Nigeria HPN Multi-Activity Evaluation

Trends in Select DHIS2 and Population-Level Malaria, Antenatal Care, and Family Planning Indicators

September 2024

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Trends in DHIS2 and Population-Based Malaria, Antenatal Care, and Family Planning Indicators

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Photo credit: Integrated Health Program, Nigeria.

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Abbreviations

ACT	artemisinin-based combination therapy
ANC	antenatal care
BA-N	Breakthrough ACTION – Nigeria
D4I	Data for Impact
DHIS2	District Health Information System Version 2
DHS	Demographic and Health Survey
EA	enumeration area
FP	family planning
HPN	Health, Population, and Nutrition
IHP	Integrated Health Program
IPTp	intermittent preventive treatment of malaria during pregnancy
MICS	Multi Indicator Cluster Survey
MIS	Malaria Indicator Survey
PMI-S	President's Malaria Initiative for States
PSM	Global Health Supply Chain Program – Procurement and Supply Management
RDT	rapid diagnostic test
RMNCH+NM	reproductive, maternal, newborn, and child health plus nutrition and malaria
USAID	United States Agency for International Development

Executive Summary

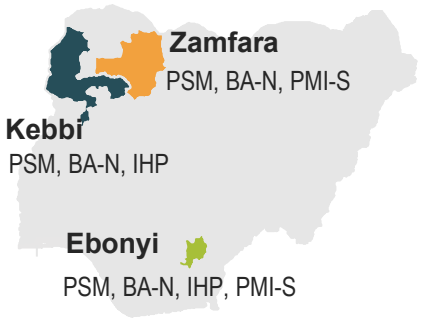
Data for Impact (D4I) conducted a prospective mixed-methods portfolio evaluation of four USAID/Nigeria Health, Population, and Nutrition (HPN) activities, with a focus on comparing an integrated health programming approach with a disease-focused approach (malaria). Evaluation results will inform adaptive program implementation and support USAID/Nigeria's investment strategy prioritization to improve health outcomes.

The evaluation was implemented in three case study states (Ebonyi, Kebbi, and Zamfara). The purpose of this report is to summarize trends in health behavior and service delivery outcomes for selected malaria, antenatal care (ANC) and intermittent preventive treatment of malaria in pregnancy (IPTp), and family planning (FP) indicators using the data from the District Health Information System (DHIS2) and three population-based studies: (1) the Multiple Indicator Cluster Survey (MICS), (2) the Malaria Indicator Survey (MIS), and (3) the Demographic and Health Survey (DHS). Results include an assessment of trends over time within each state as well as descriptive comparisons and trends across the three case study states.

Intervention Models

- **Integrated approach**: The Integrated Health Program (IHP) implements a fully integrated set of reproductive, maternal, newborn, and child health plus nutrition and malaria (RMNCH+NM) and health system strengthening interventions (Ebonyi, Kebbi).
- **Disease-focused approach**: The President's Malaria Initiative for States (PMI-S) focuses on malaria health programming and limited health system strengthening (Ebonyi, Zamfara).
- Both models include **demand creation** (led by Breakthrough ACTION – Nigeria [BA-N]) and **commodity procurement and distribution** (led by Global Health Supply Chain Program – Procurement and Supply Management [PSM]) interventions (Ebonyi, Kebbi, Zamfara)

Figure E1. Case study states and interventions



Evaluation Question

The analysis presented in this report addresses the following broad evaluation question related to health programming effectiveness:

> Did malaria and other health behavior and service delivery outcomes improve more from baseline to endline in states where an integrated approach was implemented, a disease-focused approach was implemented, or a combination of the two?

Kebbi provides a case study state in which an integrated approach was implemented, Zamfara provides a case study state where a disease-focused approach was implemented, and Ebonyi provides a case study state where a combination of an integrated and a disease-focused approach was implemented.

Methods

Health behavior and service delivery trends in malaria, ANC, IPTp, and FP were summarized using data from DHIS2 and five population-based surveys: MICS 2021, MICS 2016/2017, MIS 2021, MIS 2015, and DHS 2018. Results include an assessment of trends of key indicators over time within each state as well as descriptive comparisons and trends among the three case study states.

Time series data were obtained from the Nigeria Health Management Information System DHIS2 (NHMIS-DHIS2) at the facility-month level for the period January 2017 through March 2023 (75 months). Facilities were eligible for study inclusion if they were public primary health care (PHC) facilities in the three case study states. A set of malaria, ANC and IPTp, and FP data elements were extracted and analyzed; facilities were only included in the study if they reported on at least one of the variables for at least one month during the study period. The state-level mean number of cases or clients per facility by month was analyzed to understand how state-level service delivery volumes change over time.

The DHS, MIS, and MICS are among the most important population-based surveys for maternal and child health and malaria in Nigeria. We examine trends in selected malaria, ANC and FP indicators from these surveys. We limit analysis in this report to trends between two surveys and compare indicators from the same type of survey (MIS, MICS, DHS) whenever possible.

Key Findings: Malaria Testing and Treatment

DHIS2 analysis shows that providers in public PHCs are generally following national guidelines to test children under five with fever for malaria in all three case study states. Testing in public PHCs has increased over time, particularly in Kebbi and Zamfara where testing was at lower levels before the HPN activities began and was over 90% in all three states in March 2023. Clinical diagnosis of malaria has correspondingly declined as testing has increased. Testing remains slightly lower in Zamfara than in the other two states.

DHIS2 data also show that nearly all providers in public PHCs are following national guidelines to treat confirmed uncomplicated malaria cases with ACTs in all three states.

Although providers in public PHCs are generally following national testing and treatment guidelines, MIS population-based survey data show that relatively few children under five who have a fever are taken to a public PHC (less than 50% in Kebbi and Zamfara; 21% in Ebonyi). The majority of children under five with a fever are either not taken for care or care is sought at sources other than public PHCs.

In Ebonyi, the use of antimalarial drugs for fever cases increased slightly from 39.8% in 2015 to 43.5% in 2021. In Kebbi and Zamfara states, the percentage of children under five years who received antimalaria drugs for fever declined between 2015 and 2021 (from 45.5% to 0.4% in Kebbi[1] and from 40.0% to 21.1% in Zamfara). Sample sizes in the MIS and other available surveys are too small to be able to draw meaningful

[1] Very few respondents reported specific drugs for treatment of malaria in Kebbi in the 2021 MIS resulting an unusually low prevalence of treatment with ACTs. This may reflect issues with the reporting in the survey in Kebbi rather than genuine decline to these levels.

conclusions about changes over time in care seeking for fever in children under five at the state level.

Both the integrated and disease-specific models were associated with increased adherence to national malaria testing and treatment guidelines.

Overall, this analysis suggests that the intervention model does not seem to be strongly associated with provider adherence to national testing and treatment guidelines for children under five presenting with fever in public PHCs; both models are associated with increased adherence to national guidelines. Care-seeking behavior in the community appears to be a larger barrier to children under five receiving appropriate testing and treatment for fever than provider behavior in public PHCs.

Key Findings: ANC and IPTp

Population-based data and DHIS2 facility-based data provide a broadly consistent picture of trends in ANC care in the three states. The MICS provides evidence of increased ANC use in Ebonyi (any visits and 4+ visits) between 2016/17 and 2021, consistent with the small gradual increase in ANC client volumes in public PHCs, which has continued since 2021. The MICS data show no increase in any ANC in Kebbi between 2016/17 and 2021, consistent with relatively constant ANC volumes in public PHC facilities there. There is some evidence in the DHIS2 data that ANC client volumes are starting to increase in Kebbi since April 2022 (after the most recent MICS). The uptake of ANC remains low in Zamfara, where interventions are focused on only malaria.

Both the DHIS2 data and population-based data indicate that early ANC care in the first trimester remains uncommon in all three states and is not increasing. The majority of women in Kebbi and Zamfara who seek ANC care used the public sector, compared to Ebonyi, where about a third of women receive ANC outside of the public sector.

Population-based and facility-based data also provide a broadly consistent picture of IPTp services in Kebbi and Zamfara where there has been little change in the percentage of women getting any IPTp between 2015 and 2021 in the population-based surveys and fluctuating or declining IPTp1 uptake in public PHCs in the same period. However, Kebbi has seen an increase in IPTp1 uptake since around July 2021 (after the MIS). The lack of change in the uptake of ANC in Kebbi and Zamfara described above likely contributes to lack of change in IPTp1 uptake in the two states. The MIS shows an increase in the percentage of women who received IPTp1 between 2015 and 2021 in Ebonyi, while public PHC client volumes remained stable in this period and since 2021. Sample sizes in the population-based data are small, however, and women in Ebonyi are less likely to use the public sector for ANC than women in the other two states.

All three states show evidence of increases in IPTp3 uptakes in public PHCs since January 2021 and increases in coverage of IPTp3 in populations-based data between 2015 and 2021. The ratio of IPTp1 clients

Progress in ANC appears to have been somewhat better in the two integrated states than in Zamfara where programming is focused only on malaria. However, even in the two integrated states, evidence of significant progress in ANC associated with the integrated model is mixed.

to ANC1 clients has also increased notably since around July 2021, particularly in Ebonyi and Kebbi. These findings suggest fewer missed opportunities to provide IPTp once women come in for ANC, which may suggest improved adherence to IPTp guidelines by providers, particularly in the two states with integrated programming.

Overall, progress in ANC appears to be somewhat better in the two integrated states than in Zamfara where programming is focused only on malaria. However, even in the two integrated states, evidence of significant progress in ANC associated with the integrated model is mixed. The increases in ANC client volumes in Ebonyi predated the start of IHP and continued at a similar pace after IHP began so could be associated with larger demand and other contextual factors, although it is possible that the past increases could reflect the influences of earlier ANC activities in Ebonyi that the integrated model could build on. There appears to have been little progress in any ANC use in Kebbi under the integrated model early in the analysis period but there is some suggestion of increases in ANC uptake and improved IPTp use in the most recent period. The low levels of ANC use present a barrier to significant increases in IPTp use in Zamfara, an important component of malaria prevention.

Key Findings: Family Planning

Use of family planning is increasing in all three states according to both population-level and the facility-based data, including in Zamfara where malaria-focused programming does not include FP.

Both the population-based and the facility-based data show use of family planning is increasing in all three states, including in Zamfara where malaria-focused programming does not include FP. This finding suggests that the increase in FP use in Zamfara is driven by demand factors external to the HPN activities working there and/or other programming in Zamfara that is addressing FP.

Community members in all three states reported exposure to messages and community sensitization activities on FP and changing community norms on FP in FGDs (Data for Impact, 2024). Increases in FP use have been smaller in Zamfara than in Kebbi though, so broader integrated programming that includes FP likely plays a facilitating role to enable women to translate increasing interest in FP into FP use in Kebbi. The increase in new FP acceptor client volume in public PHCs has continued since 2021 (when the MICS was conducted) in Kebbi but has leveled off somewhat in the other two states.

Recommendations

The analysis in this report is designed to provide higher level strategic recommendations rather than specific implementation recommendations. With that in mind, we have the following recommendations for USAID, the Government of Nigeria, and other actors responsible for setting health strategy.

- **All programs, integrated or disease-focused, need to continue to include strong behavior change components. Demand side factors are significant barriers to achieving large increases in positive population health behaviors.** Qualitative data collected in other parts of this evaluation have suggested that community sensitization and empowering ward development committees are potentially successful strategies for generating demand for services (Data for Impact, July 2023; Data for Impact, 2024) but reach of these interventions can be low (Hutchinson, et al. 2023) so scale is also an important consideration for population level impact.
- **Programs, integrated or disease-focused, also must address availability of essential drugs, diagnostics, and supplies.**
- **Integrated and disease-focused programs both operate in complex social and political environments and interact with that environment. Any programming needs to recognize and adapt to that environment both in its implementation and in its expected results.**
- **Both integrated and disease-focused programming can lead to changes in desired outcomes. However, integrated programming provides more leverage points in the wider environment and to have multiplicative effects (e.g., programming to improve ANC has potential benefits for maternal and child health and for malaria prevention through increased IPTp).**

Conclusion

Overall, there are limited differences in outcomes between integrated and disease-focused intervention approaches, although progress appears to be somewhat better in the two states implementing integrated programming than in the state implementing disease-focused programming, particularly for ANC. Providers in all three states appear to be following national treatment guidelines for fever in children. There are also increases in IPTp3 client volumes and population coverage under both intervention models. ANC use remains relatively low in the two northern states but overall progress in ANC appears to be somewhat better in the two states implementing integrated programming than in Zamfara where programming is focused only on malaria. Family planning use increased in all three states. Demand factors, availability of essential drugs, diagnostics and supplies, and larger contextual factors such as political economy and security appear to play a larger role than the implementation model in influencing progress in use of services.

Introduction

Data for Impact (D4I) conducted a prospective mixed-methods portfolio evaluation of four USAID/Nigeria Health, Population, and Nutrition (HPN) activities, with a focus on comparing an integrated health programming approach with a disease-focused approach (malaria). Evaluation results will inform adaptive program implementation and support USAID/Nigeria's investment strategy prioritization to improve health outcomes.

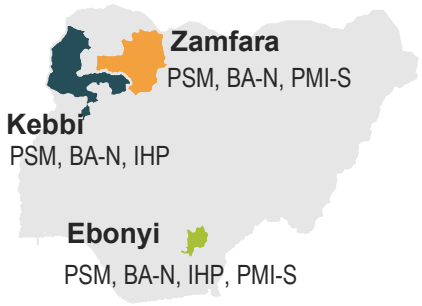
The evaluation was implemented in three case study states (Figure 1). The purpose of this report is to summarize trends in health behavior and service delivery outcomes for select malaria, antenatal care (ANC), and family planning (FP) indicators using the data from the District Health Information System (DHIS2) and three population-based studies: (1) the Multi Indicator Cluster Survey (MICS), (2) the Malaria Indicator Survey (MIS), and (3) the Demographic and Health Survey (DHS). Results include an assessment of trends over time within each state as well as descriptive comparisons and trends across the three case study states.

For most DHIS2 indicators, data spans the period of January 2017–March 2023. MICS data were gathered from the 2016/2017 and 2021 surveys, MIS data from the 2015 and 2021 surveys, and DHS data from the 2018 survey.

Intervention Models

- **Integrated approach**: The Integrated Health Program (IHP) implements a fully integrated set of reproductive, maternal, newborn, and child health plus nutrition and malaria (RMNCH+NM) and health system strengthening interventions.
- **Disease-focused approach**: The President's Malaria Initiative for States (PMI-S) focuses on malaria health programming and health system strengthening.
- Both models include **demand creation** (led by Breakthrough ACTION – Nigeria [BA-N]) and **commodity procurement and distribution** (led by Global Health Supply Chain Program – Procurement and Supply Management [PSM]) interventions.

Figure 1. Case study states and interventions



PSM initiated operations in the three states in July 2016, followed by BA-N in 2017. In Ebonyi state, PMI-S and IHP initiated operations in January and August 2020, respectively. In Kebbi state, IHP began in April 2019 and PMI-S initiated operations in Zamfara in August 2020.

Evaluation Question

The analysis presented in this report addresses the following broad evaluation question related to health programming effectiveness:

Did malaria and other health behavior and service delivery outcomes improve more from baseline to endline in Local Government Areas (LGAs)/states where an integrated approach was implemented, a disease-focused approach was implemented, or a combination of the two?

The analysis of DHIS2, MICS, MIS, and DHS data is one component of the evaluation contributing to answering this question. Other components that address this question include a 2021 health facility assessment and provider survey (Brugh et al., 2022a; Brugh et al., 2022b). The evaluation includes five further questions that are addressed through other data collection and analysis (Data for Impact, February 2023). Findings relevant to the other evaluation questions are available on the D4I website's Nigeria resources page.

Methods

The objective of the study is to summarize health behavior and service delivery trends in malaria testing and treatment, ANC, IPTp, and FP using data from DHIS2 and five population-based surveys: MICS 2021, MICS 2016/2017, MIS 2021, MIS 2015, and DHS 2018. The analysis includes an assessment of trends of key indicators over time within each state as well as descriptive comparisons and trends among the three case study states.

NHMIS DHIS2

Time series data were obtained from the NHMIS DHIS2 at the facility-month level for the period January 2017 through March 2023 (75 months). Facilities were eligible for study inclusion if they were public primary health care (PHC) facilities in the three case study states.

A set of malaria, ANC and IPTp, and FP data elements were extracted and analyzed; facilities were only included in the study if they reported on at least one of the variables for at least one month during the study period.

The percentage of facilities reporting each service delivery variable by month was examined to understand how facility-level reporting of health service delivery data has changed over time (Data for Impact, January 2023). Health service utilization is analyzed as mean cases per month per facility at the state level due to high rates of missing data at the facility-month level. The calculation for the mean number of cases in a given month is the total number of cases reported by facilities in the state during that month divided by the number of facilities in the state that report data on the service for that month.

Data Processing and Completeness

NHMIS DHIS2 study data presented a high rate of missing values due to facilities entering the study after January 2017, facilities reporting zero cases or clients per month, which the DHIS2 database treats as missing values, or facilities not reporting for periods of time, which the DHIS2 database also treats as missing values. Pre-analysis data processing occurred in three phases for each variable.

First, each facility's study entry point was determined based on the first month it reported on each variable of interest. The facility did not contribute to the numerator or denominator for mean service volume

measures for any month before it entered the study. Second, because the DHIS2 database conflates zero values and blank data fields as missing, it was not possible to distinguish true missing values (i.e., no data reported at the facility-month level) from zero values (no service provided at the facility during a month). Low-volume facilities are more likely to have true zero caseloads for a given month, and therefore are more likely to have missing data in the NHMIS DHIS2. To correct for the systematic replacement of zeros as missing data in low-volume facilities, we identified low-volume facilities as those PHCs in which the median number of cases was 25 cases or clients per facility-month or lower. Missing values were replaced as zero values for low-volume facilities in all months where the facility reported data for at least one other study variable; missing values were not replaced for low-volume facilities that were missing all data for the month. Lastly, the internal consistency of reported data for each study variable was assessed. Extreme outliers were defined as monthly values that deviate from the facility's median value by at least 4.5 standard deviations and were excluded from analysis.

Population-Based Surveys

Population-based surveys serve as invaluable tools for obtaining maternal and child health service coverage estimates within a country. The DHS, MICS, and MIS are among the most important population-based surveys for maternal and child health in Nigeria. A summary of the study and sample design of these recent population-based surveys is provided below.

Demographic and Health Survey

The 2018 Nigeria DHS is a national survey designed to provide representative information for various key indicators across urban and rural areas, as well as the country's six geopolitical zones, 36 states, and the Federal Capital Territory (FCT). The 2018 NDHS used a stratified, two-stage cluster design based on the 2006 Nigeria Population Census sampling frame. In the first stage, 1,400 enumeration areas (EAs) were selected with probability proportional to enumeration area size, serving as the primary sampling units. In the second stage, 41,668 households were systematically chosen from a comprehensive listing of households within each of the selected EAs using equal probability systematic sampling. The overall response rate among households was 99% (NPC and ICF, 2019).

Multiple Indicator Cluster Survey

The 2021 Nigeria MICS is a national representative survey designed to provide international comparable information for various indicators across urban and rural areas, including the 37 strata with all 36 states and the FCT. Similar to the DHS, the 2021 Nigeria MICS used a stratified, multi-stage cluster sampling design based on the 2006 Nigeria Population Census sampling frame. In the first stage, 1,850 census EAs were selected with probability proportional to size, with the state serving as the main sampling strata. In the second stage, a representative sample of 41,532 households was systematically chosen from a comprehensive listing of households within each of the EAs. The overall response rate among households was 98.9% (NBS and UNICEF, 2022). The 2016/17 Nigeria MICS used a similar stratified, two-stage cluster sampling design and chose a representative sample of 2,340 EAs and 37,440 households. The overall response rate among households was 98.9% (NBS and UNICEF, 2017).

Malaria Indicator Survey

The 2021 Nigeria MIS is designed to provide representative information on malaria indicators at the national and state levels, including urban and rural areas, as well as the country's six geopolitical zones, 36 states, and the FCT. The 2021 Nigeria MIS used a two-stage sampling design based on the proposed 2023 Population and Housing Census of the Federal Republic of Nigeria. In the first stage, 568 EAs (195 in urban areas and 373 in rural areas) were selected with probability proportional to EA size, serving as the primary sampling units. In the second stage, a representative sample of 14,185 households were chosen from each of the selected EAs by using equal probability systematic sampling. The overall response rate among households was 99% (with 99% in both rural and urban areas) (NMEP, NPC, and ICF, 2022), Similarly, the 2015 Nigeria MIS used a two-stage sampling design based on the 2006 National Population and Housing Census, selecting a representative sample of 333 EAs (138 in urban areas and 195 in rural areas) and 8,148 households. The overall response rate among households was 99% (with 99% in rural areas and 98% in urban areas) (NMEP, NPoPC, NBS, and ICF, 2016).

Analysis

Sampling weights provided in the survey datasets were applied in the data analysis to ensure that the survey results accurately reflect the state-level characteristics of the population in the different population-based surveys.

Data Availability Across Surveys

Table 1 presents key indicators that closely align with NHMIS DHIS2 indicators and summarizes the availability of key under-five malaria, ANC, IPTp, and FP indicators from the various population-based surveys. The table categorizes the availability of data as tabulated in the survey report (T), calculated using public data (C), or unable to be calculated because required data were not collected (X).

Table 1. Population-based indicator availability for under-five malaria, ANC, IPTp, and FP indicators

Indicator and data availability	MIS 2021	MIS 2015	MICS 2021	MICS 2016/17	DHS 2018
Percentage of children under five with a fever in the past two weeks	T	C	T	T	T
Percentage of children under five with fever for whom advice or treatment was sought	T	C	T	T	T
Percentage of children under five with fever for whom advice or treatment was sought from a public sector source	C	C	C	C	C
Percentage of children under five with fever for whom advice or treatment was sought from a government health center or government health post	C	C	C	C	C
Among children 6–59 months with fever in the past 2 weeks, percentage who tested positive for malaria using RDT	C	T	X	X	T
Among children 6–59 months with fever in the past 2 weeks, percentage who tested positive for malaria using microscopy	C	T	X	X	T

Indicator and data availability	MIS 2021	MIS 2015	MICS 2021	MICS 2016/17	DHS 2018
Among children under 5 with a fever in the past two weeks, percentage who took any antimalarial drug	C	C	T	T	C
Percentage of women ages 15–49 years with a live birth in the last two years who received at least one ANC visit from a skilled health personnel	T	C	T	T	C
Percentage of women ages 15–49 years with a live birth in the last two years who received four or more ANC visits from any provider	T	X	T	T	C
Percentage of women ages 15–49 years with a live birth in the last 2 years (who received any ANC) who received their first ANC visit before four months gestational age	C	X	C	C	C
Among women ages 15–49 whose most recent live birth was in the past two years who received any ANC, the percentage who received ANC from a public sector facility	C	X	X	X	C
Among women ages 15–49 whose most recent live birth was in the past two years who received any ANC, the percentage that received ANC from a public sector PHC facility (government health center or health post)	C	X	X	X	C
Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received one or more doses of SP/F	C	C	X	T	C
Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage who received three or more doses of SP/F	C	C	X	T	C
Among women ages 15–49 who are currently married or in union OR are sexually active and unmarried, the percentage who are currently using any method of contraception	X	X	C	C	C
Among women ages 15–49 who are currently married or in union OR are sexually active and unmarried, the percentage who are currently using a modern method of contraception	X	X	C	C	C

Notes: T = tabulated in report; C = can calculate using public data; X = cannot calculate because data not collected.

Sample size across surveys

When assessing key indicators across population-based surveys, differences in survey designs and sample sizes impact the completeness and reliability of these indicators. Table 2 provides an overview of the national sample sizes across the population-based surveys to calculate the indicators described in Table 1. Several of the indicators in Table 1 are based on sub-samples of the full sample; some of these sub-samples can be small (e.g., children under five with a fever in the past two weeks; children under five with a fever in the past two weeks for whom advice or treatment was sought). Samples sizes at the state level are smaller than the national sample sizes in Table 2.

Table 2. Sample size (weighted denominators) of under-five malaria, ANC, IPTp, and FP indicators from population-based surveys

Indicator and sample size	MIS 2021	MIS 2015	MICS 2021	MICS 2016/17	DHS 2018
Percentage of children under five with a fever in the past two weeks	10,805	6,364	26,640	28,085	30,881
Percentage of children under five with fever for whom advice or treatment was sought	3,947	2,600	6,558	7,124	7,466
Among children under 5 with fever in the last 2 weeks and for whom advice or treatment was sought, percentage for whom advice or treatment was sought from a public sector source	2,524	1,770	4,113	3,817	5,507
Among children under 5 with fever in the last 2 weeks and for whom advice or treatment was sought, percentage for whom advice or treatment was sought from a government health center or government health post	2,524	1,770	4,113	3,817	5,507
Among children 6–59 months with fever in the past 2 weeks, percentage who tested positive for malaria using RDT	3,702	2,373	X	X	2,775
Among children 6–59 months with fever in the past 2 weeks, percentage who tested positive for malaria using Microscopy	3,678	2,226	X	X	2,026
Among children under 5 with a fever in the past two weeks, percentage who took any antimalarial drug	3,947	2,600	6,558	7,124	7,466
Percentage of women ages 15–49 years with a live birth in the last two years who received at least one ANC visit from a skilled health personnel	4,087	2,512	9,813	11,547	13,231
Percentage of women ages 15–49 years with a live birth in the last two years that received four or more ANC visits from any provider	4,087	X	9,813	11,547	13,231
Percentage of women ages 15–49 years with a live birth in the last 2 years (who received any ANC) who received their first ANC visit before four months gestational age	3,116	X	7,746	7,894	10,071
Among women ages 15–49 whose most recent live birth was in the past two years who received any ANC, the percentage that received ANC from a public sector facility	3,116	X	X	X	10,071
Among women ages 15–49 whose most recent live birth was in the past two years who received any ANC, the percentage that received ANC from a public sector PHC facility (government health center or health post	3,116	X	X	X	10,071
Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received one or more doses of SP/F	3,116	1,878	X	7,894	10,071
Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received three or more doses of SP/F	3,116	1,878	X	7,094	10,071

Indicator and sample size	MIS 2021	MIS 2015	MICS 2021	MICS 2016/17	DHS 2018
Among women ages 15–49 who are currently married or in union OR are sexually active and unmarried, the percentage who are currently using any method of contraception	X	X	26,241	25,750	30,600
Among women ages 15–49 who are currently married or in union OR are sexually active and unmarried, the percentage who are currently using a modern method of contraception	X	X	26,241	25,750	30,600

X = cannot calculate because data not collected.

Indicator estimates fluctuate between surveys due to sampling variation, particularly for state-level analysis and differences in survey instrument design and survey implementation. For consistency and ease of presentation we limit analysis in this report to trends between two surveys and compare indicators from the same type of survey (MIS, MICS, DHS) whenever possible. For malaria indicators including IPTp, we present trends from the 2015 MIS and 2021 MIS because those surveys cover the malaria indicators of interest and cover the widest time period. For ANC and FP we present trends from the 2016/17 and 2021 MICS because sample sizes are larger. For ANC/FP indicators that are not available in the MICS we use the MIS and/or DHS. The DHS covers all the indicators of interest and has a larger sample size but the most recent DHS was in 2018 and there is only one DHS in the period of interest for this analysis.

Limitations

NHMIS DHIS2 data are not service coverage data because only client volume is recorded (i.e., there is no denominator against which to compare case volume); therefore, they are not directly comparable with population-based survey coverage indicators. In addition, our DHIS2 analysis only captures services received in public primary healthcare facilities, not all services received. Population-based data also captured care sought in higher level public facilities, private facilities, and in pharmacies, drug stores and other community sources. As discussed above, NMHIS DHIS2 study data presented a high rate of missing values due to facilities entering the study after January 2017, facilities reporting zero cases or clients per month, which the DHIS2 database treats as missing values, or facilities not reporting for particular periods, which the DHIS2 database also treats as missing values. Therefore, we imputed zero values as described above for low volume facilities which may or may not have been accurate, and we exclude services received in higher volume facilities that did not report into the DHIS2 system in a given month.

Small sample sizes at the state level for some of the population-based survey indicators resulted in wide conference intervals, which limits our ability to identify statistically significant changes over time and increases the level of uncertainty associated with the findings. Additionally, population-based surveys relying on respondent recall are susceptible to recall bias. Finally, unlike the DHIS2 data, which provides monthly health facility reports, population-based surveys typically have longer data collection intervals of three to five years and do not capture recent changes in key indicators since 2021.

Results: Malaria Among Children Under Five

Malaria Indicators

According to the National Guidelines for Diagnosis and Treatment of Malaria (Federal Ministry of Health National Malaria Elimination Programme, 2020), malaria cannot be diagnosed based on clinical assessment alone without parasitological (testing) confirmation. The guidelines highlight two important components for appropriate case management of malaria: (1) testing, using microscopy and rapid diagnostic tests (RDTs) for parasitological confirmation, and (2) prompt treatment using artemisinin-based combination therapy (ACT) for uncomplicated malaria. Even though the signs and symptoms of malaria are non-specific, a child presenting with fever in a clinic serves as the entry point for initiating malaria case management. To align with the national guidelines, a set of indicators was identified from the DHIS2 to show provider adherence when a child under five presents to the health facility with a fever. The sequence covers fever presentation, testing for malaria, obtaining a positive malaria test, and the treatment of uncomplicated malaria with ACTs. A complementary set of indicators was identified from MIS population-based surveys to show population prevalence of fever, care-seeking and treatment (Table 3).

Table 3. Malaria DHIS2 and population-based survey indicators

DHIS2	Population-based surveys
Fever cases	
• Mean number of cases of children under 5 with fever at public PHCs	• Percentage of children under 5 with a fever in the past two weeks
Testing	

• Percentage of under-5 fever cases in public PHCs tested for malaria using mRDT or microscopy	• Percentage of children under 5 with fever for whom advice or treatment was sought
	• Percentage of children under 5 with fever for whom advice or treatment was sought from:
	  ○ A public sector source
	  ○ A government health center or government health post

Test positivity	

• Mean number of cases of confirmed uncomplicated malaria among children under 5 with fever at PHCs
• Percentage of under-5 mRDT malaria tests in public PHCs that are positive
	• Among children 6–59 months with fever in the past 2 weeks, percentage who tested positive for malaria using:
	  • RDT
	  • Microscopy

Malaria cases	
• Percentage of under-5 malaria cases in public PHCs identified via clinical diagnosis	
Treatment	
• Mean number of cases of confirmed uncomplicated malaria among children under five that were treated with ACTs • Percentage of under-5 confirmed uncomplicated malaria cases in public PHCs that were treated with ACT	• Among children under 5 with a fever in the past two weeks, percentage who took any antimalarial drug

Note: Italicized DHIS2 indicators are calculated from other DHIS2 data elements/indicators

Fever, Care Seeking, and Malaria Testing

In a malaria endemic country like Nigeria, cases of fever are often assumed to be due to malaria. However, the National Guidelines for Diagnosis and Treatment of Malaria clearly state that the symptoms of malaria are non-specific. This has become particularly important in view of recent epidemics or pandemics of infectious diseases such as COVID-19, Ebola, and Lassa fever requiring providers to be more vigilant to determine the correct cause of fever. Clinical diagnosis without testing will result in over-diagnosis of malaria and inappropriate treatment of non-malarial febrile illnesses.

Population-Level Fever Prevalence and Care Seeking

Table 4 shows fever prevalence and care seeking patterns in 2015 and 2021 across the three states. In Ebonyi and Zamfara states there was a notable (but not statistically significant) reduction in the fever cases reported. In contrast, there was a statistically significant increase in reported fever cases in Kebbi from 42.6% in 2015 to 67.3% in 2021. There was a slight increase in care seeking for children under five with fever in Kebbi and a slight decrease in Zamfara (neither statistically significant), but no change in Ebonyi.

Among children under five with fever for whom care was sought, there was a moderate increase in care seeking from a public sector source across the three states. Due to small sample sizes, the increases were not statistically significant. In 2021, slightly under 50% of caregivers who sought care for a child under five with fever in Kebbi and Zamfara visited public sector sources, compared to only 21% in Ebonyi.

Table 4. Population-based survey indicators for fever prevalence and care seeking, by survey and state

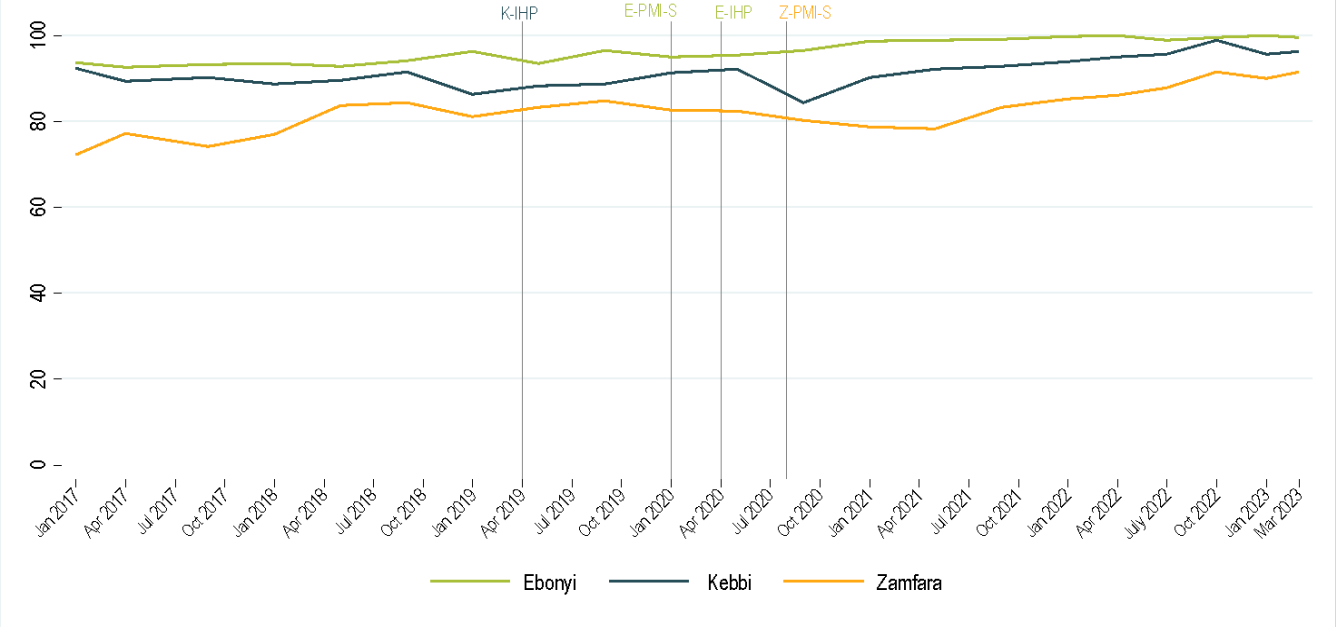
	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
% with a fever in the 2 weeks preceding the survey, among children under age 5									
MIS 2015	41.6	[32.7, 51.0]	134	42.6	[26.0, 60.9]	164	63.7	[51.2, 74.5]	210
MIS 2021	26.8	[20.3, 34.5]	297	67.3	[61.6, 72.5]	569	47.1	[39.9, 54.5]	211
% for whom advice or treatment was sought, among children under age 5 with fever									
MIS 2015	73.0	[56.3, 85.0]	56	44.3	[25.1, 65.4]	70	55.2	[29.6, 78.3]	134
MIS 2021	72.0	[55.8, 83.9]	80	47.1	[34.6, 60.0]	383	51.7	[36.8, 66.2]	100
% for whom advice or treatment was sought from a public sector source, among children under age 5 with fever for whom advice or treatment was sought									
MIS 2015	12.0	[4.7, 27.5]	41	33.2	[14.6, 59.2]	31	34.7	[24.7, 46.3]	74
MIS 2021	21.4	[10.9, 37.7]	57	47.4	[38.9, 56.1]	180	48.7	[35.7, 61.8]	51
% for whom advice or treatment was sought from a government health center or government health post, among children under age 5 with fever for whom advice or treatment was sought									
MIS 2015	5.9	[1.8, 17.2]	41	9.5	[1.3, 46.2]	31	14.4	[6.7, 28.3]	74
MIS 2021	18.8	[8.5, 36.7]	57	14.3	[8.0, 24.3]	180	29.5	[19.0, 42.7]	51

Malaria Testing in Public PHCs

The national case management guideline requires that all fever cases among children under five years who present to PHCs must have RDT testing for malaria to determine the diagnosis of malaria. The trend across the three case study states shows that almost all the fever cases were tested with RDTs by March 2023.

The vertical lines in Figure 2 show when the HPN activities began implementation in the three case study states. In Ebonyi, the percentage of fever cases in PHCs tested for malaria with RDTs increased from 93.7% at the start of the analysis period (January 2017) to 99.6% at the end of the period (March 2023). In Kebbi, there was a gradual increase in the percentage of fever cases tested for malaria with RDTs, particularly since January 2021, and it was only slightly lower than in Ebonyi (96.1%) by the end of the analysis period. In Zamfara, the percentage of fever cases tested for malaria with RDTs was lower than in the other two states throughout the analysis period but increased over time, particularly since July 2021, and was 91.5% by the end of the analysis period.

Figure 2. Percentage of under-five fever cases in public PHCs tested for malaria with RDT or microscopy (DHIS2 data, January 2017–March 2023)

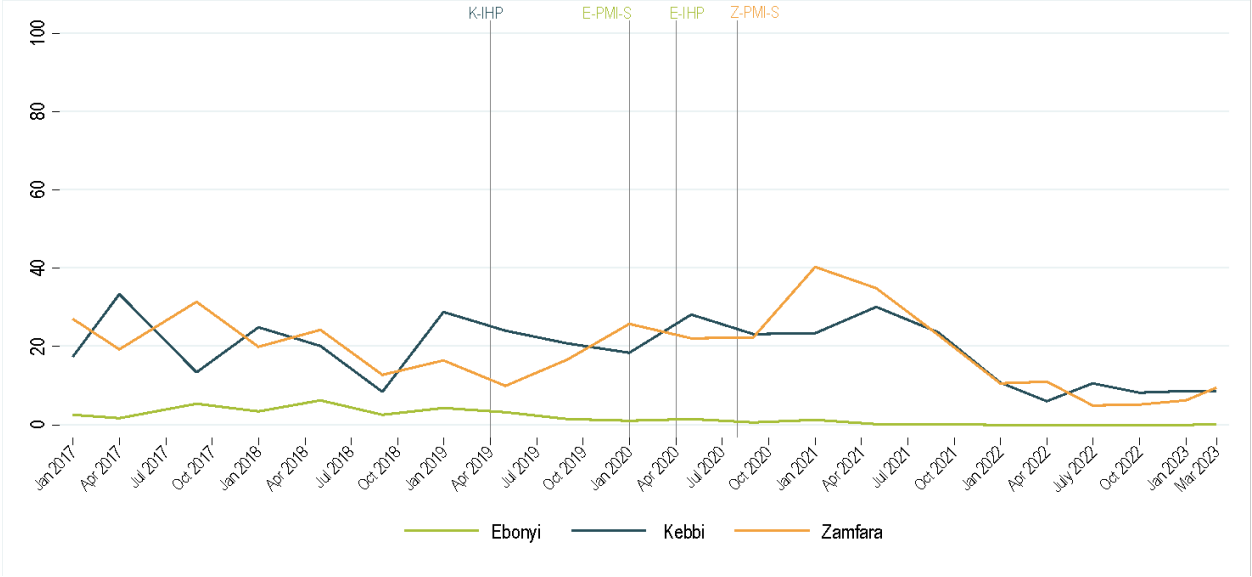


Note: Over 99.6 percent of malaria tests were conducted via mRDT for all study months

Clinical Diagnosis of Malaria in Public PHCs

Analysis of DHIS2 data shows that there has been less than 1% clinical diagnosis of malaria among children under five in Ebonyi since January 2021. In Kebbi and Zamfara states there has been a pronounced decline in clinical diagnosis of malaria in children under five from mid-2021, with under 10% of reported malaria cases clinically diagnosed in March 2023 (Figure 3). These trends are consistent with the increase in malaria testing in public PHCs as seen in the previous figure.

Figure 3. Percentage of under-five malaria cases in public PHCs identified via clinical diagnosis (DHIS2 data, January 2017–March 2023)



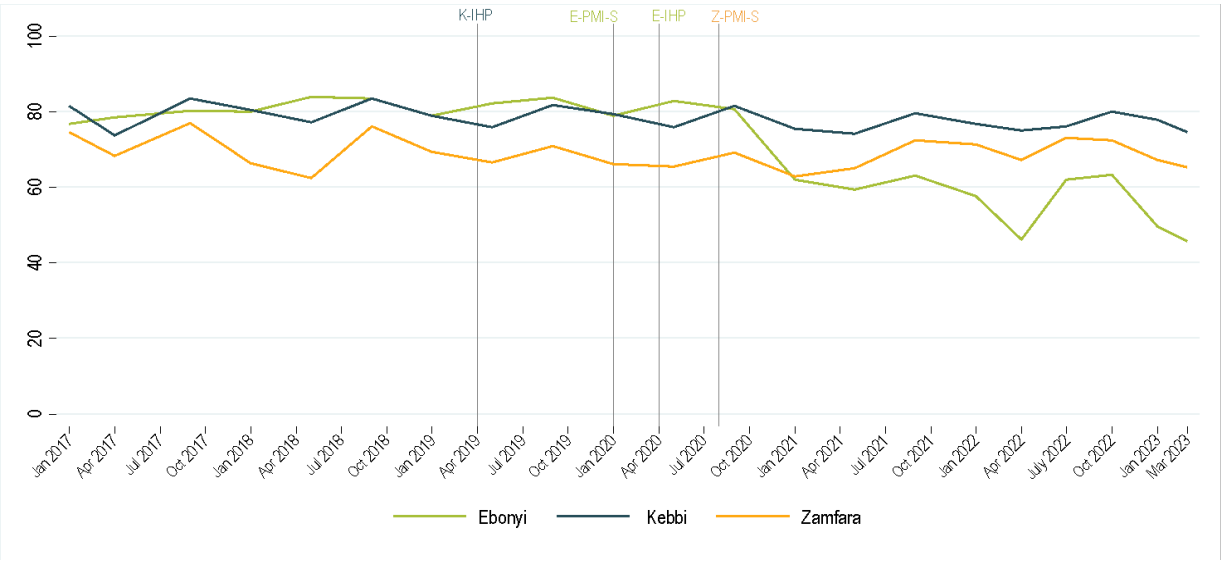
Malaria Test Positivity Rate

Malaria Test Positivity Rate in Public PHCs

Prompt and accurate diagnosis is part of effective disease management and refers to the specificity of malaria diagnosis. Only RDT positive results at PHCs are accepted as malaria cases and the national guidelines do not support any form of malaria treatment that is not based on parasitological diagnosis. Malaria test positivity is interpreted in relation to the total number of RDT tests conducted. Once testing of all fevers is established over time, the expectation is that malaria test positivity will decline as malaria interventions are sustained since non-malaria fever cases will be excluded from the test positivity rate.

In Ebonyi, a sharp decline in malaria test-positivity was observed in PHCs from around June 2020 (84.2%) to March 2023 (45.8%). For Kebbi, malaria test positivity has been relatively stable at around 80% in PHC facilities throughout the analysis period, while in Zamfara test positivity has fluctuated from a low of 62.3% (April 2018) to a high of 89.4% (June 2022), with the March 2023 rate at 65.3% (Figure 4).

Figure 4. Percentage of under-five mRDT malaria tests in public PHCs that are positive (DHIS2 data, January 2017–March 2023)



Note: Over 99.6 percent of malaria tests were conducted via mRDT for all study months

Population-Level Malaria Prevalence

Children ages 6–59 months were tested for malaria as part of the MIS Biomarker Questionnaire. A medical laboratory scientist collected blood samples for biomarker testing via finger or heel pricks from the children, conducted the RDT in the field, and prepared blood smear slides for malaria testing by microscopy (further details available in the 2015 and 2021 Nigeria MIS reports: NMEP, NPC, and ICF, 2022; NMPE, NPopC, NBS, and ICF International, 2016). Table 5 shows the prevalence of malaria among children ages 6–59 months who also were reported to have had a fever during the two weeks prior to the survey. Based on the MIS, the malaria prevalence dropped between the two surveys in Ebonyi and Zamfara states but increased in Kebbi state. However, testing with microscopy showed an increase in malaria prevalence in Ebonyi and a decrease in malaria prevalence in Kebbi and Zamfara states.

Table 5. Population-based survey indicators for malaria prevalence, by survey and state

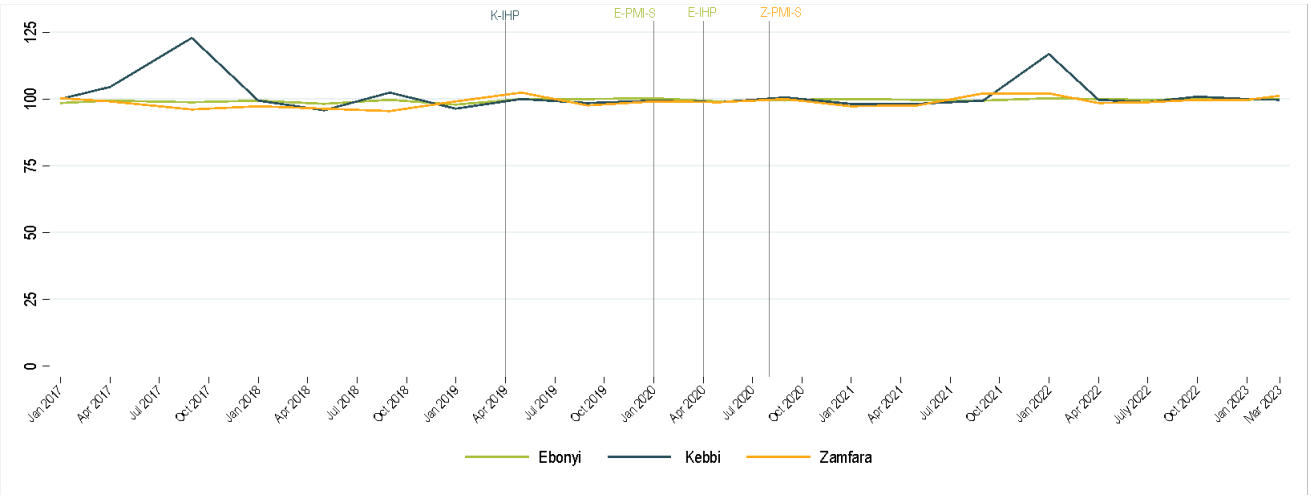
	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
Among children 6–59 months with fever in the past 2 weeks, percentage who tested positive for malaria antigens using RDT									
MIS 2015	50.5	[32.6, 68.1]	53	48.5	[32.0, 65.3]	63	75.0	[65.5, 82.6]	124
MIS 2021	27.6	[13.5, 48.1]	80	75.9	[59.8, 86.9]	333	58.3	[43.0, 72.2]	97
Among children 6–59 months with fever in the past 2 weeks, percentage who tested positive for malaria parasites using microscopy									
MIS 2015	21.5	[6.7, 51.0]	49	70.8	[38.2, 90.4]	58	61.3	[42.0, 77.6]	111
MIS 2021	25.5	[15.8, 38.5]	80	49.8	[33.3, 66.3]	333	30.0	[19.7, 42.8]	97

Malaria Treatment

Malaria Treatment in Public PHCs

The national guidelines require that ACTs be used for the treatment of uncomplicated malaria. DHIS2 analysis shows that nearly all confirmed uncomplicated malaria cases were treated with ACTs across the three states (Figure 5). However, there are observed fluctuations including some months in which the number of children under five treated with ACTs exceeds the number of confirmed uncomplicated malaria cases (percentage is greater than 100). These reported values exceeding 100% could reflect inclusion of treatment of unconfirmed malaria cases in the numerator of the indicator or errors in reporting in DHIS2.

Figure 5. Percentage of under-five confirmed uncomplicated malaria cases in public PHCs that were treated with ACT (DHIS2 data, January 2017–March 2023)



Note: Over 98.9 percent of confirmed uncomplicated malaria cases that received any antimalarial were treated with ACT for all study months

Population-Level Malaria Treatment

The MIS asked about treatment sought for children under five years who had fever in the past two weeks, regardless of whether the fever was confirmed as malaria. Table 6 shows that in Ebonyi, the use of antimalarial drugs for fever cases increased slightly from 39.8% in 2015 to 43.5% in 2021, but this change is not statistically significant. In Zamfara and Kebbi states, the percentage of children under five years who received antimalaria drugs for fever declined between 2015 and 2021 (from 45.5% to 0.4% in Kebbi and from 40.0% to 21.1% in Zamfara). However, these changes were not statistically significant because of the wide confidence intervals for each estimate due to small sample sizes. Among those children under five with a fever in the last two weeks that were treated with an antimalarial drug, the percentage treated with ACTs increased from 57.0% to 85.0% in Ebonyi and from 41.5% to 50.3% in Zamfara, but these changes are not statistically significant. In Kebbi, the proportion dropped from 8.2% in 2015 to zero in 2021.

Table 6. Population-based survey indicators for Malaria treatment, by survey and state

	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
% who took any antimalarial drug, among children under 5 with a fever in the past two weeks									
MIS 2015	39.8	[28.8, 52.0]	56	45.5	[28.7, 63.3]	70	40.0	[25.1, 57.0]	134
MIS 2021	43.5	[28.3, 60.0]	80	0.4	[0.0, 3.6]	383	21.1	[11.7, 35.1]	100
% who took ACT, among children under 5 with a fever who took any antimalarial drugs									
MIS 2015	57.0	[35.5, 76.1]	22	8.2	[1.8, 29.3]	32	41.5	[20.4, 66.2]	54
MIS 2021	85.0	[73.1, 92.2]	35	0	0	2	50.3	[28.3, 72.1]	21

Malaria Cascades

Client volume malaria cascades by state are presented in the Annex A. In Ebonyi, the mean client volume of children under five with fever fluctuated between 27 and 53 per month from January 2017 to November 2020, then fluctuated between 16 and 27 from December 2020 to March 2023. Nearly all cases were tested for malaria by either RDT or microscopy, with the mean number of positive cases of confirmed, uncomplicated malaria fluctuating between 21 and 53 per month from January 2017 to November 2020, then fluctuating between 7 to 16 per month for December 2020 to March 2023. Nearly all cases of confirmed uncomplicated malaria were treated with ACTs.

In Kebbi, the mean client volume of children under five with malaria fluctuated throughout the study period (from 13 to 63), and almost all cases were tested for malaria by either RDT or microscopy, with the mean number of positive cases of confirmed uncomplicated malaria fluctuating between 9 to 52 per month over the study period. Nearly all cases of confirmed, uncomplicated malaria were treated with ACTs.

In Zamfara, the mean client volume of children under five with malaria fluctuated throughout the study period (from 36 to 124), and almost all cases were tested for malaria by either RDT or microscopy, with the mean number of positive cases of confirmed, uncomplicated malaria fluctuating between 21 to 92 per month over the study period. Nearly all cases of confirmed, uncomplicated malaria were treated with ACTs.

Results: ANC and IPTp

ANC and IPTp Indicators

We examined indicators related to ANC client volume, timeliness of ANC, and IPTp from DHIS2 and MICS data. The DHIS2 analysis is limited to ANC in PHCS so we also examined the source of ANC from DHS and MIS data to explore the proportion of all ANC care represented in the DHIS2 data. Table 7 provides a list of the indicators examined.

Table 7. ANC and IPTp indicators

DHIS2	Population-based surveys
ANC client volume	
• Mean ANC client volume in public PHCs • Mean ANC1 client volume in public PHCs • Mean ANC4 client volume in public PHCs • Percentage of total ANC clients at 1st and 4th+ visit in public PHCs	• Percentage of women ages 15–49 years with a live birth in the last two years who received at least one ANC visit from a skilled health personnel • Percentage of women ages 15–49 years with a live birth in the last two years that received four or more ANC visits from any provider
Timeliness of ANC	
• Percentage of ANC1 visits before 20 weeks gestational age in public PHCs	• Percentage of women ages 15–49 years with a live birth in the last 2 years (who received any ANC) who received their first ANC visit before four months gestational age
ANC source	

	• Among women ages 15–49 whose most recent live birth was in the past two years who received any ANC, the percentage that received ANC from:
	  ○ A public sector facility
	  ○ A public sector PHC facility (government health center or health post

IPTp	
• Mean IPTp client volume in public PHCs • Mean IPTp3+ client volume in public PHCs (2021-2023) • Ratio of IPTp1 to ANC1 clients in public PHCs	• Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received one or more doses of SP/F • Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received three or more doses of SP/F

Note: Italicized DHIS2 indicators are calculated from other DHIS2 data elements/indicators

ANC

The 2016 World Health Organization ANC model was adopted as the national guidelines for ANC in 2018 (Federal Ministry of Health, 2018). The guidelines require that a pregnant woman or adolescent has at least eight contacts with a trained health provider as follows: one contact in the first trimester, two contacts in the second trimester, and five contacts in the third trimester. The change from the previous ANC approach requiring four ANC visits was due to evidence suggesting that there are more perinatal deaths under that

model than under ANC models requiring at least eight contacts. According to the national guidelines, ANC interventions fall into the following categories: routine antenatal, nutrition, maternal and fetal assessment, preventive measures, interventions for management of common physiologic symptoms in pregnancy, and health system-level interventions to improve the utilization and quality of ANC. Based on this strategy, the expectation is that ANC volume will increase and there will be more contacts between ANC1 and delivery.

ANC Client Volume in PHCs

The percentage of ANC1 clients among total ANC clients in public PHCs was relatively similar across states at the start of the study period (January 2017) at approximately 50% but decreased over time in Ebonyi and Kebbi to 40% or less, while remaining constant in Zamfara. At the end of the study period (March 2023), the percentage was highest in Zamfara (50.6%), followed by Kebbi (39.8%) and Ebonyi (31.7%) (Figure 6).

The percentage of ANC4 clients among total ANC clients in public PHCs was highest in Kebbi at the start of the study period at 21.8% and relatively similar and lower in Ebonyi (10.1%) and Zamfara (11.9%). The percentage decreased over time in Kebbi (15.5%) but increased slightly in Ebonyi (12.4%) and Zamfara (15.3%) (Figure 6).

The mean number of total monthly ANC visits per facility in public PHCs increased slightly over the study period in Ebonyi, with most of the increase seen after the start of implementation by PMI-S and IHP, reaching an average of 28.8 per month in March 2023 (Figure 7). The mean number of total monthly ANC visits per facility fluctuated over the study period in Kebbi, with start and end dates (January 2017 and March 2023) showing similar values of about 84 per month (Figure 8). In Zamfara, the mean number of total ANC visits per facility decreased over the study period from 91.7 to 61.4 per month (Figure 9).

Figure 6. DHIS2: Percentage of total ANC clients at 1st and 4th+ ANC visit, by state

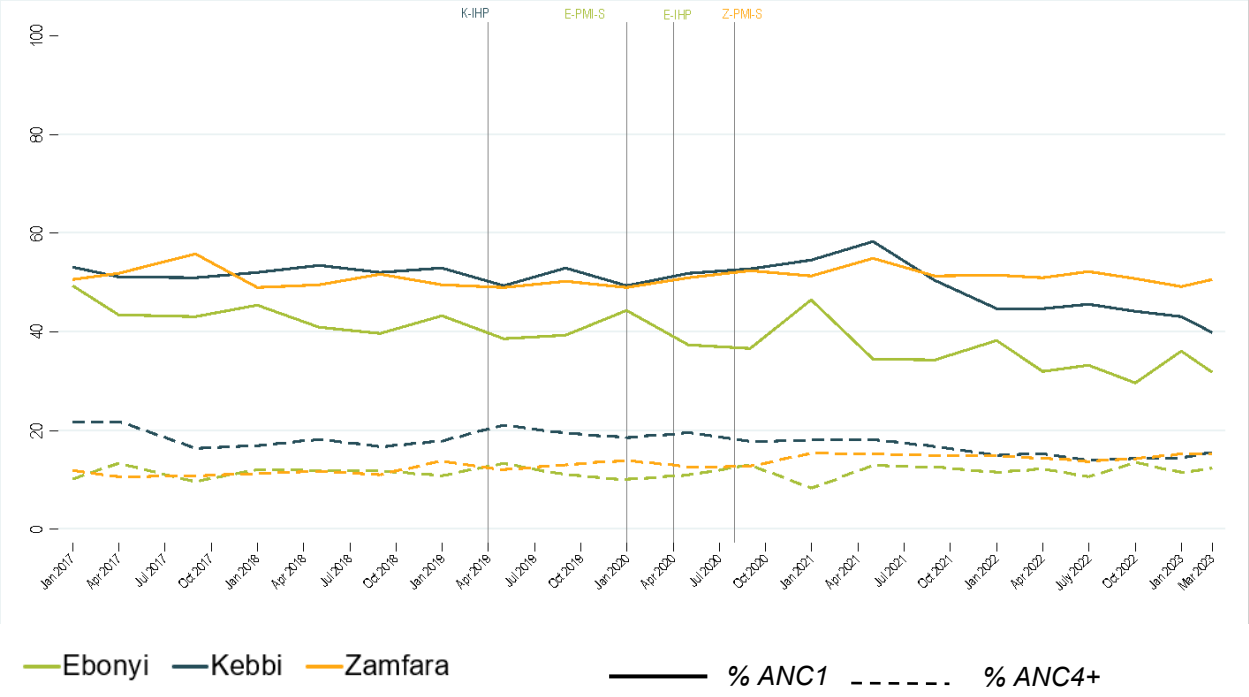


Figure 7. DHIS2: Mean ANC client volume at public PHCs, Ebonyi state

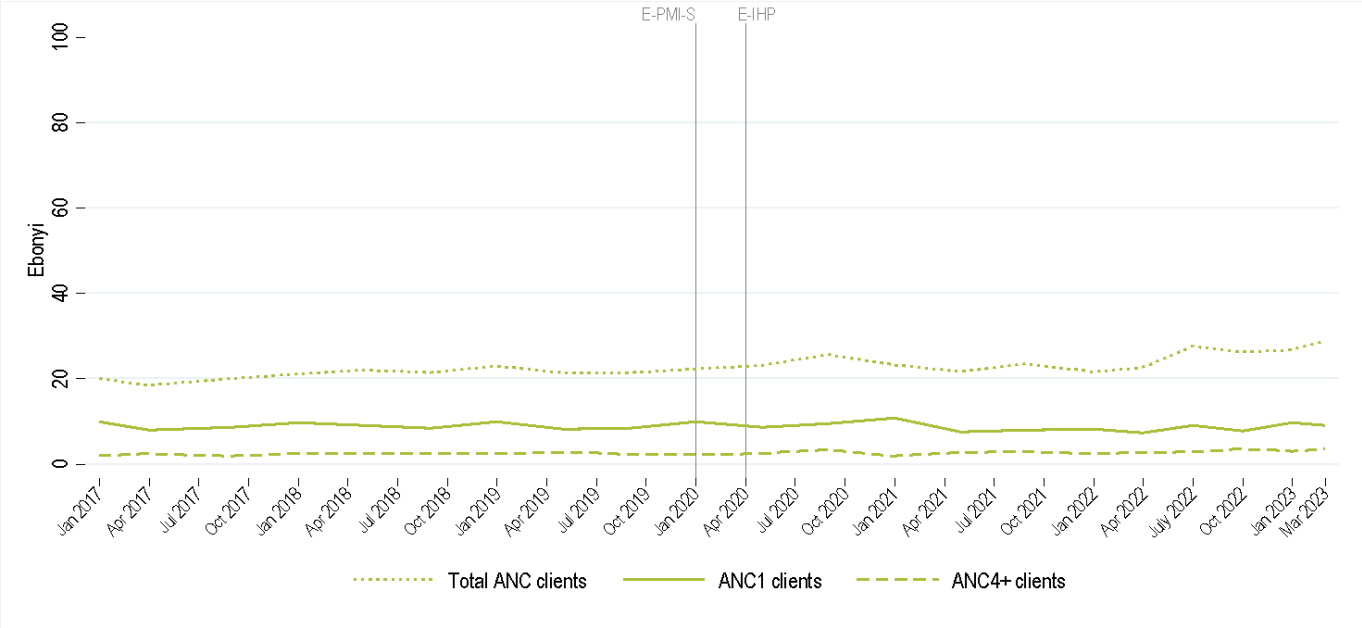


Figure 8. DHIS2: Mean ANC client volume at public PHCs, Kebbi state

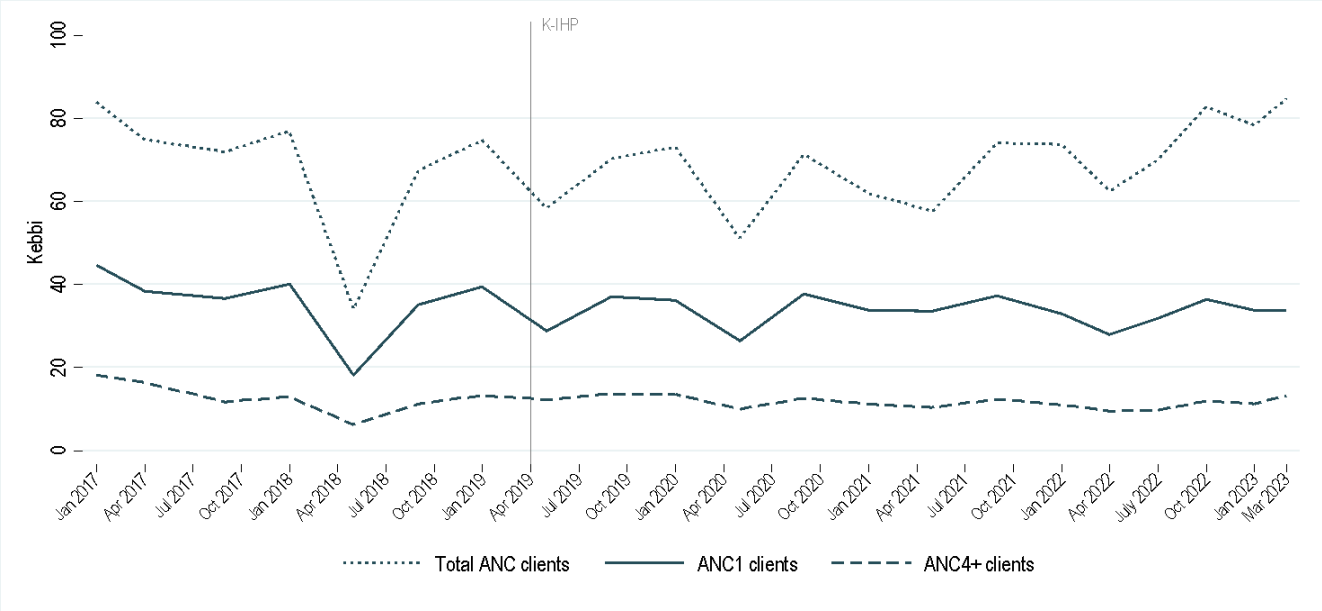
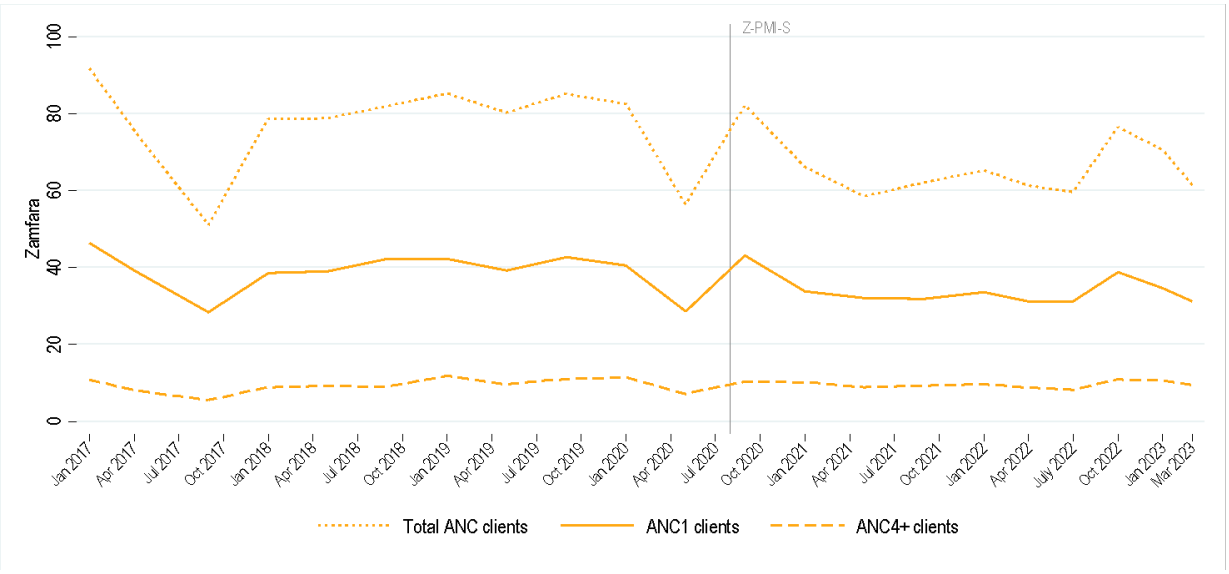


Figure 9. DHIS2: Mean ANC client volume at public PHCs, Zamfara state



Population-Level ANC Coverage

Table 8 shows MICS indicator data for ANC population coverage. The percent of women ages 15–49 years with a live birth in the last two years that received at least one ANC visit from skilled health personnel was highest in Ebonyi and increased from 75.0% in 2016/2017 to 93.7% in 2021. Percentages were lower and decreasing in Kebbi (45.4% to 41.9%) and Zamfara (42.4% to 33.8%), but these declines are not statistically significant.

The percentage of women ages 15–49 years with a live birth in the last two years that received four or more ANC visits from any provider increased in both Ebonyi and Kebbi from 2016/2017 to 2021, with Ebonyi seeing an increase of over 20 percentage points (57.7% to 78.9%) and Kebbi seeing an increase of 15.9 percentage points (20.9% to 36.8%). In Zamfara, the percentage of women ages 15–49 years with a live birth in the last 2 years that received four or more ANC visits from any provider decreased by 11.6 percentage points (29.0% to 17.4%).

Table 8. Population-based survey indicators for ANC coverage, by survey and state

	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
Percentage of women ages 15–49 years with a live birth in the last two years that received at least one ANC visit from skilled health personnel									
MICS 2016/2017	75.0	[67.5, 81.3]	111	45.4	[37.0, 54.0]	398	42.2	[33.6, 51.3]	583
MICS 2021	93.7	[75.7 98.6]	134	41.9	[31.9, 52.7]	334	33.8	[24.7, 44.2]	271
Percentage of women ages 15–49 years with a live birth in the last two years that received four or more ANC visits from any provider									
MICS 2016/2017	57.7	[49.4, 65.7]	111	20.9	[15.3, 27.8]	398	29.0	[22.3, 36.7]	583
MICS 2021	78.9	[52.5, 92.6]	134	36.8	[27.9, 46.7]	334	17.4	[12.4, 30.5]	271

Timeliness of ANC in PHCs

The percentage of ANC1 visits before 20 weeks gestational age in public PHCs remained relatively flat over the study period in all three states. At the end of the study period, the percentage was highest in Zamfara (44.0%), followed by Kebbi (39.5%) and Ebonyi (35.1%) (Figure 10).

Figure 10. DHIS2: Percentage of ANC1 visits in public PHCs before 20 weeks gestational age

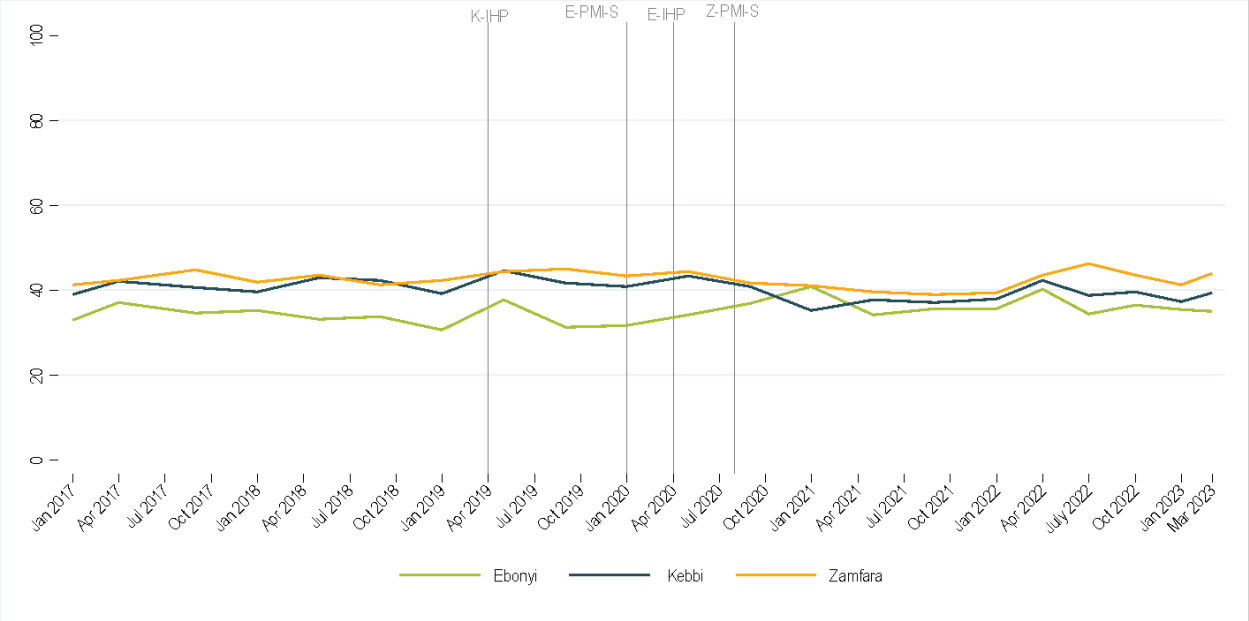


Table 9 shows MICS indicator data for timeliness of ANC. The percentage of women ages 15–49 years with a live birth in the last 2 years (who received any ANC) who received their first ANC visit before four months gestational age decreased in all three states from 2016/2017 to 2021, although the declines were not statistically significant. In 2021, the percentage was highest overall in Ebonyi (29.5%), followed by Kebbi (22.3%) and Zamfara (19.7%).

Table 9. Population-based survey indicators for timeliness of ANC services, by survey and state

	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
Percentage of women ages 15–49 years with a live birth in the last 2 years (who received any ANC) who received their first ANC visit before four months gestational age									
MICS 2016/2017	34.0	[25.5, 43.6]	87	33.6	[26.2, 42.0]	188	29.1	[22.0, 37.5]	246
MICS 2021	29.5	[25.4, 34.1]	126	22.3	[17.0, 28.8]	165	19.7	[12.1, 30.5]	92

Population-Level ANC Source

Table 10 provides data on the source of ANC from the 2018 DHS and 2021 MIS. Among women ages 15–49 whose most recent live birth was in the past two years and who received any ANC, the percentage that

received ANC from a public sector facility was over 93% in Kebbi and Zamfara in both time periods, with Kebbi showing a slight decrease over time and Zamfara a slight increase. In Ebonyi, the percentages were lower (64.3% in 2018 and 71.9% in 2021).

Among women ages 15–49 whose most recent live birth was in the past two years and who received any ANC, the percentage that received ANC from a public PHC level facility (government health center or health post) increased in Ebonyi from 46.2% in 2018 to 61.6% in 2021, decreased in Kebbi from 74.8% to 27.3%, and remained constant in Zamfara at approximately 39%.

Table 10. Population-based survey indicators for source of ANC services, by survey and state

	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
Among women ages 15–49 whose most recent live birth was in the past two years who received any ANC, the percentage that received ANC from a public sector facility									
DHS 2018	64.3	[56.0, 71.8]	283	98.2	[94.9, 99.4]	225	95.3	[89.5, 98.0]	197
MIS 2021	71.9	[54.1, 84.8]	91	93.3	[85.5, 97.1]	121	99.1	[91.6, 99.9]	38
Among women ages 15–49 whose most recent live birth was in the past two years who received any ANC, the percentage that received ANC from a public PHC level facility (government health center or health post)									
DHS 2018	46.2	[37.8, 54.7]	282	74.8	[65.6, 82.1]	225	39.5	[19,5, 63.8]	197
MIS 2021	61.6	[44.9, 75.9]	91	27.3	[15.0, 44.4]	121	39.2	[20.3, 62.1]	38

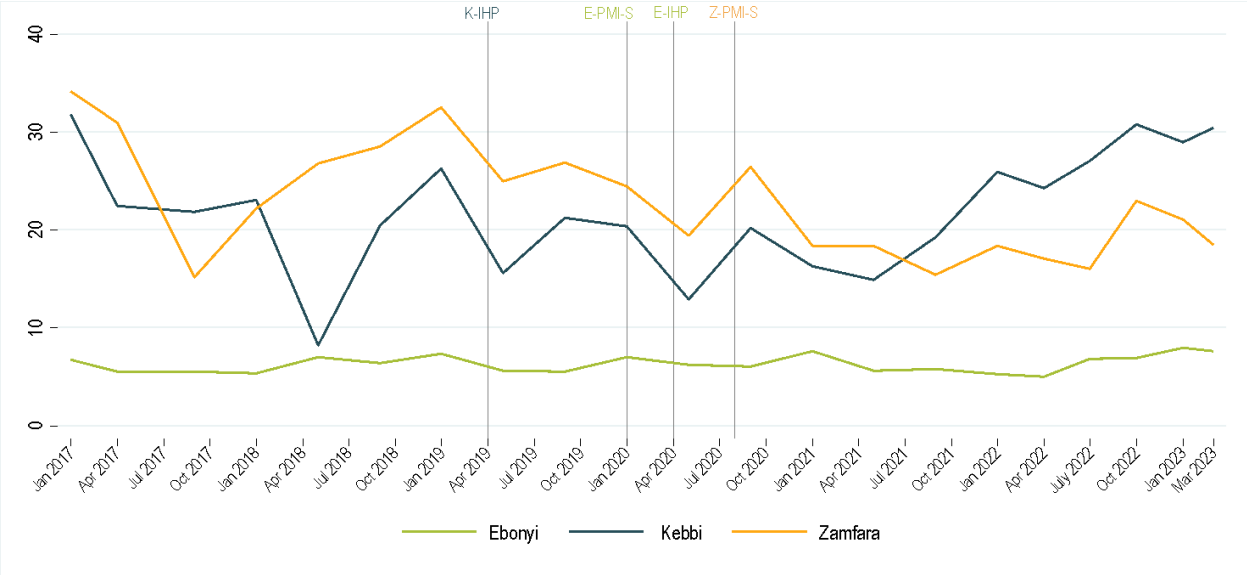
IPTp

Under the new ANC guidelines requiring a minimum of eight contacts for ANC, IPT is required during pregnancy from the beginning of the second trimester until the time of delivery in at least one-month intervals. The DHIS2 historically tracked IPTp1 and IPTp3 under the previously focused ANC model (minimum of four ANC visits). With the new ANC model, IPTp3+ was included in the DHIS2.

IPTp in PHCs

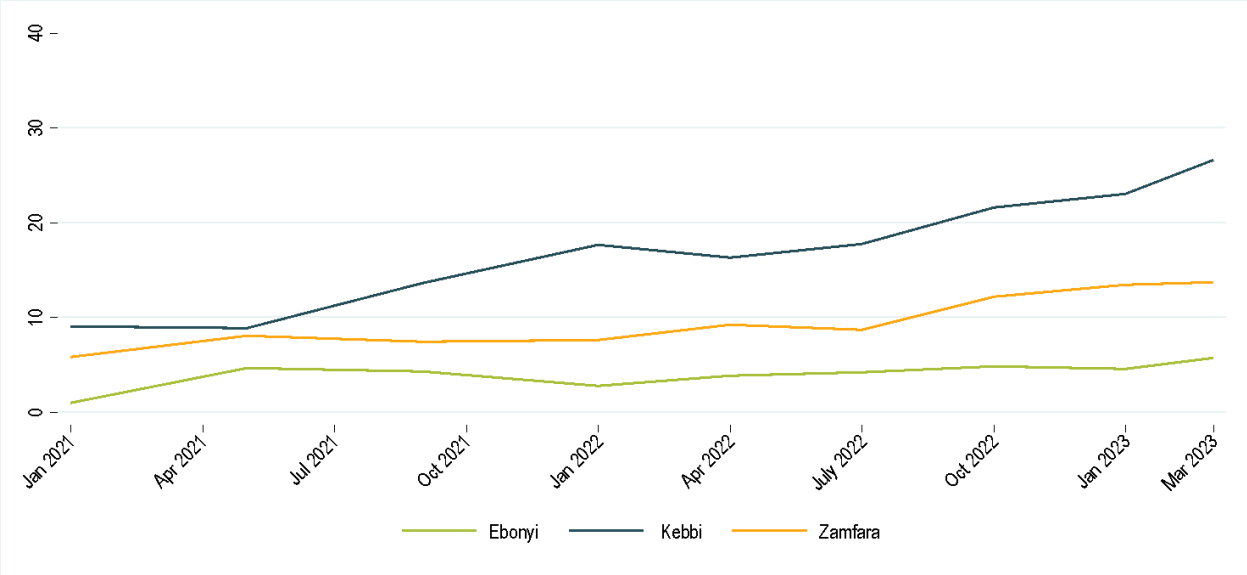
The mean monthly number of pregnant women per facility who received IPTp1 at a public PHC remained constant in Ebonyi over time at about 7 per month, fluctuated over time in Kebbi, but had similar values at the start and end of the study period at about 30 per month, and declined in Zamfara from about 34 to 18 per month. Kebbi saw an increase in the mean number of pregnant women per facility who received IPTp1 since the start of IHP implementation, while Zamfara saw a decrease since the start of PMI-S implementation with suggestion of a slight upward trend since October 2021. (Figure 11).

Figure 11. DHIS2: Mean IPTp1 client volume in public PHCs



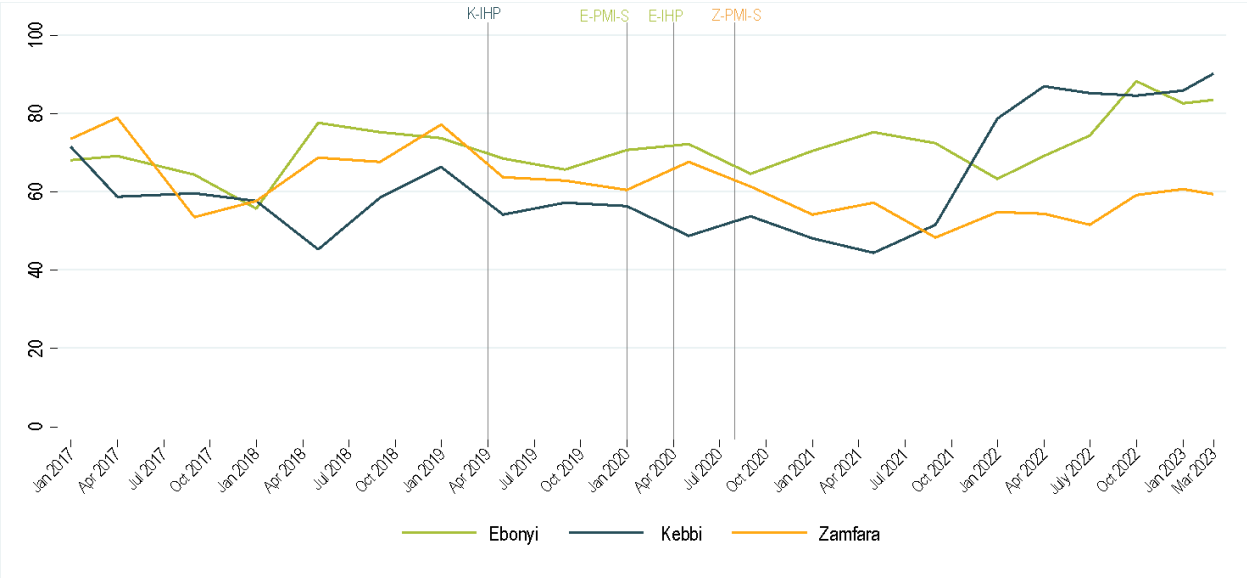
The mean monthly number of pregnant women per facility who received IPTp3 at a public PHC was only available beginning in January 2021. All three states registered an increase in volume with Kebbi seeing the greatest increase, from about 9.0 to 26.6 per month. (Figure 12).

Figure 12. DHIS2: Mean IPTp3 client volume in public PHCs



The ratio of IPTp1 clients to ANC1 clients in public PHCs increased in Ebonyi and Kebbi over the study period (from about 68:100 to 84:100 and 72:100 to 90:100 respectively) but declined in Zamfara (from about 74:100 to 60:100). Increases were seen in both Ebonyi and Kebbi after the start of implementation of IHP and PMI-S in Ebonyi, and after the start of IHP in Kebbi, but the sustained increases did not begin until early 2022 in Ebonyi and late 2021 in Kebbi. In Zamfara, the ratio initially declined after the start of PMI-S implementation, but recently showed an increase. (Figure 13).

Figure 13. DHIS2: Ratio of IPTp1 to ANC1 clients



Population-Level IPTp

Table 11 shows MIS indicator data for IPTp services. Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received one or more doses of SP/F to prevent malaria increased in Ebonyi from 72.0% in 2015 to 94.1% in 2021, decreased in Kebbi from 86.2% to 81.9% (not statistically significant), and remained constant in Zamfara at approximately 87%.

Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received three or more doses of SP/F to prevent malaria decreased in Ebonyi from 51.0% in 2015 to 42.8% in 2021 and in Kebbi from 71.1% to 58.1% but increased in Zamfara from 40.8% to 56.8%. However, these changes are not statistically significant due to the wide confidence intervals around these survey estimates.

Table 11. Population-based survey indicators for IPTp services, by survey and state

	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received one or more doses of SP/F									
MIS 2015	72.0	[63.4, 79.3]	46	86.2	[65.8, 95.3]	27	87.8	[74.9, 94.6]	30
MIS 2021	94.1	[83.2, 98.1]	91	81.9	[70.6, 89.5]	121	87.2	[65.0, 96.2]	38
Among women ages 15–49 whose most recent live birth was in the past two years and who had any ANC, the percentage that received three or more doses of SP/F									
MIS 2015	51.0	[29.6, 72.1]	46	71.1	[49.0, 86.3]	27	40.8	[25.7, 57.8]	30
MIS 2021	42.8	[30.2, 56.4]	91	58.1	[43.6, 71.3]	121	56.8	[27.6, 81.9]	38

Results: Family Planning

The Federal Government of Nigeria Family Planning Blueprint for 2020-2024 (Federal Ministry of Health, 2020) describes the low uptake of family planning and the low contraceptive prevalence as associated with cultural factors that support large family size, myths and misconceptions about contraception, gender inequity, inadequate access to FP services, poor quality of services, and inadequate demand creation efforts. The blueprint states that ensuring the delivery of high-quality FP services across Nigeria will depend on providers' competence and human and material resource availability at service delivery points in public and private facilities. These two factors, alongside the availability of commodities, will largely affect the supply component of service delivery and the uptake of family planning methods.

FP Indicators

To determine progress in the uptake of FP at the service delivery points we examined NHMIS DHIS2 data indicators related to new female acceptors of FP and the percentage of women using any or a modern method of contraception from population-level surveys (Table 12).

Table 12. Family planning indicators

DHIS2	Population-based surveys
• *Percentage of new FP acceptors in public PHCs who are female* • Mean new FP acceptor female clients in public PHCs • Mean number of females ages 15–49 years using modern FP method in public PHCs	• Among women ages 15–49 who are currently married or in union OR who are sexually active and unmarried, the percentage who are currently using any contraceptive method. • Among women ages 15–49 who are currently married or in union OR who are sexually active and unmarried, the percentage who are currently using a modern contraceptive method.

Note: Italicized DHIS2 indicators are calculated from other DHIS2 data elements/indicators

New Female Family Planning Acceptors in PHCs

The percentage of new FP acceptors in public PHCs who were female was high in Kebbi and Zamfara, with Kebbi showing an increase (from 87.4% to 93.6%) and Zamfara remaining constant over the study period (at about 92%). A lower percentage of new female family planning acceptors were female in Ebonyi, which showed a slight overall increase over the study period from 61.5% to 66.1% (Figure 14).

The mean monthly number of new female FP clients per facility in public PHCs increased in all three states (6.5 to 13.2 per month in Ebonyi, 13.4 to 25.1 per month in Kebbi, and 14.3 to 18.7 per month in Zamfara). Ebonyi had been experiencing an upward trend prior to the start of IHP and PMI-S, and this upward trend continued. Kebbi also maintained an upward trend following the start of IHP (Figure 15).

Figure 14. DHIS2: Percent of new FP acceptors in public PHCs who are female

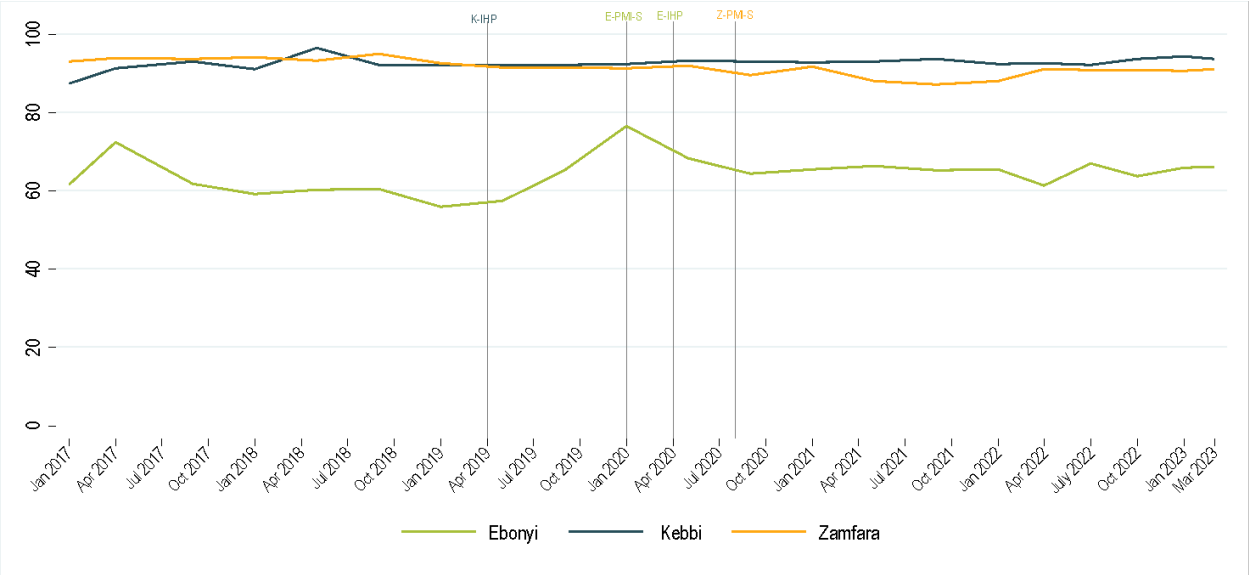
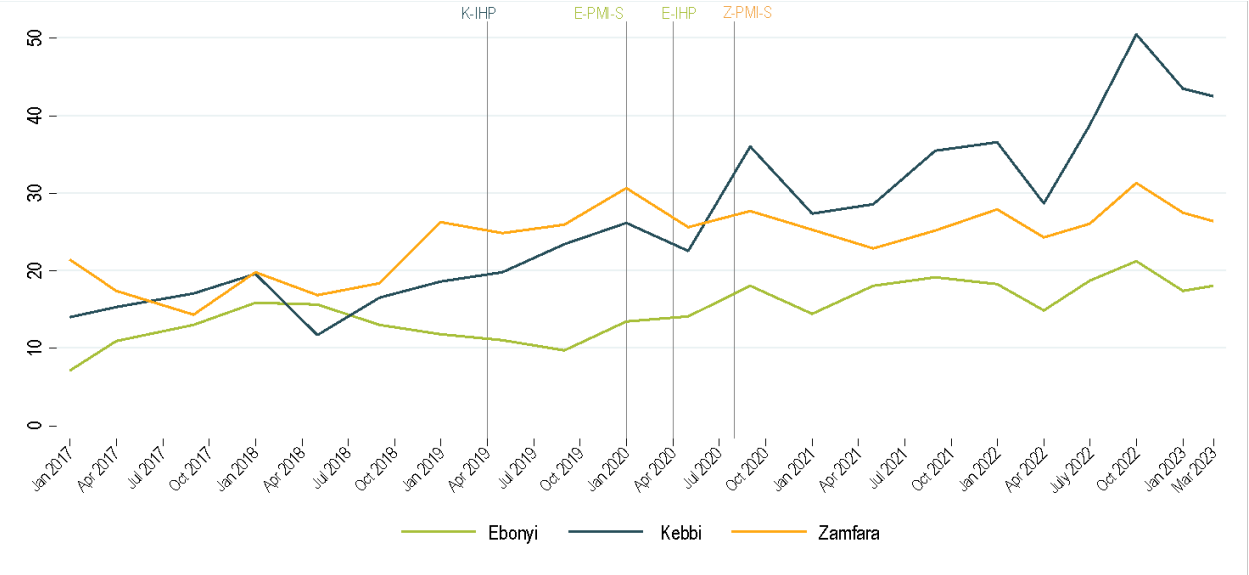
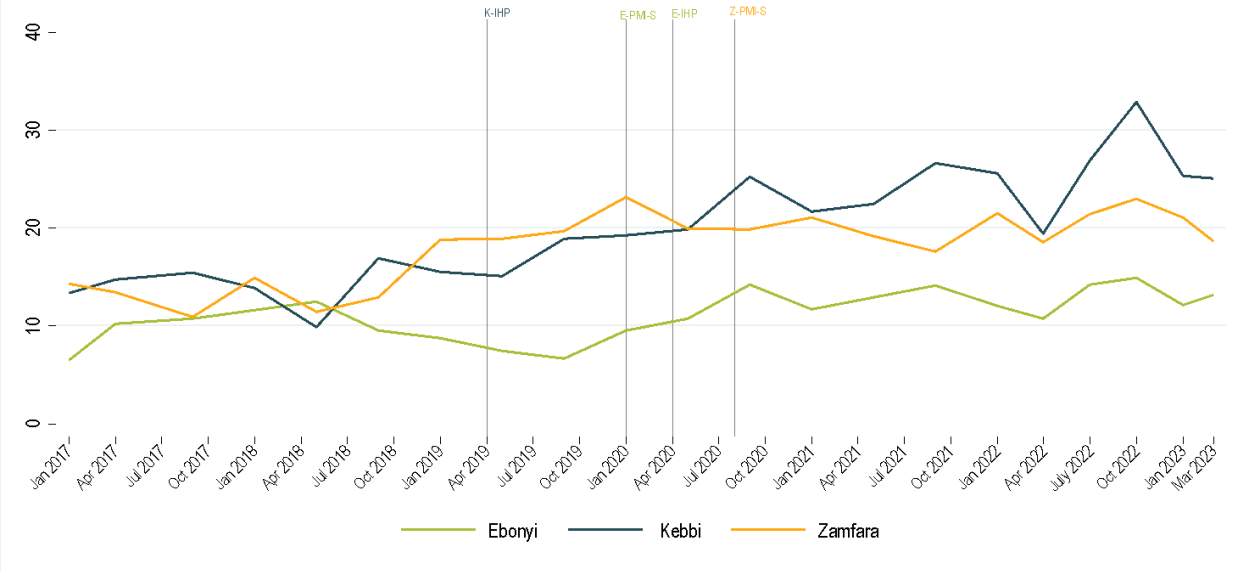


Figure 15. DHIS2: Mean new female FP acceptor client volume in public PHCs



The mean monthly number of females using a modern contraceptive method per facility for public PHCs increased in all three case study states over the study period. In Ebonyi, there was an increase from 7.1 to 18.1 per month, in Kebbi from 14.0 to 42.5 per month, and in Zamfara, from 21.5 to 26.4 per month (Figure 16).

Figure 16. DHIS2: Mean number of females ages 15–49 years using modern FP method in public PHCs



Women Currently Using a Modern Method

Table 13 shows MICS indicator data for FP. The percentage of women currently using any contraceptive method among women ages 15–49 who are currently married/in a union or sexually active and unmarried increased in all three states from 2016/2017 to 2021. The largest increase was in Ebonyi (5.3% to 40.1%), followed by Zamfara (5.5% to 15.0%), and Kebbi (6.4% to 11.5%).

The percentage of women who are currently using a modern contraceptive method among women ages 15–49 who are currently married/in a union or sexually active and unmarried also increased in all three states from 2016/2017 to 2021. The largest increase was in Ebonyi (2.9% to 31.2%), followed by Kebbi (5.1% to 10.9%), and Zamfara (4.9% to 10.3%).

Table 13. Population-based survey indicators for FP, by survey and state

	Ebonyi			Kebbi			Zamfara		
Indicator, year	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**	**Value**	**95% CI**	**N**
Percentage of women who are currently using any contraceptive method, women ages 15–49 who are (currently married or in union) OR (sexually active and unmarried)									
MICS 2016/2017	5.3	[3.3–9.3]	235	6.4	[4.3–9.4]	765	5.5	[3.6–7.8]	1159
MICS 2021	40.1	[32.2–48.5]	374	11.5	[8.3–15.6]	697	15.0	[11.0–20.0]	727
Percentage of women who are currently using modern method, women ages 15–49 who are (currently married or in union) OR (sexually active and unmarried)									
MICS 2016/2017	2.9	[1.7–4.9]	235	5.1	[3.1–8.1]	765	4.9	[2.8–8.6]	1159
MICS 2021	31.2	[19.9–45.1]	374	10.9	[7.9–15.0]	697	10.3	[6.8–15.3]	727

Discussion

Malaria Testing and Treatment

The analysis of the NHMIS DHIS2 data shows that providers in public PHCs are generally following national guidelines to test children under five with fever for malaria. This is the case in all three states regardless of integrated or malaria-focused program approach. Testing in public PHCs has increased over time, particularly in Kebbi and Zamfara where testing was at lower levels before the HPN activities began. Clinical diagnosis of malaria has correspondingly declined as testing has increased. Testing remains slightly lower in Zamfara than in the other two states. This may be related to higher stock outs of malaria RDTs reported in Zamfara (Brugh, Walsh, et al. 2022). More recent data are needed to determine if Zamfara still experiences higher stock outs than the other two states. While some in-charge facility officers in Zamfara reported increased availability of certain drugs—such as folic acid and antibiotics in key informant interviews conducted in 2022—the majority reported limited improvement in overall availability of essential drugs, diagnostics, and supplies (Data for Impact, 2024).

The DHIS2 data also show that providers in public PHCs are generally following national guidelines to treat confirmed uncomplicated malaria cases with ACTs in all three states. This finding is consistent with data from the 2021 provider survey which found that nearly all providers surveyed reported correct testing and treatment in a child health clinical vignette for a five-year-old boy presenting with malaria (Brugh, Curtis, et al. 2022). The percentage of tests in public PHCs that are positive for malaria is relatively high but has been declining in Ebonyi. This is seen as indicative of increased confidence in the tests among providers there related to improved capacity due to training provided by USAID HPN activities (Data for Impact, July 2023).

Although providers in public PHCs are generally following national testing and treatment guidelines, the population-based survey data show that relatively few children under five who have a fever are taken to a public PHC. The majority of children under five with a fever are either not taken for care or care is sought at sources other than public PHCs. Sample sizes in the MIS and other available surveys are too small to draw meaningful conclusions about changes over time in care seeking for fever in children under five at the state level. All the survey estimates are subject to a high level of uncertainty which limits their use for this analysis. A behavioral sentinel surveillance survey (BSS) conducted by Breakthrough RESEARCH in late 2022 in Kebbi and Zamfara concluded that testing and treatment of fevers in children was relatively low at the population level in areas in which Breakthrough ACTION operated. They found a slight decline in testing in Kebbi and slight increase in Zamfara between 2019 and 2022 but the differences in the trends in Kebbi and Zamfara were not statistically significant (Hutchinson, et al. 2023).

Overall, this analysis suggests that the intervention model does not seem to be strongly associated with provider adherence to national testing and treatment guidelines for children under five presenting with fever in public PHCs; both models are associated with increased adherence to national guidelines. Care-seeking behavior in the community appears to be a larger barrier to children under five receiving appropriate testing and treatment for fever than provider behavior in public PHCs. General barriers to care seeking reported in community FGDs include cost and distance (Data for Impact, 2024), while barriers to pediatric malaria care reported by BREAKTHROUGH Research include feeling that testing was unnecessary or that the test was not offered where they sought care (Hutchinson, et al. 2023).

ANC and IPTp

Population-based data and NHMIS DHIS2 facility-based data provide a broadly consistent picture of trends in ANC care in the three states. The MICS provides evidence of increased ANC use in Ebonyi (any visits and 4+ visits) between 2016/17 and 2021, consistent with the small gradual increase in ANC client volumes in public PHCs there, which has continued since 2021. The increase in ANC client volume preceded the start of IHP in Ebonyi but has continued since then. The MICS data show no increase in any ANC in Kebbi between 2016/17 and 2021, consistent with relatively constant ANC volumes in public PHC facilities there. There is some evidence that ANC client volumes are starting to increase in Kebbi since April 2022 (after the most recent MICS). Uptake of ANC remains low in Zamfara, where interventions are focused only on malaria. Both the DHIS2 data and the population-based data indicate that early ANC care in the first trimester remains uncommon in all three states and is not increasing. The majority of women in Kebbi and Zamfara who seek ANC care used the public sector so the DHIS2 data analysis captures most of the ANC care women are getting, although in Kebbi women appear to be going to secondary and tertiary public facilities for ANC rather than primary public facilities in the most recent MIS. This is not the case in Ebonyi, however, where about a third of women get ANC outside of the public sector. Community members in focus group discussions in 2022 in all three states reported having seen messages on ANC in the past six months. They reported that they liked and understood the messages. There were perceived increases in ANC use in communities (Data for Impact, 2024) which are partially supported by the DHIS2 analysis in Ebonyi and to a

lesser extent in Kebbi and by the 2022 BSS conducted by Breakthrough RESEARCH (Hutchinson, et al. 2023).

Population-based and facility-based data also provide a broadly consistent picture of IPTp services in Kebbi and Zamfara where there has been little change in the percentage of women getting any IPTp between 2015 and 2021 in the population-based surveys and fluctuating or declining IPTp1 client volumes in public PHCs in the same period. However, Kebbi has seen an increase in IPTp1 volumes since around July 2021 (after the MIS). The lack of change in use of ANC in Kebbi and Zamfara described above likely contributes to lack of change in IPTp1 use in the two states. The MIS shows an increase in the percentage of women who received IPTp1 between 2015 and 2021 in Ebonyi, while public PHC client volumes remained stable in this period and since 2021. Sample sizes in the population-based data are small, however, and women in Ebonyi are less likely to use the public sector for ANC that women in the other two states.

All three states show evidence of increases in IPTp3 client volumes in public PHCs since January 2021 and increases in coverage of IPTp3 in population-based survey data between 2015 and 2021. The ratio of IPTp1 clients to ANC1 clients has also increased notably since around July 2021, particularly in Ebonyi and Kebbi. These findings suggest fewer missed opportunities to provide IPTp once women come in for ANC, which may suggest improved adherence to IPTp guidelines by providers, particularly in the two states with integrated programming. Stockouts of SP have been a problem during the analysis period, particularly in Zamfara and Kebbi and improvements in the availability of SP could be a factor in the increase in IPTp3 coverage and the increase in the ratio of IPTp1 clients to ANC1 clients in Ebonyi and Kebbi (Data for Impact, February 2023b; Data for Impact, 2024).

Overall, progress in ANC appears to be somewhat better in the two integrated states than in Zamfara where programming is focused only on malaria. However, even in the two integrated programming states, evidence of significant progress in ANC associated with the integrated model is mixed. The increases in ANC client volumes in Ebonyi predated the start of IHP and continued at a similar pace after IHP began. The larger demand and other contextual factors could thereby be associated, although past increases could reflect the influences of earlier ANC activities in Ebonyi that the integrated model could sustain and build on. There appears to have been little progress in any ANC use in Kebbi under the integrated model early in the analysis period but there is some suggestion of increased ANC uptake and improved IPTp use in the most recent period. The low levels of ANC use present a barrier to significant increases in IPTp use in Zamfara, an important component of malaria prevention.

Family Planning

Use of FP is increasing in all three states in both the population-based and the facility-based data, including in Zamfara where malaria-focused programming does not include FP. This finding suggests that the increase in FP use in Zamfara is driven by demand factors external to the HPN activities working there and/or other programming in Zamfara that is addressing FP. There is evidence that women in Zamfara were exposed to integrated radio behavior change programming on FP and ANC produced by BREAKTHROUGH Action in neighboring Sokoto state (Hutchinson, et al. 2023). In addition, community

members in all three states reported exposure to messages and community sensitization activities on FP and changing community norms on FP in FGDs (Data for Impact, 2024). However, increases in FP use have been smaller in Zamfara than in Kebbi, so broader integrated programming that includes FP likely plays a facilitating role to enable women to translate increasing interest in FP into FP use in Kebbi. The increase in new FP acceptor client volume in public PHCs has continued since 2021 (when the MICS was conducted) in Kebbi but has leveled off somewhat in the other two states. These quantitative findings are consistent with strong FP results reported in Kebbi in the MSC study in this evaluation (Data for Impact, July 2023).

Recommendations

The analysis presented in this report addresses the following broad evaluation question related to health programming effectiveness:

> Did malaria and other health behavior and service delivery outcomes improve more from baseline to endline in Local Government Areas (LGAs)/states where an integrated approach was implemented, a disease-focused approach was implemented, or a combination of the two?

As such, the analysis in this report is designed to provide higher level strategic recommendations rather than specific implementation recommendations. With that in mind, we have the following recommendations for USAID, Government of Nigeria, and other actors responsible for setting health strategy.

- Any programs, integrated or disease-focused, need to continue to include strong behavior change components. Demand side factors are significant barriers to achieving large increases in positive population health behaviors. Qualitative data collected in other parts of this evaluation have suggested that community sensitization and empowering ward development committees are potentially successful strategies for generating demand for services (Data for impact, July 2023; Data for Impact, 2024) but reach of these interventions can be low (Hutchinson, et al. 2023) so scale is also an important consideration for population level impact.
- Programs, integrated or disease-focused, also must address availability of essential drugs, diagnostics, and supplies.
- All programs, integrated or disease-focused, operate in complex social and political environments and interact with that environment. Any programming needs to recognize and adapt to that environment both in its implementation and in its expected results.
- Both integrated and disease-focused programming can lead to changes in desired outcomes. However, integrated programming provides more leverage points in the wider environment and to have multiplicative effects (e.g., programming to improve ANC has potential benefits for maternal and child health and for malaria prevention through increased IPTp).

Conclusion

Overall, there are limited differences in outcomes between integrated and disease-focused intervention approaches, although progress appears to be somewhat better in the two states implementing integrated programming than in the state implementing disease-focused programming, particularly for ANC. Providers in all three states appear to be following national treatment guidelines for fever management in children. There are also increases in IPTp3 client volumes and population coverage under both intervention models. ANC use remains relatively low in the two northern states but overall progress in ANC appears to be somewhat better in the two states implementing integrated programming than in Zamfara where programming is focused on malaria. FP use increased in all three states. Demand factors, availability of essential drugs, diagnostics and supplies and larger contextual factors such as political economy and security appear to play a larger role than the integrated or disease-focused implementation model in influencing progress in use of services.

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Annex A. Malaria Cascades by State

Figure A1. Malaria cascade, Ebonyi

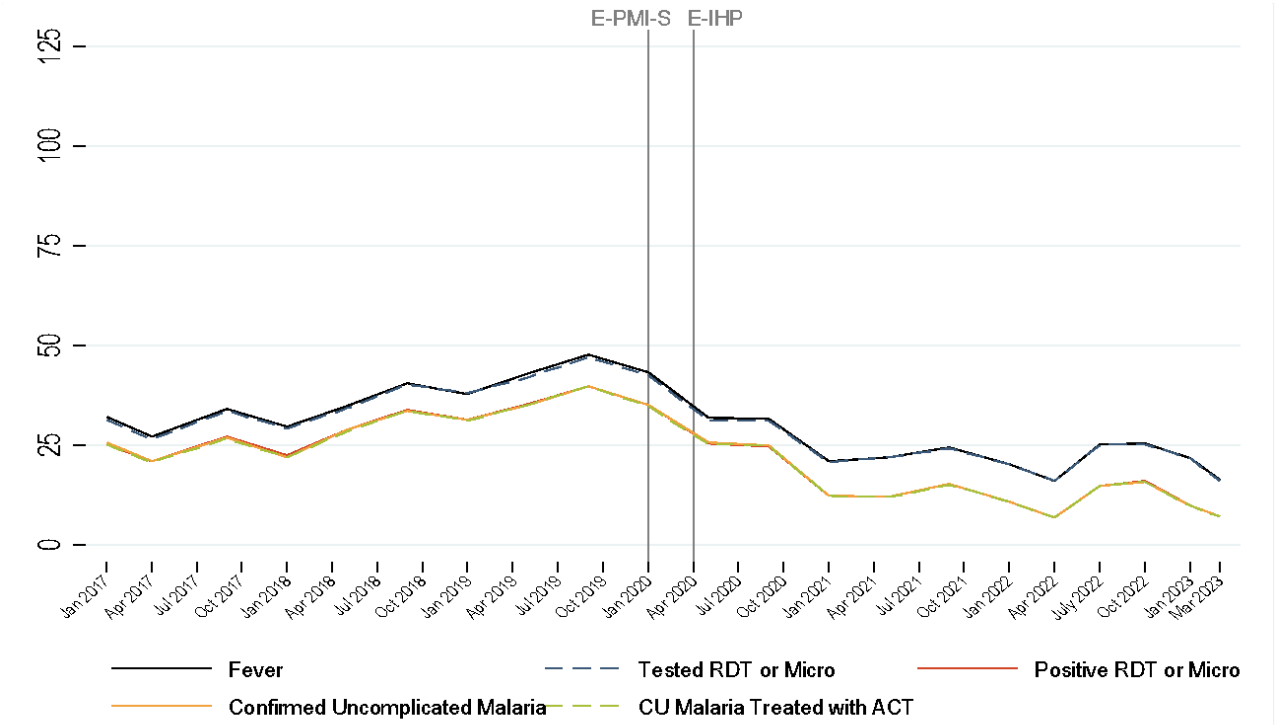


Figure A2. Malaria cascade, Kebbi

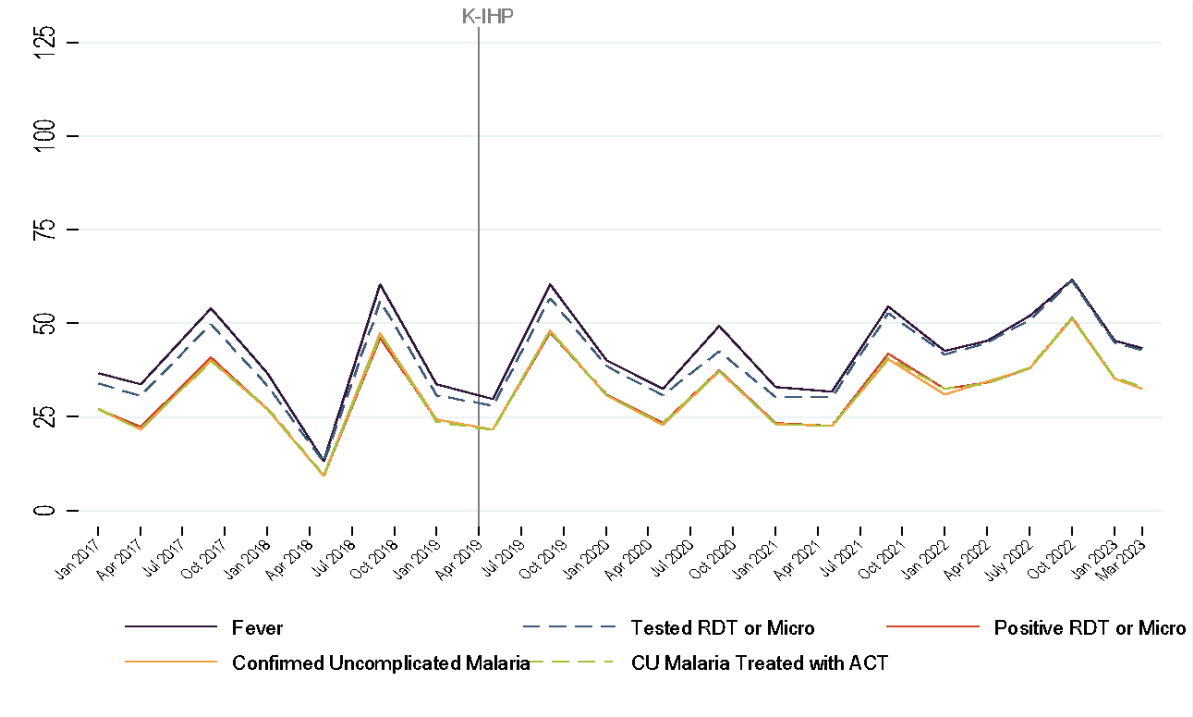
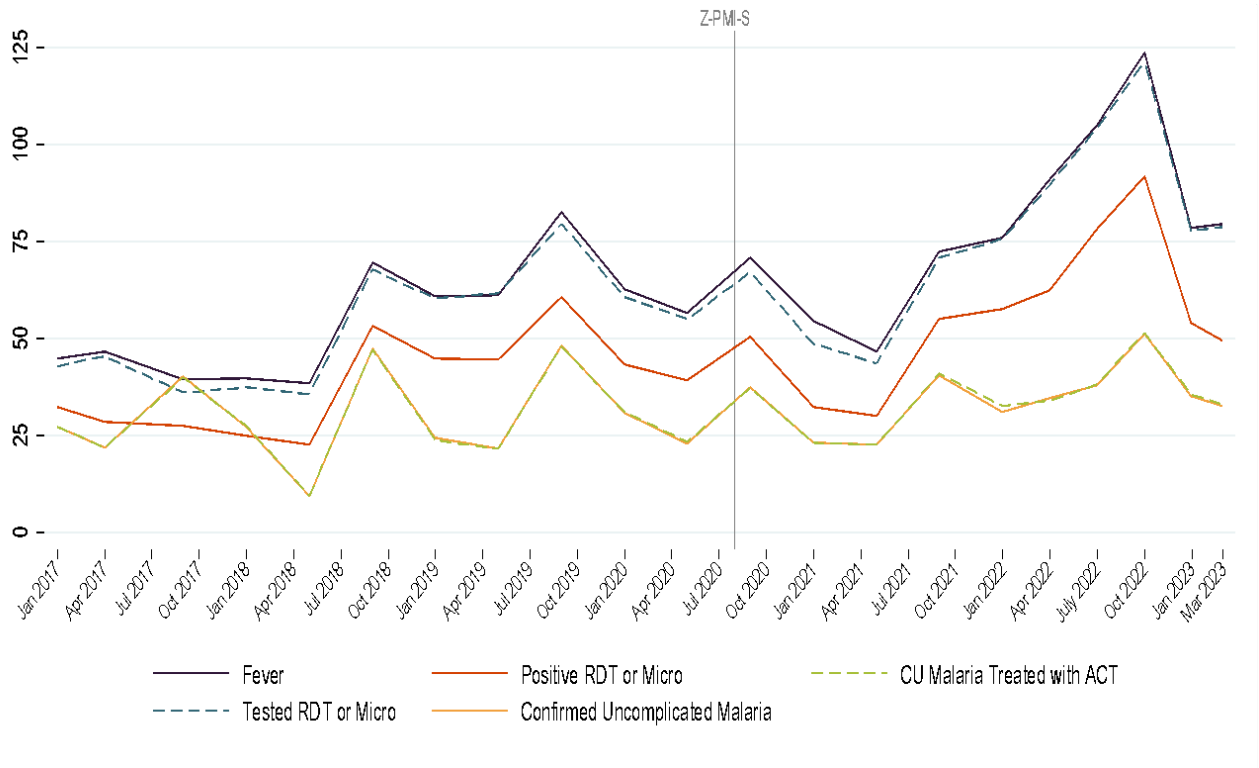


Figure A3. Malaria cascade, Zamfara



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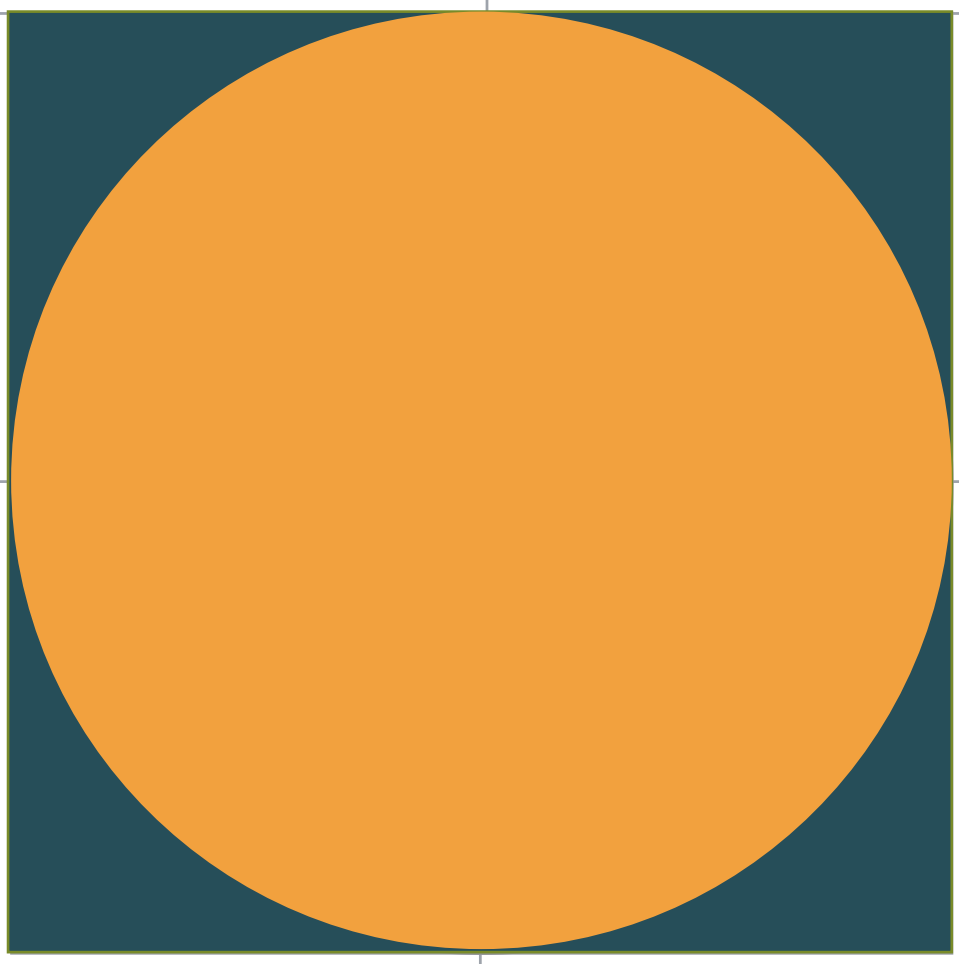

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