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Original Research Article

Barriers and enablers of modern contraceptive use among adolescent girls and young women in Nigeria: evidence from a multilevel mixed effect analysis

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ABSTRACT

Background: Modern contraceptive use among adolescent girls and young women in Nigeria remains low despite persistent high fertility and early childbearing. Understanding the ecological factors shaping contraceptive uptake is essential for addressing unmet needs and improving reproductive health outcomes.
Methods: This study analyzed data from the 2018 Nigeria Demographic and Health Survey (NDHS), including 8,825 adolescent girls and young women aged 15–24 years. Weighted descriptive statistics were used to examine the characteristics. Multilevel logistic regression models were fitted to assess individual, household and community predictors of modern contraceptive use, accounting for clustering at the primary sampling unit level.
Results: The prevalence of modern contraceptive use was 9.1%. Uptake was significantly higher among young women aged 20–24 years, those with secondary or higher education, unmarried respondents and higher wealth quintiles. Conversely, Muslim affiliation and Hausa ethnicity were associated with lower use compared to Catholic and other ethnic groups. Fertility factors such as parity and desire for more children were important determinants: women with higher parity and those desiring no more children reported greater use. Community-level influences persisted, with rural residence and northern regional location associated with lower contraceptive uptake.
Conclusions: Modern contraceptive use among Nigerian adolescents and young women is shaped by intersecting individual, socioeconomic and community factors. Addressing cultural and religious barriers, reducing regional inequities and strengthening youth-friendly reproductive health services are critical for improving uptake. Tailored interventions targeting younger, less educated, rural and socioeconomically disadvantaged women are urgently needed to reduce unmet need Nigeria.

Keywords: Adolescent girls and young women, Barriers, Enablers, Modern Contraceptive, Multilevel Mixed Effect analysis, Nigeria, evidence

INTRODUCTION

According to the 2020 World Youth Report, an estimated 1.2 billion individuals aged 15–24 years representing 16% of the global population—were alive in 2020.[1,2] By 2021, the United Nations projected that the number of young people would increase by 7%, reaching approximately 1.3 billion by 2030, the target year for achieving the sustainable development goals (SDGs).[2] Adolescents and young people living in humanitarian settings are particularly vulnerable due to the breakdown of social support systems, which increases their exposure to sexual coercion, exploitation, violence, early marriage and harmful coping strategies.[3] These conditions

contribute to a higher incidence of unintended pregnancies and increased demand for safe abortion services.[3] Pregnancy remains a major public health concern, especially in low- and middle-income countries (LMICs), where adolescent girls experience high rates of unintended pregnancy, often with short inter-pregnancy intervals.[4,5] Sub-Saharan Africa has the highest prevalence of adolescent pregnancies globally, coupled with the lowest uptake of modern contraception.[6] Although adolescent fertility has slightly declined over the past two decades, it remains persistently high across Africa. In sub-Saharan Africa, the adolescent birth rate was reported at 101 births per 1,000 females the highest regional rate worldwide.[5]

The highest rates of adolescent and young women pregnancies and the lowest rates of use of contemporary contraception are seen in Sub-Saharan Africa.[6] Approximately one-third of adolescent pregnancies in the region are unintended and more than one-third of this end in unsafe abortions.[7] Pregnancy-related complications are a leading cause of maternal mortality among adolescent girls aged 15–19 in LMICs.[8] Furthermore, adolescent pregnancy is associated with adverse health outcomes, including anemia, preterm birth, low birth weight and poor mental health, in addition to limiting educational and employment opportunities.[9]

Nigeria presents one of the highest fertility rates globally, with a total fertility rate (TFR) of 5.4.[10] Given global commitments to reduce fertility rates by 2050, Nigeria's fertility dynamics are expected to significantly influence this trajectory. International and national frameworks including the 1994 International Conference on Population and Development (ICPD), the 2015 SDGs, the African Union Agenda 2063 and Nigeria's 8-point reform agenda emphasize the importance of population management and improving well-being by slowing rapid population growth.

A critical component of this effort is raising the contraceptive prevalence rate (CPR) among women of reproductive age (15–49 years). Despite multiple family planning initiatives, Nigeria continues to record a low CPR of 17%, in stark contrast to other sub-Saharan African countries such as Malawi (66%), Kenya (65%), Rwanda (64%), Cabo Verde (56%) and South Africa (55%).[10] Persistent demand-side barriers undermine progress in contraceptive uptake, limiting the effectiveness of government interventions to reduce fertility rates and population growth.[11,12]

METHODS

Study design and setting

In this study, we analysed cross-sectional data from the most recent NDHSs. The datasets across all the states were used to determine barriers and enablers of modern contraceptive use among adolescent girls and young women in Nigeria.

Data source and study population

Data for this study were obtained from the NDHS conducted in 2018. The NDHS provides nationally representative data on demographic, health and sexual and reproductive health indicators, including family planning, fertility, pregnancy, maternal health, health-seeking behaviours and sexual behaviour. This study specifically utilized the women's recode file (IR), which contains responses from women aged 15–49 years. The NDHS employed a two-stage stratified sampling design. In the first stage, enumeration areas (EAs) were selected using probability sampling proportional to size, with independent selections carried out within each sampling stratum. In the second stage, households within selected EAs were systematically sampled.

The study population comprised sexually active adolescent girls and young women (AGYW) aged 15–24 years who were not pregnant at the time of the survey. AGYW who were pregnant or who had never engaged in sexual activity were excluded from the analysis, as they were not considered eligible for modern contraceptive use. After applying these criteria, a weighted total of 8,825 AGYW aged 15–24 years were included in the analysis (Table 1). Respondents with missing data on variables of interest were excluded. The NDHS datasets used for this analysis are publicly available at http://dhsprogram.com/data/available-datasets.cfm.

Study variables

Outcome variable

The primary outcome variable for this study was the current use of modern contraceptives. This was derived from responses to a survey question asking AGYW about the type of contraceptive method they were using at the time of the survey. Reported methods were categorized into four groups: no method, folkloric method (i.e., cultural or spiritual practices), traditional method and modern method. For the purposes of this study, AGYW who reported using any modern contraceptive method were coded as "1" (users). Those who reported no method, folkloric methods or traditional methods including periodic abstinence (e.g., rhythm or calendar method), withdrawal, country-specific traditional methods and locally described or spiritual practices were classified as "0" (non-users).

Explanatory variables

Eighteen explanatory variables were included in this study, categorized into individual and community-level variables to align with the multilevel analytic approach. These variables were chosen based on their availability in the datasets and as potential determinants of modern

contraceptive use based on the literature reviewed for this study.

Individual level variables

Modern contraception (not using, using), age (15-19 20-24), education level (no education, primary, secondary, higher), marital status (never in union, currently in union, formerly in union), parity (no children, 1–2 children, 3+ children), fertility preference (want more, no more/sterilized/infecund, undecided), recent sexual activity (not active, active) age at first sex (≤14, 15–17, 18+), respondent currently working (no, yes), visited health facility last 12 months (no, yes), getting medical help for self: distance to health facility (big problem, not a big problem) wealth index (poorest, poorer, middle, richer, richest) and ever had a terminated pregnancy (no, yes).

Community level variables

Type of place of residence (Urban, Rural) Community wealth index (Poorest, Poorer, Middle, Richer, Richest) Years lived in place of residence (Recent mover (<5 years), Long-term (≥5 years/Always), Visitor) Region (North central, North east, North west, South east, South south, South west).

Statistical analysis

Data were processed, cleaned and analyzed using STATA/SE version 14. All analyses were weighted to account for the complex survey design, including clustering within sampling units, unequal probabilities of selection and potential non-response, thereby ensuring the reliability of estimates and standard errors.

Given the hierarchical structure of the DHS data which violates the assumptions of independence of observations and homoscedasticity required for ordinary logistic regression a multilevel mixed-effects logistic regression model was employed to account for between-cluster variability.

The analysis followed a three-step approach. First, descriptive statistics (frequencies and percentages) were computed to estimate the pooled prevalence of modern contraceptive use among AGYW in Nigeria. Second, bivariate analyses were conducted using the chi-square test of independence (χ^2) at a 95% confidence level (CI) to explore the distribution of modern contraceptive use across individual- and community-level variables. Explanatory variables with a p-value≤0.20 were retained for multivariable analysis. Third, a multilevel logistic regression model was fitted, incorporating both fixed and random effects. Multicollinearity was assessed using the variance inflation factor (VIF), with results indicating no significant collinearity (Mean VIF=1.66; Maximum VIF=3.56; Minimum VIF=1.02).

A total of four models were specified. Model 1 was the empty model (without explanatory variables), which estimated the proportion of variance in the outcome attributable to clustering at the primary sampling unit (PSU) level. Model 2 included only individual-level determinants, Model 3 included only community-level determinants and Model 4 simultaneously included both individual- and community-level determinants. Fixed effects were reported as adjusted odds ratios (aORs) with 95% CIs, while random effects were assessed using the Intra-Cluster Correlation (ICC).

Model adequacy was evaluated using the Likelihood Ratio (LR) test and the Wald chi-square test. Model comparisons were based on the Akaike Information Criterion (AIC) and the Log-Likelihood Ratio (LLR), with the best-fitting model identified as the one with the lowest AIC and highest LLR value. All analyses and reporting followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

RESULTS

A total of 8,825 adolescent girls and young women (AGYW) aged 15–24 years were included in the analysis. The weighted prevalence of modern contraceptive use among the study population was 9.1%, indicating very low uptake in this group. Regarding age distribution, about one-third of respondents were adolescents aged 15–19 years (34.4%), while the majority were young women aged 20–24 years (65.6%). Educational attainment varied widely: nearly two-fifths had no formal education (39.6%), while 13.4% attained primary education, 41.6% completed secondary education and only 5.4% had higher education.

Most respondents were currently married or in union (71.4%), while 28.6% were never married. Fertility experience was common, with 49.3% reporting one to two children, 12.9% having three or more children and 37.8% having no children. Fertility preference revealed a strong desire for future childbearing: 94.3% expressed wanting more children, whereas only 5.7% wanted no more. Sexual activity was reported by nearly two-thirds of participants, with 64.9% sexually active in the past four weeks. Early sexual debut was also prominent: 42.5% had first intercourse before age 18, while 57.5% initiated sexual activity at 18 years or older. A small proportion (8.5%) reported ever terminating a pregnancy.

Socioeconomic indicators showed a relatively even distribution across wealth quintiles, though skewed slightly toward poorer households: 22.9% in the poorest, 20.4% poorer, 19.4% middle, 19.5% richer and only 17.8% in the richest quintile. With respect to occupation, 46.8% of respondents were not engaged in any work, 27.5% were in agricultural or manual labor, while 25.7% were employed in professional, clerical or service-related jobs.

Religion and ethnicity reflected Nigeria's demographic composition. A vast majority were Muslim (72.6%), while 27.4% were Christians or adherents of other religions. Ethnically, Hausa constituted 39.5%, Yoruba 13.3%, Igbo 13.7% and other minority ethnic groups 33.5%.

Most respondents resided in rural areas (65.2%), compared with 34.8% in urban settings. Residential stability was high, with 90.5% reporting living in the same community for at least five years. Regional distribution showed marked concentration in the northern zones, particularly the North West (43.2%), followed by North East (17.4%), North Central (15.7%), South South (9.6%), South West (8.6%) and South East (5.5%).

Access to health care services remained a concern, as 28.9% reported distance to a health facility as a major barrier, while the majority (71.1%) did not perceive distance as a problem. The bivariate analysis revealed strong and statistically significant associations between socio-demographic, reproductive and contextual factors and the uptake of modern contraceptives among adolescent girls and young women ($p<0.05$ for most variables).

Age was an important determinant: contraceptive use was lowest among adolescents aged 15–19 years (23.9%) compared to young women aged 20–24 years (76.1%) ($p<0.0001$). Similarly, education level showed a strong gradient—contraceptive uptake increased markedly with higher education, ranging from only 8.7% among those with no education to 68.2% among those with secondary education and 15.4% among those with higher education ($p<0.0001$). Marital status was also significant. While the majority of adolescents were currently in union, contraceptive use was disproportionately higher among those never in union (49.1%) compared to those currently married (49.7%) or formerly married (1.2%) ($p<0.0001$). Parity further highlighted this trend contraceptive use was highest among those without children (46.6%), declining with increasing number of children ($p<0.0001$).

With respect to fertility preference, those who desired no more children, were sterilized or infecund reported higher contraceptive use (91.2%) compared to those who wanted more children (94.2%) ($p=0.011$). Interestingly, recent sexual activity did not significantly influence contraceptive use ($p=0.3403$). However, earlier sexual debut (≤14 years) was associated with the lowest contraceptive use (12.5%), while initiation at older ages (≥18 years) was linked to higher uptake (39.9%) ($p<0.0001$).

Socioeconomic indicators showed consistent effects. Contraceptive use increased steadily with wealth, from 6.4% in the poorest quintile to 27.4% in the richest ($p<0.0001$). Similarly, those who reported that distance to a health facility was not a big problem had significantly higher contraceptive uptake (76.1%) compared to their counterparts (23.9%) ($p=0.0072$). Women who were currently employed were also more likely to use contraceptives (59.2%) compared to those not working (40.8%) ($p=0.0003$). Religious affiliation and ethnicity played significant roles. Contraceptive use was lowest among Muslim women (31.1%) compared to Catholics (13.5%) and other Christians (55.3%) ($p<0.0001$). Ethnic disparities were also pronounced, with use highest among women in the "Other" ethnic group (47.3%) and lowest among Hausa (13.5%) ($p<0.0001$).

Regarding community-level factors, women in urban areas reported significantly higher contraceptive uptake (51.1%) compared to rural residents (48.9%) ($p<0.0001$). Community wealth index further revealed that uptake increased progressively from poorest (8.5%) to richest communities (27.9%) ($p<0.0001$). Recent movers were more likely to use contraceptives (26.8%) compared to long-term residents (71.7%) and visitors (1.5%) ($p=0.0185$).

Regional variations were striking ($p<0.0001$). Uptake was lowest in the North West (14.4%) and North East (14.1%), while the highest levels were recorded in the South (22.3%) and South West (20.4%). In contrast, health service utilization indicators such as visiting a health facility in the last 12 months ($p=0.4401$) and history of pregnancy termination ($p=0.1740$) did not show significant associations with contraceptive use.

Table 3 presents the fixed and random effects from four models examining predictors of modern contraceptive use among adolescent girls and young women in Nigeria. Model 1 (null model) showed significant variation across clusters, with a PSU-level variance of 1.68 (95% CI: 1.34–2.12), corresponding to an intraclass correlation coefficient (ICC) of 33.9%. This justified the application of multilevel modeling.

Model 2 (individual-level factors)

Age was significantly associated with contraceptive uptake: women aged 20–24 years were more likely to use modern methods compared to adolescents aged 15–19 (aOR=1.40, 95% CI: 1.12–1.74). Education showed a strong gradient effect, with odds of use increasing from primary (aOR=2.51, 95% CI: 1.71–3.68) to higher education (aOR=7.04, 95% CI: 4.65–10.65) relative to women with no education. Being currently or formerly in a union reduced the likelihood of use compared to never-married women. Higher parity (≥3 children) was strongly associated with contraceptive use (aOR=2.61, 95% CI: 1.78–3.81). Fertility preference also played a role, as women undecided about future childbearing were more likely to use contraception (aOR=1.46, 95% CI: 1.01–2.09). Household wealth showed a dose-response association, with the richest quintile having more than twice the odds of contraceptive use compared to the poorest (aOR=2.27, 95% CI: 1.51–3.41). Religion and ethnicity were significant predictors, with Muslim women

having lower odds than Catholics (aOR=0.42, 95% CI: 0.29–0.61) and Yoruba and Fulani women showing higher uptake than Hausa. Rural residence reduced odds by half (aOR=0.50, 95% CI: 0.40–0.62). At the community level, higher community wealth was consistently associated with contraceptive uptake, with those in the richest communities having threefold higher odds compared to the poorest (aOR=3.10, 95% CI: 2.19–4.39).

Model 3 (interpersonal and household factors)

When interpersonal and household factors were introduced, the associations remained broadly consistent, although the effect sizes for education, parity and wealth were slightly attenuated. Religion retained significance, with Muslim women less likely to use modern contraception (aOR=0.56, 95% CI: 0.38–0.83). Region also emerged as a factor, with women in the South East having higher odds than those in the North Central (aOR=1.44, 95% CI: 1.01–2.05).

Model 4 (full model including community factors)

In the fully adjusted model, age, education, marital status and parity remained strong predictors of contraceptive use. Women aged 20–24 were 37% more likely to use contraception (aOR=1.37, 95% CI: 1.09–1.71) and those with higher education remained nearly six times more likely than those without education (aOR=5.60, 95% CI: 3.63–8.64). Being in union continued to reduce use, while higher parity increased it. Wealth remained important, with richer women more likely to adopt contraception. The religious gap persisted, with Muslim women significantly less likely than Catholics (aOR=0.56, 95% CI: 0.38–0.83). Ethnic and community-level effects diminished in significance after full adjustment, suggesting that individual and household characteristics account for much of the observed variation.

Random effects and model fit

Across models, PSU variance declined from 1.68 in the null model to 0.71 in the full model and ICC reduced from 33.9% to 17.8%, indicating that individual and community-level factors explained a substantial share of between-cluster differences. Likelihood ratio tests confirmed that multilevel models significantly improved fit over single-level models ($p<0.001$). Model fit statistics (AIC and BIC) also favored the full model. Overall, uptake of modern contraception among adolescent girls and young women was strongly patterned by age, education, marital status, parity, wealth and religion. Community and regional factors initially contributed, but their effects were attenuated once individual and household characteristics were considered.

Table 1: Characteristics of study participants: barriers and enablers of modern contraceptive use among adolescent girls and young women in Nigeria.

DHS code	Variable	Unweight result		Weight result	
		Frequency	%	Frequency	%
v312	Modern Contraception				
	Not using	7,999	90.64	8035	90.89
	Using	826	9.36	805	9.107
V012	Age				
	15-19	2,953	33.42	2989	33.76
	20-24	5,884	66.58	5864	66.24
V106	Education level				
	No education	3,382	38.27	3515	39.71
	Primary	1,039	11.76	1027	11.6
	Secondary	3,836	43.41	3751	42.38
	Higher	580	6.56	559	6.31
V501	Marital Status				
	Never in union	2,458	27.81	2334	26.37
	Currently in union	6,136	69.44	6287	71.02
	Formerly in union	243	2.75	232	2.619
V201	Parity				
	No children	3,320	37.57	3327	37.59
	1–2 children	4,357	49.3	4348	49.12
	3+ children	1,160	13.13	1177	13.29
V602	Fertility preference				
	Want more	8,239	93.23	8316	93.94
	No more/sterilized/infecund	189	2.14	172	1.942
	Undecided	409	4.63	365	4.123

Continued.

DHS code	Variable	Unweight result		Weight result	
		Frequency	%	Frequency	%
V536	Recent sexual activity				
	Not active	3,139	35.52	2985	33.72
	Active	5,698	64.48	5868	66.28
V525	Age at first sex				
	≤14	1,781	20.15	1783	20.14
	15–17	4,738	53.62	4787	54.08
	18+	2,318	26.23	2283	25.79
V714	Respondent currently working				
	No	4,266	48.27	4244	47.94
	Yes	4,571	51.73	4609	52.06
V394	Visited health facility last 12 months				
	No	5,166	58.46	5212	58.88
	Yes	3,671	41.54	3640	41.12
V467d	Getting medical help for self: distance to health facility				
	Big problem	2,722	30.8	2550	28.81
	Not a big problem	6,115	69.2	6302	71.19
V190	Wealth index:				
	Poorest	2,010	22.75	1875	21.18
	Poorer	2,164	24.49	2186	24.69
	Middle	1,915	21.67	1859	21
	Richer	1,705	19.29	1729	19.53
	Richest	1,043	11.8	1204	13.6
V228	Ever had a terminated pregnancy				
	No	8,100	91.66	8101	91.51
	Yes	737	8.34	751.3	8.487
V130	Religion				
	Catholic	797	9.03	780	8.83
	Other Christian	2,983	33.8	2672	30.22
	Islam	4,983	56.46	5350	60.52
	Other	62	0.7	38	0.43
V131	Ethnicity				
	Hausa	2,635	29.82	3165	35.75
	Igbo	981	11.1	914	10.33
	Yoruba	877	9.92	1013	11.44
	Fulani	866	9.8	761	8.59
	Other	3,478	39.36	3000	33.89
V025	Type of place of residence				
	Urban	2,758	31.21	3078	34.78
	Rural	6,079	68.79	5774	65.22
V190a	Community wealth index:				
	Poorest	1,787	20.22	1699	19.19
	Poorer	1,883	21.31	1899	21.45
	Middle	1,943	21.99	2030	22.93
	Richer	1,771	20.04	1836	20.74
	Richest	1,453	16.44	1388	15.68
V104	Years lived in place of residence				
	Recent mover (<5 years)	2,148	24.31	2135	24.12
	Long-term (≥5 years/Always)	6,629	75.01	6653	75.16
	Visitor	60	0.68	64	0.73
V024	Region				
	North central	1,684	19.06	1343	15.17
	North east	1,906	21.57	1604	18.11
	North west	2,508	28.38	3112	35.15
	South east	838	9.48	746	8.422
	South south	998	11.29	934	10.55
	South west	903	10.22	1115	12.6

Table 2: Association of modern contraceptive use among adolescent girls and young women in Nigeria (n=8,825).

Variables	Total (Weighted %)	Modern Contraception (Weighted %)		P value
		Not using (%)	Using (%)	
Age (in years)				
15-19	2981 (33.72)	2789 (34.71)	192 (23.92)	0.0001
20-24	5859 (66.28)	5247 (65.29)	612.5 (76.08)	
Education level				
No education	3513 (39.74)	3443 (42.85)	69.74 (8.662)	0.0001
Primary	1027 (11.62)	965.1 (12.01)	61.94 (7.694)	
Secondary	3742 (42.33)	3193 (39.73)	549.3 (68.22)	
Higher	558.6 (6.319)	434.4 (5.407)	124 (15.42)	
Marital status				
Never in union	2326 (26.31)	1931 (24.03)	395.6 (49.14)	0.0001
Currently in union	6284 (71.08)	5884 (73.23)	399.9 (49.67)	
Formerly in union	230.3 (2.605)	220.7 (2.747)	9.599 (1.192)	
Parity				
No children	3322 (37.58)	2947 (36.67)	374.9 (46.57)	0.0001
1–2 children	4342 (49.11)	3997 (49.74)	345 (42.86)	
3+ children	1177 (13.31)	1092 (13.58)	85.17 (10.58)	
Fertility preference				
Want more	8304 (93.93)	7569 (94.2)	734.3 (91.21)	0.011
No more/sterilized/infecund	171.9 (1.944)	153.1 (1.906)	18.76 (2.33)	
Undecided	365 (4.129)	313 (3.895)	52.04 (6.464)	
Recent sexual activity				
Not active	2978 (33.68)	2691 (33.49)	286.5 (35.58)	0.3403
Active	5863 (66.32)	5344 (66.51)	518.6 (64.42)	
Age at first sex				
≤14	1777 (20.1)	1676 (20.86)	100.4 (12.47)	0.0001
15–17	4781 (54.08)	4398 (54.73)	383.2 (47.6)	
18+	2283 (25.82)	1961 (24.41)	321.5 (39.94)	
Respondent currently working				
No	4239 (47.95)	3910 (48.66)	328.5 (40.81)	0.0003
Yes	4602 (52.05)	4125 (51.34)	476.6 (59.19)	
Visited health facility last 12 months				
No	5200 (58.82)	4714 (58.67)	486 (60.36)	0.4401
Yes	3640 (41.18)	3321 (41.33)	319.1 (39.64)	
Getting medical help for self: distance to health facility				
Big problem	2548 (28.82)	2356 (29.32)	192.2 (23.88)	0.0072
Not a big problem	6293 (71.18)	5680 (70.68)	612.9 (76.12)	
Wealth index				
Poorest	1872 (21.17)	1820 (22.65)	51.25 (6.365)	0.0001
Poorer	2184 (24.71)	2091 (26.02)	93.13 (11.57)	
Middle	1857 (21)	1661 (20.67)	195.4 (24.27)	
Richer	1724 (19.5)	1479 (18.41)	244.8 (30.41)	
Richest	1204 (13.62)	983.7 (12.24)	220.5 (27.39)	
Ever had a terminated pregnancy				
No	8091 (91.52)	7342 (91.37)	748.4 (92.96)	0.174
Yes	749.8 (8.481)	693.1 (8.626)	56.69 (7.041)	
Religion				
Catholic	780.5 (8.829)	671.7 (8.359)	108.8 (13.52)	0.0001
Other Christian	2672 (30.220	2227 (27.71)	445.1 (55.28)	
Islam	5350 (60.52)	5099 (63.46)	250.7 (31.14)	
Traditionalist	19.4 (0.219)	19.4 (0.24)	0 (0)	
Other	18.69 (0.21)	18.16 (0.226)	0.5267 (0.07)	
Ethnicity				0.0001

Continued.

Variables	Total (Weighted %)	Modern Contraception (Weighted %)		P value
Hausa	3165 (35.8)	3056 (38.04)	108.3 (13.45)	
Igbo	912.9 (10.33)	779.8 (9.705)	133.1 (16.53)	
Yoruba	1010 (11.43)	855.7 (10.65)	154.6 (19.2)	
Fulani	760.2 (8.599)	732 (9.11)	28.17 (3.499)	
Other	2993 (33.85)	2612 (32.5)	381 (47.32)	
Type of place of residence				
Urban	3074 (34.77)	2662 (33.13)	411.7 (51.14)	0.0001
Rural	5767 (65.23)	5373 (66.87)	393.4 (48.86)	
Community wealth index				
Poorest	1628 (20.26)	1628 (20.26)	68.3 (8.483)	
Poorer	1778 (22.13)	1778 (22.13)	116.3 (14.45)	0.0001
Middle	1859 (23.14)	1859 (23.14)	168.5 (20.92)	
Richer	1608 (20.01)	1608 (20.01)	227.2 (28.22)	
Richest	1162 (14.46)	1162 (14.46)	224.8 (27.92)	
Years lived in place of residence				
Recent mover (<5 years)	2133 (24.12)	1917(23.86)	215.5(26.77)	0.0185
Long-term (≥5 years/Always)	6644 (75.15)	6066 (75.49)	577.2 (71.7)	
Visitor	64.46 (72.92)	52.09 (.6482)	12.38 (1.537)	
Region				
North central	1339 (15.15)	1217 (15.14)	122.5 (15.21)	
North east	1603 (18.13)	1489 (18.53)	113.7 (14.13)	
North west	3112 (35.2)	2996 (37.29)	115.9 (14.39)	0.0001
South east	744.2 (8.418)	635.3 (7.906)	108.9 (13.52)	
South south	930.1 (10.52)	750.3 (9.338)	179.7 (22.32)	
South west	1112 (12.58)	947.8 (11.79)	164.5 (20.43)	

Table 3: Multilevel mixed effect analysis on determinants of modern contraceptive use among adolescent girls and young women in Nigeria (n=8,825).

Variables	Model 1 (Null)	Model 2 aOR (95%CI)	Model 3 aOR (95%CI)	Model 4 aOR (95%CI)
Age (in years)				
15-19		Ref		Ref
20-24		1.40 (1.12-1.74)**		1.37 (1.09-1.71) **
Education level				
No education		Ref		Ref
Primary		2.51 (1.71-3.68) ***		2.23 (1.51-3.31) ***
Secondary		4.98 (3.61-6.86) ***		4.02 (2.86-5.67) ***
Higher		7.04 (4.65-10.65) ***		5.60 (3.63-8.64) ***
Marital status				
Never in union		Ref		Ref
Currently in union		0.43 (0.33-0.55) ***		0.50 (0.38-0.66) ***
Formerly in union		0.20 (0.10-0.42) ***		0.23 (0.11-0.48) ***
Parity				
No children		Ref		Ref
1–2 children		1.81 (1.40-2.34) ***		0.78 (1.37-2.30) ***
3+ children		2.61 (1.78-3.81) ***		2.64 (1.80-3.88) ***
Fertility preference				
Want more		Ref		Ref
No more/sterilized/infecund		0.92 (0.53-1.59)		0.28 (0.47-1.42)
Undecided		1.46 (1.01-2.09) *		1.35 (0.94-1.95)
Age at first sex				
≤14		Ref		Ref
15–17		1.15 (0.89-1.50)		1.16 (0.90-1.51)

Continued.

Variables	Model 1 (Null)	Model 2	Model 3	Model 4
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
18+		1.15 (0.86-1.54)		1.17 (0.87-1.58)
Respondent currently working				
No		Ref		Ref
Yes		1.12 (0.94-1.34)		1.06 (0.89-1.27)
Getting medical help for self distance to health facility				
Big problem		Ref		Ref
Not a big problem		0.85 (0.69-1.04)		0.88 (0.71-1.09)
Wealth index				
Poorest		Ref		Ref
Poorer		1.03 (0.70-1.51)		1.01 (0.64-1.61)
Middle		1.86 (1.28-2.70) ***		1.89 (1.09-3.26) *
Richer		2.00 (1.37-2.95) ***		2.05 (1.07-3.92) *
Richest		2.27 (1.51-3.41) ***		2.36 (1.02-5.42) *
Ever had a terminated pregnancy				
No		Ref		Ref
Yes		0.91 (0.67-1.27)		0.94 (0.68-1.29)
Religion				
Catholic			Ref	Ref
Other Christian			0.9 (0.74-1.32)	0.97 (0.72-1.30)
Islam			0.42 (0.29-0.61) ***	0.56 (0.38-0.83) **
Other			0.08 (0.01-1.34)	0.08 (0.01-1.35)
Ethnicity				
Hausa			Ref	Ref
Igbo			0.97 (0.53-1.79)	0.76 (0.41-1.42)
Yoruba			1.93 (1.12-3.33) *	1.18 (0.67-2.07)
Fulani			1.25 (.76-2.07)	1.40 (0.83-2.34)
Other			1.68 (1.11-2.55) *	1.27 (0.82-1.95)
Type of place of residence				
Urban			Ref	Ref
Rural			0.50 (0.40-0.62) ***	0.10 (0.66-1.45)
Community wealth index:				
Poorest			Ref	Ref
Poorer			1.43 (1.01-2.01) *	1.02 (0.69-1.50)
Middle			1.70 (1.22-2.38) **	1.12 (0.71-1.77)
Richer			2.72 (1.95-3.78) ***	1.11 (0.63-1.96)
Richest			3.10 (2.19-4.39) ***	1.05 (0.53-2.05)
Years lived in place of residence				
Recent mover (<5 years)			Ref	Ref
Long-term (≥5 years/Always)			1.13 (0.93-1.37)	1.01 (0.83-1.24)
Visitor			2.13 (1.02-4.39) *	2.08 (0.99-4.36)
Region				
North central			Ref	Ref
North east			1.44 (0.99-2.10)	1.71 (1.16-2.51) **
North west			0.93 (0.59-1.45)	1.11 (0.70-1.75)
South east			1.64 (0.94-2.87)	1.43 (0.82-2.52)

Continued.

Variables	Model 1 (Null)	Model 2	Model 3	Model 4
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
South south			1.44 (1.01-2.05) *	1.27 (0.89-1.81)
South west			1.12 (0.71-1.77)	1.21 (0.76-1.92)
Random effect result				
PSU variance (95%CI)	1.68 (1.34 – 2.12)	0.76 (0.55-1.04)	0.76 (0.55-1.04)	0.71 (0.51 – 0.99)
ICC (%)	33.90%	19.00%	18.72%	17.80%
LR Test	χ^2=305.50, p<0.001	χ^2=103.27, p<0.001	χ^2= 98.04, p<0.001	χ^2=88.71, p<0.001
Wald Chi-square	Reference	361.63***	308.05***	394.78***
Model fitness				
Log-likelihood	-2543.733	-2324.7887	-2402.0734	-2298.5538
AIC	5091.466	4,691.58	4811.225	4677.108
BIC	5105.636	4,840.37	4960.018	4960.521
N	8,825	8,825	8,825	8,825

*p<0.05, **p<0.01, ***p<0.001.

DISCUSSION

This study applied a multilevel modeling framework to examine determinants of modern contraceptive use among adolescent girls and young women in Nigeria, accounting for both individual- and community-level factors. The null model demonstrated substantial clustering of contraceptive use at the PSU level, with nearly one-third of the variation attributable to community differences. This justified the use of multilevel analysis rather than single-level models. At the individual level, age, education, marital status, parity and household wealth consistently emerged as strong predictors. Uptake was higher among young women aged 20–24 compared to adolescents 15–19, underscoring the persistent gap in contraceptive access among younger adolescents this is similar to some studies conducted.[13,14] Education showed a robust gradient effect, with higher education increasing the likelihood of contraceptive use more than fivefold which is similar to a study conducted in Ghana, highlighting the transformative role of female education in shaping reproductive behavior.[15] Similarly, wealth exerted a dose–response relationship, with the richest women significantly more likely to use modern contraception than their poorest counterparts. These findings align with evidence from other Sub-Saharan African countries where socioeconomic empowerment facilitates contraceptive uptake.[16]

Marital status and parity also played crucial roles. Being in a union was associated with lower contraceptive use, suggesting that cultural or partner-related constraints may inhibit uptake among married adolescents and young women.[17] In contrast, higher parity increased use, reflecting the tendency of women to adopt contraception after reaching desired family size which is similar to a study conducted in Ibadan Nigeria.[18] Fertility preference further reinforced this pattern, with undecided women more likely to use contraception, possibly reflecting uncertainty about future childbearing desires.

Religion and ethnicity retained significance in several models. Muslim women consistently had lower odds of contraceptive use than Catholics, a pattern well documented in Nigerian reproductive health research and likely linked to socio-cultural norms and divergent family planning messages across faith communities, which is similar to a study conducted in Nigeria.[19,20] Ethnic differences were also observed, though these diminished after adjusting for socioeconomic and household factors, indicating that structural determinants may explain much of the variation initially attributed to ethnicity. The findings of this study reveal that living in urban areas was found to be associated with higher odds of using modern contraceptives, similar to findings of studies from other developing countries where young women from rural areas reported barriers to modern contraceptive use.[19,21]

Community and regional contexts contributed importantly in the earlier models, particularly community wealth and regional location. However, their effects were attenuated in the fully adjusted model, suggesting that much of the between-community variation is mediated through individual and household-level characteristics such as education and wealth. Nevertheless, the persistence of significant random effects after full adjustment indicates that unobserved contextual influences remain, potentially reflecting differences in service availability, quality of family planning programs or local sociocultural environments.

The progressive reduction in PSU-level variance from 1.68 in the null model to 0.71 in the full model, alongside a decline in ICC from 33.9% to 17.8%, highlights that both individual and household factors substantially explained community-level differences in contraceptive use. Yet, the residual clustering underscores the continued importance of community-level dynamics in shaping contraceptive behavior. Overall, these findings emphasize that modern contraceptive uptake among adolescent girls and young women in Nigeria is driven primarily by

individual-level socioeconomic and demographic factors, particularly age, education, marital status, parity, wealth and religion, while contextual effects remain secondary but non-negligible. Policy interventions should therefore prioritize adolescent-friendly strategies that expand access for younger, less educated and poorer women, while also addressing religious and cultural barriers to use. At the same time, strengthening community-level family planning services and fostering supportive environments remains essential to reducing the persistent clustering of contraceptive behavior.

Policy and program implications

These findings have important implications for family planning programs in Nigeria. First, strategies should prioritize reaching younger adolescents (15–19 years) and nulliparous women who are at high risk of unmet need but least likely to access services. Second, interventions must be tailored to address sociocultural barriers among married adolescents and Muslim communities, including engaging religious and community leaders to foster support for contraceptive use. Third, efforts to reduce socioeconomic and geographic inequities are critical, including scaling up mobile outreach services and removing financial and physical barriers to access. Fourth, education and empowerment of girls remain long-term but essential strategies to enhance contraceptive uptake. Finally, strengthening community-based and youth-friendly services is vital to ensure that health facility visits translate into actual contraceptive use.

Strengths

A major strength of this study lies in the use of nationally representative DHS data with robust multilevel modeling that accounts for both individual and contextual influences.

Limitations

However, limitations should be noted. The cross-sectional design precludes causal inference. Self-reported contraceptive use may be subject to recall or social desirability bias, particularly among unmarried adolescents. Furthermore, the DHS does not capture some critical determinants such as provider attitudes, quality of counseling or detailed measures of gender norms, which could explain the remaining cluster-level variance.

CONCLUSION

In conclusion, this study underscores the multifaceted determinants of modern contraceptive use among adolescent girls and young women in Nigeria. Age, parity, marital status, education, wealth, religion, ethnicity and community context all significantly influence uptake, with strong evidence of persistent contextual effects beyond individual characteristics. Addressing the unmet need for contraception in this population requires a comprehensive strategy that combines individual empowerment, sociocultural engagement, service delivery improvements and broader structural interventions. Tailoring policies and programs to the unique needs of adolescents and young women, particularly in underserved northern regions, will be essential to achieving Nigeria's family planning goals and improving reproductive health outcomes.

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