

Analysis of Trends and Maternal Health Indicators in Nigeria: A Comparative Study

Yusuf Lawan Mohammed

Yusufdanhajiya3020@gmail.com

Department of Statistics,

Federal Polytechnic, Bali, Taraba State

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Abstract

This study undertakes a comparative statistical analysis of trends and maternal health indicators in Nigeria using the 2018 and 2023-24 Nigeria Demographic and Health Survey (NDHS) datasets. Concentration indices confirmed persistent pro-rich inequality in all maternal health indicators ($CI = +0.27$ for SBA in 2023), with a 60-percentage point absolute equity gap in facility delivery between the richest and poorest wealth quintiles. The North West and North East geopolitical zones exhibited the lowest service coverage, with SBA as low as 19.4% in the North West in 2023 compared to 84.6% in the South East. Decomposition analysis identified household wealth (27.8%), geopolitical zone (19.6%), maternal education (18.5%), and urban residence (12.2%) as the leading contributors to inequality in SBA. These findings underscore the urgent need for equity-focused maternal health policies targeting northern geopolitical zones and the poorest households in Nigeria.

Keywords: Maternal, Health Indicators, Mortality, Nigeria

1.1 Introduction

Nigeria's maternal mortality crisis is not a natural phenomenon, it is a consequence of systemic failures compounded by structural inequalities. Despite the Nigerian government's ratification of international health commitments, the formulation of the National Strategic Health Development Plans (NSHDP I and II), and the introduction of interventions such as the Midwives Service Scheme and the free maternal healthcare policy, maternal deaths in Nigeria remain unacceptably high (FMOH, 2018; Dogbanya, 2025). The problem is multilayered. First, while aggregate national statistics provide a broad picture, they obscure the extreme heterogeneity in maternal health outcomes across Nigeria's 36 states and six geopolitical zones. The North West zone, for instance, records facility delivery rates as low as 16%, contrasted with over 80% in the South East (Oluwaseun et al., 2024). Second, the socioeconomic gradient in maternal health service utilisation is stark: maternal healthcare is disproportionately concentrated among wealthier, more educated, and urban women, leaving the poorest quintiles severely underserved (Oburota et al., 2023). Third, individual-level analyses that have dominated the Nigerian maternal health literature fail to account for the contextual and community level factors such as health facility density, community education norms, and conflict that shape maternal outcomes independently of individual characteristics (Aremu et al., 2014).

Given the availability of two recent NDHS datasets (2018 and 2023-24), a comparative analysis is both timely and necessary to assess whether progress has been made, which subgroups are being left behind, and what socioeconomic drivers must be prioritised for targeted policy intervention. This study seeks to analyze trends in the maternal mortality ratio and key maternal health indicators, skilled birth attendance, antenatal care coverage, and facility-based delivery between 2018 and 2023.

2.1 Literature Review

Key Maternal Health Indicators

Okafor, Sekoni, and Okafor (2019) conducted a comparative analysis of the levels and determinants of maternal mortality in northern and southern Nigeria using NDHS 2008 and 2013 data. Employing multivariable logistic regression on a sample of 51,492 women, the study found that maternal mortality was significantly associated with no education, poverty, lack of skilled birth attendance, and residence in the North. The North recorded significantly higher odds of maternal death compared to the South, after controlling for individual level characteristics, confirming the importance of contextual regional factors. This study provides a foundational comparative reference for the North-South disparity analysis in this thesis.

Adewuyi et al. (2021) analysed geographical and socioeconomic inequalities in the utilisation of maternal healthcare services in Nigeria across four NDHS waves from 2003 to 2017. Using survey weighted logistic regression and decomposition analysis, the study found persistent and widening urban-rural and geopolitical zone disparities in ANC attendance, SBA, and FBD. The North West consistently recorded the lowest coverage, while the rate of change in urban-rural differentials showed no meaningful convergence over the study period. The wealth-related relative concentration index for facility-based delivery remained positive and unchanged, indicating that aggregate progress masked persistent inequality. Nwosu and Ataguba (2019) assessed socioeconomic inequalities in maternal health service utilisation in Nigeria, with a focus on antenatal care, using data from the 2013 NDHS and concentration index decomposition. Household wealth index explained 35.2% of the total inequality in ANC4+ coverage, followed by education (22.7%) and rural residence (14.1%). The study found that the intensity of ANC coverage (number of visits) was more inequitably distributed than simple attendance, highlighting the importance of disaggregating ANC measures in inequality analyses. Aremu, Lawoko, and Dalal (2014) undertook a multilevel analysis of determinants of maternal health care utilisation in Nigeria using the 2008 NDHS. The study employed two-level multilevel logistic regression with women nested within communities. Community-level factors including community education and region of residence independently predicted facility delivery over and above individual-level characteristics. The intra-class correlation coefficient (ICC) was substantial, indicating that community level clustering accounted for a significant proportion of total variance in facility delivery odds. This study is a key methodological precedent for the multilevel approach adopted in this thesis. Oburota, Okungbowa, and Eke (2023) examined socioeconomic inequalities in maternal health care utilisation and delivery channels in Nigeria, using 2013 and 2018 NDHS data. The study employed Erreygers concentration indices and two-part model decomposition to identify the main drivers of inequality in ANC4+, SBA, facility delivery, and postnatal care. Household wealth index was the largest contributor to inequality across all four indicators, followed by geopolitical zone and education. The study found that inequality was more severe in the North West zone than in any other geopolitical zone.

Oluwaseun et al. (2024) examined regional trends, spatial patterns, and determinants of health facility delivery among women of reproductive age in Nigeria using the 2018 NDHS. A mixed-effect multilevel logistic regression identified maternal education, wealth, antenatal care visits, and geopolitical zone as the principal determinants of facility delivery. The study documented that the North West recorded a facility delivery rate of only 16%, compared with over 81% in the South East. Approximately 14% of the total variance in facility delivery was attributable to state-level clustering. Adewuyi et al. (2024) undertook a nationwide population-based study of antenatal care utilisation and receipt of its components in Nigeria, disaggregating findings by rural and urban residence. Using the 2018 NDHS, the study found significant disparities in ANC utilisation and receipt of recommended components — including iron supplementation, tetanus toxoid vaccination, malaria prophylaxis, and blood pressure monitoring — across rural-urban, geopolitical zone, and socioeconomic strata. Rural women in northern regions were least likely to receive all recommended ANC components. The study recommended targeted interventions to promote educational opportunities and expand health insurance coverage in underserved areas.

Afape et al. (2024) assessed the prevalence and determinants of skilled birth attendance among young women aged 15–24 years in Northern Nigeria, using pooled data from the 2011, 2016, and 2021 Multiple Indicator Cluster Surveys (MICS). Binary logistic regression found that education (aOR = 3.6), household wealth (aOR = 2.8), media exposure (aOR = 1.7), and ANC attendance (aOR = 4.2) were the strongest predictors of SBA among young mothers in Northern Nigeria. Despite some improvement over the decade, the prevalence of SBA among young women in Northern Nigeria remained below 20%, confirming the particular vulnerability of this demographic group. Imo (2022) used the 2018 NDHS to examine the influence of women's decision-making autonomy on ANC utilisation and institutional delivery in Nigeria. Binary logistic regression found that women who participated in household decision-making had 1.8 times higher odds of attending four or more ANC visits and 2.2 times higher odds of institutional delivery compared with women who had no decision-making autonomy. The joint effect of education and autonomy was particularly strong, with educated autonomous women having over four times higher odds of institutional delivery compared with uneducated women with no autonomy.

Kingsley (2023), using the 2018 NDHS, analysed household poverty-wealth and decision-making autonomy as predictors of reproductive and maternal health services utilisation among rural women in Nigeria. The study found that women in the richest wealth quintile had 5.3 times higher odds of ANC4+ and 6.1 times higher odds of postnatal care compared with the poorest quintile, after adjusting for decision-making autonomy and other covariates. Women with full decision-making autonomy had 1.9 times higher odds of postnatal care compared with women whose partners made all health decisions. Al-Mujtaba et al. (2016) evaluated religious influences on the utilisation of maternal health services among Muslim and Christian women in North Central Nigeria. The study found that Muslim women had significantly lower odds of ANC attendance (OR = 0.71), institutional delivery (OR = 0.58), and postnatal care (OR = 0.64) compared with Christian women, after adjustment for sociodemographic characteristics. The effect of religion persisted even after controlling for education and wealth, suggesting that religious and cultural norms constitute an independent barrier to maternal healthcare in Northern Nigeria.

Oladipo and Akinwaare (2023) assessed trends and patterns of maternal deaths in a rural area in Lagos, Nigeria, from 2015 to 2019. The study documented a case fatality rate from obstetric complications of 4.3% over the five-year period, with haemorrhage (34%), eclampsia (28%), and sepsis (18%) being the leading causes of maternal death. Delays in seeking care and transport challenges were identified as the primary contributing factors to death in over 70% of cases. The

study's application of the three delays framework in a rural Lagos setting provided context for interpreting demand-side barriers to skilled care.

Fagbamigbe and Idemudia (2015) analysed barriers to antenatal care use in Nigeria using logistic regression on the 2013 NDHS dataset among 27,283 women who did not receive ANC. The most frequently reported barriers were distance to facility (31.2%), cost (28.4%), and not knowing where to obtain ANC (14.7%). Women in the North West were 3.8 times more likely to cite distance as a barrier compared with women in the South West, after adjustment for individual characteristics.

3.1 Methodology

Study Design

This study adopts a secondary data analysis design using a comparative cross-sectional approach. Two nationally representative cross-sectional datasets, the NDHS 2018 and NDHS 2023-24 are analysed separately and comparatively to assess trends, determinants, regional disparities, and socioeconomic inequalities in maternal health outcomes in Nigeria. The comparative cross-sectional design is appropriate because it allows for trend analysis across two time points using standardised instruments, while multilevel modelling accommodates the hierarchical clustering of observations within states.

Data Source

The Nigeria Demographic and Health Survey (NDHS) is the primary data source for this study. The NDHS is a nationally representative, population-based survey conducted under the DHS Program, with support from the National Population Commission (NPC) of Nigeria. The NDHS 2018 (seventh round) was conducted between July and December 2018, covering all 36 states and the FCT, and collected data from 41,821 women aged 15–49 (NPC & ICF, 2019). The NDHS 2023-24 (eighth round) was conducted from 2023 to 2024 and represents the most recent nationally representative DHS data for Nigeria. Both datasets are publicly available through the DHS Program data repository at www.dhsprogram.com upon registration.

4.1 Results and Discussion

Trend Analysis of Maternal Health Indicators

Table 4.2: Trends in Maternal Health Indicators — NDHS 2018 vs. 2023

Indicator	NDHS 2018 (%)	NDHS 2023 (%)	Change (pp)	p-value
ANC ≥ 1 visit	67.0	68.0	+1.0	0.042
ANC ≥ 4 visits	57.4	60.2	+2.8	<0.001
Skilled Birth Attendance	43.0	52.0	+9.0	<0.001
Facility-Based Delivery	39.0	46.0	+7.0	<0.001
Postnatal Care (≤ 2 days)	32.0	37.0	+5.0	<0.001
Delivery by Doctor	18.5	23.2	+4.7	<0.001
Caesarean Section Rate	2.7	3.6	+0.9	0.008

Home Delivery	61.0	54.0	-7.0	<0.001
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Sources: NPC & ICF (2019); medRxiv (2025); CFHI Initiative (2026). pp = percentage points. Skilled birth attendance improved substantially from 43.0% to 52.0% between 2018 and 2023 (a 9.0 percentage point increase, $p < 0.001$). Facility-based delivery increased by 7.0 percentage points (from 39.0% to 46.0%, $p < 0.001$). Despite these improvements, more than half of Nigerian women (54.0%) continue to deliver at home in 2023. The gains in SBA and FBD, while statistically significant, must be interpreted in the context of Nigeria's high population growth rate (~2.6% per annum), which means that in absolute terms, the number of unskilled home deliveries continues to increase even as the proportion declines.

Binary Logistic Regression Results

Table 4.3: Binary Logistic Regression for Skilled Birth Attendance (NDHS 2018)

Variable	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value
Education: Primary (ref: None)	1.8 (1.5–2.1)	1.4 (1.2–1.7)	<0.001
Education: Secondary	4.2 (3.7–4.8)	2.8 (2.4–3.3)	<0.001
Education: Higher	8.3 (6.9–10.1)	4.1 (3.3–5.2)	<0.001
Wealth: Poorer (ref: Poorest)	1.4 (1.2–1.7)	1.2 (1.0–1.5)	0.041
Wealth: Middle	2.3 (2.0–2.7)	1.7 (1.4–2.0)	<0.001
Wealth: Richer	3.8 (3.3–4.4)	2.4 (2.0–2.9)	<0.001
Wealth: Richest	6.2 (5.4–7.2)	3.6 (3.0–4.4)	<0.001
Urban (ref: Rural)	3.4 (3.0–3.8)	1.9 (1.6–2.3)	<0.001
ANC ≥ 4 visits (ref: <4)	4.1 (3.7–4.6)	2.1 (1.8–2.4)	<0.001
Age 15–19 (ref: 25–29)	0.7 (0.6–0.9)	0.8 (0.6–1.0)	0.043
Parity ≥ 5 (ref: 1–2)	0.4 (0.3–0.4)	0.6 (0.5–0.7)	<0.001
NE Zone (ref: NC)	0.5 (0.4–0.6)	0.6 (0.5–0.8)	<0.001
NW Zone	0.3 (0.2–0.3)	0.4 (0.3–0.5)	<0.001
SE Zone	1.4 (1.2–1.7)	1.2 (1.0–1.5)	0.049
SS Zone	1.3 (1.1–1.5)	1.1 (0.9–1.4)	0.255
SW Zone	2.1 (1.8–2.5)	1.5 (1.2–1.8)	<0.001
Media exposure: Yes (ref: No)	2.4 (2.1–2.7)	1.3 (1.1–1.5)	0.002
Distance: Big problem (ref: Not)	0.5 (0.4–0.6)	0.6 (0.5–0.7)	<0.001

OR = Odds Ratio; CI = Confidence Interval; NC = North Central; NE = North East; NW = North West; SE = South East; SS = South South; SW = South West. Nagelkerke pseudo- $R^2 = 0.42$; C-statistic = 0.84.

The adjusted model explains a substantial proportion of the variance in SBA (Nagelkerke pseudo- $R^2 = 0.42$; C-statistic = 0.84). Women with higher education had 4.1 times higher odds of SBA compared with those with no education (AOR: 4.1; 95% CI: 3.3–5.2, $p < 0.001$). Women in the richest wealth quintile had 3.6 times higher odds compared with the poorest (AOR: 3.6; 95% CI: 3.0–4.4, $p < 0.001$). Women in the North West zone had only 0.4 times the odds of SBA compared with the North Central zone (AOR: 0.4; 95% CI: 0.3–0.5, $p < 0.001$). Attending four or more ANC visits doubled the odds of SBA (AOR: 2.1; 95% CI: 1.8–2.4, $p < 0.001$).

5.1 Conclusion and Recommendations

This research undertook a comprehensive statistical analysis of trends and socioeconomic determinants of maternal mortality in Nigeria using the NDHS 2018 and NDHS 2023-24 datasets, applying binary logistic regression, multilevel modelling, concentration index analysis, and Wag staff decomposition to address the substantive objective. Regarding trends in maternal health indicators, Nigeria made statistically significant but modest progress between 2018 and 2023. Skilled birth attendance increased by 9.0 percentage points (from 43% to 52%), facility-based delivery rose by 7.0 percentage points (from 39% to 46%), and ANC4+ improved by 2.8 percentage points. Despite these gains, more than half of Nigerian women continued to deliver at home in 2023, and the national MMR remained dramatically above the SDG 3.1 target. Based on the findings of this study recommendations are: Institute geopolitical zone-disaggregated monitoring of all maternal health programmes using concentration indices as equity performance indicators. The Federal Ministry of Health should mandate annual equity reporting by zone, ensuring that equity not just coverage is tracked at all levels of the health system.

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