NATIONAL AND SUBNATIONAL COVERAGE AND OTHER SERVICE STATISTICS FOR REPRODUCTIVE, MATERNAL, NEWBORN AND CHILD HEALTH FROM HEALTH FACILITY DATA AND SURVEYS, 2017-2021

NIGERIA

A brief synthesis report based on

Countdown to 2030 / GFF / UNICEF / WHO workshop,

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Background

Nigeria is a country located on the western coast of Africa. The country is divided into 37 geographical boundaries, comprising 36 states and a Federal Capital Territory (FCT) as shown in Figure 1. The country is also categorised into six geopolitical region, namely North-west, North-East, North-Central, South-West, South-South and South-East. These geopolitical regions are also used as the health zones for administrative purposes. The Nigeria District Health Information Systems (DHIS) is the platform used to document data that are routinely collected in all public and private health facilities. A DHIS Technical Task Team that works at the national level gathers on the fifteenth of every month to analyse the data. The Integrated Health Data Management Team (IHDMT), which is comprised of monitoring and evaluation (M&E) experts from various disease and health programme areas and is comprised of each state and LGA, oversees supportive supervisions and managing data quality in conjunction with sub-national implementing partners.

This synthesis describes the data, methods, and results of an analysis of the health facility data for selected indicators of reproductive, maternal, newborn and child health, supported by survey analyses and health system data where available. It focuses on national, regional and states as administrative units in Nigeria.

The aim of the analysis is to inform national and global reviews of progress and performance of the national plan and strategy for RMNCH. From the health facility data (kept in DHIS2 software) a clean data set is created for the endline review.

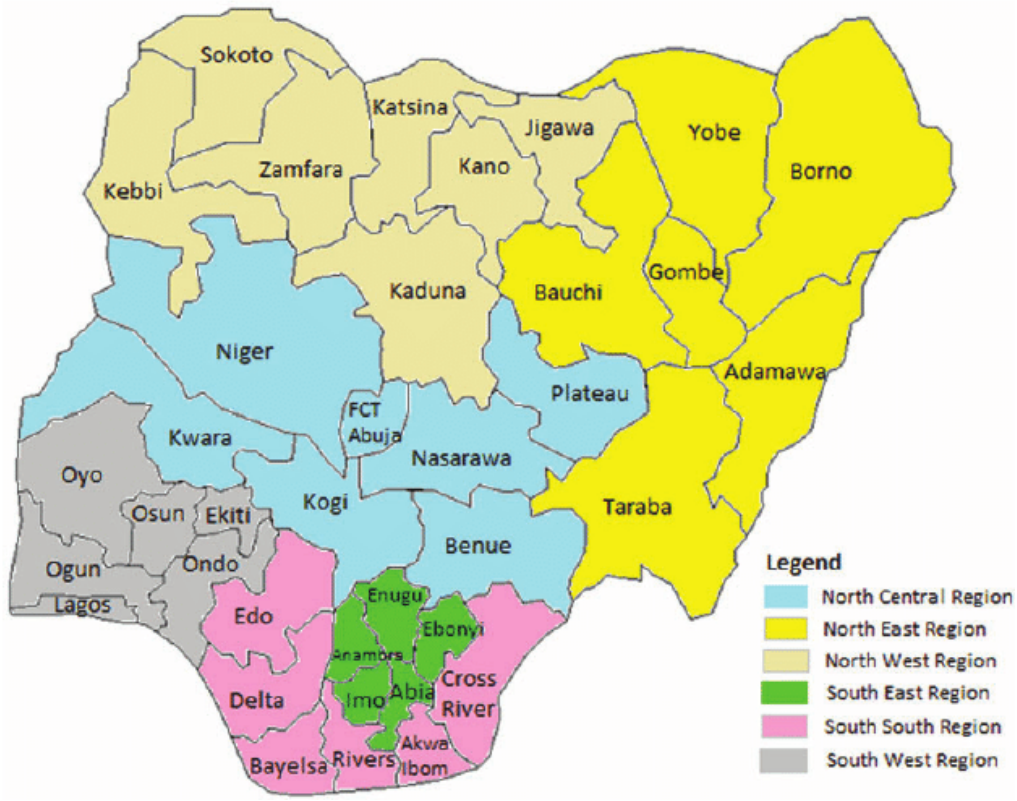


Figure 1: Map of Nigeria showing the 36 states and Federal Capital Territory (FCT), Abuja

Data analysis approach

The data analysis took place during a workshop organised by Countdown to 2030/GFF/UNICEF/WHO in Nairobi from June 13 to 17, 2022, as part of the existing Countdown country collaborations, which are multi-year partnerships between Countdown to 2030 global and regional public health institutions and country public health institutions and ministries of health. This is done through a systematic approach, with ample attention for facility data quality assessment and adjustment, denominator selection, joint assessment of surveys and facility results and consideration of possible other biases.

Creating a data set and fixing data quality issues

The analytical approach started with reported monthly data from each district. The assessment and adjustments were made using common rules, as there often are too many districts to make individual decisions. The districts with problematic reporting rates and inconsistencies were flagged.

The following criteria were used:

1. *Reporting rates*: summarize the percent of district months with RR below 90% and list all district months with reporting rates below 75%. If the latter was the case the month would receive the median value of the year.
2. *Adjustment for incomplete reporting*:[1] inspection of the monthly RR for districts, one value for each service based on program knowledge. The default adjustment factor was 0.25.
3. *Correction of extreme outliers*: modified Z-score which is a standardized score of observations measuring the deviation from the median which was obtained by dividing the difference from the median-by-median absolute deviation. Monthly data with a score higher than 5 standard deviations from the annual median were identified as outliers.[2] [3] Extreme outliers were corrected by imputing a value based on median of 6 months before and 6 months after outlying values.

This report has the following sections:

A. Description of the data sets
B. Data quality assessment and adjustment
C. Denominators or target populations
D. Survey coverage trends and equity
E. Facility data derived coverage trends and inequalities
F. Private sector bias
G. Analysis of subnational progress and performance
H. Potential additional indicators

[1] Maina I, Wanjala P, Soti D, et al. Using health-facility data to assess subnational coverage of maternal and child health indicators, Kenya. Bull World Health Organ. 2017 Oct 1;95(10):683-694.

[2] WHO. Data quality review: a toolkit for facility data quality assessment. Module 2. Desk review of data quality. Geneva 2017.

[3] Iglewicz B, Hoaglin DC. How to detect and handle outliers. Milwaukee, Wisconsin: American Society for Quality Control, 1993: 85

A. Description of the Nigeria DHIS2 Datasets Used

The 36 states and FCT in Nigeria are further divided into 774 smaller administrative areas referred to as the Local Government Areas (LGAs). At the time of this data analysis, there were 39939 health facilities in Nigeria. The list of RMNCH indicators utilised for this data analysis were as shown in Table I.

Table 1: Description of the Nigeria DHIS2 Datasets Used for analysis

Indicator	
Administrative organization	
Number of states	37
Number of Local Government Area (LGA)	774
Health facilities	
Number of health facilities in country	39,939
Facility data analysis period	
First month and year with health facility data	January, 2017
Last month and year with health facility data	December, 2021
Indicators with facility data for the analysis	Has data
Antenatal care first visit	Yes
Antenatal care 4th visit	Yes
IPT 2nd dose (malaria)	Yes
Institutional delivery or skilled birth attendant	Yes
Caesarean Section	Yes
Postnatal care	Yes
Family planning new and revisits	Yes
BCG vaccination	Yes
Pentavalent / DPT first dose	Yes
Pentavalent / DPT third dose	Yes
Measles vaccination	Yes
Stillbirths (fresh / macerated)	Yes
Maternal deaths in health facilities	Yes
OPD visits children under 5 years	Yes
IPD admissions children under 5 years	Yes
Under 5 deaths in health facilities	Yes
Population-based surveys (3 most recent health surveys)	
Name of survey	Year
NDHS	2018
MICS	2016
National Nutrition and Health (NNHS)	2018
Population projection data in DHIS2	
Total population for every year	Yes
Live births for every year	Yes
Population under 1 year for every year	Yes

B. Data Quality Assessment and Adjustments

Adjustments and corrections

We applied an adjustment factor of 0.25 to each health service for incomplete reporting since we expected some services (about 25%) to be non-reporting but substantially lower than reporting facilities. Table I summarizes the national data quality scores for each year from 2017 through 2021, including completeness of monthly facility reporting, percentage of facilities with extreme outliers, and consistency of annual reporting, computed using data from all 36 states and the FCT.

From 2017 to 2021, the overall expected monthly facility reports in the Nigeria DHIS2 were less than 90%, with values rising from 75.0 percent in 2017 to 84.0 % and down to 80.9 % in 2021. The predicted proportion of states (districts) with completeness of facility reporting greater than 90% increased from 21.6 percent in 2017 to 37.8 percent in 2019 and will fall to 27.0 percent in 2021. Despite the fact that the percentages of districts with completeness of facility reporting over or equal to 90% were abysmally low in all years except 2020, when 85.6 percent of districts had no missing value, practically all districts had no missing monthly reporting values in the other four years. Similarly, when looking at national values, the percentage of monthly values that are not extreme outliers was greater than 90% from 2017 to 2021. However, the percentage of districts with no severe outliers was less than 90 percent in 2018, 2020, and 2021.

Over the five-year period, we discovered that the average yearly completeness reporting rate was less than 90%. However, the pattern showed that the reporting rate gradually increased between 2017 and 2019, followed by a considerable fall in 2020. Because the low reporting rate standard was set at 90%, a state in Nigeria was classified as having a low reporting rate if less than 90% (that is, 9 out of every 10 facilities) submitted a report for the designated month.

The modest increase between 2017 and 2019 could be ascribed to broad DHIS reporting training across the country. The subsequent drop in 2020 can be attributed to the potential detrimental influence of the COVID-19 pandemic, which triggered restrictions and outright lockdown in several parts of Nigeria. Nigeria also upgraded to a newer version of the DHIS2 software in 2020. Many states (districts) struggled with the transfer, which hampered reporting. For most indicators, the pattern of completeness of reporting is consistent. A closer examination of the pattern across states revealed some other insights. (See Figures 1a and 1b): Many Northwest states (Sokoto, Zamfara, Kano, Sokoto, and Kebbi) showed greater levels of completeness and remained stable

over time. This observed tendency could be attributed to a higher concentration of implementing partners supporting PHC operations in this region. The Northeast States (Borno, Yobe, Taraba, and so on) have more inconsistencies. This could reflect the region's ongoing domestic security challenges. Because they are inside the precinct of the Federal Government's seat, the performance of the FCT, Kogi, and Nasarawa warrants closer scrutiny.

Notably, extreme outliers exist in only a few states. The following were identified as special situations (ANC): Bauchi in 2017; Katsina in 2021; Niger in 2020; and Yobe in 2020. Those observed for 2020 may still be linked to the COVID-19 related issues. As seen in Figure 3, the consistency in the number reported for penta 1 and penta 3 was excellent.

Table 2: Summary of DHIS2 data quality 2017-2021 using ANC, delivery, vaccination and OPD

S/N	Data Quality Indicators	2017	2018	2019	2020	2021
1	**Completeness of monthly facility reporting (green >90%)**					
1a	% of expected monthly facility reports (mean, national)*	75.0	79.3	84.0	79.9	80.9
1b	% of districts with completeness of facility reporting >= 90%*	21.6	27.0	37.8	35.1	27.0
1c	% of districts with no missing monthly values in the year*	100.0	100.0	100.0	85.6	99.5
2	**Extreme outliers (green > 95%)**					
2a	% of monthly values that are *not* extreme outliers (mean, national)*	99.5	98.5	98.7	97.9	96.7
2b	% of districts with no extreme outliers in the year*	95.0	88.3	90.1	84.7	84.2
3	**Consistency of annual reporting (green>85%)**					
	Ratio ANC1 – penta1 numbers (national)	0.68	0.70	0.73	0.55	0.71
3a	% of districts with ANC1-penta1 ratio between 1.0 and 1.5	18.9	29.7	21.6	5.4	27.0
	Ratio Penta1 – penta3 numbers (national)	1.09	1.09	1.07	1.07	1.07
3b	% of districts with penta1-penta3 ratio between 1.0 and 1.5	100.0	100.0	97.3	100.0	97.3
	Annual data quality score (mean indicator 1a to 3b)	72.9	74.7	75.7	69.8	73.2

*Mean for ANC, delivery, immunization and OPD services

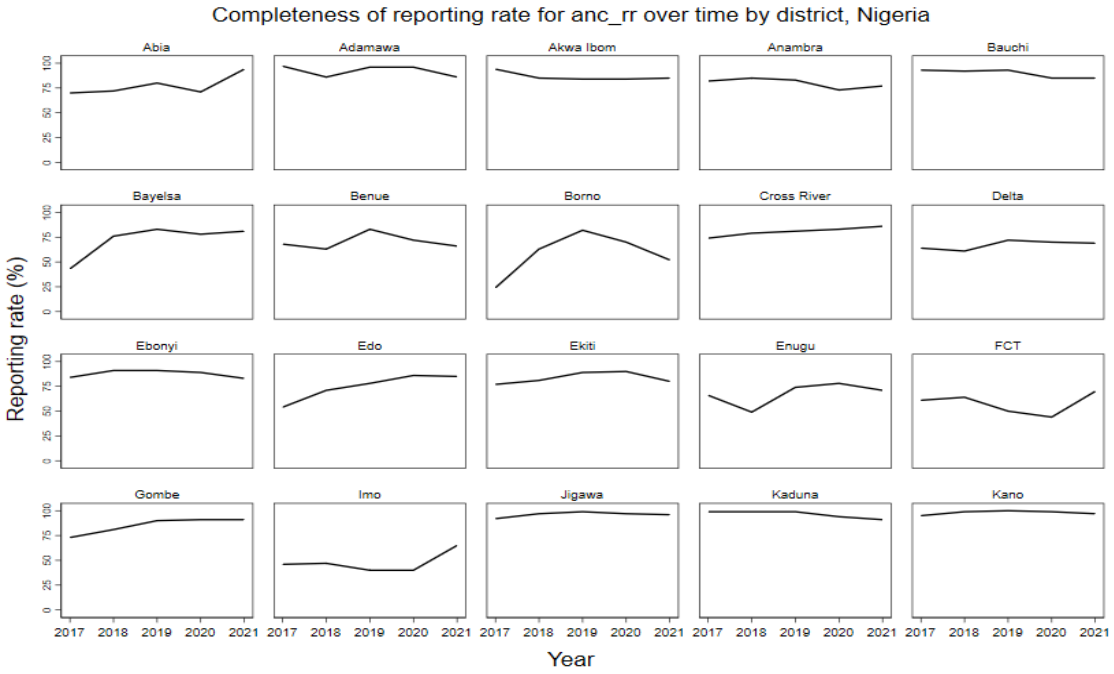


Figure 2a: Completeness of reporting for ANC by States

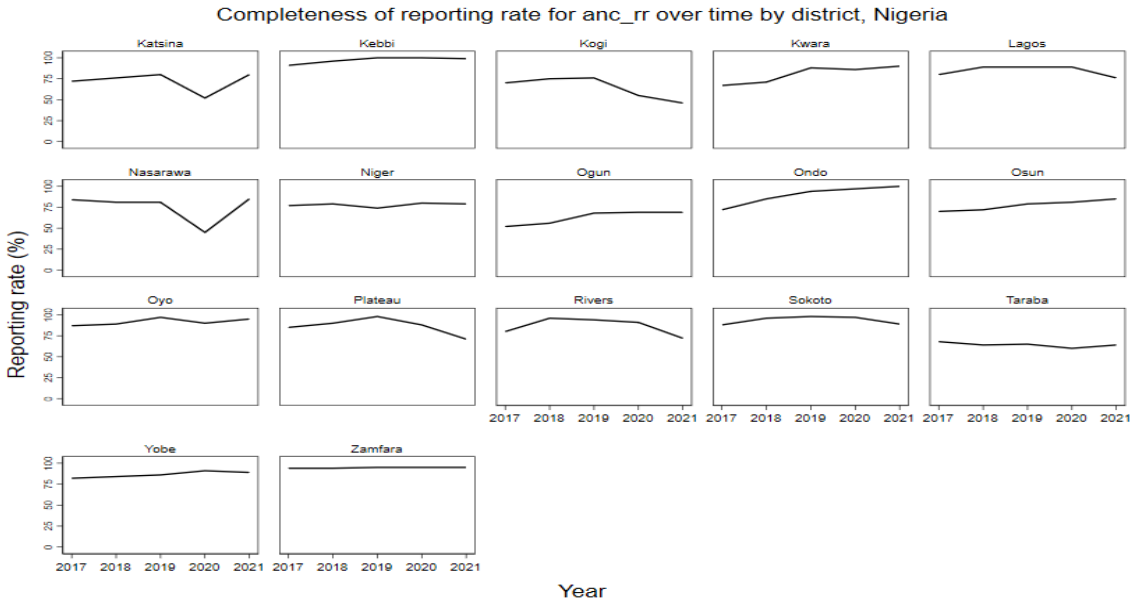


Fig 1b: Completeness of reporting for ANC by States

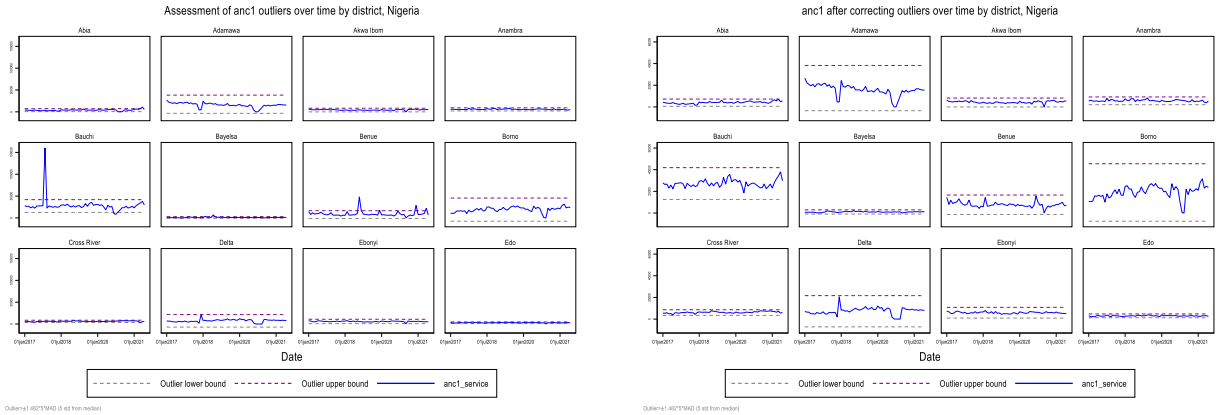


Figure 3a: Example of adjustment for outliers for ANC first visit in districts before and after correction.

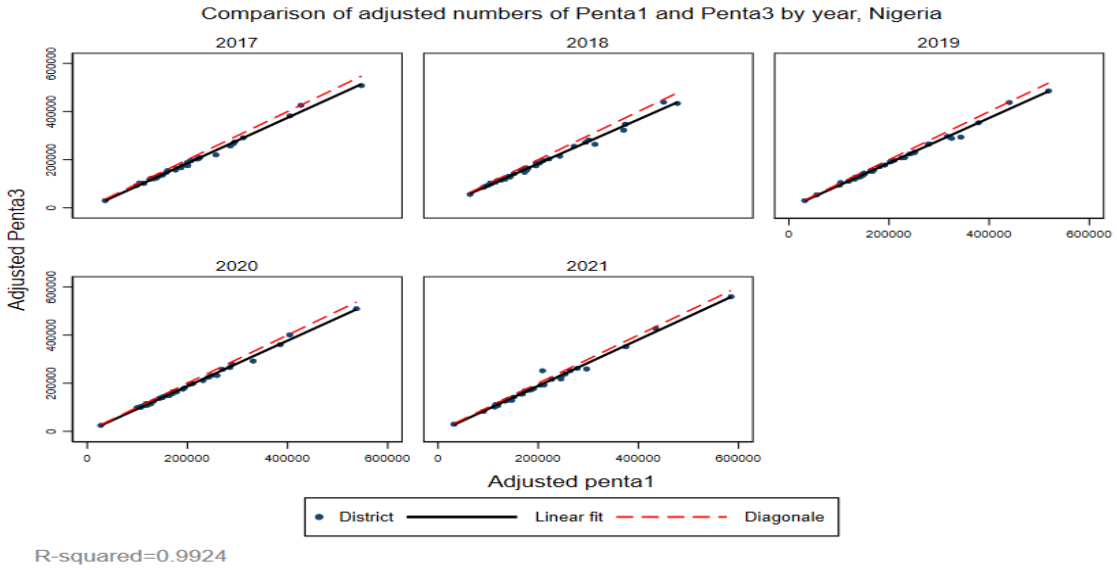


Figure 3b: Consistency in reporting of penta1 and penta 3

Aside from a drop to 70% in 2020, overall data quality is reasonably steady at around 73%. While most service indicators were around this level, maternal death was significantly lower than others. This service would require immediate intervention to improve the quality of data reported. Less than half of the states (districts) achieved acceptable levels of reporting completeness. FMOH officials provided two probable explanations for this pattern of performance: (i) states' inability to provide reporting forms and registers for use by facilities, and (ii) states' failure to hold regular data validation sessions.

C. Assessment of the population projections in DHIS2

Projected population was like those from the UN estimates. Population of under-fives and total live births in DHIS2 relatively lower than the UN estimates. Similar patterns were observed across the five geo-political regions of the country (Figure 4 below).

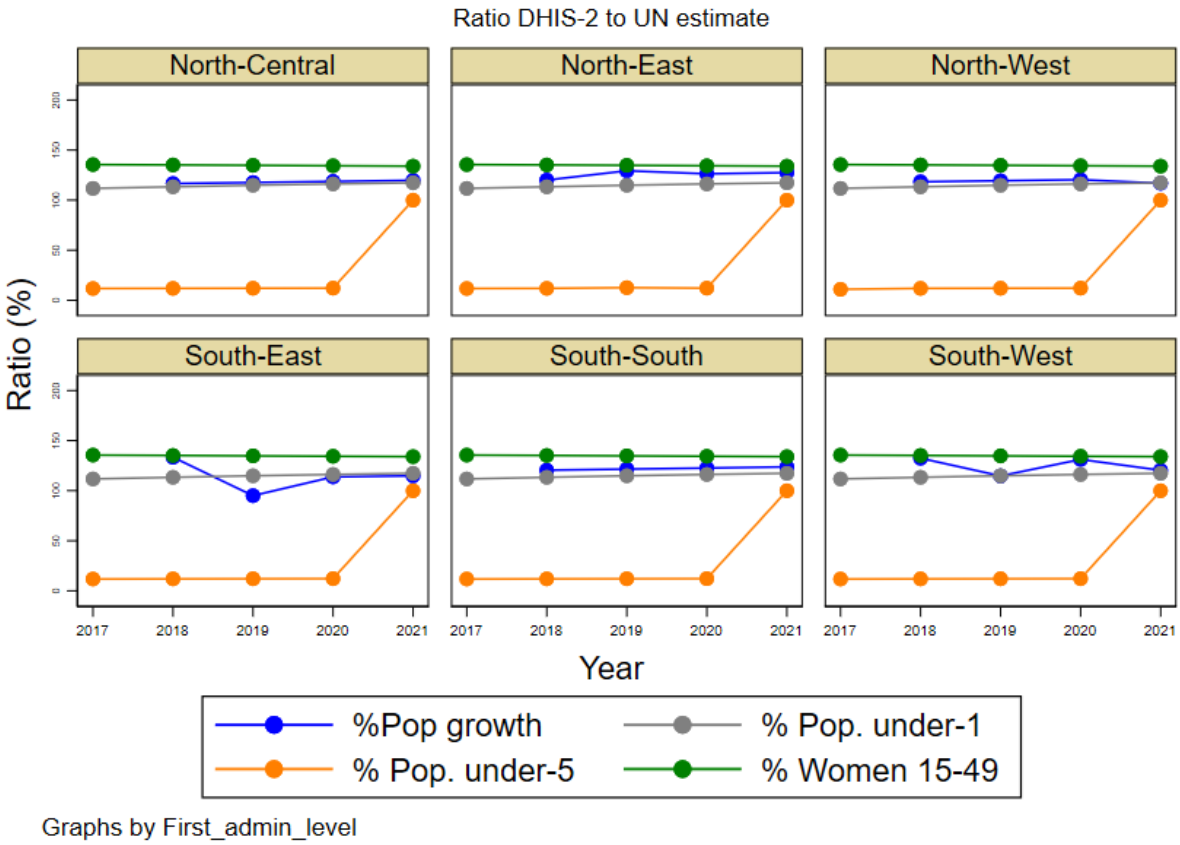


Fig 3: Comparison of DHIS 2 population projections to UN estimates

Testing facility data derived denominators

ANC coverage based on DPT1 derived denominators is higher than those of ANC1 derived denominators. Most of the coverage indicators are lower than NDHS 2018 estimates. Therefore, we opted for coverage based on DPT1 derived denominators

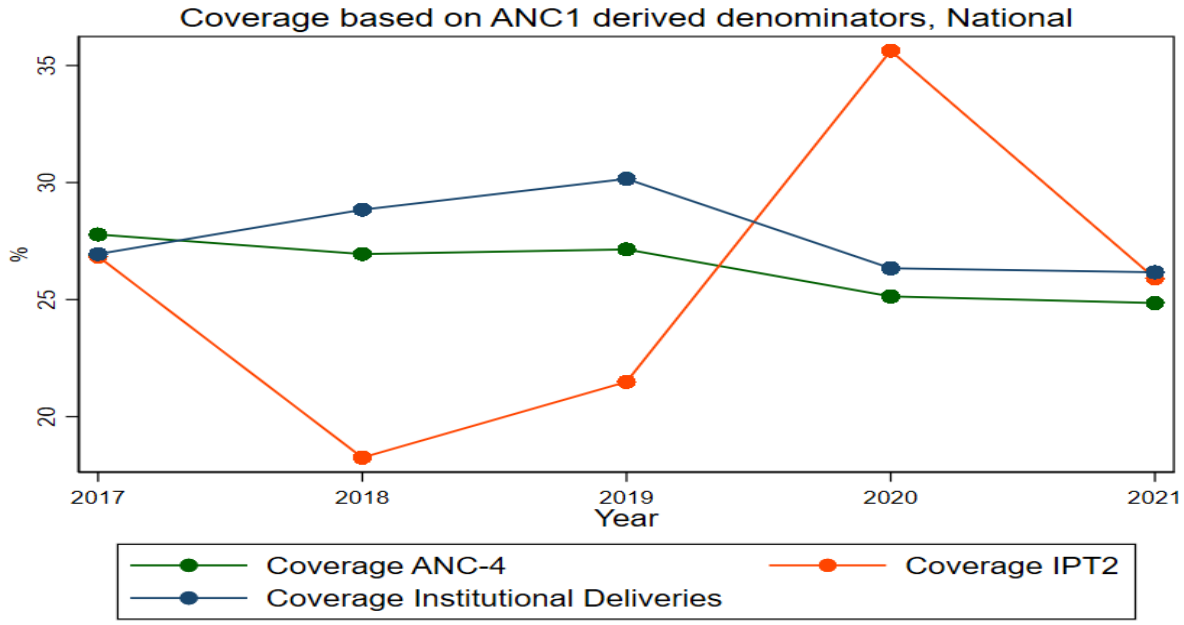


Fig 4a: Coverage of ANC, IPT2 and Institutional Delivery based on ANC derived denominator

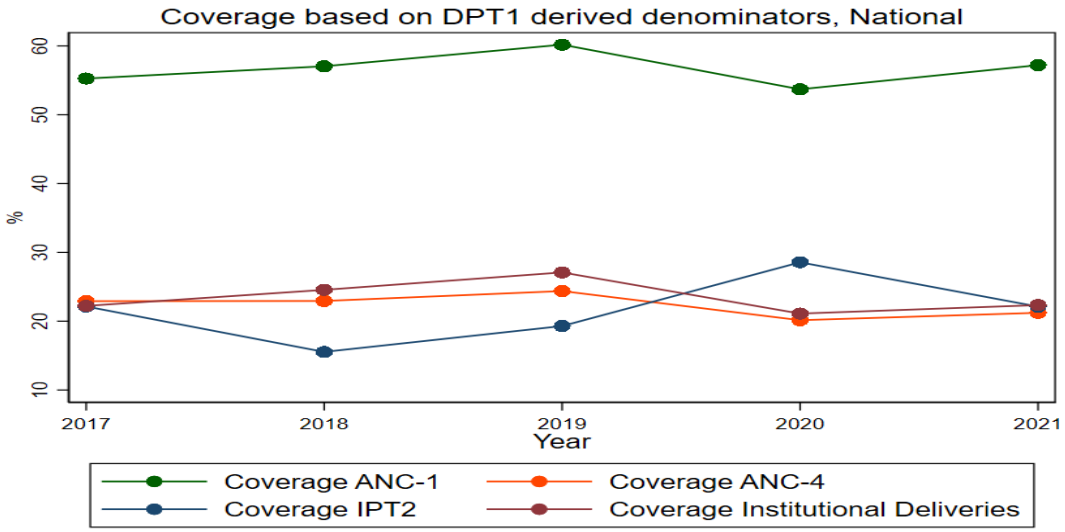


Fig 4b: Coverage of ANC, IPT2 and Institutional Delivery based on DPT1 derived denominator

The average coverage of ANC4 lies between 25-30% and this is lower than the value reported in NDHS 2018 (54%). Penta 1 coverage was over 100% possibly because there were children who received the vaccine but whose mothers did not attend ANC.

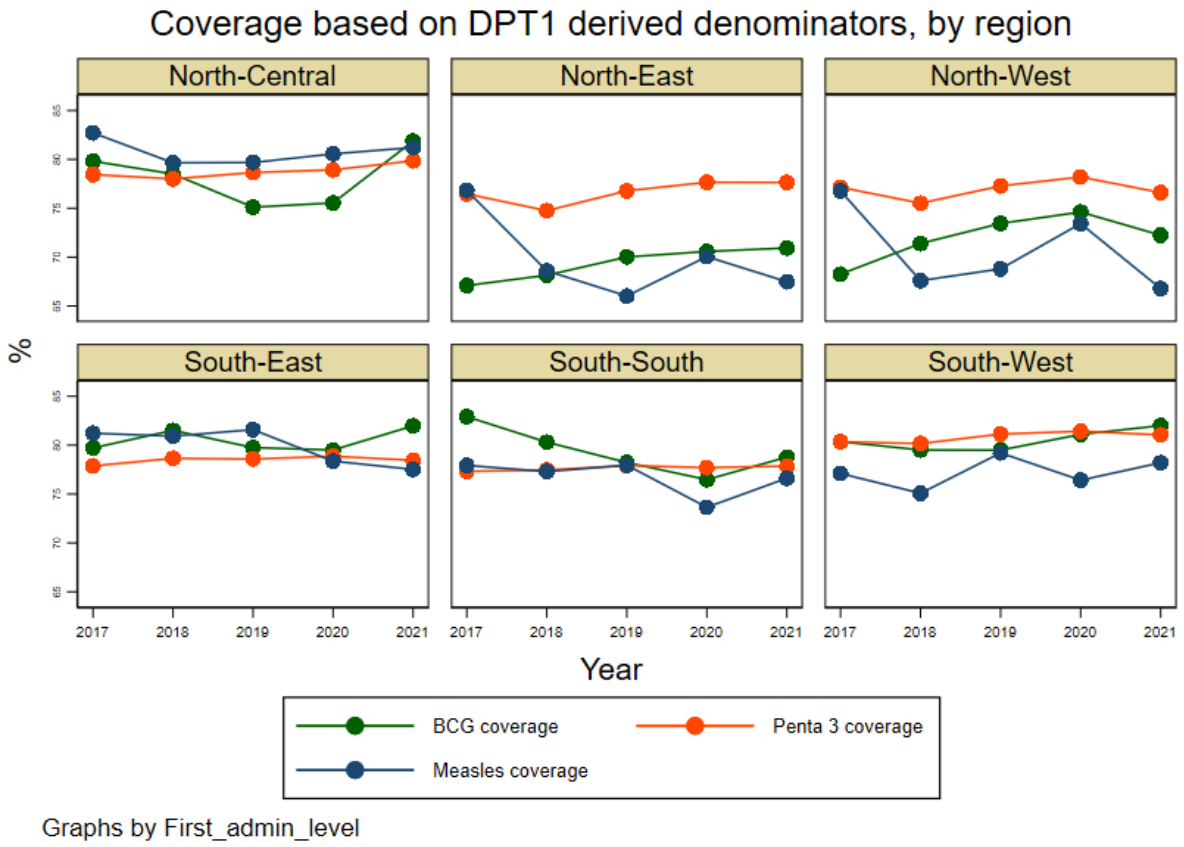


Fig 5: BCG, Measles and Penta3 coverage in sub-national regions

Levels in NE and NW were close to NDHS 2018 levels. With exception of NE and NW, patterns across regions like the national coverage (Fig 5).

Part #5

D. Survey coverage trends and equity

Composite coverage index (CCI)

Fig 6 shows the CCI across the six geo-political regions of Nigeria with South East and North West having the highest and lowest score respectively.

Fig 7 summarises the inequality in ANC coverage across selected West African countries. It also highlights the huge inequity in Nigeria as compared to its neighbours.

Table 3 summarises the inequalities in the different indicators across the geopolitical zones in Nigeria. This is for both simple and complex measures of inequalities, with SBA, and DPT having the highest score.

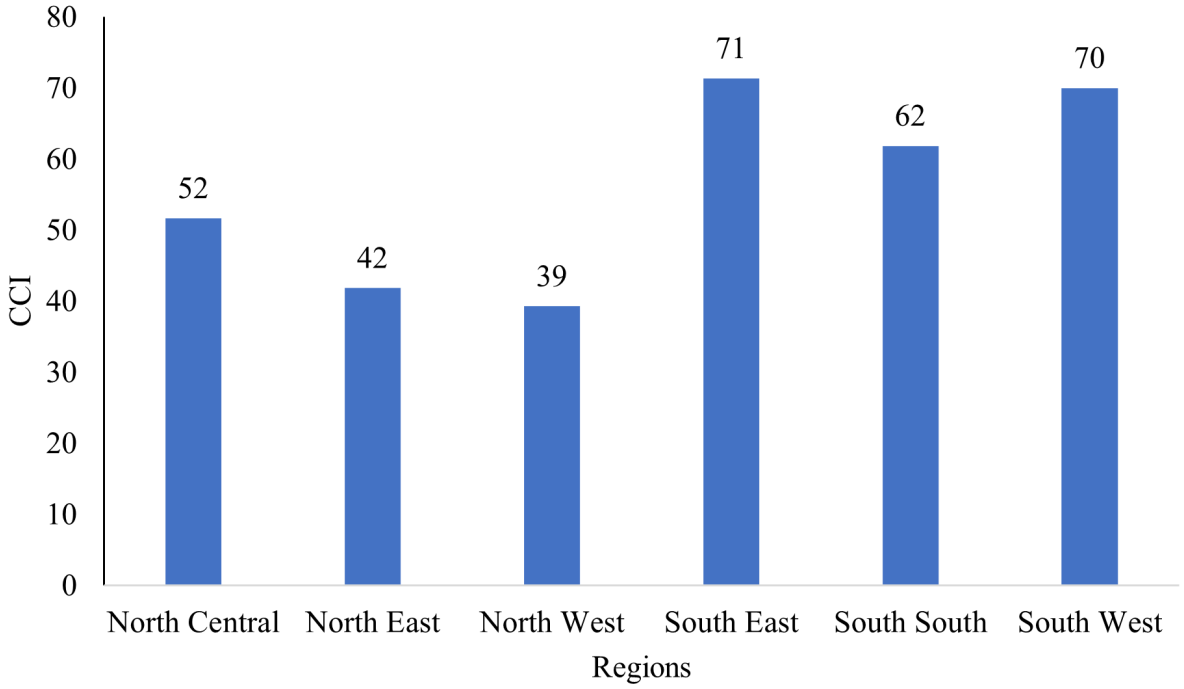


Fig 6: CCI for Nigeria geopolitical regions

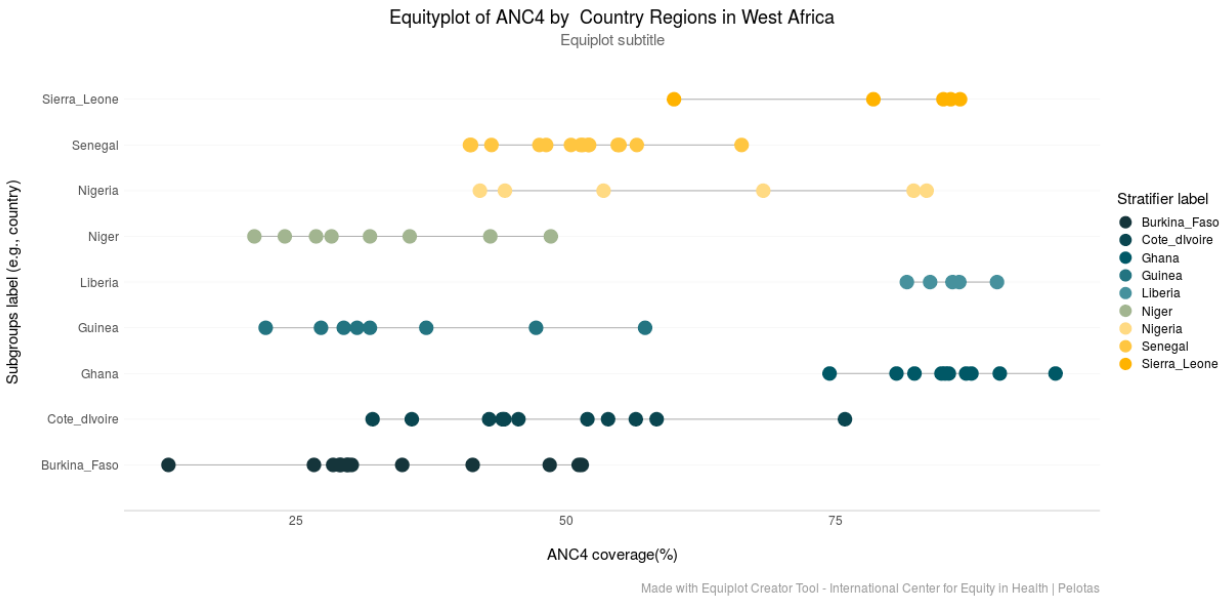
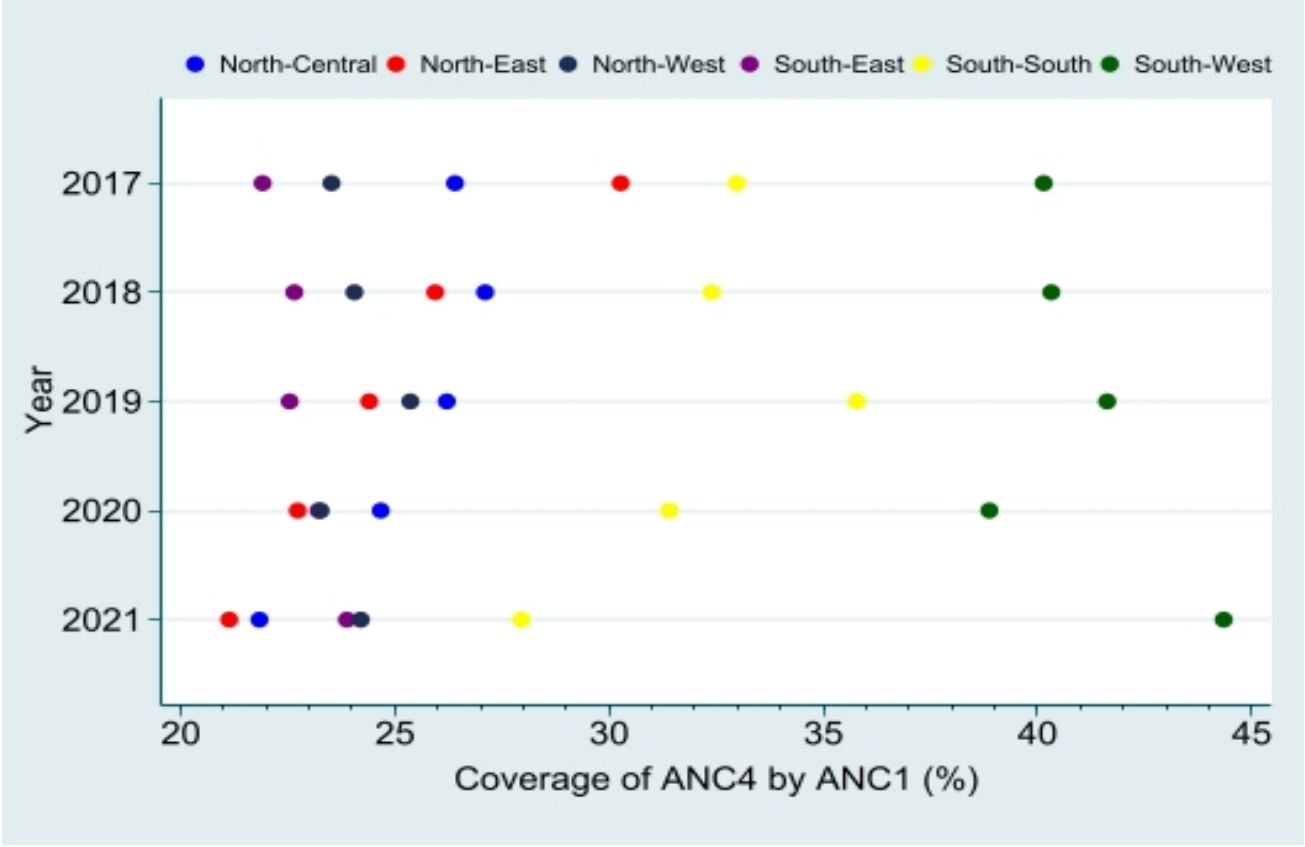
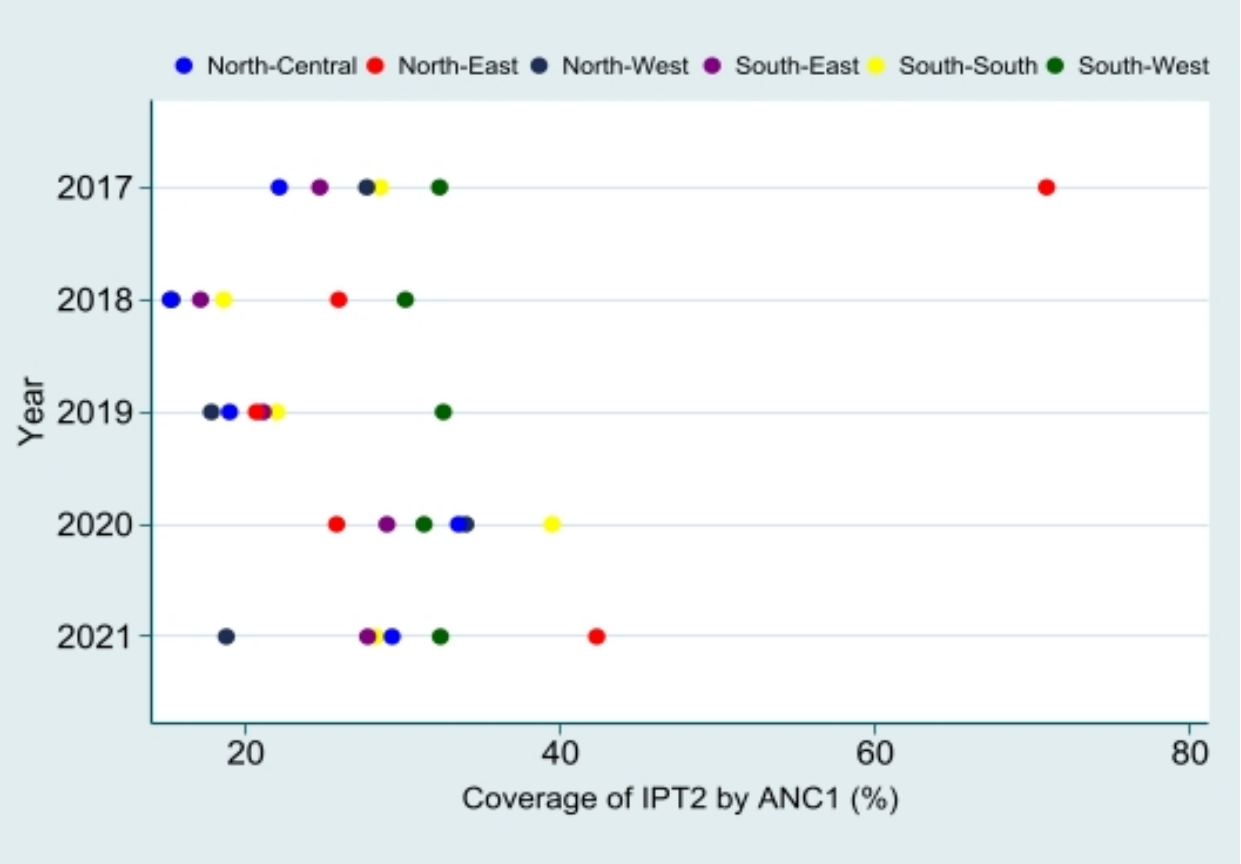


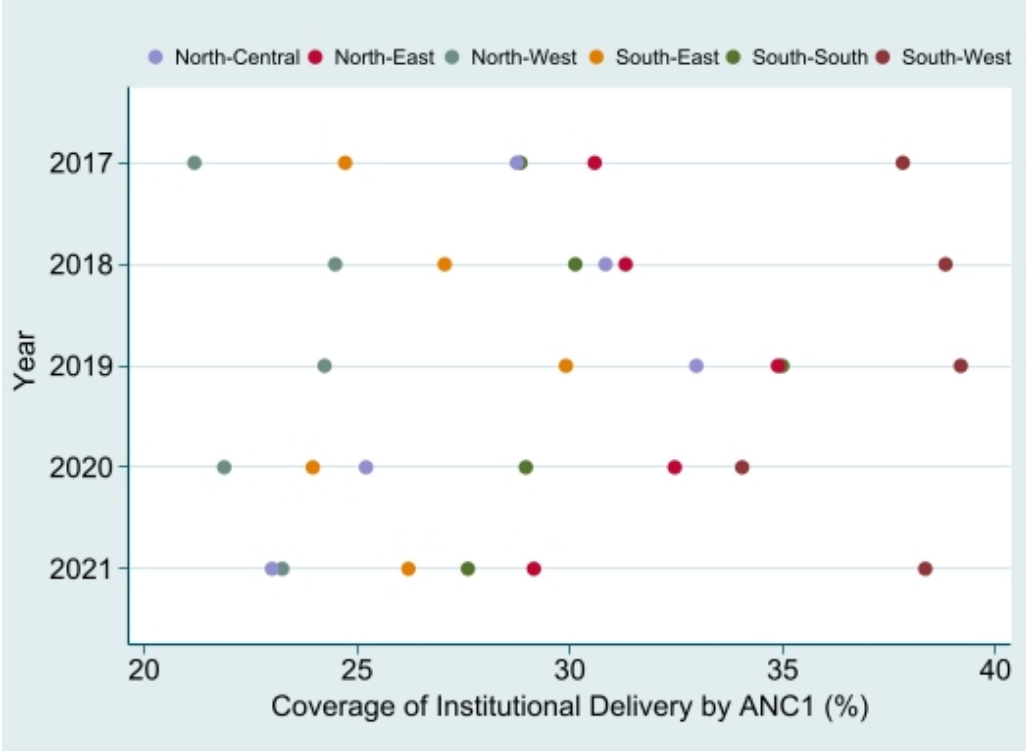
Fig 7: Equiplot for ANC coverage in selected West African countries



Equiplot of Coverage of Four Antenatal Care by ANC1 in the Six Regions of Nigeria from 2017 to 2021



Equiplot of Coverage of Uptake of Two Doses of IPT by ANC1 in the Six Regions of Nigeria from 2017 to 2021



Equiplot of Coverage of Institutional Delivery by ANC1 in the Six Regions of Nigeria from 2017 to 2021

Table 3: Measures of inequality across Nigeria sub-regions for selected indicators

Indicator	Difference	Ratio	MADM	MADMW
FPMSO	29.41	1.92	5.65	5.6
ANC4	41.44	1.99	15.69	14.76
SBA	65.63	4.33	25.27	24.52
BCG	48.42	2.08	17.83	17.92
MSL	36.01	1.92	14.03	13.67
DPT	53.57	2.80	19.1	18.63
ORS	13.99	1.38	3.97	2.71
CAREP	24.12	1.48	10.24	7.13
CCI	32.09	1.82		

Report part #6

E. Facility data derived coverage trends and equity

Like the assessment of coverage based on survey data, we utilized facility data to explore coverage of services as well as equity. Figure 8 shows that coverage of ANC4 was higher in the 2017 than 2021 and there were remarkable variations in all the states of Nigeria suggesting a decline in ANC4 and inequality of access to the ANC4 services.

Figures 9 and 10 further showed a decline in the measures of inequality between 2017 and 2021. This was demonstrated for ANC, Institutional delivery, SBA, and the basic childhood vaccination such as BCG, Penta1 and Penta 3.

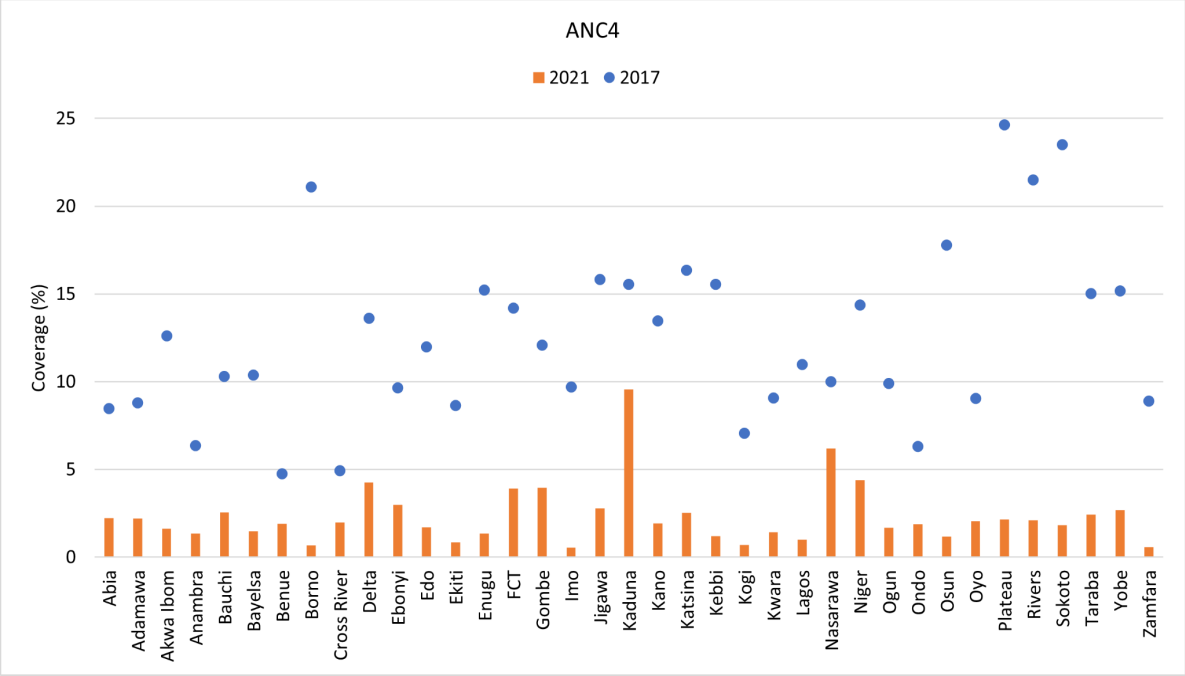


Fig 8: Facility-Derived Coverage for ANC4 across States in Nigeria in 2017 and 2021

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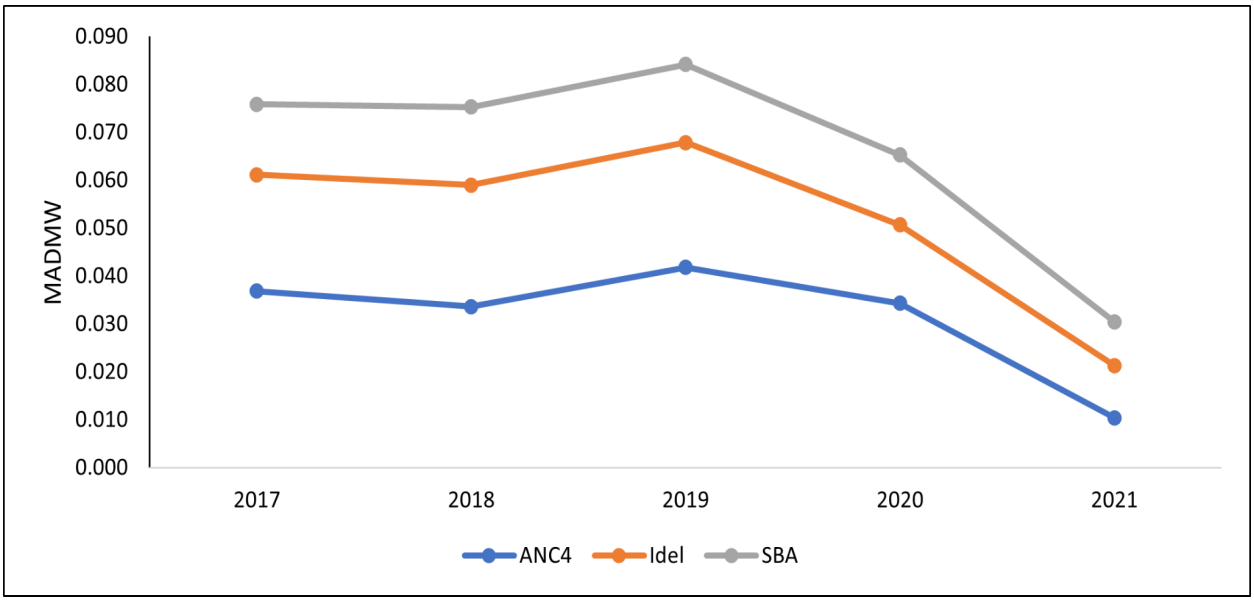

Fig 9: Mean absolute difference from the mean (MADMW), weighted estimates, for 2017-2021: ANC4, Institutional delivery and SBA

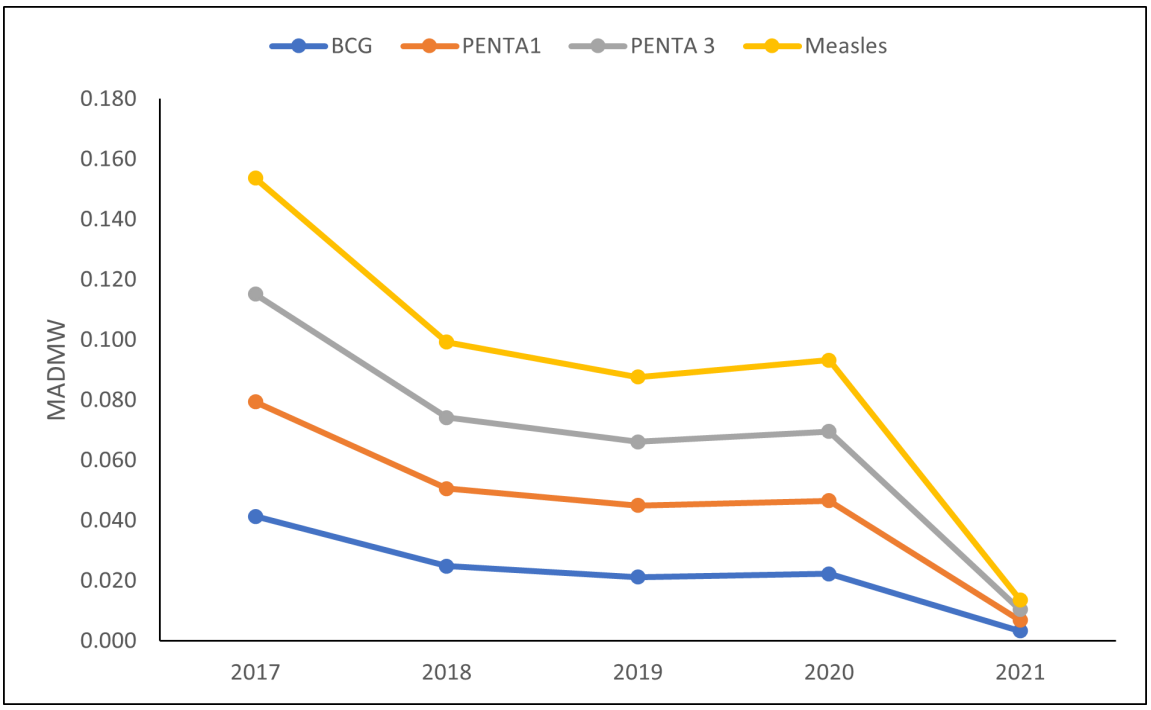

Fig 10: Mean absolute difference from the mean (MADMW), weighted estimates, for 2017-2021: BCG, Penta 1, Penta 3 and Measles Vaccination

F. Private sector bias

Analysis of data from the 2018 NDHS revealed that 67% and 30% of institutional delivers take place in public and private health facilities respectively (Table 4). A similar proportion was also observed for sources of family planning commodities. In contrast, slightly more than half of the treatment for sick children are provided by private health facilities while 34% were sourced from public facilities. This pattern is replicated across all the six geo-political regions (Table 5).

More than half of sick children are treated at private health facilities. Meanwhile, reporting of private facilities is very low on DHIS2. These imply that outpatient services for under-five children are under-reported.

Table 4: Share of the service provision (%) by type of health facility, selected indicators, NDHS, 2018

Type of facility	Public sector	Private sector	Other
Institutional births / deliveries	67.0	29.5	3.5
Family planning methods	65.2	31.0	3.8
Treatment of sick children	34.1	54.3	11.6

Table 3a: treatment of sick children by region

Type of facility	Public sector	Private sector	Other
North Central	30.2	57.8	12.0
Northeast	29.2	56.4	14.5
Northwest	42.6	47.8	9.5
South-East	24.5	69.2	6.3
South-South	31.3	63.5	5.2
South-West	40.8	45.6	13.6

Report part #8

Potential additional indicators

OPD visits per child (0-4 years) per year

There are no good indicators of population treatment coverage in the health facility data. It would be possible to obtain the number of children who have presented with a specific health issue, or are diagnosed with a certain condition (such as lab confirmed malaria) and include information on the number of diagnosed children who have received treatment. The challenge is however that the denominator is not known: the number or proportion of children with the condition in the population. There will be children who have not used the health services and these numbers are needed to compute treatment coverage.

Note that also survey data on curative care for diseases like pneumonia, diarrhea and malaria are often problematic. Indicators limited to treatment seeking behavior for children who were reported sick in the last two weeks preceding the survey interview. These are crude indicators as reporting by the respondent, usually the mother, may be variable and subjective.

OPD visits per child per year is an indicator of service access and utilization. In general, we expect the rate to not fluctuate too much over time, and not vary much by region/province unless there are differences in access. If not, there may be data quality issues and these need to be flagged.

In-patient data for children: admission and case fatality rates

The number of children under-5 years admitted to hospital per 1,000 population under-5 years is both an indicator of both the burden of disease among under-fives and the access to in-patient services. Therefore, subnational comparisons are of interest.

Case fatality rates are an indicator of the quality of care for sick children and do not need population denominators, as these are defined as the number of under-fives who died in health facilities divided by the number of under-fives admitted. Numbers may be small for subregional units and combining years may help address this problem.

Maternal mortality and stillbirth rates

Maternal mortality in health facilities – number of deaths divided by the number of live births times 100,000 – is a useful indicator of overall maternal mortality and the quality of care, especially now that high proportions of women deliver in health facilities in most settings. The reporting is often problematic, and the numbers will need to be scrutinized for data quality. (ratios between 100 and 300 are expected in most settings).

Stillbirth rates can be analyzed (number of stillbirths per 1,000 births in the health facilities) or with fresh and macerated separate. Fresh stillbirth rates are considered as a good indicator of intrapartum mortality.

Family planning

An analysis of use and coverage of modern contraceptive use requires more detailed analyses with survey and health facility data, as shown by Track20. To obtain a rough idea of the intensity of the use of modern FP methods, the ratio of the number of new and re-visits per 1,000 women of reproductive ages can be computed.