25.0		18.4	8.9	
Secondary	11.0	17.7		24.9	43.8		29.7	21.8		0.9	3.4	
Higher	5.4	3.4		11.7	2.1		2.8	2.4		0.9	0.0	
Walking time to PHC												
0–15 minutes	46.0	60.2	**0.002**	30.0	33.0	0.619	19.6	28.8	0.441	40.3	53.5	0.255
15–30 minutes	37.7	34.9		25.8	26.0		52.2	49.0		41.9	40.0	
30–60 minutes	15.3	2.6		18.8	26.1		23.5	19.2		10.2	4.7	
> 1 hour	0.8	1.6		22.3	13.5		4.7	3.0		5.9	1.9	
Don't know	0.1	0.8		3.1	1.4		0.0	0.0		1.7	0.0	
Number of clients	184	157		103	137		229	234		194	223	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value (bolded p = statistically significant)

Among the pregnant women attending ANC, the majority were between the ages of 20 and 34 in each of the four states. When comparing the age of PMI and non-PMI PHC respondents in each of the states, only significant differences were observed in Sokoto, with more women in non-PMI PHCs falling between 20 and 34 years, and more respondents in PMI PHCs stating they did not know their age or did not want to disclose their age. In Cross River and Ebonyi, the majority of women had a secondary level of education or higher, with no significant differences observed between PMI and non-PMI PHCs. In Nassarawa, significantly more women from PMI PHCs had higher levels of education compared to those from the non-PMI PHCs; while in Sokoto, the majority of the women had received no education. Overall, the majority of clients lived within 30 minutes walking distance to the PHC in Cross River, Nassarawa, and Sokoto, and about half or just under half did in Ebonyi. No significant differences were observed in walking distance between PMI and non-PMI PHCs in any of the states.

Table 17. Demographic characteristics of pregnant women attending ANC, by PMI and non-PMI facilities for each state

	Cross River			Ebonyi			Nassarawa			Sokoto		
	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*
Age (Years)												
15–19	12.7	12.0		12.7	3.5		7.5	10.9		15.4	17.6	
20–34	78.9	77.7		74.5	73.1		82.1	86.6		57.6	72.8	
≥35	7.5	6.9		2.7	4.7		10.4	2.6		3.8	7.2	
Don't know	0.1	3.4	0.731	10.1	18.7	0.091	0.0	0.0	0.136	23.3	2.4	**0.031**
Highest level of education												
None	15.6	14.2	0.677	6.5	10.5	0.544	19.2	51.6	**0.015**	78.4	83.8	0.421
Primary	22.9	23.6		20.2	25.2		26.2	21.6		6.5	5.8	
Secondary	54.5	59.4		66.3	59.4		42.3	21.9		13.6	5.7	
Higher	7.1	2.8		7.0	4.9		12.3	4.9		1.5	4.8	
Walking time to PHC												
0–15 min	55.1	73.1	0.054	30.3	18.3	0.313	32.6	39.3	0.614	31.8	33.6	0.712
15–30 min	36.6	24.4		19.5	22.6		34.6	34.2		37.6	41.7	
30–60 min	7.4	2.6		29.4	29.8		20.5	20.7		20.1	21.6	
> 1 hour	0.0	0.0		18.9	27.7		12.3	5.8		7.2	1.4	
Don't know	0.9	0.0		2.0	1.6		0.0	0.0		3.2	1.5	
Number of pregnant women	109	130		212	149		119	101		116	58	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value (bolded p = statistically significant)

3.4.2 Quality of Care in Malaria Case Management

Respondents that came to the PHC with fever were asked a series of questions about whether they were requested to have a blood test; whether they had one done and were told the result of the test; how long they had to wait for the results of the blood test; and if they had a positive malaria test whether they received any medication (results presented in Tables 18–19). The percentage of clients with fever that were asked to have a blood test and those who had a blood test done was very high in Ebonyi and Nassarawa in both PMI- and non-PMI-supported PHCs (above 95 percent); and was close to 85 percent of clients in PMI-supported PHCs in Cross River and Sokoto. In non-PMI PHCs, the percentage of clients that were asked to have a blood test done and that had a test done was slightly lower in Sokoto (76 percent for both) and Cross River (66 percent and 56 percent, respectively). The percentage of clients who were told the result of the test was similarly high in Ebonyi and Nassarawa (around or about 95 percent) in both types of PHCs; the percentage dropped relatively little from those that had received a blood test in Cross River (79 percent and 53 percent, respectively for PMI and non-PMI PHCs) and dropped considerably in Sokoto, where only 58 percent and 20 percent of clients from PMI and non-PMI PHCs respectively, were told the result of the test. Significant differences were observed between PMI and non-PMI PHCs in Cross River for clients asked to have a blood test, that had a blood test done, and were told the result of the test, and in Sokoto for clients that were told the result of the test, with better performance in PMI-supported PHCs compared to non-PMI PHCs.

Overall, the majority of respondents waited less than an hour for the result of their blood test, with about half or more waiting less than 15 minutes, in all four states. There were no significant differences observed in wait time between PMI and non-PMI PHCs in any state other than Ebonyi, where more clients from non-PMI PHCs reported a shorter wait time (< 15 minutes).

Table 18. Management of clients with fever, by PMI and non-PMI facilities for each state

Indicator	Cross River			Ebonyi			Nassarawa			Sokoto		
	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*
% of clients with fever who were asked to have a blood test	85.3	65.7	**0.029**	99.0	95.6	0.141	97.8	95.4	0.307	85.7	75.6	0.289
% of clients with fever who had a blood test done	83.8	55.7	**0.019**	99.0	95.6	0.141	97.8	96.3	0.440	85.9	75.5	0.274
% of clients with fever who were told the result of the test	79.4	53.1	**0.007**	96.2	94.7	0.177	97.8	95.8	0.677	58.0	20.1	**0.007**
# of clients with fever (all ages)	184	157		103	137		229	234		194	223	
Clients with fever who had a blood test and were told the result, length of time they waited for the result												
< 15 minutes	49.1	50.8	0.670	53.3	87.0	**0.007**	41.0	51.1	0.354	79.3	87.3	0.437
15–60 minutes	49.3	47.8		35.0	9.1		57.7	47.5		19.3	12.7	
> 60 minutes	0.2	1.1		0.8	0.5		1.4	1.3		0.8	0.0	
Don't know	1.4	0.4		11.0	3.4		0.0	0.0		0.5	0.0	
# of clients with fever who had blood test and were told result (all ages)	130	102		98	125		219	215		115	89	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value (bolded p = statistically significant)

Overall, the majority of clients across both PMI and non-PMI PHCs who tested positive for malaria were given ACTs in Cross River, Nassarawa, and Sokoto; in Ebonyi, the majority of clients from PMI PHCs were given ACTs (97 percent) but only 45 percent of clients from the non-PMI PHCs (Table 19). The percentage of clients that tested positive that were given other medicines (not specified) varied considerably across the states with more than 70 percent of clients in both types of PHCs given other medicines in Cross River, while less than a quarter of all clients in Ebonyi were given other medicines (23 percent and 14 percent for PMI and non-PMI PHCs, respectively). In Sokoto, significantly more clients from non-PMI PHCs were given other medicines (73 percent) compared to only 39 percent of clients from PMI PHCs. Overall, the percentage of clients who tested positive for malaria who were given a prescription to fill was low in Cross River, Ebonyi, and Nassarawa (all less than 10 percent) across both types of PHCs; and slightly higher in Sokoto (26 percent and 16 percent of clients from PMI and non-PMI PHCs, respectively).

Table 19. Among clients with fever who tested positive for malaria, the percentage who received ACTs, other medicines, and/or a prescription, by PMI and non-PMI facilities for each state

Indicator	Cross River			Ebonyi			Nassarawa			Sokoto		
	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*
% who were given ACTs	86.7	95.2	0.265	97.4	44.6	**< 0.001**	77.4	70.6	0.494	93.7	88.8	0.563
% who were given other medicines	73.2	74.3	0.906	23.2	14.4	0.512	38.9	42.3	0.804	38.5	73.4	**0.016**
% who were given prescription	2.5	6.0	0.276	10.3	2.6	0.187	7.9	3.1	0.346	26.3	16.2	0.446
# of clients with fever who tested positive	104	83		37	48		219	215		105	84	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value (bolded p = statistically significant)

3.4.3 Quality of Care in Malaria in Pregnancy

The assessment examined quality of care around two of the four main components of malaria in pregnancy, specifically the provision of IPTp and education and distribution of ITNs.[3] Respondents who came to the PHC for an ANC visit were asked a series of questions about the visit, including if they were given SP during the visit and if they were asked to take the SP in the presence of a health worker; the number of times they had received SP; whether they were advised to sleep under an ITN/LLIN; and whether they received an ITN/LLIN free of charge (results presented in Tables 20–22).

The percentage of clients attending an ANC visit at the PHC who were given SP varied across the states, ranging from as low as 45 percent to as high as 87 percent (Table 20). In Nassarawa, about 87 percent of the pregnant women clients were given SP during their visit, while in Cross River and Sokoto, close to half of the pregnant women clients were given SP. In Ebonyi, 77 percent of clients were given SP in PMI PHCs,

[3] The other two main components of malaria in pregnancy care, focused ANC with health education about malaria and case management of women with signs and symptoms of malaria, were not examined in the assessment.

compared to 57 percent in non-PMI PHCs; however, no significant differences in receipt of SP were observed between clients from PMI compared to non-PMI PHCs in any of the four states. Overall, the majority of clients were not asked to swallow the SP in the presence of a health worker in all four states, with the exception of Ebonyi state, where 65 percent of clients from PMI-supported PHCs were asked to take the medicine in front of a health worker.

Table 20. Percentage of pregnant women given SP and asked to take the medicine in the presence of a health worker, by PMI and non-PMI facilities for each state

Indicator	Cross River			Ebonyi			Nassarawa			Sokoto		
	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*
% of women who were given SP during visit	44.7	54.2	0.387	77.3	56.8	0.117	87.4	86.5	0.900	50.3	46.5	0.692
# of pregnant women interviewed	109	130		212	149		119	101		116	57	
Pregnant women who were given SP, % asked to swallow tablets in the presence of health worker	31.0	48.1	0.116	64.7	47.4	0.205	32.4	34.5	0.872	35.8	18.5	0.158
# of pregnant women who were given SP	59	75		154	94		100	81		67	23	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value

Pregnant women were asked how many times they had been given SP to take in the presence of a health worker and, if they had an ANC card, whether the information on the number of doses of SP given was recorded on the card (Table 21). Based on the woman's response, the majority of clients had received SP once (ranging between 30 percent and 50 percent) or twice (ranging between 18 percent and 46 percent) in the presence of a health worker across all four states, with no significant differences observed between PMI- and non-PMI-supported PHCs. Overall, the information recorded on the women's ANC cards was consistent with their reports in Cross River and Ebonyi. In Nassarawa, more women were given one dose of SP, according to the ANC report when compared to the women's response; however, there were a lot fewer women who had an ANC card with them. In Sokoto, there were greater inconsistencies in the information reported by the women compared to the information recorded on their ANC card, largely due to no record of the amount of SP given on many of the ANC cards.

Table 21. Percentage of women given SP in the presence of a health worker, by the number of times given the medicine and by PMI and non-PMI facilities for each state

Indicator	Cross River			Ebonyi			Nassarawa			Sokoto		
	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*
# of times given SP to take in front of health worker during pregnancy:												
Once	47.1	35.1	0.447	30.2	38.4	0.220	30.2	38.4	0.140	45	48	0.666
Twice	31.1	34.3		37.6	20.8		37.6	20.8		20.6	18.3	
Three or more	7.4	12.7		20.6	27.3		20.6	27.3		12.8	6.7	
Never/don't know	14.3	17.9		11.6	13.6		11.6	13.6		21.6	27.1	
# of pregnant women interviewed	109	130		212	149		119	101		116	57	
# of times given SP according to ANC card												
Once	45.8	37.5	0.090	27.7	23.1	0.695	47.6	49.4	0.964	20.3	3.4	**0.041**
Twice	43.5	36.3		25.9	21.0		33.2	34.3		13.3	8.0	
Three or more	6.7	10.1		9.3	17.8		5.7	6.4		15.1	0.0	
No doses indicated	4.1	16.1		37.1	38.1		13.5	9.9		51.4	88.6	
# of pregnant women who had ANC card	95	117		132	74		83	41		110	43	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value (bolded p = statistically significant)

Overall, the percentage of pregnant women who were advised to sleep under an ITN was highest in PMI-supported PHCs in Ebonyi and Nassarawa states—with 93 percent and 98 percent of women, respectively, reporting they were advised to sleep under an ITN—compared to 86 percent and 84 percent of women from non-PMI-supported PHCs from the two states, respectively (Table 22). In Sokoto, 68 percent of women from PMI PHCs and 75 percent from non-PMI PHCs reported they were advised to sleep under an ITN, while in Cross River, about two-thirds of the women from both PMI and non-PMI PHCs reported they were advised to do so. The percentage of pregnant women who were offered an ITN free of charge ranged from around a quarter of all women in Cross River, to more than half of women from PMI PHCs in the other three states. While no significant differences were observed in receipt of an ITN, more pregnant women from PMI-supported PHCs in Ebonyi, Nassarawa, and Sokoto were given an ITN compared to their non-PMI PHCs counterparts.

Table 22. Percentage of pregnant women advised to sleep under an ITN and offered an ITN free of charge during their visit, by PMI and non-PMI facilities for each state

Indicator	Cross River			Ebonyi			Nassarawa			Sokoto		
	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*	PMI	nPMI	*p*
% of women who were advised to sleep under a treated net	66.7	60.9	0.637	92.9	85.8	0.387	97.7	83.9	**0.003**	67.9	74.7	0.577
% of women who were offered a treated net free of charge	24	27.6	0.697	58.3	42.7	0.171	52.7	34.4	0.185	47.4	36.8	0.411
# of pregnant women interviewed	109	130		212	149		119	101		116	57	

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities, *p*=p-value

3.5 Contextual Factors Results

A number of factors that are associated with or directly influence child health and malaria risk across the four states were examined during the assessment period. These included household and microeconomic factors, coverage of maternal and child health survival interventions, and child nutritional status. Trends in these factors over the assessment period were analyzed using the 2008 DHS, 2013 DHS, and 2015 MIS.

3.5.1 Household Characteristics

At the household level, access to an improved water source and improved toilet facilities, modern floor material in the house, electricity, and a telephone were examined across the four states (Table 23). In Cross River and Ebonyi, there were improvements in access to an improved water source, improved toilet facilities, modern floor material, electricity, and telephone between 2008 and 2015, though the only significant change observed was in household ownership of telephones. In Nassarawa, improvements were only observed in the percentage of households with modern floor material and telephone ownership during the 2008–2015 period;

however, the only significant increase observed was in telephone access. In Sokoto, there were increases observed in household access to an improved water source, in household modern floor material, and in telephone access between 2008 and 2015; however, as with the other three states, the only significant improvement observed was in telephone ownership.

Table 23. Household attributes and asset ownership, by state, 2008–2015

Indicator	2008 DHS		2013 DHS		2015 MIS		Percentage Point Change (2008–2015)	Sig.
	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N		
Cross River								
Improved water source*	25.8 (13.1-44.5)	765	69.6 (50.4-83.8)	848	40.2 (20.2-64.2)	180	14.4	(NS)
Improved toilet facilities**	10.1 (5.8-16.9)	765	10.4 (7.0-15.1)	848	16.7 (8.6-29.9)	180	6.6	(NS)
Modern floor material (not earth/sand/dung)	63.3 (50.7-74.3)	765	68.0 (52.1-80.6)	848	78.9 (55.3-91.9)	180	15.6	(NS)
Electricity	32.0 (19.0-33.2)	765	57.4 (39.0-74.0)	848	53.0 (25.4-78.9)	180	21.0	(NS)
Telephone (landline or mobile)	42.6 (33.2-52.5)	765	74.9 (67.6-81.0)	848	79.9 (71.5-86.4)	180	37.3	(S)
Ebonyi								
Improved water source*	56.8 (42.1-70.5)	528	67.7 (52.3-80.0)	978	63.6 (37.4-83.7)	151	6.8	(NS)
Improved toilet facilities**	13.1 (8.7-19.2)	528	10.7 (7.4-15.2)	978	15.7 (8.5-27.2)	151	2.6	(NS)
Modern floor material (not earth/sand/dung)	48.7 (34.8-62.8)	528	49.0 (36.8-61.4)	978	59.5 (36.4-79.0)	151	10.8	(NS)
Electricity	41.3 (25.1-59.3)	528	39.2 (22.4-59.0)	978	51.7 (24.5-78.0)	151	10.4	(NS)
Telephone (landline or mobile)	38.8 (28.3-50.5)	528	68.6 (60.6-75.7)	978	75.4 (60.9-85.8)	151	36.6	(S)
Nassarawa								
Improved water source*	47.9 (33.3-62.9)	389	60.2 (45.0-73.6)	550	37.2 (18.7-60.3)	92	-10.7	(NS)
Improved toilet facilities**	38.2 (28.6-48.8)	389	34.3 (23.7-46.8)	550	14.5 (4.3-39.0)	92	-23.7	(NS)
Modern floor material (not earth/sand/dung)	58.2 (49.2-66.6)	389	69.6 (59.8-77.9)	550	73.6 (49.1-88.9)	92	15.4	(NS)
Electricity	26.1 (12.8-45.9)	389	33.2 (15.6-57.3)	550	27.3 (7.9-62.3)	92	1.2	(NS)
Telephone (landline or mobile)	42.1 (31.5-53.4)	389	80.4 (74.6-85.0)	550	93.8 (89.2-96.5)	92	51.7	(S)
Sokoto								
Improved water source*	24.5 (12.8-41.8)	817	64.5 (50.0-76.7)	898	43.2 (19.4-70.7)	157	18.7	(NS)
Improved toilet facilities**	56.7 (43.8-68.8)	817	44.0 (30.2-58.9)	898	21.2 (10.8-37.5)	157	-35.5	(S)
Modern floor material (not earth/sand/dung)	12.2 (4.5-28.9)	817	21.5 (12.8-33.7)	898	34.9 (16.4-59.5)	157	22.7	(NS)
Electricity	22.8 (11.0-41.3)	817	38.9 (23.6-56.7)	898	18.5 (4.4-53.2)	157	-4.3	(NS)
Telephone (landline or mobile)	26.7 (18.4-37.1)	817	65.8 (57.3-73.5)	898	70.1 (54.9-81.9)	157	43.4	(S)

Notes: N = sample size; CI = Confidence Interval; Sig. = Statistical significance. Statistics with non-overlapping 95% confidence intervals are considered significantly different. NS denotes not statistically significant and S denotes statistically significant. *Improved water sources include: piped water into dwelling/yard/plot; public tap/standpipe; tubewell/borehole; protected dug well; protected spring; rainwater; bottled water; as per DHS VI Standard Tab plan.; ** Improved, Not Shared Toilet Facility includes: flush/pour flush to piped sewer system; flush/pour flush to septic tank; flush/pour flush to a pit latrine; ventilated improved pit latrine; pit latrine with a slab; composting toilet; and does not include any toilets that are shared with other households, as per DHS VI Standard Tabs.

3.5.2 Maternal Factors

Maternal factors, including sociodemographic characteristics, fertility-related risks, and components of antenatal and delivery care, were examined across the four states from 2008 to 2013 since no data were available in the 2015 MIS (Table 24). In Cross River, there were significant increases in ANC (four or more visits) attendance and postnatal vitamin A supplementation between 2008 and 2013. There were no other significant changes in other factors examined in Cross River. In Ebonyi, there were significant improvements in ANC attendance, tetanus toxoid vaccination (2+ doses), and postnatal vitamin A supplementation; as well as improvements in women's education, delivery at a health facility, and with a skilled birth attendant (though these changes were not statistically significant).

In Nassarawa, there was a small improvement in the percentage of women who completed their primary education; no significant changes in fertility-related risks; and only significant improvements observed in coverage of tetanus toxoid vaccination (34 percent in 2008 to 49 percent in 2013) and postnatal vitamin A supplementation (22 percent in 2008 to 41 percent in 2013). No significant changes were observed in education or the percentage of women that are married; fertility-related risks; or in any of the components of antenatal or delivery care in Sokoto during the 2008–2013 period.

Table 24. Maternal factors, by state, 2008–2013

Indicator	2008 DHS		2013 DHS		Percentage Point Change (2008–2013)	Sig.
	% (95% CI)	N	% (95% CI)	N		
Cross River						
Sociodemographic characteristics						
Completed primary education (%)	83.0 (76.4-87.9)	735	81.5 (68.7-89.9)	703	-1.5	(NS)
Married (%)	55.6 (49.8-61.2)	735	62.1 (55.8-68.0)	703	6.5	(NS)
Fertility-related risks						
Births in any high-risk fertility category (%)**	54.3 (47.8-60.6)	735	58.1 (51.2-64.6)	532	3.8	(NS)
Births with unavoidable fertility risk (%)*	16.4 (13.7-19.6)	735	19.3 (14.3-25.3)	532	2.9	(NS)
Antenatal care						
ANC visits 4+ (% women, most recent live birth 0–2 yrs.)	56.4 (46.1-66.2)	376	75.8 (68.6-81.8)	368	19.4	(S)
Tetanus toxoid 2+ (% women, most recent live births, 0–2 yrs.)	58.1 (46.7-68.8)	376	67.2 (54.0-78.1)	368	9.1	(NS)
Postnatal vitamin A supplementation	41.2 (32.8-50.2)	376	66.6 (59.6-73.0)	368	25.4	(S)
Delivery at a health facility (% women, live births, 0–4 yrs.)***	38.5 (28.7-49.4)	549	40.4 (30.5-51.1)	532	1.9	(NS)
Skilled attendant at birth****	44.2 (32.5-56.6)	549	41.3 (29.9-53.7)	532	-2.9	(NS)
Ebonyi						
Sociodemographic characteristics						
Completed primary education (%)	58.7 (49.2-67.5)	586	74.8 (66.2-81.8)	1,122	16.1	(NS)
Married (%)	54.3 (49.1-59.3)	586	50.3 (46.3-54.2)	1,122	-4.0	(NS)
Fertility-related risks						
Births in any high-risk fertility category (%)**	69.3 (65.5-72.9)	432	63.6 (58.7-68.3)	748	-5.7	(NS)
Births with unavoidable fertility risk (%)*	14.1 (11.7-16.9)	432	18.5 (15.4-22.0)	748	4.4	(NS)
Antenatal care						
ANC visits 4+ (% women, most recent live birth 0–2 yrs.)	56.1 (46.9-64.8)	261	75.8 (67.6-82.6)	467	19.7	(S)
Tetanus toxoid 2+ (% women, most recent live births, 0–2 yrs.)	56.1 (49.3-62.6)	261	70.3 (62.8-76.9)	467	14.2	(S)
Postnatal vitamin A supplementation	16.8 (11.7-23.6)	261	35.9 (28.7-43.7)	467	19.1	(S)
Delivery at a health facility (% women, live births, 0–4 yrs.)***	40.7 (26.7-56.4)	432	59.6 (49.3-69.2)	748	18.9	(NS)
Skilled attendant at birth****	46.3 (30.7-62.6)	432	62.1 (50.4-72.6)	748	15.8	(NS)
Nassarawa						
Sociodemographic characteristics						
Completed primary education (%)	49.0 (38.8-59.3)	458	58.0 (46.6-68.6)	594	9.0	(NS)
Married (%)	70.1 (64.5-75.2)	458	70.6 (64.2-76.4)	594	0.5	(NS)
Fertility-related risks						
Births in any high-risk fertility category (%)**	60.8 (54.1-67.1)	320	59.2 (54.3-64.0)	460	-1.6	(NS)
Births with unavoidable fertility risk (%)*	13.6 (10.9-16.9)	320	18.2 (15.1-21.8)	460	4.6	(NS)
Antenatal care						
ANC visits 4+ (% women, most recent live birth 0–2 yrs.)	55.3 (48.5-61.9)	224	58.2 (48.7-67.1)	309	2.9	(NS)

Indicator	2008 DHS		2013 DHS		Percentage Point Change (2008–2013)	Sig.
	% (95% CI)	N	% (95% CI)	N		
Tetanus toxoid 2+ (% women, most recent live births, 0–2 yrs.)	34.4 (28.1-41.4)	224	49.4 (42.4-56.4)	309	15.0	(S)
Postnatal vitamin A supplementation	22.3 (17.0-28.8)	224	40.8 (33.6-48.5)	309	18.5	(S)
Delivery at a health facility (% women, live births, 0–4 yrs.)***	32.9 (24.0-43.2)	320	40.1 (32.3-48.5)	460	7.2	(NS)
Skilled attendant at birth****	33.8 (24.5-44.5)	320	40.7 (33.3-48.6)	460	6.9	(NS)
Sokoto						
Sociodemographic characteristics						
Completed primary education (%)	9.5 (5.3-16.6)	822	9.4 (4.6-18.2)	1,098	-0.1	(NS)
Married (%)	92.3 (86.0-95.9)	822	87.1 (80.7-91.5)	1,098	-5.2	(NS)
Fertility-related risks						
Births in any high-risk fertility category (%)**	70.5 (67.0-73.8)	983	73.0 (70.0-75.7)	1,151	2.5	(NS)
Births with unavoidable fertility risk (%)*	6.6 (5.5-8.0)	983	6.8 (5.2-8.8)	1,151	0.2	(NS)
Antenatal care						
ANC visits 4+ (% women, most recent live birth 0–2 yrs.)	10.2 (5.1-19.2)	599	16.4 (9.4-27.2)	693	6.2	(NS)
Tetanus toxoid 2+ (% women, most recent live births, 0–2 yrs.)	6.8 (3.2-14.1)	599	12.6 (7.6-20.2)	693	5.8	(NS)
Postnatal vitamin A supplementation	0.7 (0.2-2.8)	599	1.9 (0.7-5.3)	693	1.2	(NS)
Delivery at a health facility (% women, live births, 0–4 yrs.)***	4.4 (2.3-8.2)	983	4.7 (2.3-9.6)	1,151	0.3	(NS)
Skilled attendant at birth****	5.1 (2.8-9.3)	983	5.4 (2.6-10.7)	1,151	0.3	(NS)

Notes: N = sample size; CI = Confidence Interval; Sig. = Statistical significance. Statistics with non-overlapping 95% confidence intervals are considered significantly different. NS denotes not statistically significant and S denotes statistically significant. *A high-risk birth is defined as any birth following an interval of < 24 months, a multiple birth, birth order > 3, or any birth to a woman younger than 18 or older than 34 years; **An avoidable high-risk birth is a birth to a woman < 18 or > 34 years, a birth interval < 24 months, or a birth order > 3; *** An unavoidable high-risk birth is a first birth born to women ages 18-34. ***Health facility includes all public and private place of delivery response options; ****Skilled provider includes doctor, nurse, trained birth attendant, medical assistant, or midwife.

3.5.3 Child Health Factors

Trends in immunization coverage, care-seeking, and treatment for acute respiratory illness (ARI) and diarrhea, and child nutritional status were examined between 2008 and 2013 across the four states.[4] Table 25 presents the trends in immunization coverage among children 12–23 months by state. In Cross River, there was an overall improvement in coverage of BCG, DPT3, Polio3, and measles vaccinations as well as coverage of all basic vaccinations in children 12–23 months of age between 2008 and 2013; however, none of the changes was statistically significant. In Ebonyi, improvements were observed in BCG, DPT3, and Polio3 vaccination coverage (though none of the increases was significant), while measles and coverage of all basic vaccinations remained unchanged between 2008 and 2013. In Nassarawa, small improvements in coverage of BCG, DPT3, measles, and all basic vaccinations were observed from 2008 to 2013; however, none of the changes were significant. In Sokoto there were no significant changes in BCG, DPT3, measles, or coverage of all basic vaccinations during the assessment period; however, there was a significant increase observed in coverage of Polio3 vaccination, from 11 percent in 2008 to 63 percent in 2013.

Table 25. Immunization coverage among children 12–23 months, by state, 2008–2013

Indicator	2008 DHS		2013 DHS		Percentage Point Change (2008–2013)	Sig.
	% (95% CI)	N	% (95% CI)	N		
Cross River						
BCG	75.8 (59.2-87.1)	102	87.3 (67.1-95.9)	98	11.5	NS
DPT3	64.6 (47.7-78.4)	102	76.1 (48.6-91.5)	98	11.5	NS
Polio3	51.5 (37.2-65.5)	102	66.0 (46.3-81.4)	98	14.5	NS
Measles	63.6 (47.0-77.5)	102	77.1 (59.4-88.6)	98	13.5	NS
All*	42.1 (27.9-57.9)	102	52.5 (31.5-72.7)	98	10.4	NS
Ebonyi						
BCG	79.4 (68.8-87.0)	72	91.4 (81.4-96.4)	137	12.0	NS
DPT3	60.1 (45.4-73.2)	72	80.3 (66.9-89.1)	137	20.2	NS
Polio3	56.8 (41.0-71.3)	72	68.6 (56.3-78.7)	137	11.8	NS
Measles	60.8 (50.1-70.6)	72	61.7 (47.4-74.2)	137	0.9	NS
All*	50.0 (36.0-64.0)	72	51.1 (36.1-65.9)	137	1.1	NS
Nassarawa						
BCG	50.1 (34.8-65.4)	54	62.3 (49.2-73.8)	90	12.2	NS
DPT3	30.1 (17.7-46.3)	54	34.1 (34.4-45.5)	90	4.0	NS
Polio3	21.0 (19.7-45.1)	54	25.8 (15.9-39.1)	90	-5.2	NS
Measles	38.6 (26.9-51.7)	54	45.4 (34.6-56.6)	90	6.8	NS
All*	16.1 (7.1-32.4)	54	20.1 (12.3-31.1)	90	4.0	NS
Sokoto						
BCG	4.5 (2.0-9.7)	175	3.6 (1.2-10.7)	204	-0.9	NS
DPT3	2.0 (0.8-5.1)	175	2.6 (0.8-8.3)	204	0.6	NS
Polio3	11.1 (7.8-15.5)	175	63.2 (52.4-72.9)	204	52.1	S
Measles	3.5 (1.4-8.4)	175	3.6 (1.1-11.1)	204	0.1	NS
All*	1.0 (0.2-4.1)	175	1.4 (0.3-5.5)	204	0.4	NS

N = Sample Size; CI = Confidence Interval; Sig. = Statistical significance. Statistics with non-overlapping 95% confidence intervals are considered significantly different. NS denotes not statistically significant and S denotes statistically significant. *According to World Health Organization guidelines, children are considered fully vaccinated when they have received a vaccination against tuberculosis (BCG), three

[4] No data on the child health factors assessed were available in the 2015 MIS, thus changes were only assessed between 2008 and 2013.

doses each of diphtheria, pertussis, and tetanus (DPT) and polio vaccines, and a measles vaccination by the age of 12 months.

The prevalence of ARI and diarrhea among children under five in the two weeks preceding the survey in Cross River, Ebonyi, Nassarawa and Sokoto remained unchanged between 2008 and 2013; with the exception of diarrhea prevalence in Sokoto, which declined significantly from 14 percent in 2008 to 5 percent in 2013 (Table 26). In Cross River, the percentage of children under five for whom treatment was sought declined from 61 percent in 2008 to 34 percent in 2013 and the percent that received oral rehydration salts (ORS) declined from 31 percent to 20 percent during the same period, though the changes were not statistically significant. In Ebonyi, care-seeking for children under five with diarrhea declined significantly from 64 percent in 2008 to 21 percent in 2013, but treatment with ORS for children with diarrhea did increase from 24 percent to 37 percent though the change was not statistically significant. In Nassarawa, there was an insufficient sample size in 2008 to assess care-seeking and treatment with ORS for diarrhea; in 2013, 57 percent and 39 percent of children with diarrhea sought treatment and received ORS. In Sokoto, care-seeking and treatment with ORS for children remained stable between 2008 and 2013, at just under 40 percent and around 10 percent, respectively. Care-seeking for ARI was not assessed in any of the four states due to insufficient sample sizes.

Table 26. Prevalence of children under five with ARI and diarrhea, and coverage of care-seeking and treatment for diarrhea, by state, 2008–2013

Indicator	2008 DHS		2013 DHS		Percentage Point Change (2008–2013)	Sig.
	% (95% CI)	N	% (95% CI)	N		
Cross River						
ARI in previous 2 weeks	2.6 (1.3-5.0)	515	2.5 (1.5-4.1)	499	-0.1	NS
Diarrhea in previous 2 weeks	6.7 (4.2-10.4)	515	8.0 (5.4-11.6)	499	1.3	NS
Sought treatment for diarrhea	61.0 (45.3-74.8)	34	34.1 (23.3-46.9)	40	-26.9	NS
Used ORS for diarrhea	30.7 (16.3-50.4)	34	19.7 (7.2-43.9)	40	-11.0	NS
Ebonyi						
ARI in previous 2 weeks	2.5 (1.5-4.1)	380	2.0 (1.1-3.6)	663	-0.5	NS
Diarrhea in previous 2 weeks	8.5 (6.2-11.7)	380	13.2 (10.6-16.3)	663	4.7	NS
Sought treatment for diarrhea	63.8 (45.3-78.9)	32	20.9 (13.2-31.6)	87	-42.9	S
Used ORS for diarrhea	24.4 (15.8-35.6)	32	37.0 (25.6-49.9)	87	12.6	NS
Nassarawa						
ARI in previous 2 weeks	3.3 (2.1-5.2)	293	3.0 (1.7-5.1)	421	-0.3	NS
Diarrhea in previous 2 weeks	7.2 (4.8-10.8)	293	8.3 (5.7-11.9)	421	1.1	NS
Sought treatment for diarrhea	†		57.3 (36.2-76.0)	35	N/A	N/A
Used ORS for diarrhea	†		39.3 (22.6-59.0)	35	-3.2	NS
Sokoto						
ARI in previous 2 weeks	0.7 (0.3-1.6)	827	1.0 (0.4-2.6)	1,005	0.3	NS
Diarrhea in previous 2 weeks	14.0 (10.7-18.1)	827	4.6 (3.4-6.2)	1,005	-9.4	S
Sought treatment for diarrhea	36.1 (21.0-54.6)	116	39.2 (24.9-55.6)	46	3.1	NS
Used ORS for diarrhea	9.8 (4.7-19.3)	116	11.7 (5.7-22.6)	46	1.9	NS

N = Sample Size; CI = Confidence Interval; Sig. = Statistical significance. Statistics with non-overlapping 95% confidence intervals are considered significantly different. NS denotes not statistically significant and S denotes statistically significant. *Definition of ARI is based on data available in the 2000 survey: child had illness with cough in past two weeks and he/she breathed faster than usual with short, fast breaths; † denotes insufficient sample size (fewer than 25 cases) to calculate estimate.

The trends in nutritional status of children under five between 2008 and 2013 were examined, specifically vitamin A supplementation for children 6–59 months; prevalence of exclusive breastfeeding and consumption of complementary foods; and prevalence of low birth weight, stunting, underweight, and wasting among children under five (Table 27). In Cross River, a significant increase from 57 percent to 83 percent in vitamin A supplementation among children 6–59 months was observed between 2008 and 2013; no significant changes were observed, however, in breastfeeding and complementary feeding, nor in the prevalence of low birth weight, stunting, underweight, and wasting. In Ebonyi, a significant improvement in vitamin A supplementation (20 percent to 55 percent) was observed, alongside a significant decline in low birth weight (30 percent to 8 percent and stunting prevalence (32 percent to 16 percent) between 2008 and 2013. No other significant changes were observed in Ebonyi. In Nassarawa, significant improvements were observed in vitamin A supplementation (26 percent to 52 percent) and exclusive breastfeeding prevalence (17

percent to 39 percent); however, no other significant changes occurred during the assessment period. In Sokoto, the only significant improvement observed was in vitamin A supplementation during the assessment period; though the increase in coverage was small (from 5 percent to 18 percent).

Table 27. Nutritional status of children under five, by state, 2008–2013

Indicator	2008 DHS		2013 DHS		Percentage Point Change (2008–13)	Sig.
	% (95% CI)	N	% (95% CI)	N		
Cross River						
Vitamin A (6–59 months)	57.0 (46.7-66.7)	457	83.4 (69.7-91.6)	439	26.4	S
Exclusive breastfeeding (< 6 months of age)	9.8 (4.8-19.2)	58	10.5 (5.3-19.7)	60	0.7	NS
Children 6–9 months breastfed & consuming complementary foods	80.7 (66.7-89.7)	29	71.7 (59.0-81.7)	39	-9.0	NS
Low birth weight (< 2500g)	11.9 (4.8-26.6)	56	12.7 (5.7-25.6)	71	0.8	NS
Under-fives stunted	31.5 (25.6-38.1)	483	21.7 (17.7-26.3)	514	-9.8	NS
Under-fives underweight	15.9 (11.4-21.6)	483	14.8 (11.7-18.4)	514	-1.1	NS
Under-fives wasted	6.2 (4.1-9.3)	483	9.8 (6.9-13.6)	514	3.6	NS
Ebonyi						
Vitamin A (6–59 months)	20.2 (15.7-25.4)	342	55.1 (47.8-62.3)	587	34.9	S
Exclusive breastfeeding (< 6 months of age)	13.1 (6.4-25.1)	38	22.9 (12.1-39.0)	76	9.8	NS
Children 6–9 months breastfed & consuming complementary foods	80.9 (69.3-88.8)	31	85.4 (69.8-93.7)	47	4.5	NS
Low birth weight (< 2500g)	30.1 (19.0-44.1)	79	7.7 (4.1-14.2)	127	-22.4	S
Under-fives stunted	32.4 (26.7-38.6)	361	16.2 (11.9-21.6)	671	-16.2	S
Under-fives underweight	15.6 (11.9-20.2)	361	12.4 (9.6-15.8)	671	-3.2	NS
Under-fives wasted	8.4 (6.3-11.0)	361	10.5 (8.2-13.2)	671	2.1	NS
Nassarawa						
Vitamin A (6–59 months)	26.4 (21.1-32.6)	263	52.2 (44.5-59.8)	374	25.8	S
Exclusive breastfeeding (< 6 months of age)	16.7 (8.9-29.1)	29	38.9 (29.4-29.3)	47	22.2	S
Children 6–9 months breastfed & consuming complementary foods	80.3 (68.2-88.6)	26	83.1 (67.6-92.1)	33	2.8	NS
Low birth weight (< 2500g)	†		†			
Under-fives stunted	44.1 (38.4-50.1)	248	34.5 (29.0-40.5)	398	-9.6	NS
Under-fives underweight	16.6 (13.3-20.4)	248	20.9 (17.9-24.3)	398	4.3	NS
Under-fives wasted	5.6 (3.8-8.2)	248	9.8 (7.9-12.1)	398	4.2	NS
Sokoto						
Vitamin A (6–59 months)	5.0 (2.8-9.0)	726	17.9 (12.2-25.5)	901	12.9	S
Exclusive breastfeeding (< 6 months of age)	14.7 (7.6-26.4)	101	4.4 (1.6-12.0)	104	-10.3	NS
Children 6–9 months breastfed & consuming complementary foods	54.5 (44.9-63.9)	77	59.6 (45.8-72.0)	83	5.1	NS
Low birth weight (< 2500g)	†		†			
Under-fives stunted	53.6 (49.7-57.4)	743	51.6 (47.6-55.7)	929	-2.0	NS
Under-fives underweight	45.8 (40.2-51.6)	743	37.7 (33.9-41.6)	929	-8.1	NS
Under-fives wasted	24.4 (20.1-29.2)	743	19.3 (16.6-22.4)	929	-5.1	NS

N = Sample Size; CI = Confidence Interval; Sig. = Statistical significance. Statistics with non-overlapping 95% confidence intervals are considered significantly different. NS denotes not statistically significant and S denotes statistically significant. † Denotes insufficient sample size (fewer than 25 cases) to calculate estimate.

3.6 Routine Data Quality Results

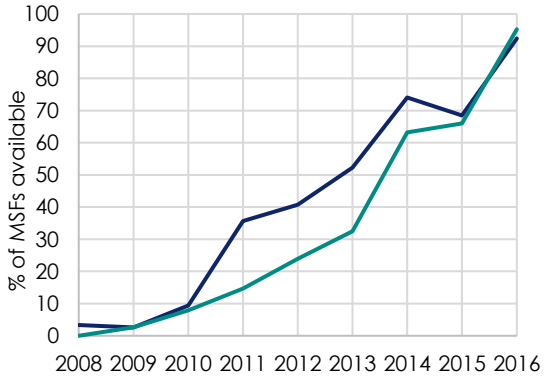
For the data quality audit component of the assessment, MEASURE Evaluation assessed the quality of the data at the PHC level through a review of the daily registers and the MSFs to assess their availability, completeness, accuracy, and consistency. Additionally, the assessment included a comparison of the data reported at the PHC level and in the DHIS 2 system for a select number of indicators. Finally, the availability and completeness of the data reported in the MSFs were compared to data reported in the DHIS 2. For all aspects of the data quality audit, PMI- and non-PMI-supported PHCs were compared to determine if there were any differences in the quality of data collected and reported. For a complete list of definitions of the different indicators assessed in the data quality audit, see Annex 5 (Section 8).

3.6.1 Availability, Completeness, and Accuracy of PHC Monthly Summary Forms

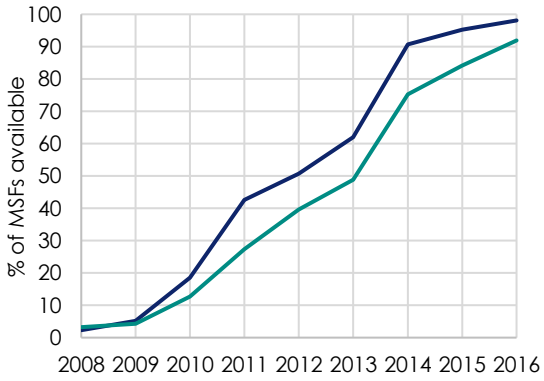
Figure 48 a–d shows the percentage of MSFs available for review at the PHC out of the total number of MSFs that should be available to review per year for PMI and non-PMI PHCs across the four states. In each state, there was substantial improvement in availability of the data between 2008 and 2016, from around or close to no forms being available in 2008, to greater than 80 percent availability by 2016 (with the exception of non-PMI PHCs in Sokoto, which reached 73 percent availability by 2016). Generally, there was higher data availability in PMI-supported PHCs than in non-PMI PHCs across the eight-year time frame.

Figure 48 a–d. Percentage of MSFs available for review at PHC out of the total number of MSFs that should be available to review per year, by PMI and non-PMI facilities for each state

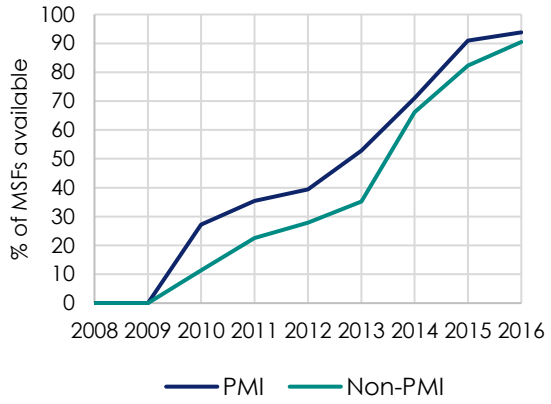
a. Cross River



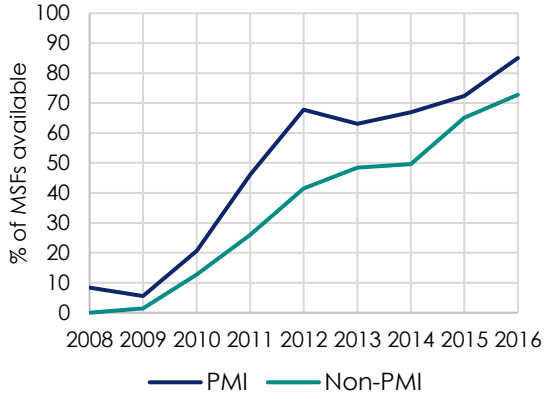
b. Ebonyi



c. Nassarawa

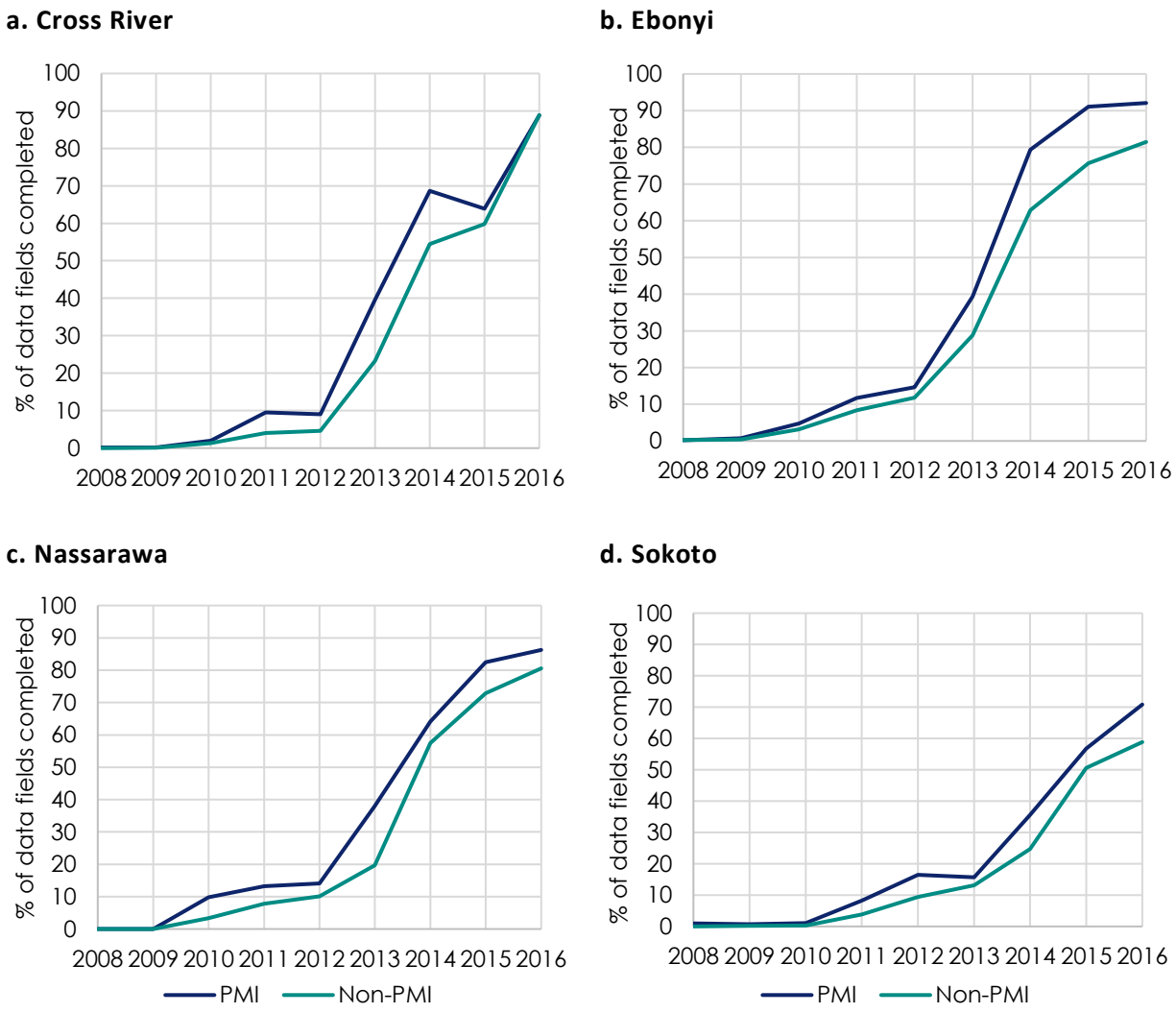


d. Sokoto



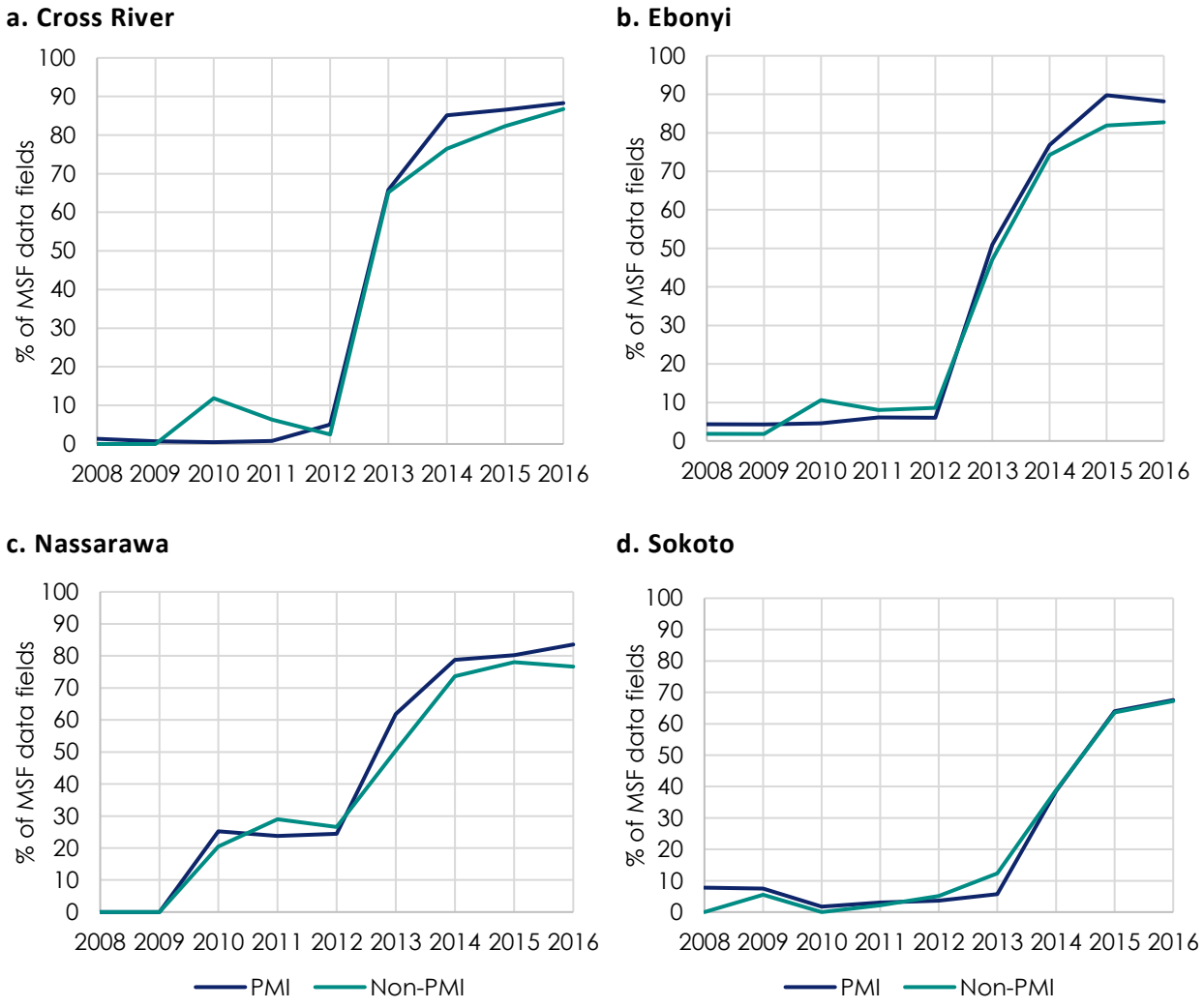
The completeness of the MSF data was also assessed by calculating the percentage of MSF data fields that were completed out of the total number of MSF data fields reviewed (Figure 49 a–d). As with data availability, a substantial improvement in the completeness of the MSFs was observed across all four states from 2008 to2016, with marked improvements occurring beginning 2012–2013 and continuing through 2016. Across all four states, completeness of the MSF data was higher overall in PMI-supported PHCs compared to non-PMI PHCs.

Figure 49 a–d. Percentage of MSF data fields completed out of the total number of MSF data fields reviewed, by PMI and non-PMI facilities for each state



Accuracy of the MSF data was assessed by calculating the percentage of MSF data fields that contained a total that equaled the summation of its component fields out of the total number of MSF data fields containing a summation (Figure 50 a–d). Similar results were observed in terms of the accuracy of the data, with drastic improvements observed around 2012–2013 in each of the four states and continuing through 2016. In Cross River, Ebonyi, and Nassarawa, slightly higher accuracy was generally observed in PMI-supported PHCs compared to non-PMI PHCs.

Figure 50 a–d. Percent of MSF data fields containing a total that equals the summation of its component fields out of the total number of MSF data fields containing a summation that were assessed among MSF available for review, by PMI and non-PMI facilities for each state



3.6.2 Comparison of Daily Registers and Monthly Summary Forms

The counts in the daily registers were compared with the counts in the MSFs for select indicators to assess the consistency in the data reported between the two forms. A verification ratio of the two counts was then calculated.[5] A verification ratio of 1 indicates that the verified count in the PHC register exactly matched the value reported by the PHC in the MSF; while a verification ratio less than 1 or greater than 1 indicates an inconsistency in the data between the two forms. Table 28 presents the verification ratios for select malaria indicators by state for PMI- and non-PMI-supported PHCs. Overall, with a few exceptions in Ebonyi and

[5] The verification ratio was calculated by taking a ratio of the verified count in the PHC register for the select indicator to the value reported by that PHC in its MSF. Field teams used data from the month before the month preceding the data collator's visit to the PHC.

Nassarawa, there were discrepancies in the counts across all indicators in the PHC registers and MSFs across all states and in both types of PHCs. The greatest discrepancies in the counts were observed in Sokoto across all selected indicators in both PMI and non-PMI PHCs; in Cross River, Ebonyi, and Nassarawa the discrepancies were not as great, with the exception of a few indicators in Nassarawa in PMI-supported PHCs (number of children under five with confirmed uncomplicated malaria and the number with confirmed uncomplicated malaria that received ACT).

Table 28. Verification ratios for select malaria indicators: sum of counts from daily registers/sum of counts from the MSFs

Indicator	Cross River		Ebonyi		Nassarawa		Sokoto	
	PMI	nPMI	PMI	nPMI	PMI	nPMI	PMI	nPMI
Number of children under five presenting with fever and tested by RDT	1.05	0.92	0.92	0.97	0.87	0.87	0.42	0.51
Number of children under five tested positive for malaria by RDT	1.13	0.95	0.92	0.91	1.02	1.30	0.50	0.66
Number of children under five presenting with fever and tested by microscopy	0.94	0.97	1.00	1.00	0.96	0.94	1.87	0.86
Number of children under five tested positive for malaria by microscopy	0.92	0.97	1.00	1.00	0.96	1.00	1.80	0.83
Number of children under five with confirmed uncomplicated malaria	0.94	0.99	0.85	0.82	1.77	0.94	0.66	0.73
Number of children under five with confirmed uncomplicated malaria receiving ACT	0.92	0.98	0.88	0.81	1.50	0.95	0.56	0.70

PMI=PMI-supported facilities, nPMI=Non-PMI-supported facilities

3.6.3 Comparison of DHIS 2 and the PHC Registers

The counts in the DHIS 2 were compared with the verified counts in the PHC registers from 2013 to 2016 for the following indicators: number of children under five presenting with fever and tested by RDT (Figure 51); the number of children under five that tested positive for malaria by RDT (Figure 52); the number of children under five with confirmed malaria (Figure 53); the number of pregnant women that received IPTp2 (Figure 54); and the number of pregnant women with confirmed malaria (Figure 55). Across all of the selected indicators in the four states, there are evident discrepancies in the data reported in the PHC register and in the DHIS 2, with no discernable improvement observed in reporting consistency between 2013 and 2016. Similarly, there are no marked differences in consistency between PMI and non-PMI PHCs in any of the four states.

Figure 51. Verification ratio of DHIS 2 count versus PHC register count for the number of children under five presenting with fever and tested by RDT, by PMI and non-PMI facilities for each state

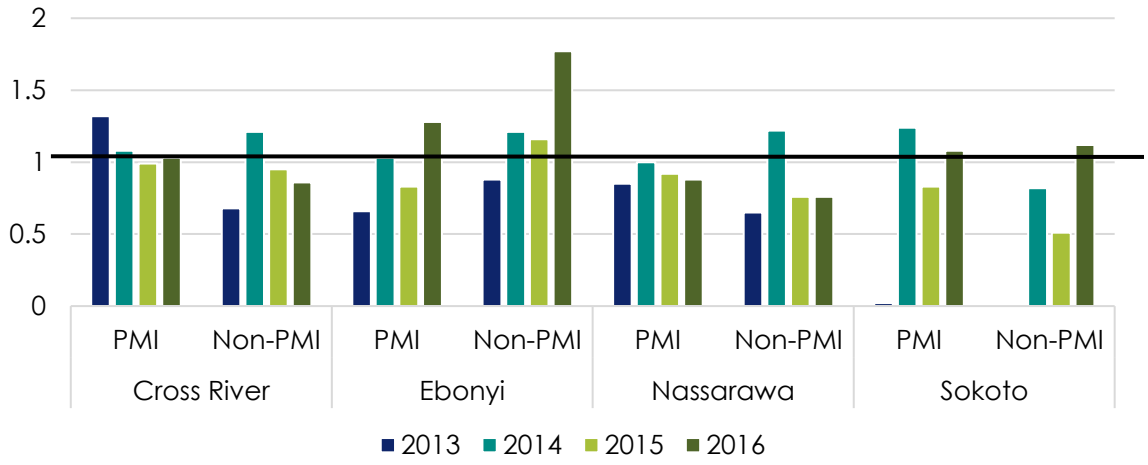


Figure 52. Verification ratio of DHIS 2 count versus PHC register count for the number of children under five that tested positive for malaria by RDT, by PMI and non-PMI facilities for each state

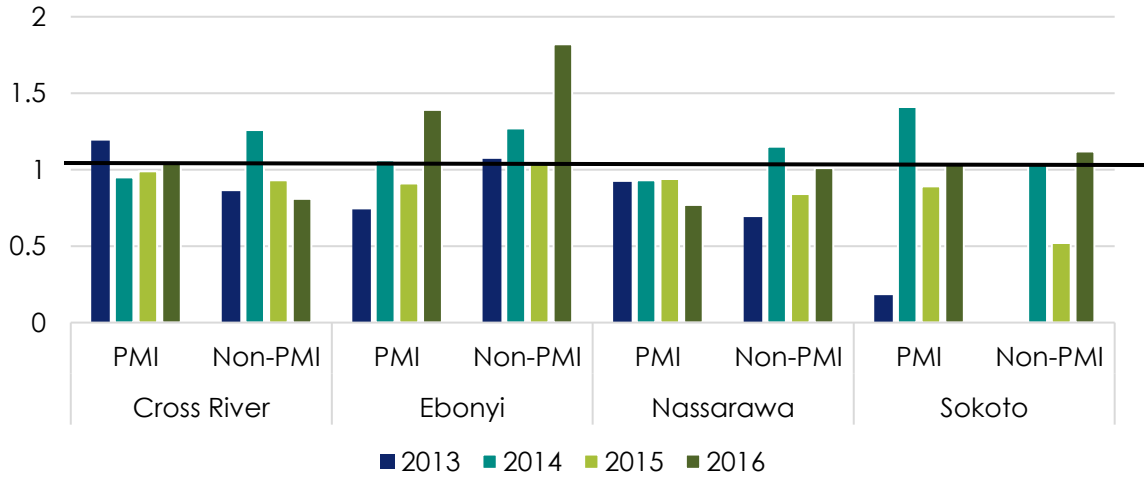


Figure 53. Verification ratio of DHIS 2 count versus PHC register count for the number of children under five with confirmed malaria, by PMI and non-PMI facilities for each state

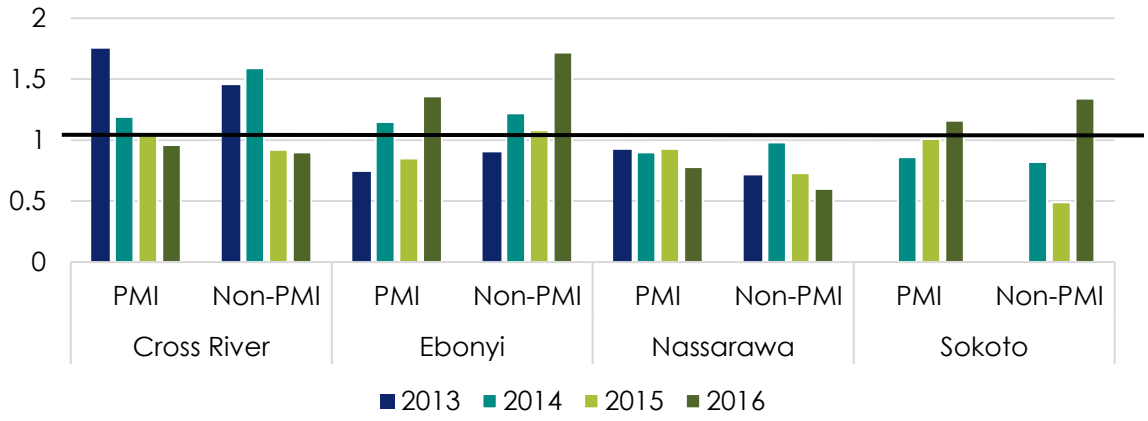


Figure 54. Verification ratio of DHIS 2 count versus PHC register count for the number of pregnant women who received IPTp2, by PMI and non-PMI facilities for each state

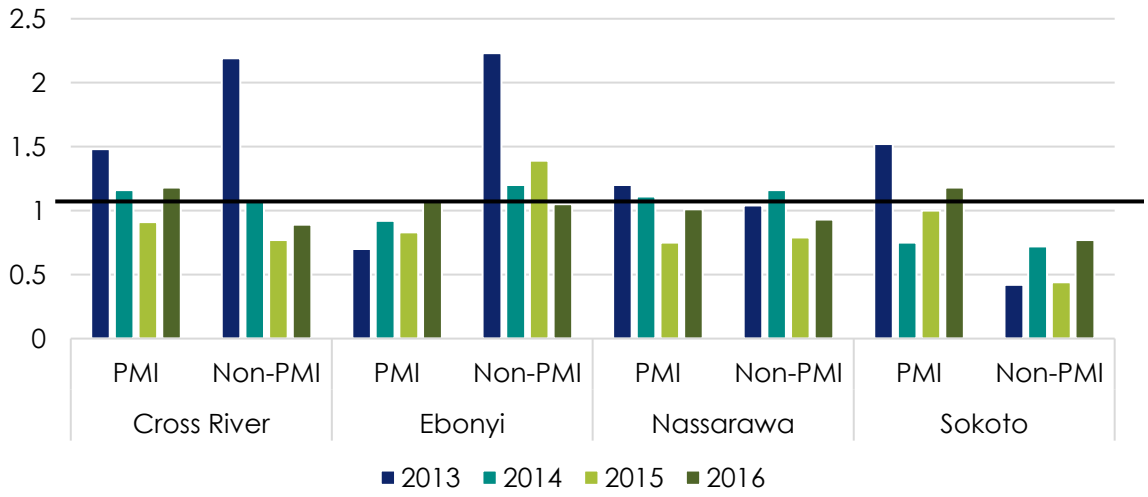
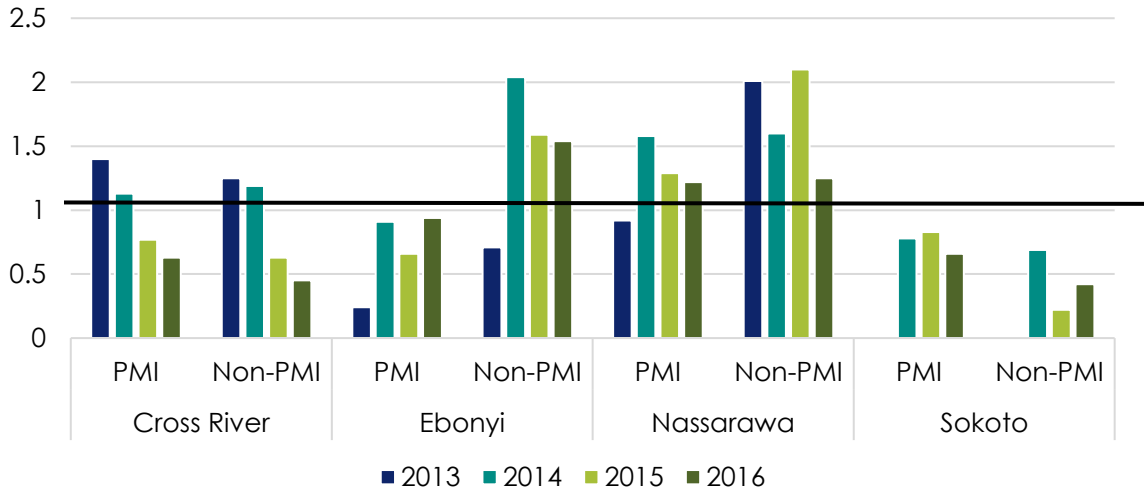


Figure 55. Verification ratio of DHIS 2 count versus PHC register count for the number of pregnant women with confirmed malaria, by PMI and non-PMI facilities for each state

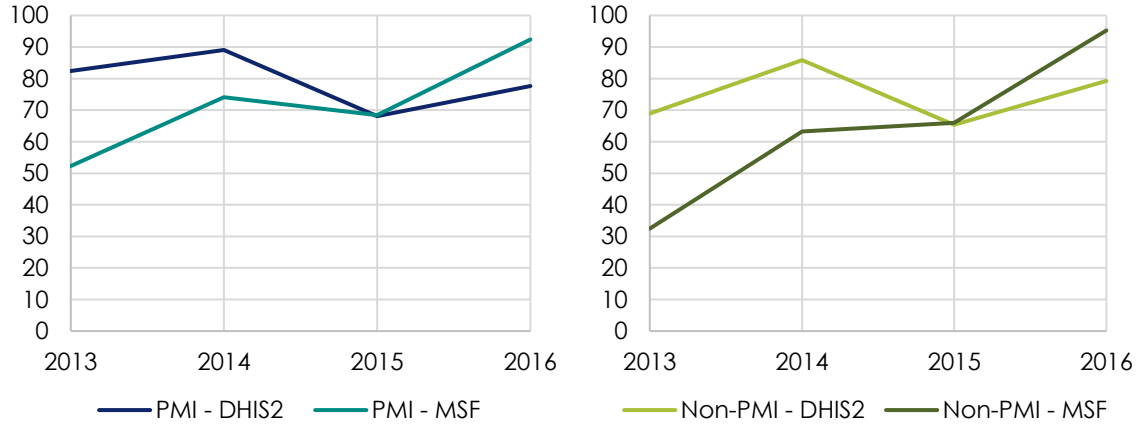


3.6.4 Comparison of DHIS 2 and the PHC MSFs

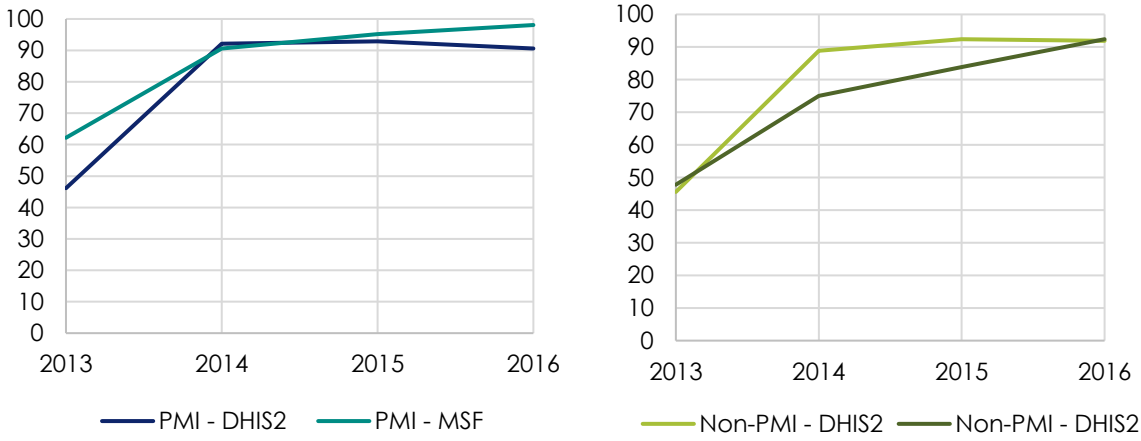
The last component of the data quality audit compared trends in the availability and completeness of DHIS 2 data and PHC MSF data. Figure 56 a–d presents the availability of monthly data per year in DHIS 2 compared to the monthly data in the MSFs, by type of facility (PMI and non-PMI PHCs) for each state. In Cross River, availability of monthly data in both the PMI and non-PMI MSFs gradually improved from 2013 to 2016, and the availability of the data declined slightly in the DHIS 2 for both types of PHCs. In Ebonyi, availability of monthly data gradually improved in both types of PHCs and in both the DHIS 2 and MSFs from 2013 to 2016. In Nassarawa, availability of the DHIS 2 data for both PMI and non-PMI PHCs improved slightly between 2013 and 2014, but then remained stable with no further improvement between 2014 and 2016, while availability of the MSF data gradually improved during the four-year period. A similar trend was observed in Sokoto for the DHIS 2 data in both types of PHCs, with availability showing a slight improvement from 2013 to 2014, and then remaining stable with no further improvement between 2014 and 2016; availability of MSF data showed a small gradual improvement between 2014 and 2016. Availability of MSF data was slightly higher in PMI versus non-PMI PHCs in Ebonyi and Sokoto.

Figure 56 a–d. Availability of monthly data per year in DHIS 2 compared to MSF, by PMI and non-PMI facilities for each state

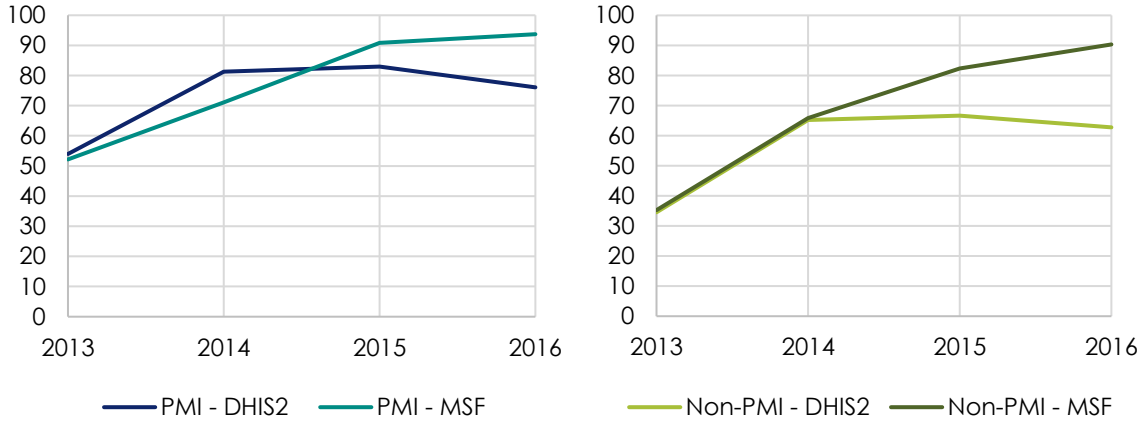
a. Cross River



b. Ebonyi



c. Nassarawa



d. Sokoto

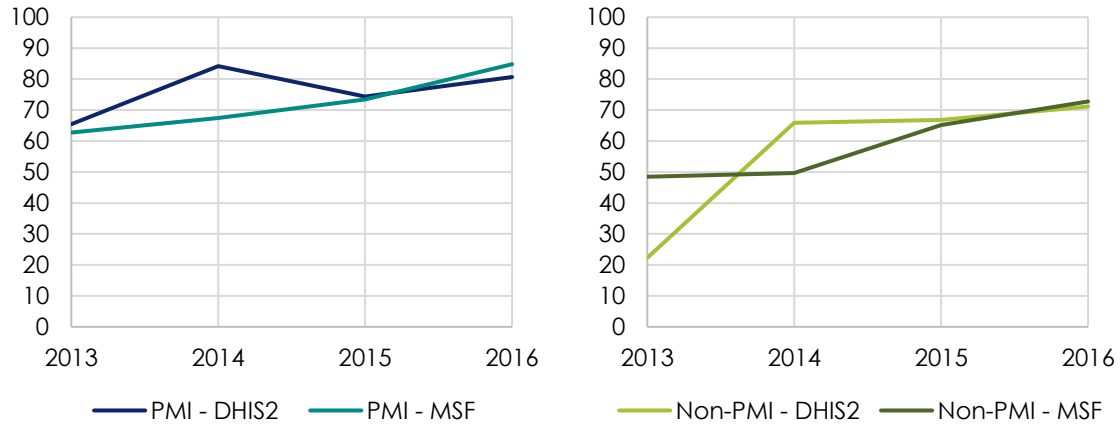
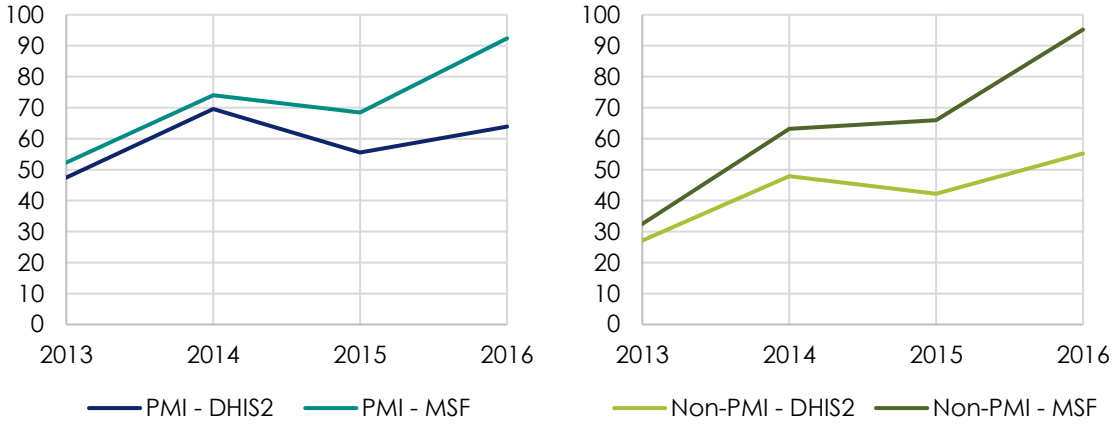


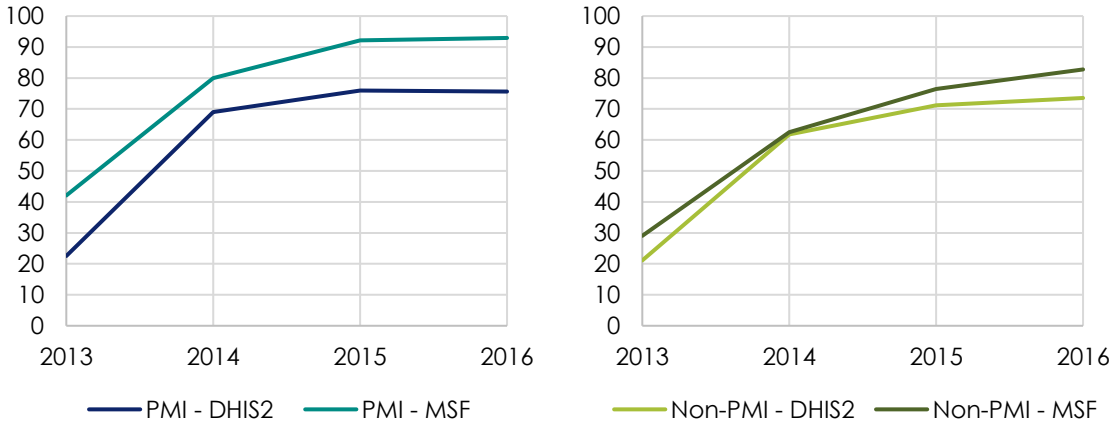
Figure 57 a–d presents the completeness of attendance and malaria indicators per year in the DHIS 2 compared to the monthly data in the MSFs, by type of facility (PMI and non-PMI PHCs) for each state. Overall, across all four states, completeness in the MSF forms showed gradual improvement between 2013 and 2016 in both PMI- and non-PMI-supported PHCs, with overall higher completeness of the forms in PMI compared to non-PMI PHCs. Across all four states, the completeness of the DHIS 2 data was lower than the MSF data, and lower in non-PMI-supported PHCs compared to PMI-supported PHCs.

Figure 57 a–d. Completeness of attendance and malaria indicators per year in DHIS 2 compared to MSF, by PMI and non-PMI facilities for each state

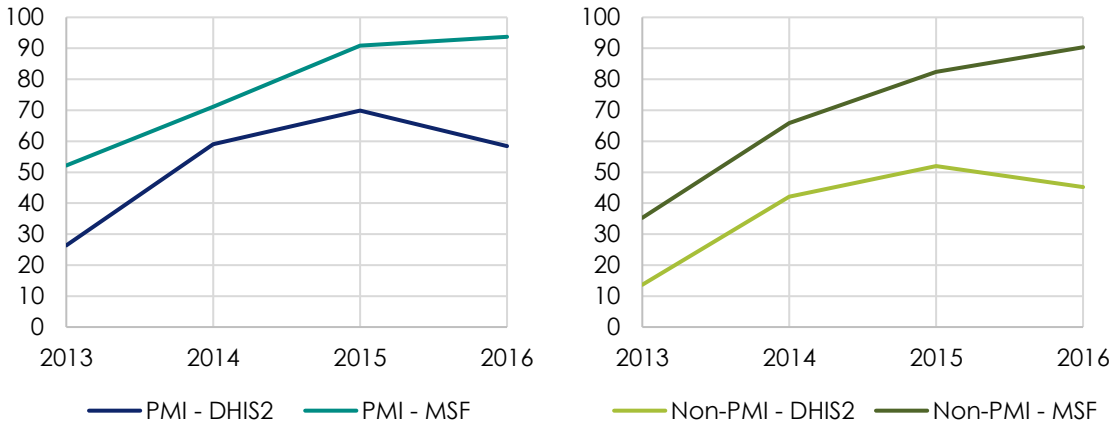
a. Cross River



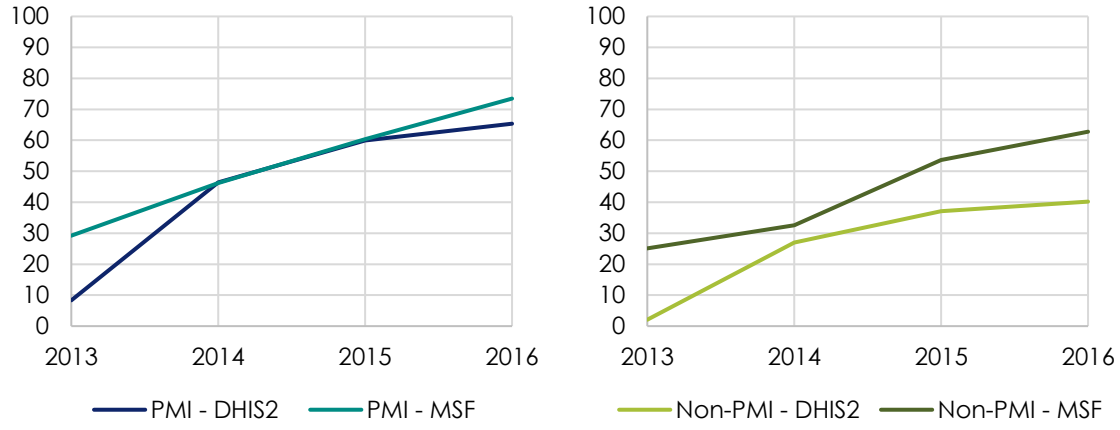
b. Ebonyi



c. Nassarawa



d. Sokoto



3.6.5 Summary of Routine Data Quality Results

Across the four states, availability and completeness of routine data from the MSFs at the PHC level improved significantly between 2008 and early 2016 in both PMI- and non-PMI-supported facilities; however, overall availability and completeness were slightly higher in PMI-supported facilities compared to non-PMI-supported facilities. Accuracy of the data in the PHC MSF's was very low until 2012, but then steadily increased to above 80 percent by early 2016 in Cross River, Ebonyi, and Nassarawa, with slightly better performance in PMI-supported PHCs compared to non-PMI-supported PHCs. In Sokoto, improvement in the accuracy of the PHC data started in 2013, and improved to just under 70 percent by early 2016, with similar improvements observed in both PMI- and non-PMI-supported PHCs.

The consistency in the data reported in the PHC registers and MSFs, assessed through the calculation of verification ratios for select malaria indicators, showed overall that there are discrepancies in the transfer of the data between the two forms. With a few exceptions in Ebonyi and Nassarawa, discrepancies were observed across all four states and in both PMI- and non-PMI-supported PHCs. The greatest discrepancies were observed in Sokoto across all of the selected indicators; while overall the discrepancies in Cross River, Ebonyi, and Nassarawa were smaller. There were a few indicators, however, in Nassarawa in PMI-supported PHCs, specifically the number of children under five with confirmed malaria and the number of children under five with confirmed uncomplicated malaria that received ACT that had large discrepancies between the register and the MSF.

Overall, there were many discrepancies between the data reported in the PHC registers and in the DHIS 2 for the selected indicators in the assessment. Furthermore, there was no marked improvement observed in the consistency of the two data sources between 2013 and 2016 in any of the states, nor any real discernable differences in consistency of the data in PMI-supported PHCs, compared to non-PMI-supported PHCs. When comparing the availability of the DHIS 2 and PHC MSF data, there were different results across all four states. In Cross River, availability of MSF data showed improvement from 2013 to 2016, while availability of DHIS 2 data declined slightly during the same period (for both types of facilities). In Ebonyi, there was a gradual improvement in availability seen in both PHC MSF and DHIS 2 data from 2013 to 2016, while in Nassarawa and Sokoto there was improvement overall in availability of MSF data and little

improvement observed in the availability of the DHIS 2 data. For the comparison of the completeness of the DHIS 2 and MSF data at the PHC level, there was higher completeness in the MSFs overall compared to the DHIS 2 database across all four states. Furthermore, completeness was higher overall in each of the four states in PMI-supported PHCs (for both MSF and DHIS 2 data) compared to the non-supported PHCs for both MSF and DHIS 2 data.

4. DISCUSSION

4.1 Cross River State

4.1.1 Summary of the Implementation of Malaria Interventions and Contextual Factors

During the assessment period, there were many positive changes in malaria prevention and control in Cross River. Household ownership of at least one ITN improved significantly to above 80 percent, while household ITN access rose to 55 percent by 2015. Increases were also observed in ITN use among children under five, pregnant women, and the general population. IPTp (2+ and 3+ doses) coverage did improve, with coverage of 2+ doses reaching around 55 percent by 2015.

There were substantial improvements in availability of malaria commodities during the latter half of the assessment period as evidenced by the PHC routine data that showed reductions in stockouts of all malaria commodities and by the observations conducted at the PHCs, which showed overall high availability of all commodities. Similarly, there was high availability of trained health workers in the PHCs in malaria case management, malaria in pregnancy, and in diagnosing malaria (using RDTs). ANC service coverage was also high (100%), though coverage of PHCs with laboratories and functional microscopes was lower overall at all PHC facilities.

Household survey data showed no significant improvements in coverage of malaria case management among children under five with fever, with diagnostic testing, care-seeking for children with fever, and coverage of any antimalarial treatment and ACTs remaining relatively stable between 2008 and 2015. The PHC routine data do suggest an improvement in coverage of diagnostic testing and treatment with ACTs, while also showing a reduction in provision of ACT treatment based on clinical diagnosis only—though these improvements were seen only toward the end of the assessment period and represent a different population than that of the household surveys.

Changes in malaria morbidity and mortality were difficult to assess due to the limited data available from household surveys and from the PHC and hospital routine data. Parasitemia prevalence as of 2015 was relatively high (approximately 26 percent via microscopy) and severe anemia prevalence was around 7 percent in 2015. The referral hospital data show no reductions in severe malaria cases, malaria case-fatality, nor in the proportion of deaths due to malaria; however, as noted, these data need to be interpreted with caution due to the overall very low reporting of cases and deaths.

Overall, there were few significant changes in contextual factors that are associated with or directly influence child survival and malaria risk in the state during the assessment period. Significant improvements were only

observed in household telephone access, ANC coverage, and vitamin A supplementation for postnatal women and children 6–59 months in Cross River between 2008 and 2013. Flooding in 2012–2013, and in 2015 was also noted in the KIIs as a potential factor that may have led to an increase in malaria prevalence during these years.

4.1.2 PMI Contribution to the Performance of the Malaria Interventions in the State

In general, PMI-supported PHCs showed better performance in terms of availability of malaria commodities, national guidelines, trained health workers, and laboratories and functional microscopes compared to non-PMI-supported PHCs. Overall quality of malaria case management was high in both PMI and non-PMI PHCs, however, PMI PHCs did overall perform better. In terms of quality of care for malaria in pregnancy, both PMI and non-PMI PHCs performed moderately with no substantial differences between the two types of facilities.

During the assessment period, there were also notable improvements in PHC data quality, in terms of the availability, completeness, and accuracy of the data. Generally, both PMI and non-PMI PHCs saw improvements in the quality of their data, but PMI PHCs did perform better overall. Discrepancies in the transfer of data between the PHC register and MSF, and into the DHIS 2 were observed, however, across most of the indicators assessed. Generally, there were no differences between PMI and non-PMI PHCs in the consistency between the data sources.

Overall, the greatest improvements were observed in the availability of malaria commodities and trained health staff, which has led to improved malaria case management in the facilities, improved ownership and use of ITNs, and in IPTp uptake. These positive changes did occur in both PMI- and non-PMI-supported facilities, but were greater overall in PMI-supported facilities. These improvements were also highlighted as the main changes in the KIIs.

4.2 Ebonyi State

4.2.1 Summary of the Implementation of Malaria Interventions

Between 2008 and early 2016, there were substantial improvements in malaria prevention and control in Ebonyi. Household ownership of at least one ITN improved significantly to just under 90 percent, while household ITN access rose to more than 60 percent by 2015. Significant increases were also observed in ITN use among children under five, pregnant women, and the general population. IPTp (2+ and 3+ doses) coverage also significantly improved, to around 40 percent coverage for both 2+ and 3+ doses by 2015.

There were substantial improvements in availability of malaria commodities during the latter half of the assessment period as evidenced by the PHC routine data that showed reductions in stockouts of all malaria commodities and by the observations conducted at the PHCs, which showed overall high availability of all malaria commodities. Similarly, there was high availability of trained health workers in the PHCs in malaria case management, malaria in pregnancy, and in diagnosing malaria (using RDTs). ANC service coverage was very high, though coverage of PHCs with laboratories and functional microscopes was very low.

Household survey data showed very little change in coverage of malaria case management among children under five with fever. Diagnostic testing was very low (only reaching around 5 percent by 2015) and care-seeking coverage for children with fever remained high, but stable between 2008 and 2015. Coverage with any antimalarial drug remained overall low and stable, while the proportion of children that received ACTs out of those that received any antimalarial did show some significant improvement, but only reached around 20 percent. The PHC routine data also show very little changes at the end of the assessment period, though the data points available are very limited. The PHC data do suggest a decline in treatment with ACT based on clinical diagnosis occurring at the end of the assessment period, a high diagnostic testing rate, and high coverage of ACT treatment for confirmed malaria.

Changes in malaria morbidity and mortality were difficult to assess due to the limited data available from household surveys and from the routine data sources. Parasitemia prevalence as of 2015 was relatively high (approximately 30 percent via microscopy) and severe anemia prevalence was around 8 percent in 2015. Confirmed malaria cases remained relatively stable at the end of the assessment period, and the referral hospital data show no changes in severe malaria cases, malaria case-fatality, nor in the proportion of deaths due to malaria; however, as noted, these data need to be interpreted with caution due to the overall low facility reporting rate coverage for PHC data and low reporting of cases and deaths (for hospital data).

There were some significant changes that occurred in contextual factors that are positively associated with or directly influence child survival and malaria risk in the state. Significant improvements were observed in household telephone access, ANC coverage, tetanus toxoid vaccination during pregnancy, vitamin A supplementation for postnatal women and children 6–59 months in Ebonyi between 2008 and 2013. Furthermore, there were also significant reductions in low birth weight prevalence and under-five stunting between 2008 and 2013.

4.2.2 PMI Contribution to the Performance of the Malaria Interventions in the State

In general, PMI-supported PHCs showed better performance in terms of availability of malaria commodities, national guidelines, trained health workers, and laboratories and functional microscopes compared to non-PMI-supported PHCs. Overall quality of malaria case management was high in both PMI and non-PMI PHCs, however, PMI PHCs did perform better overall in terms of patients receiving ACT treatment at the facility compared to non-PMI PHCs. Both PMI and non-PMI PHCs had moderately high quality of care for malaria in pregnancy, with PMI PHCs performing better overall than non-PMI PHCs.

There were also notable improvements in PHC data quality, in terms of the availability, completeness, and accuracy of the data. These improvements were noted in both PMI and non-PMI PHCs, with slightly higher performance in PMI-supported PHCs. There were some small discrepancies in the transfer of data between the PHC register and the MSFs; while the discrepancies in data reported in the PHC registers and DHIS 2 were greater overall for the select indicators examined. Discrepancies in the data between the PHCs and MSFs, and in the PHCs and DHIS 2 were observed in both PMI- and non-PMI-supported PHCs.

Overall, the greatest improvements were observed in the availability of malaria commodities, in trained health staff, and in data reporting. These positive changes have contributed to improved quality of malaria case

management in the facilities, improved ownership and use of ITNs, and in IPTp coverage. While these changes occurred in both PMI- and non-PMI-supported facilities, they were greater overall in PMI-supported facilities. These positive changes were also highlighted in the KIIs.

4.3 Nassarawa State

4.3.1 Summary of the Implementation of Malaria Interventions

There were a number of improvements in malaria prevention and control in Nassarawa between 2008 and early 2016. ITN household ownership improved significantly to 76 percent, while household ITN access rose to just over 30 percent by 2015. Significant increases were also observed in ITN use among children under five, pregnant women, and the general population. IPTp (2+ doses) coverage also significantly improved, but only reached around 30 percent by 2015.

There were improvements in availability of malaria commodities during the latter half of the assessment period as evidenced by the PHC routine data that showed reductions in stockouts of malaria commodities toward the end of the assessment period (generally between 2015 and early 2016) and by the observations conducted at the PHCs, which showed high availability overall of RDTs, ACTs, and SP. LLINs had low availability in the PHCs (around 40 percent and 30 percent, respectively for PMI and non-PMI PHCs). Similarly, there was high availability of trained health workers in the PHCs in malaria case management, malaria in pregnancy, and in diagnosing malaria (using RDTs), and generally high availability of the national treatment guidelines (with the exception of malaria in pregnancy guidelines in non-PMI PHCs). Availability of ANC services, laboratories, and functional microscopes across the PHCs was also high.

Household survey data showed relatively small improvements in coverage of malaria case management among children under five with fever. Diagnostic testing coverage reached only 25 percent by 2015, while care-seeking coverage for children with fever remained high (above 80%), but stable between 2008 and 2015. Treatment with any antimalarial drug reached over 60 percent by 2013, but then showed a significant reduction in 2015; similarly, the proportion of children that were treated with ACTs among those that received any antimalarial improved between 2008 and 2013, but then significantly declined to only 7 percent in 2015. The PHC routine data points were limited overall, but suggest some positive changes occurring toward the end of the assessment period in the reduction of treatment with ACT based on clinical diagnosis only, and moderately high receipt of ACTs for confirmed malaria and low treatment of confirmed malaria with other antimalarial drugs.

As with Cross River and Ebonyi, changes in malaria morbidity and mortality were difficult to assess in Nassarawa during the assessment period. Parasitemia prevalence as of 2015 was relatively high (approximately 36 percent via microscopy) and severe anemia prevalence was 7 percent in 2015. Confirmed malaria cases remained relatively stable at the end of the assessment period, and the referral hospital data showed no changes in severe malaria cases. Some fluctuations were observed in malaria case-fatality and in the proportion of deaths due to malaria; however, as noted, these data need to be interpreted with caution due to the overall low facility reporting rate coverage for PHC data and low reporting of cases and deaths (for hospital data).

There were only a few significant changes in contextual factors that are positively associated with or directly influence child survival and malaria risk in the state that occurred during the assessment period. Significant improvements were observed in household telephone access, tetanus toxoid vaccination during pregnancy, vitamin A supplementation for postnatal women and children 6–59 months, and in exclusive breastfeeding prevalence.

4.3.2 PMI Contribution to the Performance of the Malaria Interventions in the State

In general, PMI-supported PHCs showed better performance in terms of availability of malaria commodities, national guidelines, trained health workers, laboratories, and functional microscopes compared to non-PMI-supported PHCs. Overall, quality of malaria case management was high in both PMI and non-PMI PHCs. Both PMI and non-PMI PHCs had moderately high quality of care for malaria in pregnancy, with PMI PHCs performing overall better than non-PMI PHCs, particularly in terms of women who were advised to sleep under a treated net and who were given an ITN during their visit.

There were also notable improvements in PHC data quality, in terms of the availability, completeness, and accuracy of the data. These improvements were noted in both PMI and non-PMI PHCs, with slightly higher performance in PMI-supported PHCs. There were some large discrepancies in the transfer of data between the PHC register and the MSFs for a few of the selected indicators; with larger discrepancies observed in PMI-supported PHCs for these indicators. There were also discrepancies in the consistency of the data in the PHC registers and the DHIS 2; however, there was no discernable difference across the years assessed between PMI and non-PMI PHCs.

Similar to Cross River and Ebonyi, the greatest improvements were observed in the distribution and availability of malaria commodities, in the coverage of trained health staff, and in improved reporting. These improvements have contributed to the increases in ownership and use of ITNs, improved quality of malaria case management and malaria in pregnancy in the facilities, and increases in IPTp coverage. Positive changes occurred in both PMI- and non-PMI-supported facilities, but were greater in PMI-supported facilities overall.

4.4 Sokoto State

4.4.1 Summary of the Implementation of Malaria Interventions

During the assessment period, some improvements in malaria prevention and control occurred in Sokoto. Household ownership of at least one ITN improved significantly to just under 80 percent, however, household ITN access only increased to 24 percent by 2015. Significant increases were observed in ITN use among all populations assessed—children under five, pregnant women, and the general population—between 2008 and 2015. IPTp coverage showed a significant improvement during this period, however, it only rose to 28 percent by 2015 (2+ doses).

The PHC routine data did not show improvements in the reduction of stockouts of malaria commodities during the assessment period; however, there was generally high availability of RDTs and ACTs across the PHCs and in PMI-supported PHCs, and good availability of SP and LLINs. There was high availability of

trained health workers in the PHCs in malaria case management and in diagnosing malaria (using RDTs), while roughly half of the PHCs had staff trained in malaria in pregnancy. ANC service coverage was high in PMI-supported PHCs (above 90 percent), but only reached 50 percent of non-PMI-supported PHCs. Generally, there was low coverage of laboratories and functional microscopes at the PHCs.

Household survey data showed no changes in coverage of malaria case management among children under five with fever between 2008 and 2015. Diagnostic testing was very low (only reaching around 5 percent by 2015) and care-seeking coverage for children with fever remained low and unchanged (reaching only 24 percent in 2015). Treatment with any antimalarial drug and ACTs was overall low, and coverage also remained unchanged during the assessment period. Due to low reporting rates, trends in routine PHC data on malaria diagnostic testing and treatment could not be assessed.

It was difficult to assess changes in malaria morbidity and mortality during the assessment period in Sokoto due to the limited data available from household surveys and from the PHC and hospital routine data. Parasitemia prevalence as of 2015 was high (approximately 47 percent via microscopy) and severe anemia prevalence was also high at 19 percent in 2015. Referral hospital data suggest a small reduction in severe malaria cases, while fluctuations were observed in malaria case-fatality and the proportion of deaths due to malaria during the latter part of the assessment period, making it difficult to discern trends. Trends in malaria cases at the PHCs were unavailable to assess due to low reporting rates over the assessment period.

There were only a few significant changes during the assessment period in contextual factors that are positively associated with or directly influence child survival and malaria risk in the state. Significant improvements were observed in household telephone access, polio vaccination coverage, and vitamin A supplementation for children 6–59 months. Additionally, there was a significant reduction in diarrhea prevalence among children under five years of age. Significant flooding during the last year was noted in the KIIs as potentially increasing malaria risk toward the end of the assessment period.

4.4.2 PMI Contribution to the Performance of the Malaria Interventions in the State

As in the other states, the PMI-supported PHCs showed better performance in terms of availability of malaria commodities, national guidelines, trained health workers, and laboratories and functional microscopes compared to non-PMI-supported PHCs. Overall the quality of malaria case management was relatively high in both PMI and non-PMI PHCs, however, PMI PHCs did perform better overall. Both PMI and non-PMI PHCs had moderate quality of care for malaria in pregnancy, though overall performance was better in PMI-supported PHCs.

There were substantial improvements in PHC data quality, in terms of the availability, completeness, and accuracy of the data. These improvements were noted in both PMI and non-PMI PHCs, with slightly higher performance in PMI-supported PHCs. There were discrepancies however, observed in the transfer of data between the PHC register and the MSFs and between the data reported in the PHC registers and DHIS 2. These discrepancies were observed in both PMI- and non-PMI-supported PHCs.

Overall, positive changes were observed in the availability of most malaria commodities, trained health staff, and in data reporting. These changes have contributed to improved quality of malaria case management in the facilities, improved ownership and use of ITNs, and in IPTp coverage. At the facility level, positive changes occurred in both PMI- and non-PMI-supported facilities, but were greater overall in PMI-supported facilities.

5. CONCLUSION

Between 2008 and early 2016, there were significant improvements in malaria intervention coverage across the four states. All states received substantial technical assistance and support from the FMOH, the SMOH/SMEP, and other partners during this period for malaria control efforts. The main improvements observed were increased availability of key malaria commodities and improved supply chain management, increased availability of national treatment guidelines and training of health workers malaria diagnosis and treatment and malaria in pregnancy in public health facilities, and overall improvements in data reporting at PHCs. These interventions have contributed to improvements observed across the four states in ITN ownership and use, in IPTp coverage, and improved quality of care for malaria case management and for malaria in pregnancy. The findings also highlight an overall better performance in quality of care and quality of data at the facility level in PMI-supported facilities.

While many improvements were observed during this period, gaps in coverage and challenges in implementation remain that should be the focus of future efforts. Household ownership of at least one ITN improved significantly; however, gaps in overall household access remain and improvement in use across all populations is needed to reach the targets set in the current NMSP. Across all four states, coverage of diagnostic testing and treatment for children under five with fever was very low and showed very little improvement, if any, between 2008 and 2015. In Sokoto, care-seeking for children under five with fever was also discernably low. IPTp coverage did improve but was well below the set targets. Generally, there was high availability of malaria commodities in the four states, but challenges with stockouts of key malaria commodities – particularly LLINs, remains a challenge that was emphasized in the KIIs. Similarly, significant efforts in training of health workers have been made, but gaps remain, particularly in availability of trained staff in malaria in pregnancy. Across all four states, coverage of trained staff in malaria in pregnancy was lower than coverage for malaria diagnostic testing and treatment. Finally, there have been dramatic improvements in data quality during the latter half of the assessment period, but gaps still remain in terms of overall low reporting rates across PHCs in the four states and in the accurate transfer of data up through the reporting system. This was evident through the inconsistencies found between the PHC registers, the MSFs, and in the DHIS 2.

6. RECOMMENDATIONS

Table 29 outlines the recommendations for each component area that was examined based on the key findings from the assessment. The table also includes suggested stakeholders responsible for implementing the recommendations.

Table 29. Recommendations based of the assessment findings, by component area

Key Issues	Recommendations	Stakeholder(s) Responsible
Component Area 1: Coverage of malaria control interventions		
1.1. Coverage of at least one ITN in the household has increased significantly in all four states; however, a large gap remains in household access to an ITN indicating that there are insufficient ITNs to cover all people in the household. ITN use also rose over the assessment period; however, due to issues around access, use also remains well below national and PMI-set targets.	• Continue carrying out LLIN distribution using both mass campaigns and targeted distribution through ANC facilities and schools where gaps in access remain. • Consider a rapid survey to quantify the real gap in access to LLINs. • Review routine data on a regular basis to monitor LLIN distribution through routine channels.	NMEP, SMEPs, PMI, and partners
1.2. Overall, care-seeking was high in Cross River, Ebonyi, and Nassarawa, but did not show any improvements over the assessment period. Diagnostic testing and antimalarial and ACT treatment coverage remain very low across all states.	• Carry out operational research or perform further analysis of exiting data to better understand factors associated with low coverage of diagnostic testing and treatment, as it does not correspond with the high coverage of care-seeking and overall high availability of malaria commodities in PHC facilities. • Tailor information, education, and communication/behavior change communication (IEC/BCC) messages at the community level to reinforce timely care-seeking and uptake of testing and treatment for fever at PHCs.	NMEP, SMEPs, PMI, and partners
1.3. IPTp coverage improved in all states over the assessment period, but remains very low for both 2+ and 3+ doses.	• Reinforce supervision at heath facilities with a focus on IPTp treatment. A specific tool could be designed to monitor IPTp provision at the facility level. • Consider conducting a small-scale qualitative study to better understand health providers' perspectives on the low uptake of IPTp.	NMEP, SMEPs, PMI, and partners
Component Area 2: Malaria commodity availability		
2.1. Malaria commodities availability showed improvements in the latter half of the assessment period with declining numbers	• Develop improved commodities tracking system/tool that is able to more accurately predict and monitor commodity supply and	NMEP, SMEPs, PMI, and partners

Key Issues	Recommendations	Stakeholder(s) Responsible
of stockouts. Observations at PHCs also demonstrated overall high availability of malaria commodities, though availability of LLINs did vary across the different states and was overall lower than RDTs, ACTs, and SP. While significant improvements have been demonstrated, PHCs continue to experience stockouts and progress has not been even across all PHCs (with PMI-supported facilities showing overall better availability than non-PMI-supported facilities).	demand based on malaria surveillance data and be able to respond more timely to large fluctuations in demand.	
Component Area 3: Quality of malaria case management and malaria in pregnancy care; availability of trained health workers		
3.1. Availability of trained health workers in malaria case management and in use of RDTs for diagnosing malaria was very high across all PHCs, though was slightly higher in PMI-supported PHCs. Availability of trained health workers in malaria in pregnancy was lower across the board, however, and ranged widely across the states, indicating that there is still improvement in coverage of trained health workers in this area.	• Continue routine supervision, provision of guidelines, and refresher trainings to maintain high quality of malaria case management in all health facilities. • Focus short-term training efforts on ensuring adequate coverage of trained health providers in malaria in pregnancy care at PHCs that offer ANC services.	NMEP, SMEP, PMI, and partners
3.2. The majority of PHCs demonstrated good quality of care for malaria case management. There were a few identified areas for improvement in some of the states, specifically in ensuring clients are told the result of the malaria test and are given an ACT with a confirmed positive test.	• Integrate routine monitoring of quality of care into supervisory visits conducted at PHCs to ensure high quality is maintained and to be able to better target mentoring and refresher training efforts for health providers in the delivery of malaria case management. • Set up a mechanism for periodic external rapid assessments of quality of care. The assessment could be done every six months in a select number of health facilities. • Incorporate messaging around importance of asking the health provider for the malaria test results in IEC/BCC activities at the community level.	NMEP and partners

Key Issues	Recommendations	Stakeholder(s) Responsible
3.3. The quality of care for malaria in pregnancy was generally lower across the PHCs, with only adequate coverage of pregnant women receiving SP, receiving the dose of SP in the presence of a health worker, getting advice to sleep under an LLIN, and receiving an LLIN during the prenatal care visit.	• Integrate routine monitoring of quality of care into supervisory visits conducted at PHCs to ensure high quality is maintained and to be able to better target mentoring and refresher training efforts for health providers in the delivery of malaria in pregnancy care.	SMEP, PMI, and partners
Component Area 4: Data quality		
4.1. Overall, there were substantial improvements in data quality during the assessment period with great improvements in data availability, completeness, and accuracy at the PHC level. The main gaps identified were in the transfer of data across the different reporting levels, with inconsistencies noted across all indicators and levels of the reporting system and in the overall coverage of PHCs reporting data.	• Conduct regular data quality assessments at the PHCs, with data verification tracing through the different levels of the reporting system to monitor data quality and identify common data quality issues. A rapid data quality assessment approach and tool could be used during supervisory visits carried out at the PHCs. • Investigate further into the main source(s) of error in the transfer of data across the reporting system to understand why the inconsistencies are occurring during the transfer of data from the PHC register to the MSF, and from the MSF into the DHIS 2 system, and to identify actions to improve the accurate transfer of data up through the reporting system. • Review and revise existing data quality assurance tools and procedures. This process could be led by a specific data quality assurance taskforce that includes all key stakeholders. • Assess capacity of NMEP, SMEP, and LGA-level staff in malaria surveillance and M&E to identify gaps for improvement. • Consider producing malaria weekly/biweekly bulletins to help track and share progress with all key stakeholders. The bulletin will serve to monitor and improve data quality and use.	NMEP, SMEPs, PMI, and partners

Key Issues	Recommendations	Stakeholder(s) Responsible
	• Consider setting up a mobile phone reporting system to improve health facilities reporting rate. • Consider setting up a center(s) of excellence for malaria surveillance and M&E. The center(s), which could be public health centers, would be supported to champion and enhance quality malaria surveillance and M&E at the substate levels.	

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8. APPENDIXES

8.1 Data Collection Tool: Primary Healthcare Facility Collation Tool

MALARIA INTERVENTION ASSESSMENT: PRIMARY HEALTHCARE FACILITY COLLATION TOOL

Facility Identification	
State	
LGA	
Political Ward	
Number and Name of Health Facility (FID)	
PMI-supported facility?	Yes:I__I No:I__I
Data collator name and code	Name:_____ Code: I__I__I__I
Date of visit	I__I__I/I__I__I/2016
Time data collation began	

Then, put here the selection option if person is SUPERVISOR OR DATA COLLATOR.

The supervisor will complete the next two sections. The data collator will skip to completing the monthly summary forms for each year.

TO BE COMPLETED BY THE SUPERVISOR: DETAILED FACILITY INFORMATION	
Facility Code	I__I__I__I__I I__I__I__I__I Not available
Telephone Number (of health facility or health staff in charge)	I__I__I__I__I I__I__I__I__I I__I__I__I__I
Names of hospitals that the facility refers to	
Number of health facility staff in total	Medical doctor: I__I__I__I Nurse : I__I__I__I Midwife: I__I__I__I Community Health Officer – CHO: I__I__I__I Community Health Extension Worker – CHEW: I__I__I__I Junior Community Health Extension Worker – J/CHEW: I__I__I__I Records Officer: I__I__I__I Laboratory technician: I__I__I__I Pharmacist Technician/Assistant: I__I__I__I Others: I__I__I__I
When did this facility start operating?	Before 2008: I__I 2008–2016: I__I. Specify the year: I__I__I__I__I
Does the facility offer ante-natal care services?	Yes:I__I No:I__I

TO BE COMPLETED BY THE SUPERVISOR: **Observation of Malaria Case Management Commodities and Tools at PHC Facilities:**	
Instructions: For each of the following questions, check and see if each item is present at the facility today.	
Does the facility have malaria Rapid Diagnostic Tests (RDTs) available?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have Artemether-lumefantrine (AL) (Coartem or generic) available?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have Artesunate-amodiaquine (ASAQ) available?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have Sulphadoxine-Pyrimethamine (SP) available?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have long-lasting insecticidal nets (LLINs) or insecticide-treated nets (ITNs) available?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have a laboratory?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have a functional microscope?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have the national malaria treatment guidelines available?	Yes: I__I No: I__I Not confirmed: I__I
Does the facility have the Malaria in Pregnancy (IPTp) protocol/guideline available?	Yes: I__I No: I__I Not confirmed: I__I
PLEASE ASK: Does the facility have at least one health worker trained in malaria in pregnancy?	Yes: I__I No: I__I
PLEASE ASK: Does the facility have at least one health worker trained in malaria case management (treatment)?	Yes: I__I No: I__I
PLEASE ASK: Does the facility have personnel trained in using RDTs for diagnosing malaria?	Yes: I__I No: I__I
PLEASE ASK: Does the facility have personnel trained in microscopy for diagnosing malaria?	Yes: I__I No: I__I
PLEASE ASK: In most cases in this facility, is it the same health care worker who sees the patient who does the Rapid Diagnostic Test (RDT) or is it someone else?	Yes, the same health care worker that sees the patient usually does the RDT: I__I No, the RDT is usually done by the laboratory technician: I__I No, the RDT is usually done by a different health care worker. I__I We do not do/have RDTs here. I__I

MALARIA DATA COLLATION FROM MONTHLY SUMMARY FORMS OR REGISTERS

Instructions: Enter the number as seen in the monthly summary form or register for each indicator and month. If data are not available for a particular month, write N/A. Do not leave any empty cells.

YEAR: 2015

	JAN	FEB	MAR	APR	MAY	JUN	JAN	FEB	MAR	APR	MAY	JUN
Health Facility Attendance												
Number of **males** between 0-28 *days* (MSF 1a)												
Number of **males** between 29 days-11 months (MSF 1b)												
Number of **males** between 12-59 months (MSF 1c)												
Number of **males** between 5-9 years (MSF 1d)												
Number of **males** between 10-19 years (MSF 1e)												
Number of **males** 20 years+ (MSF 1f)												
Number of **females** between 0-28 *days* (MSF 1g)												
Number of **females** between 29 days -11 months (MSF 1h)												
Number of **females** between 12-59 months (MSF 1i)												
Number of **females** between 5-9 years (MSF 1j)												
Number of **females** between 10-19 years (MSF 1k)												
Number of **females** 20 years+ (MSF 1l)												
Total number of persons (male and female patients) (Total - all ages). Write the number that is on the form. Do not add the previous values. (MSF 1m)												
m.1. *Note to tool developer: Auto-calculate* ***a+b+c+d+e+f+g+h+i+j+k+l here. Skip values that have "N/A."***												
m.2. **Computation accuracy ratio of reported to actual totals**. *Note to tool developer: auto-calculate ratio of m/m1 here*												

	JAN	FEB	MAR	APR	MAY	JUN	JAN	FEB	MAR	APR	MAY	JUN
Health Facility Attendance												
Number of **children** (males and females) under 5 years of age (< 5 years) *[Note: this indicator is not included in the register, it will need to be calculated by adding the following previous indicators:* ***a+b+c+g+h+i]*** ***Note to tool developer:*** **AUTO-calculate this**												
Number of **persons** (male and female patients) ages 5 years and above (≥ 5 years) *[Note: this indicator is not included in the register, it will need to be calculated by adding the following previous indicators: d+e+f+j+k+I]* ***Note to tool developer:*** **AUTO-calculate this**												
Maternal Health (Ante-natal Care)												
p. Antenatal attendance – total (MSF 3)												
q. Number of pregnant women who received malaria IPT1 (MSF 11)												
r. Number of pregnant women who received malaria IPT2 (MSF 12)												
s. Number of pregnant women who received malaria IPT3+ *[Note: this indicator is not included in the 2013 version of the monthly summary form but may be available in other versions]*												
t. Number of pregnant women who received LLIN (MSF 13)												
Malaria Prevention (LLIN)												
u. Number of children under 5 years who received LLIN (MSF 79)												
Malaria Testing												
w. Number of persons with fever (< 5 years) (MSF 190a)												
x. Number of persons with fever (≥ 5 years) (MSF 190b)												
y. Number of persons with fever (Total – all ages) (MSF 190c)												

	JAN	FEB	MAR	APR	MAY	JUN	JAN	FEB	MAR	APR	MAY	JUN
Health Facility Attendance												
y.1. *note to tool developer:* auto-calculate w + x here												
y.2. Computation accuracy ratio: *note to tool developer*— auto-calculate y/y.1. here												
z. Number of persons presenting with fever and tested by RDT (< 5 years) (MSF 191a)												
aa. Number of persons presenting with fever and tested by RDT (≥ 5 years) (MSF 191b)												
bb. Number of persons presenting with fever and tested by RDT (Total – all ages) (MSF 191c)												
bb.1. *Note to developer:* auto-calculate z + aa here.												
bb.2. **Computation accuracy ratio:** *note to developer*— auto-calculate bb/bb.1. here												
cc. Number of persons test positive for malaria by RDT (< 5 years) (MSF 192a)												
dd. Number of persons test positive for malaria by RDT (≥ 5 years) (MSF 192b)												
ee. Number of persons test positive for malaria by RDT (Total – all ages) (MSF 192c)												
ee.1. *Note to developer:* auto-calculate cc + dd here.												
ee.2. **Computation accuracy ratio:** *note to developer*— auto-calculate ee/ee.1. here												
ff. Number of persons presenting with fever and tested by Microscopy (< 5 years) (MSF 193a)												
gg. Number of persons presenting with fever and tested by Microscopy (≥ 5 years) (MSF 193b)												
hh. Number of persons presenting with fever and tested by Microscopy (Total – all ages) (MSF 193c)												
hh.1. *Note to developer:* auto-calculate ff + gg here.												
hh.2. **Computation accuracy ratio:** *note to developer*— auto-calculate hh/hh.1. here												

	JAN	FEB	MAR	APR	MAY	JUN	JAN	FEB	MAR	APR	MAY	JUN
Health Facility Attendance												
ii.Number of persons tested positive for malaria by microscopy (< 5 years) (MSF 194a)												
jj.Number of persons tested positive for malaria by microscopy (≥ 5 years) (MSF 194b)												
kk. Number of persons tested positive for malaria by microscopy (Total – all ages) (MSF 194c)												
kk.1. *Note to developer:* auto-calculate ii + jj here.												
kk.2. **Computation accuracy ratio:** *note to developer*— auto-calculate kk/kk.1. here												
Malaria in Pregnancy												
ll. Number of pregnant women with clinically diagnosed malaria (MSF 195)												
mm. Number of pregnant women with confirmed malaria (RDT or Microscopy) (MSF 196)												
Malaria Cases												
nn. Number of persons with clinically diagnosed malaria (< 5 years) (MSF 197a)												
oo. Number of persons with clinically diagnosed malaria (≥ 5 years) (MSF 197b)												
pp. Number of persons with clinically diagnosed malaria (Total – all ages) (MSF 197c)												
pp.1. *Note to developer:* auto-calculate nn + oo here.												
pp.2. **Computation accuracy ratio:** *note to developer*— auto-calculate pp/pp.1. here												
qq. Number of persons with confirmed (RDT or Microscopy) uncomplicated malaria (< 5 years) (MSF 198a)												
rr. Number of persons with confirmed (RDT or Microscopy) uncomplicated malaria (≥ 5 years) (MSF 198b)												

	JAN	FEB	MAR	APR	MAY	JUN	JAN	FEB	MAR	APR	MAY	JUN
Health Facility Attendance												
ss. Number of persons with confirmed (RDT or Microscopy) uncomplicated malaria (Total – all ages) (MSF 198c)												
ss.1. *Note to developer:* auto-calculate qq + rr here.												
ss.2. **Computation accuracy ratio:** *note to developer*— auto-calculate ss/ss.1. here												
tt. Number of persons with severe malaria (< 5 years) (MSF 199a)												
uu. Number of persons with severe malaria (≥ 5 years) (MSF 199b)												
vv. Number of persons with severe malaria (Total – all ages) (MSF 199c)												
vv.1. *Note to developer:* auto-calculate tt + uu here.												
vv.2. **Computation accuracy ratio:** *note to developer*— auto-calculate vv/vv.1. here												
Malaria Treatment												
ww. Number of persons with confirmed uncomplicated malaria receiving ACT (< 5 years) (MSF 200a)												
xx. Number of persons with confirmed uncomplicated malaria receiving ACT (≥ 5 years) (MSF 200b)												
yy. Number of persons with confirmed uncomplicated malaria receiving ACT (Total – all ages) (MSF 200c)												
yy.1. *Note to developer:* auto-calculate ww + xx here.												
yy.2. **Computation accuracy ratio:** *note to developer*— auto-calculate yy/yy.1. here												
zz. Number of persons treated with ACT on the basis clinical diagnosis only (< 5 years) (MSF 201a)												
aaa. Number of persons treated with ACT on the basis clinical diagnosis only (≥ 5 years) (MSF 201b)												

	JAN	FEB	MAR	APR	MAY	JUN	JAN	FEB	MAR	APR	MAY	JUN
Health Facility Attendance												
bbb. Number of persons treated with ACT on the basis clinical diagnosis only (Total – all ages) (MSF 201c)												
bbb.1. *Note to developer:* auto-calculate zz + aaa here.												
bbb.2. **Computation accuracy ratio:** *note to developer*—auto-calculate bbb/bbb.1. here												
ccc. Persons with confirmed uncomplicated malaria treated with other antimalarials (Total – all ages) (MSF 202)												
Malaria Commodity Availability (Enter Yes, No or N/A)												
cdd. Stock out of ACTs for 7 days consecutively in the past one month? (MSF 225)												
eee. Stock out of RDTs for 7 days consecutively in the past one month? (MSF 226)												
fff. Stock out of SPs for 7 days consecutively in the past one month? (MSF 227)												
ggg. Stock out of LLINs for 7 days consecutively in the past one month? (MSF 228)												
(Tool developer: At the end of each month, please add the following <u>two questions</u>): **At which location did you collate the data for this month?** **ANSWERS: AT THE PRIMARY HEALTH CARE FACILITY (PHC) OR AT THE STATE OFFICE** **Did the data collated for this month come from the 2013 version of the HMIS Monthly Summary Form (MSF) or from a different type of form/register? ANSWERS: FROM THE 2013 VERSION OF THE HMIS MSF OR FROM A DIFFERENT TYPE OF FORM/REGISTER** (Tool developer: If "FROM THE 2013 VERSION OF THE HMIS MSF" is selected, skip to the next open-ended section below (i.e. "Please add any general observations you had as you completed this month"). If "FROM A DIFFERENT TYPE OF FORM/REGISTER" is selected, present the following three additional indicators to be collated. Once the additional indicators are collated, proceed to the general comments section):												
Additional Health Facility Attendance Indicators to Collate if the 2013 Version of the HMIS MSF was NOT Used for This Month												
hhh. Number of **children** (males and females) under 5 years of age (< 5 years) (include not available and not legible options)												

	JAN	FEB	MAR	APR	MAY	JUN	JAN	FEB	MAR	APR	MAY	JUN
Health Facility Attendance												
iii. Number of **persons** (males and females) ages 5 years and above (≥ 5 years) (include not available and not legible options)												
jjj. Total number of persons (Total – all ages) (include not available and not legible options)												
General comments from data collator												
Please add any general observations you had as you completed this month.												
Did you experience any challenges in collating the data for this year? If so, please explain.												

Note to tool developer: Please replicate the table above for each of these years: 2014, 2013, 2012, 2011, 2010, 2009, 2008
Please also replicate the table above for the first three months in 2016: January - March

NOTES FOR TOOL DEVELOPER: ALSO *PROGRAM* THESE CALCULATIONS FOR THE FOLLOWING INDICATORS:

COMPLETENESS (% OF INDICATORS COMPLETE per month for each facility):
NUMERATOR=number of complete fields on monthly summary forms (i.e. number of monthly summary forms or registers with no N/A or blank fields) / DENOMINATOR= 56 (or 57 if the IPT3+ indicator is available) (That is the total number of fields on the tool.)

AVAILABILITY (% OF MONTHLY SUMMARY FORMS AVAILABLE per facility per year):
NUMERATOR=number of monthly summary forms or registers available to review / DENOMINATOR= 12 (the number of monthly summary forms or registers that should be available to review per year)

TIMELINESS (% FACILITIES WITH A MSF DATED FOR THE MONTH OF DECEMBER 2015) NUMERATOR=number of facilities with a "Yes" response for field "Hhh" (i.e., with a report dated for the month that precedes the month before this visit) / DENOMINATOR=number of facilities in the assessment sample

ACCURACY INDEX: Measured by multiplying the values of the 10 computation accuracy ratios (NUMERATOR = written total in the monthly summary form or register / DENOMINATOR = value obtained by adding values in relevant fields) in the table above. That is, multiply fields m2, bb2, ee2, hh2, kk2, pp2, ss2, vv2, yy2, bbb2.

hhh. Is there a COMPLETED MONTHLY SUMMARY FORM for the month preceding the month before this visit (e.g., if the visit is in February, is there a form for December; if the visit is in March, is there a form for January)?

Circle: YES NO

CROSS-CHECK SELECTED INDICATORS: Find each indicator in the daily registers for the month preceding the month before this visit. (e.g., if the visit is in February, then write the values recorded for December.) Add the "cases" (either ticks, crosses, or "+" and "–" symbols as appropriate) for each indicator for the whole month and enter the total for the month.

	Indicator	Total for the month	Verification Ratio*
	Refer to the Daily General Attendance Register for the next six indicators		
a-1	Number of **males** between 0-28 *days* (add all ticks of #11a)		
b-1	Number of **males** between 29 days-11 months (add all ticks of #11b)		
c-1	Number of **males** between 12-59 months (add all ticks of #11c)		
g-1	Number of **females** between 0-28 *days* (add all ticks of #12a)		
h-1	Number of **females** between 29 days-11 months (add all ticks of #12b)		
i-1	Number of **females** between 12-59 months (add all ticks of #12c)		
	Refer to the Daily OPD Register for the next six indicators		
z-1	Number of persons presenting with fever and tested by RDT (< 5 years) (add "+" and "–" of column #19a <5, if column #19a is not completed use columns #13 and #15)		
cc-1	Number of persons test positive for malaria by RDT (< 5 years) (add "+"only of #19a <5, if column #19a <5 is not completed use column #15))		
ff-1	Number of persons presenting with fever and tested by microscopy (< 5 years) (add "+" and "–" of #19b <5, if column #19b <5 is not completed use columns #13 and #15)		
ii-1	Number of persons tested positive for malaria by microscopy (< 5 years) (add "+"only of #19b <5, if column #19b<5 is not completed use #15)		
qq-1	Number of persons with confirmed (RDT or Microscopy) uncomplicated malaria (< 5 years)) (add all ticks of #20 <5, if column #20 is not completed use column #15)		
ww-1	Number of persons with confirmed uncomplicated malaria receiving ACT (< 5 years) (add ticks of #22 <5 IF #20 <5 is also ticked, if columns #22 and/or #20 are not completed use columns #15 and #16)		

	Indicator	Total for the month	Verification Ratio*
Please add any general observations you had as you completed this cross check.			
Did you experience any challenges in conducting this cross check? If so, please explain.			

PROGRAM CALCULATIONS **that compare the auto-calculated totals from the last column above to the corresponding column of the monthly summary form, e.g., if the visit is in February, then compare the values in the final column of the table above [NUMERATOR] to the December column values for corresponding rows of the monthly summary form [DENOMINATOR] to create a verification ratio. The VR for indicator "a" would be the value in the "Total for the month" column for row "a-1" in the cross-check tool / the value for row "a" in the "December" column of the monthly summary tool.**

Tool completed by			
Name:	**Signature:**	**Date:**	**Time data collation ended:**
Tool verified by			
Name:	**Signature:**	**Date:**	**Time:**

8.2 Data Collection Tool: Hospital Collation Tool

MALARIA INTERVENTION ASSESSMENT: HOSPITAL COLLATION TOOL

Hospital Identification	
State	
LGA	
Political Ward	
Number and Name of Hospital (HID)	
Data collator name and code	Name:_____ Code: I__I__I__I
Date of visit	I__I__I/I__I__I/2016
Time data collation began	

Then, put here the selection option if person is SUPERVISOR OR DATA COLLATOR. The supervisor will complete the section 1.

SECTION 1: DETAILED HOSPITAL INFORMATION TO BE COMPLETED BY THE SUPERVISOR	
Hospital/Facility Code	I__I__I__I__I I__I__I__I__I I__I__I__I__I Not available
Telephone Number (of hospital or health staff in charge)	I__I__I__I__I I__I__I__I__I I__I__I__I__I
Number of hospital staff in total	Medical doctor: I__I__I__I Nurse : I__I__I__I Midwife: I__I__I__I Pharmacist : I__I__I__I Pharmacy technician: I__I__I__I Records Officer: I__I__I__I Laboratory scientist: I__I__I__I
When did this hospital start operating?	Before 2008: I__I 2008–2016: I__I. Specify the year: I__I__I__I__I

For the data collator: Which year do you want to enter data for? List all years from 2008 to 2016.

After year is selected, which month do you want to enter data for? List all months for selection.

For each month selected, ask: Do you want to collate data from the HMIS monthly summary form or from a different type of monthly register? If HMIS monthly summary form, go to section 2. If "other monthly register" go to section 3. (Note: After the collation for a particular month has been completed, then the data collator should be asked again which month he/she wants to enter data for next followed by the type of monthly register.)

SECTION 2: MALARIA DATA COLLATION FROM MONTHLY SUMMARY FORMS

Instructions: Enter the number as seen in the monthly register for each indicator. If data is not available for a particular indicator, write N/A. If data is not legible, select not legible. Do not leave any empty cells.

YEAR: 2015

	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB
Health Facility Attendance												
Number of **males** between 0-28 *days* (MSF 1a)												
Number of **males** between 29 days-11 *months* (MSF 1b)												
Number of **males** between 12-59 *months* (MSF 1c)												
Number of **males** between 5-9 years (MSF 1d)												
Number of **males** between 10-19 years (MSF 1e)												
Number of **males** 20 years+ (MSF 1f)												
Number of **females** between 0-28 *days* (MSF 1g)												
Number of **females** between 29 days-11 *months* (MSF 1h)												
Number of **females** between 12-59 *months* (MSF 1i)												
Number of **females** between 5-9 years (MSF 1j)												
Number of **females** between 10-19 years (MSF 1k)												
Number of **females** 20 years+ (MSF 1l)												
Total number of persons (male and female patients) (Total - all ages) (MSF 1m)												
m.1. *Note to developer:* auto-calculate ***a+b+c+d+e+f+g+h+i+j+k+l*** here.												
m.2. **Computation accuracy ratio:** *note to developer*— auto-calculate m/m.1. here												
Number of **children** (males and females) under 5 years of age (< 5 years) *[Note: this indicator is not included in the register, it will need to be calculated by adding the following previous indicators:*												

	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB
Health Facility Attendance												
***a+b+c+g+h+i]* Note to developer: auto-calculate this.**												
Number of **persons** (male and female patients) ages 5 years and above (≥ 5 years) *[Note: this indicator is not included in the register, it will need to be calculated by adding the following previous indicators: d+e+f+j+k+l]* ***Note to developer: auto-calculate this.***												
Maternal Health (Ante-natal Care)												
p. Antenatal attendance – total (MSF 3)												
Malaria in Pregnancy												
q. Number of pregnant women with clinically diagnosed malaria (MSF 195)												
r. Number of pregnant women with confirmed malaria (RDT or Microscopy) (MSF 196)												
Malaria Cases												
s. Number of persons with clinically diagnosed malaria (< 5 years) (MSF 197a)												
t. Number of persons with clinically diagnosed malaria (≥ 5 years) (MSF 197b)												
u. Number of persons with clinically diagnosed malaria (Total – all ages) (MSF 197c)												
u.1. ***Note to developer:*** auto-calculate s+t here.												
u.2. **Computation accuracy ratio:** *note to developer*— auto-calculate u/u.1. here												
v. Number of persons with confirmed uncomplicated malaria (< 5 years) (MSF 198a)												
w. Number of persons with confirmed uncomplicated malaria (≥ 5 years) (MSF 198b)												
x. Number of persons with confirmed uncomplicated malaria (Total – all ages) (MSF 198c)												
x.1. ***Note to developer:*** auto-calculate v+w here.												

	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB
Health Facility Attendance												
x.2. **Computation accuracy ratio:** *note to developer*— auto-calculate x/x.1. here												
y. Number of persons with severe malaria (< 5 years) (MSF 199a)												
z. Number of persons with severe malaria (≥ 5 years) (MSF 199b)												
aa. Number of persons with severe malaria (Total – all ages) (MSF 199c)												
aa.1. ***Note to developer:*** auto-calculate y+z here.												
aa.2. **Computation accuracy ratio:** *note to developer*— auto-calculate aa/aa.1. here												
Mortality												
cc. Number of deaths among **males** between 0-28 *days* (MSF 137a)												
dd. Number of deaths among **males** between 29 days-11 *months* (MSF 137b)												
ee. Number of deaths among **males** between 12-59 *months* (MSF 137c)												
ff. Number of deaths among **females** between 0-28 *days* (MSF 137g)												
gg. Number of deaths among **females** between 29 days-11 *months* (MSF 137h)												
hh. Number of deaths among **females** between 12-59 *months* (MSF 137i)												
Number of deaths among **children** (males and females) under 5 years of age (< 5 years) *[Note: this indicator is not included in the register, it will need to be calculated by adding the following previous indicators:* ***cc+dd+ee+ff+gg+hh****]* **AUTO-POP**												
Under 5 Mortality (Causes)												
jj. Number of deaths among children under 5 years of age due to d**iarrhoea** (MSF 142a)												

	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB	JAN	FEB
Health Facility Attendance												
kk. Number of deaths among children under 5 years of age due to **malaria** (MSF 142b)												
ll. Number of deaths among children under 5 years of age due to **pneumonia** (MSF 143c)												
General comments from data collator												
Please add any general observations you had as you completed this month.												
Did you experience any challenges in collating the data for this year?												

Note to tool developer: Please replicate the table above for each of these years: 2014, 2013, 2012, 2011, 2010, 2009, 2008
Please also replicate the table above for the first three months in 2016: January - March

SECTION 3: OTHER MONTHLY HOSPITAL REGISTERS

If data collator selects section 3, ask:

Do you have monthly inpatient data to enter? If yes, go to section 3A. If no, ask: do you have outpatient data to enter? If yes, go to section 3B. In no, ask: do you have total monthly hospital data to enter (inpatient and outpatient combined). If yes, go to section 3C.

Section 3A: Monthly Hospital Inpatient Data

Instructions: Enter the number as seen in the monthly register for each indicator. If data is not available for a particular indicator, write N/A. If data is not legible, select not legible. Do not leave any empty cells.

YEAR: 2015

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hospital Attendance: Inpatient												
Number of **males** under 5 years of age (< 5 years)												
Number of **females** under 5 years of age (< 5 years)												
Number of **children** (males and females) under 5 years of age (< 5 years)												
Malaria Cases												
d. Number of **males** under 5 years of age with clinically diagnosed malaria (< 5 years)												
e. Number of **females** under 5 years of age with clinically diagnosed malaria (< 5 years												
f. Number of **children** (males and females) under 5 years of age with clinically diagnosed malaria (< 5 years)												
g. Number of **males** under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
h. Number of **females** under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
i. Number of **children** (males and females) under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
j. Number of **males** under 5 years of age with severe malaria (< 5 years)												
k. Number of **females** under 5 years of age with severe malaria (< 5 years)												
l. Number of **children** (males and females) under 5 years of age with severe malaria (< 5 years)												
m. Number of **children** (males and females) under 5 years of age who had blood transfusion (< 5 years)												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mortality (Any Cause)												
n. Number of deaths among **males** under five years of age (< 5 years)												
o. Number of deaths among **females** under five years of age (< 5 years)												
p. Number of deaths among **children** (males and females) under 5 years of age (< 5 years)												
Under 5 Mortality (Causes)												
n. Number of deaths among **males** under five years of age (< 5 years) due to **malaria**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **malaria**												
r. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to **malaria**												
n. Number of deaths among **males** under five years of age (< 5 years) due to **diarrhoea**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **diarrhoea**												
q. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to d**iarrhoea**												
n. Number of deaths among **males** under five years of age (< 5 years) due to **pneumonia**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **pneumonia**												
s. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to **pneumonia**												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
General comments from data collator												
Please add any general observations you had as you completed this month.												
Did you experience any challenges in collating the data for this year?												

Note to tool developer: Please replicate the table above for each of these years: 2014, 2013, 2012, 2011, 2010, 2009, 2008
Please also replicate the table above for the first three months in 2016: January - March

After entering all inpatient data, ask: do you have outpatient data to enter? If yes, go to section 3B. If no, ask: do you have total monthly hospital data to enter (inpatient and outpatient combined). If yes, go to section 3C.

Section 3B: Monthly Hospital Outpatient Data

Instructions: Enter the number as seen in the monthly register for each indicator. If data is not available for a particular indicator, write N/A. If data is not legible, select not legible. Do not leave any empty cells.

YEAR: 2015

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hospital Attendance: Outpatient												
Number of **males** under 5 years of age (< 5 years)												
Number of **females** under 5 years of age (< 5 years)												
Number of **children** (males and females) under 5 years of age (< 5 years)												
Malaria Cases												
d. Number of **males** under 5 years of age with clinically diagnosed malaria (< 5 years)												
e. Number of **females** under 5 years of age with clinically diagnosed malaria (< 5 years												
f. Number of **children** (males and females) under 5 years of age with clinically diagnosed malaria (< 5 years)												
g. Number of **males** under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
h. Number of **females** under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
i. Number of **children** (males and females) under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
j. Number of **males** under 5 years of age with severe malaria (< 5 years)												
k. Number of **females** under 5 years of age with severe malaria (< 5 years)												
l. Number of **children** (males and females) under 5 years of age with severe malaria (< 5 years)												
m. Number of **children** (males and females) under 5 years of age who had blood transfusion (< 5 years)												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mortality (Any Cause)												
n. Number of deaths among **males** under five years of age (< 5 years)												
o. Number of deaths among **females** under five years of age (< 5 years)												
p. Number of deaths among **children** (males and females) under 5 years of age (< 5 years)												
Under 5 Mortality (Causes)												
n. Number of deaths among **males** under five years of age (< 5 years) due to **malaria**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **malaria**												
r. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to **malaria**												
n. Number of deaths among **males** under five years of age (< 5 years) due to **diarrhoea**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **diarrhoea**												
q. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to d**iarrhoea**												
n. Number of deaths among **males** under five years of age (< 5 years) due to **pneumonia**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **pneumonia**												
s. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to **pneumonia**												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
General comments from data collator												
Please add any general observations you had as you completed this month.												
Did you experience any challenges in collating the data for this year?												

Note to tool developer: Please replicate the table above for each of these years: 2014, 2013, 2012, 2011, 2010, 2009, 2008
Please also replicate the table above for the first three months in 2016: January - March

After entering all outpatient data ask: do you have total monthly hospital data to enter (inpatient and outpatient combined). If yes, go to section 3C. If no, end hospital data collation.

Section 3C: Total Monthly Hospital Data (Inpatient and Outpatient Combined)

Instructions: Enter the number as seen in the monthly register for each indicator and month. If data is not available for a particular indicator, write N/A. If data is not legible, select not legible. Do not leave any empty cells.

YEAR: 2015

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hospital Attendance: Inpatient and Outpatient Combined												
Number of **males** under 5 years of age (< 5 years)												
Number of **females** under 5 years of age (< 5 years)												
Number of **children** (males and females) under 5 years of age (< 5 years)												
Malaria Cases												
d. Number of **males** under 5 years of age with clinically diagnosed malaria (< 5 years)												
e. Number of **females** under 5 years of age with clinically diagnosed malaria (< 5 years												
f. Number of **children** (males and females) under 5 years of age with clinically diagnosed malaria (< 5 years)												
g. Number of **males** under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
h. Number of **females** under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
i. Number of **children** (males and females) under 5 years of age with confirmed uncomplicated malaria (< 5 years)												
j. Number of **males** under 5 years of age with severe malaria (< 5 years)												
k. Number of **females** under 5 years of age with severe malaria (< 5 years)												
l. Number of **children** (males and females) under 5 years of age with severe malaria (< 5 years)												
m. Number of **children** (males and females) under 5 years of age who had blood transfusion (< 5 years)												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mortality (Any Cause)												
n. Number of deaths among **males** under five years of age (< 5 years)												
o. Number of deaths among **females** under five years of age (< 5 years)												
p. Number of deaths among **children** (males and females) under 5 years of age (< 5 years)												
Under 5 Mortality (Causes)												
n. Number of deaths among **males** under five years of age (< 5 years) due to **malaria**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **malaria**												
r. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to **malaria**												
n. Number of deaths among **males** under five years of age (< 5 years) due to **diarrhoea**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **diarrhoea**												
q. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to d**iarrhoea**												
n. Number of deaths among **males** under five years of age (< 5 years) due to **pneumonia**												
o. Number of deaths among **females** under five years of age (< 5 years) due to **pneumonia**												
s. Number of deaths among **children** (males and females) under 5 years of age (< 5 years) due to **pneumonia**												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
General comments from data collator												
Please add any general observations you had as you completed this month.												
Did you experience any challenges in collating the data for this year?												

Note to tool developer: Please replicate the table above for each of these years: 2014, 2013, 2012, 2011, 2010, 2009, 2008
Please also replicate the table above for the first three months in 2016: January - March

Tool completed by			
Name:	**Signature:**	**Date:**	**Time data collation ended:**
Tool verified by			
Name:	**Signature:**	**Date:**	**Time:**

8.3 Data Collection Tool: Client Exit Interview Questionnaire

MALARIA INTERVENTION ASSESSMENT
PRIMARY HEALTH CARE FACILITY: CLIENT EXIT-INTERVIEW QUESTIONNAIRE

PRE-SCREENING SECTION FOR CLIENTS EXITING THE HEALTH FACILITY
AS A CLIENT LEAVES THE HEALTH FACILITY, APPROACH THE USER AND SAY:

Good morning/afternoon, I am _____. I am representing the Federal Ministry of Health through Nielsen research firm. We are conducting a short survey today with clients leaving the health facility to understand better the services the facility offers. Before I give you more information about this survey, can I please ask you a few questions to determine which part of the questionnaire to ask you?

IF CLIENT DISAGREES, THANK CLIENT AND END INTERVIEW.

IF CLIENT AGREES:

1. DETERMINE WHO THE CLIENT IS:

1a. Did you come to the health facility today to see a health care worker for yourself?

1b. Did you come to the health facility today to see a health care worker for this child?

2. DETERMINE THE AGE OF THE CLIENT:

2a. May I know2. your age please?
(If client is under 18 and there is no care giver present to give consent, end the interview and thank the client)

If the respondent does not know his/her age, ask: Do you have a patient card with you today?

If yes, according to the card, what is the client's date of birth?

If no card or no date of birth on the card, do the **observation**:

Look at the person. Does the person look **at least 18 years of age**? YES or NO.

If yes, proceed with the interview. If no or the interviewer is not sure thank respondent and end the interview and thank respondent.

2b. May I know the age of this child?

If the respondent does not know his/her age, do the **observation**:

Look at the child. Is it possible that this child is between 15 and 17 years of age? No, because this child looks younger than 15. If so, proceed to section 1C.

Yes, this child could be between 15 and 17 years of age. If so, proceed to section 1A if child is female and 1B if child is male.

3. NOTE THE SEX OF THE CLIENT

BASED ON THE SEX AND AGE OF THE CLIENT, PROCEED TO THE APPROPRIATE SCREENING SECTION:

SECTION 1A: FOR FEMALE CLIENT AGES 15 AND ABOVE.

SECTION 1B: FOR MALE CLIENTS AGES 15 AND ABOVE.

SECTION 1C: FOR CARETAKER OF A CHILD.

SCREENING SECTION

Section 1A: Screening Questions for Female Client (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
101.	Why did you come to the health facility today? **IF ANC VISIT:** ASK FOLLOWING QUESTION. **IF FEVER:** PROCEED WITH OBTAINING VERBAL CONSENT AND GO TO SECTION 3. **IF ANY OTHER REASON:** THANK CLIENT AND END INTERVIEW	ANC VISIT……...1 FEVER…….2 OTHER REASON……...8	
102.	How many months pregnant are you? **IF 4 MONTHS OR MORE:** PROCEED WITH OBTAINING VERBAL CONSENT AND GO TO SECTION 2. **IF LESS THAN 4 MONTHS:** THANK CLIENT AND END INTERVIEW. **IF DON'T KNOW:** ASK FOLLOWING QUESTION.	# OF MONTHS _____ DON'T KNOW……...95	
103.	Do you have an ANC card with you today? **IF YES**: ASK TO SEE THE ANC CARD **IF NO:** THANK CLIENT AND END INTERVIEW	YES……1 NO…….2	
104.	IF THE CLIENT HAS AN ANC CARD/BOOK, WHAT WAS THE DATE OF HER LAST MENSTRUAL PERIOD? OR IF THE DATE OF THE LAST MENSTRUAL PERIOD IS NOT AVAILABLE, SEE EXPECTED DATE OF DELIVERY (EDD). IF EDD IS NOT AVAILABLE, THANK CLIENT AND END INTERVIEW. ENTER THE DATE. SEE RESULTS IN MONTHS. **IF 4 MONTHS OR MORE:** PROCEED WITH OBTAINING VERBAL CONSENT AND GO TO SECTION 2. **IF LESS THAN 4 MONTHS:** THANK CLIENT AND END INTERVIEW.	DATE OF LAST PERIOD: __/__/____ EXPECTED DATE OF DELIVERY: __/__/____	

Section 1B: Screening Questions for Male Client (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
101.	Why did you come to the health facility today? **IF FEVER:** PROCEED WITH OBTAINING VERBAL CONSENT AND GO TO SECTION 3. **IF ANY OTHER REASON:** THANK CLIENT AND END INTERVIEW	FEVER…….2 OTHER REASON……...8	

Section 1C: Screening Questions for Caretaker of Child (Under Age 15)			
No.	**Questions**	**Coding Classification**	**Go To**
101.	Why did you bring this child to the health facility today? **IF FEVER:** PROCEED WITH OBTAINING VERBAL CONSENT AND GO TO SECTION 4. **IF ANY OTHER REASON:** THANK CLIENT AND END INTERVIEW	FEVER…….1 OTHER REASON……...8	

CONSENT FORMS

VERBAL CONSENT FORM FOR CLIENTS AGE 18 AND ABOVE

Good morning/afternoon, I am _____. As I mentioned earlier, I am representing the Federal Ministry of Health through Nielsen research firm. We are conducting a study of health facilities in Nigeria to generate information that will be used by the Government to understand better the services this facility offers and would like to ask you some questions about your experiences here today. This will be a short interview lasting about 10 minutes or less.

Please know that whether you decide to allow this interview or not is completely voluntary and will not affect services you receive during any future visit to this facility. You may refuse to answer any question you are not comfortable with, and you may stop the interview at any time.

Information from this interview may be provided to researchers for analyses, but your name will not be asked or recorded, so your responses will be anonymous and completely confidential.

Do you have any questions for me? Do I have your permission to continue with the interview?

Signature of Interviewer: _____ Date: _____
(Indicates respondent's willingness to participate)

Interviewer's name: _____ Time: _____
(please print name)

VERBAL CONSENT FORM FOR CARETAKER OF CHILD – UNDER AGE 15

Good morning/afternoon, I am _____. As I mentioned earlier, I am representing the Federal Ministry of Health through Nielsen research firm. We are conducting a study of health facilities in Nigeria to generate information that will be used by the Government to understand better the services this facility offers and would like to ask you some questions about your experiences bringing this child to the health facility today. This will be a short interview lasting about 10 minutes or less.

Please know that whether you decide to allow this interview or not is completely voluntary and will not affect services you or this child receive during any future visit to this facility. You may refuse to answer any question you are not comfortable with, and you may stop the interview at any time.

Information from this interview may be provided to researchers for analyses, but your or the child's name will not be asked or recorded, so your responses will be anonymous and completely confidential.

Do you have any questions for me? Do I have your permission to continue with the interview?

Signature of Interviewer: _____ Date: _____
(Indicates caretaker's willingness to participate)

Interviewer's name: _____ Time: _____
(please print name)

VERBAL CONSENT FORM FOR CARETAKER OF MINOR AGES 15-17

Good morning/afternoon, I am _____. As I mentioned earlier, we are representing the Federal Ministry of Health through Nielsen research firm. We are conducting a study of health facilities in Nigeria to generate information that will be used by the Government to understand better the services this facility offers and would like to ask you if we can ask this minor about his/her experiences at the health facility today. It will be a short interview lasting about 10 minutes or less.

Please know that whether this minor decides to allow this interview or not is completely voluntary and will not affect the services you or this minor receives during any future visit to this facility. He/she may refuse to answer any question you are not comfortable with, and may stop the interview at any time.

Information from this interview may be provided to researchers for analyses, but your or the minor's name will not be asked or recorded, so the responses will be anonymous and completely confidential.

Do you have any questions for me? Do I have your permission to ask the minor for permission to conduct the interview?

Signature of Interviewer: _____ Date: _____

(Indicates caretaker's approval to ask the minor's permission to be interviewed)

Interviewer's name: _____ Time: _____

(please print name)

VERBAL ASSENT FORM FOR MINOR BETWEEN THE AGES OF 15-17

Good morning/afternoon, I am _____. As I mentioned earlier, we are representing the Federal Ministry of Health through Nielsen research firm. We are conducting a study of health facilities in Nigeria to generate information that will be used by the Government to understand better the services this facility offers and would like to ask you some questions about your experiences here today. This will be a short interview lasting about 10 minutes or less.

Please know that whether you decide to allow this interview or not is completely voluntary and will not affect services you receive during any future visit to this facility. You may refuse to answer any question you are not comfortable with, and you may stop the interview at any time.

Information from this interview may be provided to researchers for analyses, but your name will not be asked or recorded, so your responses will be anonymous and completely confidential.

Do you have any questions for me? Do I have your permission to continue with the interview?

Signature of Interviewer: _____ Date: _____

(Indicates respondent's willingness to participate)

Interviewer's name: _____ Time: _____

(please print name)

QUESTIONNAIRE SECTIONS 2 – 4 (FOR AFTER SCREENING AND OBTAINING VERBAL CONSENT)

Section 2: For Females in the Second or Third Trimester of Pregnancy who Came for ANC Visit (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
200.	RECORD THE TIME THE INTERVIEW STARTED	☐☐ : ☐☐	
201.	During this visit, did a health worker give you three white tablets to prevent you from getting malaria?	YES……1 NO……2	→ 203
202.	Were you asked to swallow the three white tablets while still in the facility and in the presence of a health worker?	YES……1 NO……2	

Section 2: For Females in the Second or Third Trimester of Pregnancy who Came for ANC Visit (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
203.	How many times in your pregnancy so far has a health worker given you three white tablets to take in front of him/her to prevent you from getting malaria?	ONCE……1 TWICE……...2 THREE TIMES…….3 FOUR OR MORE TIMES…4 NEVER……..8 DON'T KNOW……...95	
204.	During this visit, did a health worker advise you to sleep under a mosquito net that has been treated with an insecticide?	YES.....1 NO.....2	
205.	During this visit, did a health worker offer you a mosquito net that has been treated with an insecticide free of charge?	YES.....1 NO.....2	
206.	Do you have an ANC card with you today? IF YES: ASK TO SEE THE CARD/BOOK	YES.....1 NO.....2	→ 209
207.	IF THE CLIENT HAS AN ANC CARD, DOES THE CARD INDICATE IF THE CLIENT HAS RECEIVED IPT? IF YES, INDICATE THE NUMBER OF DOSES.	YES, 1 DOSE……..1 YES, 2 DOSES……....2 YES, 3 DOSES……....3 YES, 4 DOSES……....4 NO…….....….5	
208.	ACCORDING TO THE CARD, WHAT IS THE CLIENT'S DATE OF BIRTH?	DAY _____ MONTH _____ YEAR _____ NOT AVAILABLE…….....95	
209.	How old were you at your last birthday?	AGE IN YEARS_____ DON'T KNOW……..…..95	
210.	Have you ever attended school?	YES.....1 NO.....2	→ 212
211.	What is the highest level of school you attended: primary, secondary, higher?	PRIMARY…..……1 SECONDARY……..……..2 HIGHER……..……...3	
212.	Do you know how to read or how to write in any language?	YES, READ AND WRITE….1 YES, READ ONLY……2 NO……..3	
213.	How long does it take for you to <u>walk</u> to this health facility from your place of residence? IF RESPONDENT DOESN'T PROVIDE TIME IN MINUTES, READ OUT RESPONSE OPTIONS. IF RESPONDENTS SAYS HE/SHE COMES BY A TYPE OF TRANSPORTATION, ASK TO ESTIMATE TIME OF WALKING TO FACILITY.	0 to 15 minutes……....1 15 to 30 minutes……..……2 30 minutes to one hour…….....3 More than one hour……....4 DON'T KNOW……..…..95	

Section 2: For Females in the Second or Third Trimester of Pregnancy who Came for ANC Visit (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
	Thank you very much for taking the time to answer my questions. Once again, any information you have given will be kept completely confidential. Have a good day!		
214.	RECORD THE TIME THE INTERVIEW ENDED		
	Interviewer's comments:		

Section 3: For Clients who came to Health Facility because of Fever (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
300.	RECORD THE TIME THE INTERVIEW STARTED	[ ][ ] : [ ][ ]	
301.	NOTE THE SEX OF THE CLIENT.	FEMALE……1 MALE……2	
302.	During the visit today, were you asked to have a blood test?	YES……1 NO……2	→ 308
303.	Did you have a blood test done?	YES……1 NO……2	→ 305
304.	Why did you not have a blood test done?	_____ _____ _____ _____	→ 308
305.	Were you told the result of the blood test that was done?	YES……1 NO……2	→ 308
306.	What was the result?	POSITVE FOR MALARIA……1 NEGATIVE FOR MALARIA……2 DON'T KNOW……95	
307.	How long did you wait to get the result of the test?	LESS THAN 15 MINUTES……1 BETWEEN 15 MINUTES AND ONE HOUR……2 BETWEEN ONE HOUR AND TWO HOURS……3 MORE THAN TWO HOURS……4 DON'T KNOW……95	
308.	Did the health worker give or prescribe any medicines for you to take at home?	YES, GAVE MEDS……1 YES, GAVE PRESCRIPTION……2 YES, GAVE MEDS AND PRESCRIPTION……3 NO……4	→ 310

Section 3: For Clients who came to Health Facility because of Fever (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
309.	ASK TO SEE ALL MEDICATIONS AND ANY PRESCRIPTIONS THAT THE CLIENT RECEIVED. SELECT ALL THAT IS SHOWN.	SAW RECOMMENDED ACTs (AA or AL)……..1 SAW OTHER ACTs (e.g. P-Alaxin)……..2 SAW OTHER MEDICINES……..3 SAW PRESCRIPTION……...4	
310.	Do you have a patient card/book with you today? IF YES: ASK TO SEE THE CARD/BOOK	YES……1 NO……..2	→ 312
311.	ACCORDING TO THE CARD, WHAT IS THE CLIENT'S DATE OF BIRTH?	DAY_____ MONTH _____ YEAR _____ NOT AVAILABLE……...95	
312.	How old were you at your last birthday?	AGE IN YEARS_____ DON'T KNOW……95	
313.	Have you ever attended school?	YES……1 NO……..2	→ 315
314.	What is the highest level of school you attended: primary, secondary, higher?	PRIMARY……...1 SECONDARY.....2 HIGHER.....3	
315.	Do you know how to read or how to write in any language?	YES, READ AND WRITE…….1 YES, READ ONLY……2 NO……..3	
316.	How long does it take for you to walk to this health facility from your place of residence? IF RESPONDENT DOESN'T PROVIDE TIME IN MINUTES, READ OUT RESPONSE OPTIONS. IF RESPONDENTS SAYS HE/SHE COMES BY A TYPE OF TRANSPORTATION, ASK TO ESTIMATE TIME OF WALKING TO FACILITY.	0 to 15 minutes……1 15 to 30 minutes……..2 30 minutes to one hour……3 More than one hour…….4 DON'T KNOW……95	
	Thank you very much for taking the time to answer my questions. Once again, any information you have given will be kept completely confidential. Have a good day!		
317.	RECORD THE TIME THE INTERVIEW ENDED	[ ][ ] : [ ][ ]	
Interviewer's comments:			

Section 4: For Caretaker with Child (Under Age 15) who came to Health Facility because of Fever			
No.	**Questions**	**Coding Classification**	**Go To**
400.	RECORD THE TIME THE INTERVIEW STARTED	[ ][ ] : [ ][ ]	
401.	NOTE THE SEX OF THE CHILD.	FEMALE……1 MALE……2	
402.	During the visit today, was this child asked to have a blood test?	YES……1 NO……2	→ 408
403.	Did this child have a blood test done?	YES……1 NO……2	→ 405
404.	Why did this child not have a blood test done?	_____ _____ _____ _____	→ 408
405.	Were you told the result of the blood test that was done?	YES……1 NO……2	→ 408
406.	What was the result?	POSITVE FOR MALARIA……1 NEGATIVE FOR MALARIA……2 DON'T KNOW……95	
407.	How long did you wait to get the result of the test?	LESS THAN 15 MINUTES……1 BETWEEN 15 MINUTES AND ONE HOUR……2 BETWEEN ONE HOUR AND TWO HOURS……3 MORE THAN TWO HOURS……4 DON'T KNOW……95	
408.	Did the health worker give or prescribe any medicines for this child for you to take at home?	YES, GAVE MEDS……1 YES, GAVE PRESCRIPTION……2 YES, GAVE MEDS AND PRESCRIPTION……3 NO……4	→ 410
409.	ASK TO SEE ALL MEDICATIONS AND ANY PRESCRIPTIONS THAT THE CLIENT RECEIVED. SELECT ALL THAT IS SHOWN.	SAW RECOMMENDED ACTs (AA or AL)……1 SAW OTHER ACTs (e.g. P-Alaxin)……2 SAW OTHER MEDICINES……3 SAW PRESCRIPTION……4	
410.	Do you have a patient card/book for this child with you today? IF YES: ASK TO SEE THE CARD/BOOK	YES……1 NO……2	→ 412

Section 3: For Clients who came to Health Facility because of Fever (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
411.	ACCORDING TO THE CARD, WHAT IS THE CHILD'S DATE OF BIRTH?	DAY_____ MONTH_____ YEAR_____ NOT AVAILABLE……...95	
412.	What month and year was this child born?	MONTH_____ DON'T KNOW MONTH……95 YEAR_____ DON'T KNOW YEAR…….9995	
413.	How old was this child at his/her last birthday? IF CHILD IS UNDER 5, SKIP TO **417.** IF CAREGIVER DOESN'T KNOW AGE OF CHILD, LOOK AT THE CHILD: DOES THE CHILD LOOK YOUNGER THAN 5 YEARS OF AGE? IF YES, SKIP TO **417**. IF NO, GO TO **414**.	AGE IN YEARS_____ CHILD IS UNDER ONE……..0 DON'T KNOW……95	
414.	Has this child ever attended school? (Western school)	YES……1 NO……..2	→ 416
415.	What is the highest level of school this child has attended?	PRESCHOOL……0 PRIMARY……...1 SECONDARY……....2	
416.	Does this child know how to read or hot to write in any language?	YES, READ AND WRITE…….1 YES, READ ONLY……2 NO……...3	
417.	How long does it take for you to walk to this health facility from the child's place of residence? IF RESPONDENT DOESN'T PROVIDE TIME IN MINUTES, READ OUT RESPONSE OPTIONS. IF RESPONDENTS SAYS THE CHILD COMES BY A TYPE OF TRANSPORTATION, ASK TO ESTIMATE TIME OF **WALKING** TO FACILITY.	0 to 15 minutes……1 15 to 30 minutes……..2 30 minutes to one hour……3 More than one hour…….4 DON'T KNOW……95	
	Thank you very much for taking the time to answer my questions. Once again, any information you have given will be kept completely confidential. Have a good day!		

Section 3: For Clients who came to Health Facility because of Fever (Ages 15 and above)			
No.	**Questions**	**Coding Classification**	**Go To**
418.	RECORD THE TIME THE INTERVIEW ENDED:	☐☐ : ☐☐	
Interviewer's comments:			

Facility Identification	
State	
LGA	
Political Ward	
Name of Health Facility (FID)	
Facility Code	I__I__I__I__I I__I__I__I__I I__I__I__I__I
PMI-supported facility?	Yes:I__I No:I__I
Date of Interview	I__I__I/I__I__I/2015
Name of Interviewer and Code	Name: _____ Code: I__I__I__I
Signature of Interviewer	

Questionnaire verified by			
Name:	**Signature:**	**Date:**	**Time:**

8.4 Data Collection Tool: Key Informant Interview Guide

MALARIA INTERVENTION ASSESSMENT: KEY INFORMANT INTERVIEW GUIDE FOR MALARIA DIRECTORS AT THE NATIONAL LEVEL

Verbal Consent Form

I am [Name of the interviewer] working for Nielsen research firm in partnership with MEASURE Evaluation to conduct a Malaria Intervention Assessment in four states: Cross River, Ebonyi, Nasarawa and Sokoto. The main objective of the assessment is to document progress in malaria control interventions between 2008 and 2016 in the four states. As part of the assessment, it is important for us to understand the context of malaria patterns and treatment in the four states. That is, we'd like to know how the malaria control interventions have unfolded since 2008 and know more about all the other factors which may affect malaria burden and treatment. These may include different malaria control activities, other important developments in the health sector, or more general social, economic or political events. We will be asking you to share your views, experiences and opinions on these issues. We will also be interviewing other individuals, including malaria representatives at the State and LGA levels and health facility workers.

The interview with you should take approximately 60 minutes and will be recorded and later transcribed so that we capture all your comments. The information will be used for the assessment only. No one other than the research team will be allowed to hear or read the record of the interview. We will not disclose your identity, and your name will not be mentioned during the interview or included in the transcript or any reports of the assessment.

Participation in this interview is voluntary. You are free to decide if you want to take part or not. You can refuse to answer any specific questions, or stop the interview at any time. If you choose not to answer a question, stop the interview or even not participate at all in the interview there will not be any adverse consequences for you.

Do you have any questions for me? Do I have your permission to continue with the interview?

IF YES, CONTINUE, OTHERWISE THANK THE RESPONDENT AND LEAVE.

Thank you for giving us your time, Please tell us your role and how long you have occupied this position.

MODERATOR CONTINUE IF RESPONDENT HAS BEEN IN THE DIRECTOR ROLE FOR AT LEAST 2 YEARS, OTHERWISE ASK TO BE DIRECTED TO THE APPROPRIATE PERSON.

Section A: General Situation of Malaria in Cross River, Ebonyi, Nasarawa and Sokoto

- Overall since 2008, what has been the situation of malaria in the following four states: Cross River, Ebonyi, Nasarawa and Sokoto? Probe fully
  - And what is the current situation of malaria in the four states?
  - Do you think malaria is still a concern? Why do you say so?
- Did malaria burden change between 2008 and 2016 in the four states? Probe fully. IF YES, PROBE FOR THE FOLLOWING
  - What changes have there been?
  - When did the changes begin?
  - Please tell me why did these changes occur?
  - How significant have these changes been? Please explain.
  - Have the changes been different depending on the state?

Section B: General History of Malaria Control Interventions in the Four States

- What has happened in terms of the implementation of malaria control interventions in the four states between 2008 and 2016? Please describe the main interventions implemented and overall time frame of the implementation during this period.
- What is your opinion of the implementation of malaria control interventions in the four states between 2008 and 2016?
  - What were the strengths of the implementation?
  - What were the weaknesses of the implementation?
  - What challenges were experienced?
  - Did the implementation make a difference or not? Please explain and provide examples.

- Did malaria diagnosis and treatment at the primary health care facility level change between 2008 and 2016 in the four states? IF YES, PROBE FOR THE FOLLOWING
  - Please tell us about the specific changes that occurred
    - How did it change?
    - When did this/these change/s occur?
    - Why did it change?
    - What do you think of the changes that occurred?
- Did the distribution of malaria commodities in the four states change between 2008 and 2016? IF YES, PROBE FOR THE FOLLOWING
  - How did it change? Probe fully
  - When did it change? Probe fully
  - Why did it change? Probe Fully
  - What do you think of the changes that occurred? Why do you say so? **Probe fully**

Section C: Implementation of PMI-funded interventions in the Four States

- Overall, what are your thoughts on the PMI-funded interventions implemented in the four states, such as the MAPS*, DELIVER* and TSHIP* projects?
  - Since when have the PMI-funded interventions been implemented?
  - What have the PMI-funded interventions done? Probe fully
  - What have been the strengths of the PMI-funded interventions? Probe fully
  - What have been the weaknesses of the PMI-funded interventions? Probe fully
  - What challenges have PMI-funded interventions experienced? Probe fully

  **The USAID | DELIVER PROJECT, in partnership with ministries of health and other organizations, improves health outcomes in developing countries by increasing the availability of health supplies

  TSHIP – Targeted State High Impact Project

  MAPS-- malaria Action Programme for States

  PMI – President's Malaria initiative

- What effect do you think the PMI-funded interventions have had on malaria control in the four states? Have they made a difference or not? Please explain and provide examples.
  - Did PMI-funded interventions affect the distribution of malaria commodities? Please explain.
  - Did PMI-funded interventions affect malaria diagnosis and treatment at the health facility level? Please explain.
  - Did PMI-funded interventions affect malaria morbidity and mortality? Please explain.

Section D: Contextual factors

We'd now like to ask you some questions about other factors, apart from the PMI-funded projects and other interventions you already mentioned, that may have affected the malaria disease burden, treatment seeking behaviour for malaria and/or the provision of malaria treatment between 2008 and 2016:

- Other than the interventions we have talked about so far, has there been other important malaria control interventions implemented in the four states? (e.g. roll out of ITNs/LLINs, change in diagnostics, change in first-line drug, house spraying, etc.) **Probe for the following**; By the Government? By faith-based organizations or NGOs? By the private sector?
- Apart from malaria commodities through PMI-funded projects, were there any other major purchases of malaria commodities for the public sectors? What were they?
- Were any important malaria control interventions stopped or interrupted?
- Were there any changes to the amount of funding received from international sources? National sources?
- Were there changes in the availability of antimalarials in public health facilities? (eg. Changes to the antimalarials that they stock, wide-spread stock outs, or the end of stock outs)
- Were there any important changes to the functioning of the government health system? (e.g. changes in user fees for health services, introduction of new types of health workers, opening of new facilities, etc.)

- Were there any important weather events in the four states that could have affected the malaria disease burden or malaria treatment? (e.g., floods, droughts, etc.)
- Were there any important economic changes that could have affected the malaria disease burden or malaria treatment? (e.g., high inflation, increase in unemployment, change in basic food prices, major change in exchange rate, etc.).
- Were there any important political events that could have affected the malaria disease burden or malaria treatment? (e.g., elections, unrest)
- Can you think of any other events which might have affected the malaria disease burden, malaria treatment seeking or the provision of malaria treatment?

Final Questions

- Is there anything else you would like to tell us about the implementation of malaria control interventions between 2008 and 2016 in the four states that we did not talk about?
- Do you have any recommendations for future malaria control interventions?
- Do you have any specific recommendations for future PMI-funded interventions?

Thank you very much for your time today, we really appreciate all the information you have provided!

8.5 DQA Indicator Definitions

MIA NIGERIA DQA ANALYSIS INDICATOR DEFINITIONS

1. AVAILABILITY
Indicator: Percentage of MSF available for review per PHC per year
Numerator: Number of MSF available for review per PHC per year
Denominator: Total number of MSF that should be available to review per PHC per year
Notes:

- Only months since the PHC started operating were included in this calculation. For the analysis, a PHC's first month and year were generated as follows:
- If a PHC was noted in the questionnaire to have started operating before 2008, January 2008 was the first month included. (The earliest data included in the data collation exercise were from January 2008.)
    - If a PHC was noted in the questionnaire to have started operating between 2008 and 2016, the start year noted in the questionnaire was triangulated with MSF data and DHIS2 data.
        - The first year included in the analysis was the earliest of the following if there were inconsistencies: (a) the year noted in the questionnaire, (b) the earliest year for which there were MSF data included in the dataset, (c) the earliest year for which there were PHC data in the DHIS2 data file.
        - In all cases, the first month was set to be January if the earliest MSF or DHIS2 data for the PHC available were for at least one month in the first half of the PHC's earliest year, or July if the earliest MSF or DHIS2 data for the PHC available were for a month in the second half of the PHC's earliest year.
- Only months for which an MSF should have been available in 2016 were included in this calculation. PHC staff have the first 10 days of the following month to submit a report. For the analysis, a PHC's last month in 2016 was generated as follows: if the data collators visited a PHC—
    - Between February 11 and March 10, the last month included was January;
    - Between March 11 and April 10, the last month included was February;
    - After April 10, the last month included was March.

2. COMPLETENESS
Indicator: Percentage of MSF data fields completed (filled in) per PHC per month per year
Numerator: Number of MSF data fields completed (filled in) per PHC per month per year
Denominator: Total number of MSF data fields reviewed per PHC per month per year
Notes:

- Fifty-five MSF data fields were included in the calculation.
- The IPT3 data field was excluded from the calculation.
- The first and last months used in the availability calculation were also used in the completeness calculation.
- If an MSF should have been available according to the PHC's first and last months, the MSF was included in the denominator and considered 0% complete.

3. COMPUTATIONAL ACCURACY
Indicator: Percentage of MSF data fields containing a total that equals the summation of its component fields per PHC per month per year, among MSF that were available for review
Numerator: Number of MSF data fields containing a summation that equals the summation of its component fields per PHC per month per year, among MSF that were available for review

Denominator: Total number of MSF data fields containing a summation that were assessed per PHC per month per year, among MSF that were available for review

Notes:

- Ten MSF data fields containing a total were included in the calculation when the 2013 version of the MSF was reviewed. Only nine MSF data fields were included in the calculation when older versions or other forms were reviewed.
- Each data field was assigned a value of 1 if the data field value equaled the sum of its component fields or a 0 otherwise. Scores for each MSF (month) could range from 0 to 10 for a PHC.
- If the value in any of the component fields was noted to be missing or illegible by the data collators, that data field was determined to be computationally inaccurate and assigned a value of 0.
- Only MSF available for review were included in this calculation.

4. REGISTER/MSF VERIFICATION RATIO

Indicator: Ratio of verified counts in the PHC register to the value reported by that PHC in its MSF for the month before the month preceding the data collators' visit to the PHC

Numerator: Verified counts in the PHC register for the month before the month preceding the data collators' visit to the PHC

Denominator: Value reported by that PHC in its MSF for the month before the month preceding the data collators' visit to the PHC

- A verification ratio of 1 indicates that the verified counts in the PHC register exactly matched the value reported by the PHC in the MSF.
- A verification ratio less than 1 indicates that the value reported by the PHC in the MSF was greater than the verified counts in the PHC register. This is an indication of over-reporting.
- A verification ratio greater than 1 indicates the value reported by the PHC in the MSF was less than the verified counts in the PHC register. This is an indication of under-reporting.
- The farther the verification ratio is from 1 the less consistent the verified counts and the reported are.
- This calculation was performed for six MSF data fields and six attendance fields.
- Only PHCs with both MSF and register data available for the compared month were included in this calculation.
- A verification ratio could not be calculated if the value reported in the MSF was 0.
- The data collation tool did not capture the actual month reviewed, so the same logic used to calculate timeliness was used for this calculation—
    - For visits in March, January data were used.
    - For visits in April, February data were used; however, for April visits in Nasarawa State, January data were used because of a PHC strike that closed many PHCs in February.
    - For visits in May or June, March data were used. During data cleaning, however, it was obvious that for some PHCs a month other than the one expected was reviewed; in these cases, the review month was updated manually for the calculations.

5. AVAILABILITY – DHIS2 COMPARISON

Indicator: Percentage of MSF available for review per PHC per year (MSF) or Percentage of months with DHIS2 data available for review per year (DHIS2)

Numerator: Number of MSF available for review per PHC per year (MSF) or Number of months with DHIS2 data available for review per year (DHIS2)

Denominator: Total number of months for which data should have been available to review per PHC per year for PHCs included in both the MSF and DHIS2 data files

Notes:

- Six PHCs were excluded from this calculation because they were not included in the DHIS2 data file—2144, 2145, 2147, 3152, 3155, and 4100.
- The same notes regarding the facilities' first and last month that apply to the first availability indicator apply to this indicator, except DHIS2 data were only available starting in 2013, so this indicator included all months from January 2013 through March 2013 unless not relevant because of the PHC's start date or date of data collation.

6. COMPLETENESS – DHIS2 COMPARISON

Indicator: Percentage of MSF data fields completed (filled in) per PHC per month per year (MSF) or Percentage of DHIS2 data fields completed (filled in) per PHC per month per year (DHIS2)

Numerator: Number of completed (filled in) MSF data fields per PHC per month per year (MSF) or Number of completed (filled in) DHIS2 data fields per PHC per month per year

Denominator: Total number of data fields reviewed per month for which data should have been available to review per PHC per year for PHCs included in both the MSF and DHIS2 data files

Notes:

- Six PHCs were excluded from this calculation because they were not included in the DHIS2 data file—2144, 2145, 2147, 3152, 3155, and 4100.
- Twelve data fields were included in the calculation.
- The first and last months used in the availability – DHIS comparison indicator calculation were also used in the completeness calculation.
- If an MSF should have been available according to the PHC's first and last months, the MSF was included in the denominator and considered 0% complete.

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