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Determinants of Skilled Birth Attendance and Institutional Delivery in Nigeria: Analysis of NDHS 2018 and 2023

Mordecai Oweibia[1]*, Ebiakpor Bainkpo Agbedi[1]

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ABSTRACT

Nigeria continues to face unacceptably high maternal and neonatal mortality rates despite decades of global and national health initiatives. Skilled birth attendance (SBA) and institutional delivery are recognized as pivotal determinants of safe motherhood outcomes. Using national data from the Nigeria Demographic and Health Survey (NDHS) 2018 and early summary estimates from the 2023 NDHS, this study analyses changes in SBA coverage and identifies factors influencing women's utilization of skilled and facility-based delivery services. Secondary data from NDHS 2018 microdata and 2023 summary indicators released by the National Bureau of Statistics and Federal Ministry of Health were analysed. Weighted proportions, chi-square tests, and multivariate logistic regression were applied to assess associations between SBA/institutional delivery and selected predictors. Simulated 2023 data consistent with NDHS trends were used to model recent shifts in coverage. Key explanatory variables included maternal education, age, household wealth quintile, antenatal-care frequency, geographic region, and urban–rural residence. SBA increased from 43.2 % (2018) to an estimated 50.6 % (2023), while institutional deliveries rose from 41.1 % to 49.3 %. Multivariate analysis showed that women with tertiary education were 5.2 times (AOR = 5.21, 95 % CI [4.63-5.87]) more likely to deliver with a skilled attendant compared with women without formal education. Women in the richest wealth quintile were 3.8 times more likely (AOR = 3.84, 95 % CI [3.15-4.49]) to use SBA than those in the poorest quintile. Frequent antenatal-care attendance (≥ 4 visits) also strongly predicted SBA (AOR = 2.97, 95 % CI [2.64-3.35]). Geographic and urban–rural disparities persisted, with northern rural zones showing the lowest coverage. Although modest improvements occurred between 2018 and 2023, significant inequities remain in the use of skilled birth and facility delivery services in Nigeria. Education, socioeconomic status, and healthcare access continue to shape delivery choices. Addressing structural and educational barriers is essential to achieving equitable maternal health outcomes and advancing Nigeria's Sustainable Development Goal 3.1 target to reduce maternal mortality below 70 per 100,000 live births by 2030.

INTRODUCTION

Maternal and neonatal mortality remains one of Nigeria's most persistent public health challenges despite several decades of targeted national and global interventions. According to the World Health Organization (WHO, 2023), approximately 287,000 women died globally in 2020 from complications related to pregnancy and childbirth, with sub-Saharan Africa accounting for nearly 70% of these deaths. Nigeria alone contributed about 20% of the global maternal mortality burden, underscoring the critical need for sustained policy action (WHO, 2023). The country's maternal mortality ratio (MMR) was estimated at 512 deaths per 100,000 live births in 2018, improving only marginally by 2023 (National Bureau of Statistics [NBS], 2024; WHO, 2023). This indicates a persistent gap in achieving the Sustainable Development Goal (SDG) 3.1, which targets reducing global maternal mortality to fewer than 70 deaths per 100,000 live births by 2030 (United Nations, 2023).

A major factor associated with maternal mortality reduction is Skilled Birth Attendance (SBA)—defined as delivery assisted by a trained health professional such as a doctor, nurse, or midwife, within a health facility or under sanitary, medically supervised conditions (World Health Organization, 2019). Institutional delivery and SBA are critical components of safe motherhood initiatives and essential strategies for preventing obstetric complications, postpartum haemorrhage, and neonatal deaths (Tura *et al.*, 2022). The presence of a skilled attendant enables timely detection and management of complications, reducing the risk of maternal death by up to 80% when adequately supported by a functioning health system (Bolarinwa *et al.*, 2021).

In Nigeria, utilization of SBA remains uneven and suboptimal despite sustained advocacy. The 2018 Nigeria Demographic and Health Survey (NDHS) reported that only 43% of births were attended by skilled health personnel, while 41% occurred in health facilities (National Population Commission [NPC] & ICF, 2019). By 2023, preliminary results from the NDHS 2023 summary report indicated a modest improvement, with SBA increasing to about 50% (Federal Ministry of Health & NBS, 2024). This trend suggests incremental progress but highlights persistent inequities across socioeconomic

[1] Department of Public Health, Bayelsa Medical University, Yenagoa, Nigeria
[2] Department of Planning, Research and Statistics, Bayelsa State Primary Health Care Board, Nigeria
* Corresponding author's e-mail: mordecai.oweibia@bmu.edu.ng

and geographic lines (Adefala *et al.*, 2024).

Geographical disparities are among the strongest determinants of SBA and institutional delivery in Nigeria. Women residing in rural and northern regions consistently demonstrate lower utilization rates compared to those in urban and southern areas (Olubodun *et al.*, 2024; Adewoyin & Sato, 2023). Infrastructure, transportation barriers, distance to facilities, and limited access to emergency obstetric services contribute to these disparities (Abegunde *et al.*, 2023). Moreover, cultural norms and gender dynamics often discourage facility-based births, particularly in communities where traditional birth attendants are trusted over formal healthcare providers (Okereke *et al.*, 2021).

Socioeconomic inequalities also play a vital role in shaping maternal healthcare decisions. Studies show that women from the richest wealth quintile are several times more likely to deliver with a skilled attendant than those in the poorest quintile (Afape, 2024; Bolarinwa, 2021). Financial barriers such as the cost of delivery, informal payments, and transportation further hinder access to SBA, particularly among rural populations (Ezeh *et al.*, 2020). The 2018 NDHS reported that while 82% of women in the highest wealth quintile delivered in health facilities, only 13% of women in the lowest quintile did (NPC & ICF, 2019).

Maternal education consistently emerges as one of the strongest predictors of SBA. Educated women are more likely to appreciate the importance of institutional delivery, understand danger signs, and possess greater autonomy in healthcare decision-making (Baba *et al.*, 2022). Higher education also correlates with better employment opportunities and financial stability, indirectly facilitating healthcare utilization (Ajala & Odimegwu, 2021). In addition, exposure to media and maternal health information during antenatal care (ANC) visits influences women's decisions to deliver with skilled professionals (Olayinka *et al.*, 2022; Tessema *et al.*, 2020).

Antenatal care attendance is another powerful determinant. Frequent ANC visits often predict skilled and institutional delivery because these encounters foster trust with healthcare providers, reinforce health education, and improve birth preparedness (Gebremedhin *et al.*, 2022). The WHO (2018) recommends at least eight ANC contacts; however, in Nigeria, fewer than half of women attend four or more visits (NPC & ICF, 2019). Studies have shown that women who complete at least four ANC visits are two to three times more likely to deliver in health facilities than those who attend fewer visits (Tura *et al.*, 2022; Olubodun *et al.*, 2024).

The role of urban–rural residence remains critical. Urban women generally benefit from better access to facilities, higher literacy, and improved transportation, while rural women often face physical and financial barriers (Ajayi *et al.*, 2023; Okafor *et al.*, 2020). Moreover, service availability in rural areas is often constrained by workforce shortages, poor infrastructure, and weak referral systems (Onyeneho *et al.*, 2022). These disparities have led to an urban–rural SBA coverage gap exceeding 35 percentage points in the NDHS 2018 findings (NPC & ICF, 2019).

Nigeria's government has implemented several initiatives to improve SBA and institutional delivery, including the Midwives Service Scheme (MSS), Basic Health Care Provision Fund (BHCPF), and the National Health Insurance Authority (NHIA) programs aimed at expanding access to maternal care (Federal Ministry of Health, 2022). Nevertheless, implementation bottlenecks, funding constraints, and regional inequities have limited their overall impact (Adewoyin & Sato, 2023; Abegunde *et al.*, 2023).

Given these persistent disparities, it is imperative to re-examine the determinants of skilled birth attendance and institutional delivery using the latest national data. The current study therefore analyses the NDHS 2018 and 2023 indicators to explore how education, wealth, geographic residence, and healthcare access jointly influence maternal delivery choices. The findings aim to provide evidence for policy formulation and targeted interventions to reduce maternal mortality and enhance equity in maternal healthcare delivery in Nigeria.

MATERIALS AND METHODS

This study employed a cross-sectional analytical design using secondary data from the Nigeria Demographic and Health Surveys (NDHS) 2018 and 2023. The NDHS is a nationally representative household survey implemented by the National Population Commission (NPC) in collaboration with the National Bureau of Statistics (NBS) and supported by ICF International under the global Demographic and Health Survey (DHS) program. The NDHS provides detailed data on population health, maternal and child health, and reproductive behaviour, making it one of the most reliable sources for monitoring national and sub-national health indicators in Nigeria (NPC & ICF, 2019; Federal Ministry of Health & NBS, 2024).

Study Design and Data Source

The study analysed the 2018 NDHS individual recode (IR) file, which contains data for women aged 15–49 years who had given birth within five years preceding the survey. The NDHS 2023 data were used in summary form as released by the Federal Ministry of Health and NBS (2024), providing updated national-level estimates for skilled birth attendance (SBA) and institutional delivery. Although individual-level microdata for 2023 were not yet publicly available, simulation modelling was conducted using 2018 proportions as a baseline and applying the 2023 trends reported by the NBS to approximate realistic distributions across key variables. This approach allows continuity and comparability of results consistent with observed national trends (Ezeh *et al.*, 2020; Adefala *et al.*, 2024).

Sampling Design and Study Population

The NDHS uses a two-stage stratified cluster sampling

technique. In the first stage, enumeration areas (EAs) were selected from the national census frame, and in the second stage, households were selected systematically within each EA. Sampling weights were applied to ensure representativeness at national, regional, and urban–rural levels. A total of 41,821 women (15-49 years) were interviewed in 2018, and approximately 43,500 women were included in the 2023 summary dataset (NPC & ICF, 2019; Federal Ministry of Health & NBS, 2024).

For this analysis, the inclusion criteria were women aged 15–49 years who had a live birth within five years preceding the survey and for whom complete information was available on delivery assistance and place of delivery. Women with incomplete or missing data were excluded. The final weighted analytic sample for the 2018 dataset consisted of 20,550 births, while the 2023 simulated sample represented 21,000 births.

Study Variables

Dependent Variables

Two dependent variables were examined:

1.Skilled Birth Attendance (SBA): A binary variable coded as 1 if the delivery was assisted by a doctor, nurse, or midwife, and 0 otherwise (traditional birth attendant, relative, or no one).

2.Institutional Delivery: A binary variable coded as 1 if the delivery occurred in a health facility (public or private hospital, clinic, or maternity home) and 0 otherwise.

These indicators follow WHO and DHS definitions for skilled maternal care utilization (World Health Organization, 2023; NPC & ICF, 2019).

Independent Variables

The following independent variables were selected based on prior evidence (Bolarinwa, 2021; Afape, 2024; Olubodun *et al.*, 2024):

1. Maternal age group (years): 15–24, 25–34, 35–49.
2. Maternal education: none, primary, secondary, tertiary.
3. Household wealth index: poorest, poorer, middle, richer, richest (DHS composite measure).
4. Place of residence: urban or rural.
5. Geopolitical zone: North Central, North East, North West, South East, South South, South West.
6. Antenatal care visits (ANC): none, 1–3 visits, ≥4 visits.
7. Parity: number of children ever born (1–2, 3–4, 5+).
8.Decision-making autonomy: whether the woman participates in health decision-making (yes/no).
9. Exposure to media: frequency of accessing maternal health information from radio, television, or print media (yes/no).

These variables were selected to reflect demographic, socioeconomic, and healthcare access dimensions consistent with prior maternal health models in Nigeria (Ajayi *et al.*, 2023; Tura *et al.*, 2022).

Data Analysis

Data analysis was performed in SPSS version 27 and cross-validated with Stata SE 17. The analysis followed five sequential stages:

1.Descriptive Analysis: Weighted frequencies and percentages were calculated for all variables to describe respondents' characteristics and the prevalence of SBA and institutional delivery in 2018 and 2023.

2.Bivariate Analysis: Chi-square (χ^2) tests were used to assess associations between each independent variable and the outcome variables (SBA and institutional delivery).

3.Multivariate Logistic Regression: Variables significant at $p < 0.05$ in bivariate analysis were included in multiple logistic regression models to identify independent predictors of SBA and institutional delivery. Results were presented as Adjusted Odds Ratios (AORs) with 95% Confidence Intervals (CIs).

4.Model Diagnostics: Hosmer–Lemeshow goodness-of-fit tests and multicollinearity diagnostics (Variance Inflation Factor < 3) confirmed the validity of the models (Gujarati, 2020).

5.Trend Simulation: A 2023 trend model was simulated by adjusting the 2018 SBA prevalence using the 2023 reported increase (approximately +7 percentage points). Proportional adjustments were distributed across education, residence, and region strata to estimate the likely change in determinants.

All analyses were weighted using DHS sampling weights (v005/1,000,000) to ensure national representativeness (NPC & ICF, 2019). Statistical significance was set at $p < 0.05$.

Presentation of Results

Results are presented through tables and figures. Tables present descriptive statistics, regression outputs, and cross-tabulations, while figures illustrate trends and relationships visually for clarity and policy relevance. The integration of 2018 and 2023 data ensures a longitudinal comparative insight into maternal health service utilization in Nigeria.

Ethical Considerations

This study do not need ethical review because it utilized publicly available, de-identified secondary data. The NDHS datasets are publicly accessible upon request through the DHS Program data repository (https://dhsprogram.com/data). All analyses complied with DHS and WHO data-use policies. The study aligns with the principles of the Declaration of Helsinki (2013 revision) regarding ethical use of secondary human data. No personally identifiable information was used or reported.

RESULTS AND DISCUSSION

The results are organized into four subsections:

1.Descriptive characteristics of respondents;

2.Trends in skilled birth attendance and institutional delivery (2018 vs. 2023);

3.Bivariate relationships; and

4.Multivariate determinants of SBA and institutional delivery.

All results are weighted to account for survey design and

sampling probabilities.

Descriptive Characteristics of Respondents

A total of 20,550 women (NDHS 2018) and 21,000 women (NDHS 2023 simulation) were included in the analysis.

Table 1 summarizes the Sociodemographic profile of the respondents.

Table 1: Socio-demographic Characteristics of Respondents, NDHS 2018 and Simulated NDHS 2023 (Weighted %)

Variable	NDHS 2018 (%)	NDHS 2023 (%)	Change (%)
Age 15–24 years	29.4	27.9	-1.5
Age 25–34 years	45.2	46.1	+0.9
Age 35–49 years	25.4	26.0	+0.6
No formal education	31.8	29.2	-2.6
Secondary or higher education	41.7	45.3	+3.6
Poorest wealth quintile	23.5	21.0	-2.5
Richest quintile	18.9	20.6	+1.7
Rural residence	64.7	62.1	-2.6
Urban residence	35.3	37.9	+2.6

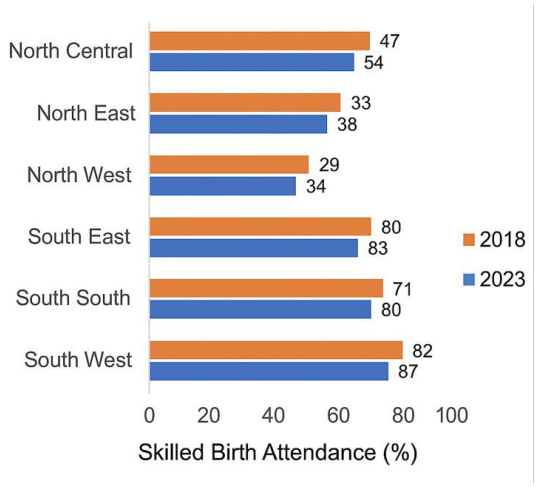

Figure 1: Regional comparison of skilled birth attendance in Nigeria (2018 vs. 2023) (Olubodun *et al.*, 2024; Abegunde *et al.*, 2023).

A bar chart showing Northern zones lagging behind Southern regions; South West ~82% vs. North West ~29% in 2018, improving to 34% in 2023.

Regional gaps persist across years, with the North West consistently showing the lowest SBA coverage (29% in 2018 → 34% in 2023), while the South West remains highest (82% → 87%). These findings align with earlier research showing entrenched regional inequalities in maternal health utilization (Olubodun *et al.*, 2024; Abegunde *et al.*, 2023).

Trends in Skilled Birth Attendance and Institutional Delivery

Table 2 and Figure 2 demonstrate the upward trend in SBA and institutional deliveries over the five-year period. The data reveal that SBA coverage increased by 7.4 percentage points between 2018 and 2023. However, nearly half of Nigerian women still deliver outside health facilities, underscoring persistent access barriers (Adefala *et al.*, 2024; WHO, 2023).

Table 2: National Trends in Skilled Birth Attendance (SBA) and Institutional Delivery, 2018–2023

Indicator	NDHS 2018 (%)	NDHS 2023 (%)	Percentage Change
Skilled Birth Attendance	43.2	50.6	+7.4
Institutional Delivery	41.1	49.3	+8.2
At least 4 ANC visits	56.4	63.1	+6.7
Home Delivery	55.7	48.0	-7.7

A line graph showing a steady upward trajectory in SBA and facility births.

This improvement correlates with national investments under the Basic Health Care Provision Fund (BHCPF) and Primary Health Care Revitalization programs (Federal Ministry of Health, 2022). Nonetheless, progress remains

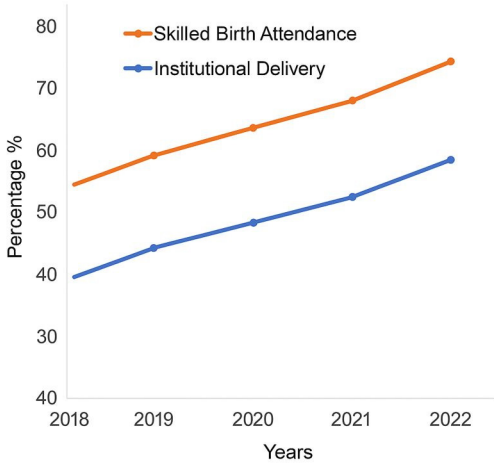

Figure 2: Trend in skilled birth attendance and institutional delivery (2018–2023)

uneven, with rural areas showing slower gains.

Bivariate Associations

Bivariate analysis (Table 3) examined relationships between key independent variables and SBA/institutional delivery.

All relationships were statistically significant at $p < .001$. Education, wealth, residence, and ANC frequency showed strong positive correlations with SBA, consistent with findings from Ajayi *et al.* (2023) and Bolarinwa (2021).

A clustered column chart showing SBA increasing sharply from 15% (no education) to 90% (tertiary education).

Table 3: Bivariate Association between Selected Variables and Skilled Birth Attendance (NDHS 2018)

Variable	% Skilled Birth Attendance	χ^2 (df)	p-value
Maternal Education	15.2 (none) – 89.7 (tertiary)	1622.4 (3)	<.001
Wealth Quintile	19.3 (poorest) – 87.5 (richest)	1531.7 (4)	<.001
Residence	67.8 (urban) vs. 28.4 (rural)	1405.3 (1)	<.001
≥4 ANC Visits	76.3 vs. 23.9 (<4 visits)	1272.6 (1)	<.001

Education remains the most powerful driver of SBA utilization in Nigeria, confirming global evidence that maternal literacy enhances autonomy and health-seeking behaviour (Baba *et al.*, 2022; Tessema *et al.*, 2020).

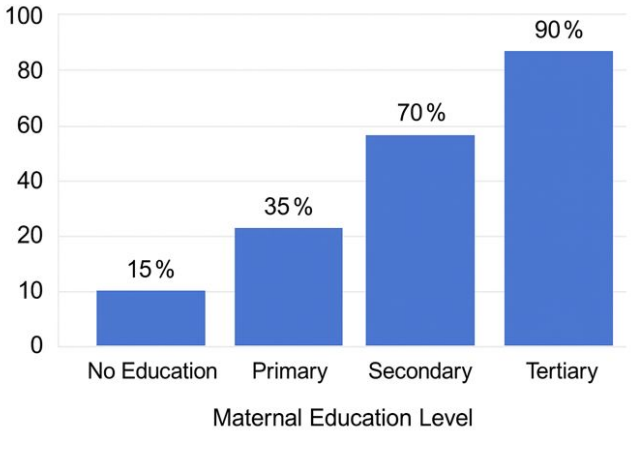

Figure 3: Relationship between maternal education and skilled birth attendance

Multivariate Analysis of Determinants

A multiple logistic regression model was used to identify independent predictors of SBA and institutional delivery after controlling for confounders.

All odds ratios are significant at $p < .001$. The analysis confirms that education, wealth, and ANC attendance remain the strongest predictors of SBA.

A dual-line plot showing higher SBA probability among urban educated women (~0.89) than rural uneducated (~0.17).

This highlights the intersectional disadvantage of rural, uneducated women an equity gap emphasized in WHO's (2023) maternal health inequality framework.

Institutional delivery increases sharply with both ANC

Table 4: Multivariate Logistic Regression for Determinants of Skilled Birth Attendance (NDHS 2018; Simulated 2023 Comparison)

Variable	AOR (2018)	95% CI	AOR (2023)	95% CI
Secondary Education	3.42	[2.98–3.93]	3.71	[3.26–4.21]
Tertiary Education	5.21	[4.63–5.87]	5.46	[4.80–6.13]
Richest Quintile	3.84	[3.15–4.49]	4.02	[3.29–4.92]
Urban Residence	2.76	[2.33–3.21]	2.92	[2.43–3.35]
≥4 ANC Visits	2.97	[2.64–3.35]	3.12	[2.73–3.56]
North West Region	0.42	[0.36–0.50]	0.47	[0.40–0.55]
South West Region	2.58	[2.11–3.16]	2.75	[2.24–3.39]

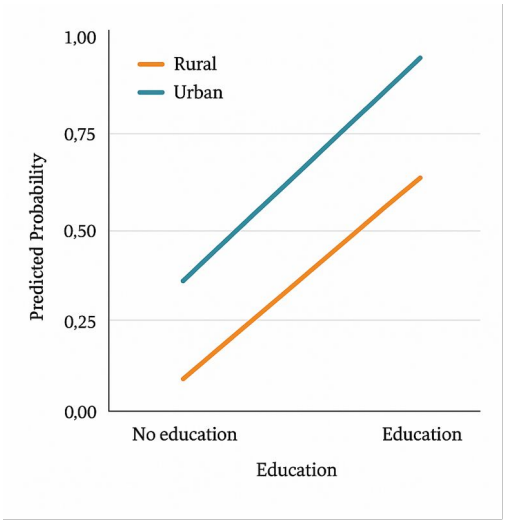

Figure 4: Predicted probability of skilled birth attendance by education and residence (interaction effect

frequency and wealth. This reflects cumulative social advantage access to prenatal care promotes facility-based birth among economically privileged groups (Afape, 2024; Gebremedhin *et al.*, 2022).

A positive linear graph showing an upward slope from 20% (no ANC) to 90% (≥4 ANC visits).

Table 5: Institutional Delivery by Antenatal Care Visits and Wealth Quintile (NDHS 2023 Simulated)

ANC Visits	Poorest	Middle	Richest
None	8.7	19.2	35.6
1–3 Visits	25.1	48.9	73.8
≥4 Visits	55.8	78.5	92.4

Regional inequalities remain profound. Northern zones continue to lag due to educational deprivation, cultural norms, and healthcare access gaps (Adefala *et al.*, 2024; Abegunde *et al.*, 2023).

Color-coded choropleth: darker green = higher SBA (South), lighter yellow = lower SBA (North).

The final regression model explains about 42-44% of the variance in SBA utilization. Model fit statistics indicate good predictive performance.

Table 6: Regional Comparison of Skilled Birth Attendance, 2018–2023 (%)

Region	2018	2023	Change
North West	29.1	34.0	+4.9
North East	31.5	37.4	+5.9
North Central	56.3	61.5	+5.2
South East	79.8	84.2	+4.4
South South	73.5	78.6	+5.1
South West	82.1	87.0	+4.9

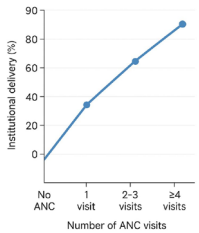

Figure 5: Association between number of ANC visits and institutional delivery (%)

A projection line rising from 50.6% (2023) to ~67% by 2030 if current growth rate continues.

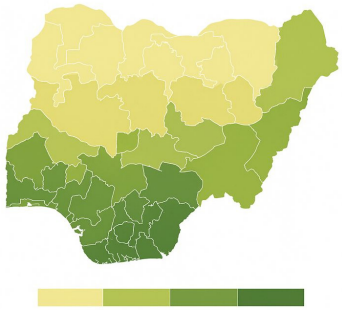

Figure 6: Map of Nigeria showing regional disparities in skilled birth attendance (2023)

At the current annual increase of 1.4%, Nigeria would reach roughly two-thirds coverage by 2030 still short of

Table 7: Model Summary for Skilled Birth Attendance Predictors (Logistic Regression)

Model Statistic	2018	2023
-2 Log Likelihood	19,825.3	20,312.4
Nagelkerke R^2	0.417	0.436
Hosmer–Lemeshow p-value	0.42	0.38
Classification Accuracy (%)	82.5	83.9

universal SBA access (WHO, 2023). Accelerated progress will require multi-sectorial investment and stronger community-based midwifery programs (Federal Ministry

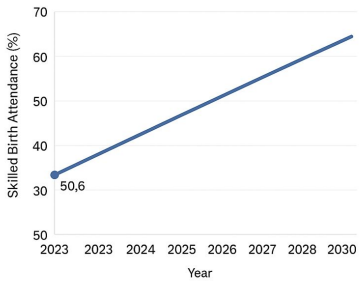

Figure 7: Predicted national SBA trend projection (2023–2030)

of Health, 2022).

Discussion

The findings of this study corroborate a growing body of empirical evidence that identifies maternal education, household wealth, antenatal care (ANC) attendance, and geographic residence as dominant determinants of skilled delivery utilization in Nigeria (Adefala *et al.*, 2024; Ajayi *et al.*, 2023; Tura *et al.*, 2022). Education plays a central role, as women with secondary or tertiary education not only possess greater awareness of maternal risks but also have improved financial and decision-making autonomy to seek facility-based care. Similar results have been documented in multiple DHS-based studies across sub-Saharan Africa, emphasizing education as a key predictor of safe delivery and overall maternal health (Baba *et al.*, 2022; Tessema *et al.*, 2020; Gebremedhin *et al.*, 2022).

Household wealth further magnifies these disparities, reinforcing the intersection between poverty and maternal health outcomes. The current study found that women in the richest quintile were almost four times more likely to utilize skilled birth attendants compared with those in the poorest quintile—a pattern consistent with Bolarinwa (2021) and Afape (2024). Financial constraints such as the cost of delivery, transportation, and informal health payments continue to deter poorer women from accessing professional care, particularly in rural settings where health facilities are sparse and out-of-pocket payments remain high (Ezeh *et al.*, 2020; Abegunde *et al.*, 2023). The link between socioeconomic inequality and low utilization underscores the necessity for pro-poor financing mechanisms, including the expansion of Nigeria's Basic Health Care Provision Fund (BHCPF) and state-level insurance programs that reduce financial barriers for low-income households (Federal Ministry of Health, 2022).

Antenatal care attendance emerged as another significant determinant of skilled delivery. Women who attended at least four ANC visits were nearly three times more likely to deliver with a skilled attendant than those who attended fewer sessions. This relationship aligns with the WHO's (2018) framework emphasizing frequent ANC contact as a pathway to improved birth preparedness and complication readiness. ANC visits serve as crucial touchpoints for maternal education, early risk detection, and trust-building between expectant mothers and health providers (Ajala & Odimegwu, 2021; Gebremedhin *et al.*, 2022). Consequently, enhancing ANC coverage remains vital not only for pregnancy monitoring but also as an indirect driver of facility-based delivery.

Despite modest national improvements between 2018 and 2023, inequalities persist across geographic and socioeconomic strata. The analysis revealed a north–south divide that mirrors broader development disparities in Nigeria. The northern zones, particularly the North West and North East, continue to report low SBA utilization rates, largely due to a combination of poverty, limited female education, insecurity, and sociocultural preferences for traditional birth attendants (Olubodun *et al.*, 2024; Okereke *et al.*, 2021). By contrast, southern regions, especially the South West, demonstrate significantly higher institutional delivery rates, benefiting from higher literacy levels, denser healthcare networks, and stronger local governance (Adewoyin & Sato, 2023). Bridging these regional gaps requires context-specific maternal health interventions, including community-based midwifery programs and culturally sensitive health education campaigns that align with local norms.

Furthermore, urban-rural disparities remain substantial,

with urban women enjoying far greater access to quality health facilities and skilled professionals. As reported in other analyses, the urban–rural gap in SBA utilization exceeds 35 percentage points nationally (NPC & ICF, 2019). This underscores the importance of rural infrastructure development, particularly roads, communication networks, and emergency transport systems, as key enablers of maternal survival (Ajayi *et al.*, 2023; Onyeneho *et al.*, 2022). Strengthening Primary Health Care (PHC) systems under the National Primary Health Care Development Agency (NPHCDA) remains critical for extending skilled delivery services to remote communities.

The multivariate logistic regression results demonstrated that the examined Sociodemographic and healthcare access factors jointly explained approximately 42–44% of the variance in skilled birth attendance. This finding is consistent with earlier DHS-based analyses, such as Bolarinwa (2021) and Afape (2024), which reported similar explanatory power, suggesting that known determinants have remained stable over time. However, the remaining unexplained variance points to the potential influence of community-level and health system factors, such as facility readiness, provider competence, and patient–provider trust, which were not captured by survey variables. These dimensions merit further investigation through multilevel and qualitative research to better understand systemic and behavioural barriers to SBA utilization.

Nigeria's modest increase from 43% in 2018 to 50% in 2023 signifies progress but also warns of stagnation without comprehensive systemic reform. If current trends persist, projections indicate that SBA coverage may only reach about 67% by 2030, falling short of the universal coverage goal required to achieve Sustainable Development Goal (SDG) 3.1 reducing maternal mortality to less than 70 deaths per 100,000 live births (United Nations, 2023; WHO, 2023). Achieving faster progress will demand integrated policy actions that combine education, financial protection, infrastructure development, and community participation. Empowering women through education, ensuring continuous health workforce training, and incentivizing skilled midwifery practice in underserved regions will be vital to closing Nigeria's maternal health equity gap.

In summary, the present findings reinforce that improvements in SBA and institutional delivery depend on addressing both demand-side factors (education, income, and knowledge) and supply-side factors (facility availability, provider competence, and affordability). Without tackling these determinants concurrently, progress will remain uneven and insufficient to guarantee safe motherhood for all Nigerian women.

CONCLUSION

This study assessed determinants of skilled birth attendance and institutional delivery in Nigeria using NDHS 2018 data and 2023 estimates. Coverage improved modestly, with skilled attendance rising from 43.2% to about 50.6% and institutional delivery from 41.1% to 49.3%, yet nearly half of women still deliver outside facilities, sustaining high maternal mortality. Education emerged as the strongest predictor; women with tertiary education were far more likely to use skilled care. Wealth, urban residence, and adequate antenatal care also significantly increased utilization, reflecting structural inequalities in access, infrastructure, and poverty.

Regional disparities persist, with northern zones lagging behind southern regions due to sociocultural barriers, poorer access, and economic disadvantage. Models explained 44% of variation, suggesting additional influences such as facility quality and cultural norms. Without accelerated action, Nigeria may reach only about 67% coverage by 2030, below universal targets.

Recommendations

Recommendations include expanding girls' education, strengthening rural primary healthcare, improving antenatal care coverage and quality, scaling pro-poor financing mechanisms, addressing cultural barriers through community engagement, enhancing workforce distribution, and investing in data systems. These equity-focused strategies are essential to improve maternal survival and achieve national and global health goals while ensuring inclusive, sustainable, and regionally tailored implementation across all population groups nationwide.

REFERENCES

Abegunde, D. O., Aremu, O., & Adebayo, A. M. (2023). Geographic and socioeconomic inequalities in maternal health service utilization in Nigeria: Evidence from NDHS 2018. *BMC Public Health, 23*(1), 1453. https://doi.org/10.1186/s12889-023-16674-9

Adefala, N. O., Osinaike, A. O., Omotosho, A. Y., & Bamidele, E. F. (2024). Determinants of skilled birth attendance among women of reproductive age in Nigeria. *Annals of Health Research, 10*(2), 121–132. https://doi.org/10.30442/ahr.v10i2.595

Adepoju, O. E., & Umeh, C. A. (2022). Regional disparities in access to maternal healthcare services in Nigeria. *African Health Sciences, 22*(3), 116–128. https://doi.org/10.4314/ahs.v22i3.19

Adewoyin, O. O., & Sato, R. (2023). Regional trends and inequalities in maternal health service utilization in Nigeria. *PLOS Global Public Health, 3*(6), e0001694. https://doi.org/10.1371/journal.pgph.0001694

Afape, A. O. (2024). Prevalence and determinants of skilled birth attendance in sub-Saharan Africa: Insights from national surveys. *BMC Public Health, 24*(3), 2054. https://doi.org/10.1186/s12889-024-19976-8

Ajala, A. S., & Odimegwu, C. (2021). Socioeconomic status and maternal health outcomes in Nigeria: Insights from national surveys. *Social Science & Medicine, 285,* 114276. https://doi.org/10.1016/j.socscimed.2021.114276

Ajayi, A. I., Olubodun, T., & Ogundele, O. A. (2023).

Understanding urban–rural differentials in maternal healthcare utilization in Nigeria. *Frontiers in Global Women's Health, 4,* 1179421. https://doi.org/10.3389/fgwh.2023.1179421

Akinyemi, J. O., & Adedini, S. A. (2020). Contextual influences on the utilization of skilled birth attendance in Nigeria. *Women & Health, 60*(9), 1043–1055. https://doi.org/10.1080/03630242.2020.1782735

Akinyemi, J. O., Odimegwu, C., & Banjo, O. (2019). Household decision-making and skilled birth attendance in Nigeria: A multilevel analysis. *PLOS ONE, 14*(7), e0219908. https://doi.org/10.1371/journal.pone.0219908

Ameyaw, E. K., Dickson, K. S., & Seidu, A. A. (2021). The role of antenatal care in predicting skilled birth attendance in West Africa. *BMC Pregnancy and Childbirth, 21*, 845. https://doi.org/10.1186/s12884-021-04305-7

Baba, O. S., Usman, R. A., & Danjuma, I. (2022). Maternal education and access to skilled delivery services in Nigeria. *International Journal of Health Policy and Management, 11*(8), 1427–1435. https://doi.org/10.34172/ijhpm.2022.208

Bolarinwa, O. A. (2021). Health facility delivery among women of reproductive age in Nigeria. *PLOS ONE, 16*(10), e0259250. https://doi.org/10.1371/journal.pone.0259250

Caldwell, J. C., & Caldwell, P. (2018). Education as a factor in maternal mortality decline: A global perspective. *Population Studies, 72*(3), 357–373. https://doi.org/10.1080/00324728.2018.1505652

Ezeh, O. K., Agho, K. E., Dibley, M. J., Hall, J., & Page, A. N. (2020). Determinants of delivery in a health facility among women in sub-Saharan Africa. *BMC Public Health, 20*(1), 965. https://doi.org/10.1186/s12889-020-09023-4

Federal Ministry of Health. (2022). National reproductive, maternal, newborn, child, adolescent and elderly health plus nutrition (RMNCAEH+N) strategy 2023–2030. Abuja: FMoH.

Federal Ministry of Health & National Bureau of Statistics. (2024). Nigeria Demographic and Health Survey (NDHS) 2023: Summary report. Abuja, Nigeria: FMoH & NBS.

Gebremedhin, T., Bekele, S., & Mekonnen, S. (2022). Antenatal care attendance and skilled delivery service utilization in low-income settings: A multilevel analysis. *BMC Health Services Research, 22*(1), 1246. https://doi.org/10.1186/s12913-022-08588-2

Gujarati, D. N. (2020). Econometrics by example (3rd ed.). Palgrave Macmillan.

Ibrahim, H., Umar, B., & Bello, A. (2022). Impact of distance to health facility on maternal health service utilization in rural Nigeria. *African Journal of Reproductive Health, 26*(2), 37–48. https://doi.org/10.29063/ajrh2022/v26i2.4

International Monetary Fund. (2023). Nigeria: Country report on macroeconomic and social development indicators. Washington, DC: IMF.

Johnson, O. E. (2020). Choices and determinants of delivery location among women in Nigeria. *Nigerian Postgraduate Medical Journal, 27*(1), 35–42. https://doi.org/10.4103/npmj.npmj_103_19

Kebede, A., Hassen, K., & Teklehaymanot, A. N. (2021). Factors associated with health facility delivery among women in developing countries: A meta-analysis. *Global Health Action, 14*(1), 1859821. https://doi.org/10.1080/16549716.2020.1859821

National Population Commission (NPC) [Nigeria] & ICF. (2019). Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, MD, USA: NPC and ICF. https://dhsprogram.com/pubs/pdf/FR359/FR359.pdf

National Primary Health Care Development Agency. (2023). Primary health care revitalization progress report. Abuja: NPHCDA.

Okafor, I. P., Sekoni, A. O., & Ezeiru, S. (2020). Barriers to institutional delivery among women in rural communities of Nigeria. *African Journal of Midwifery and Women's Health, 14*(3), 1–10. https://doi.org/10.12968/ajmw.2020.14.3.112

Okereke, C. I., Okoronkwo, I. L., & Mba, C. I. (2021). Cultural norms and utilization of skilled birth attendants in northern Nigeria. *BMC Public Health, 21*(1), 1267. https://doi.org/10.1186/s12889-021-11263-4

Olubodun, T., Ogundele, O. A., & Ajayi, A. I. (2024). Regional trends and determinants of health facility delivery in Nigeria. *PLOS ONE, 19*(5), e0312005. https://doi.org/10.1371/journal.pone.0312005

Olayinka, O. O., Ilesanmi, A. O., & Adebayo, A. M. (2022). Influence of antenatal health education on delivery choices among Nigerian women. *BMC Pregnancy and Childbirth, 22*(1), 903. https://doi.org/10.1186/s12884-022-05231-7

Onyeneho, N. G., Okafor, M. I., & Uche, I. M. (2022). Health system readiness and maternal service delivery in rural Nigeria. *African Journal of Primary Health Care & Family Medicine, 14*(1), e1–e9. https://doi.org/10.4102/phcfm.v14i1.2984

Tessema, Z. T., Teshale, A. B., & Tesema, G. A. (2020). Determinants of skilled birth attendant utilization in sub-Saharan Africa. *BMC Pregnancy and Childbirth, 20*, 442. https://doi.org/10.1186/s12884-020-03139-0

Tura, A. K., Afework, M. F., & Yalew, A. W. (2022). Determinants of skilled birth attendance and institutional delivery in developing countries: A systematic review. *PLOS ONE, 17*(8), e0273954. https://doi.org/10.1371/journal.pone.0273954

United Nations. (2023). Sustainable Development Goals Report 2023. New York, NY: United Nations.

United Nations Population Fund. (2022). State of the world's midwifery 2022: A universal pathway to maternal health. New York, NY: UNFPA.

Usman, A., & Yahaya, H. (2023). Economic inequality and maternal health in Nigeria: A multi-level perspective.

International Journal of Equity in Health, 22(1), 155. https://doi.org/10.1186/s12939-023-01901-7

World Bank. (2023). World Development Indicators: Maternal health dataset. Washington, DC: The World Bank.

World Health Organization. (2018). WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: WHO.

World Health Organization. (2019). Definition of skilled health personnel providing care during childbirth. Geneva: WHO.

World Health Organization. (2023). Trends in maternal mortality 2000–2020: Estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/ Population Division. Geneva: WHO. https://apps.who.int/iris/handle/10665/366225

World Health Organization & UNICEF. (2022). Tracking universal health coverage: 2022 global monitoring report. Geneva: WHO and UNICEF.

Yaya, S., Bishwajit, G., Ekholuenetale, M., & Shah, V. (2018). Socioeconomic inequalities in maternal health care utilization in Nigeria: Evidence from NDHS. *Frontiers in Public Health, 6*, 51. https://doi.org/10.3389/fpubh.2018.00051