

Trends and Determinants of Reproductive Transitions from Premarital Sexual Debut to Marriage and First Birth among Nigerian Women

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Research Article

Keywords: Premarital sexual debut, marriage timing, First birth timing, women reproductive transitions, cohort effect, multilevel Survival analysis, Nigeria

Posted Date: September 9th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10577038/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Premarital sexual debut has become increasingly common in sub-Saharan Africa, yet little is known about how long women take to transition from premarital sexual debut to first marriage and first birth and the factors influencing these transitions. This study examined the timing and determinants of first marriage and first birth following premarital sexual debut among Nigerian women.

Methods

This study analysed data from 17,052 women aged 15–49 years who reported premarital sexual debut in the 2023/2024 Nigeria Demographic and Health Survey. Kaplan–Meier survival analysis was used to estimate the time from premarital sexual debut to first marriage and first birth across birth cohorts and geopolitical regions. Multilevel mixed-effects parametric proportional hazards models identified individual- and community-level factors associated with both transitions.

Results

The national median interval from premarital sexual debut to first marriage was 4–5 years, while the median interval to first birth was 5 years across birth cohorts. The North West recorded the shortest transition to marriage (median: 1–2 years), whereas the South South had the longest (7–9 years). Women born in 2000–2009 had significantly higher hazards of first marriage (HR = 1.85, 95% CI: 1.66–2.06) and first birth (HR = 1.70, 95% CI: 1.54–1.89) than those born in 1970–1979. Sexual debut at age ≥ 18 years accelerated transitions to marriage (HR = 1.52, 95% CI: 1.40–1.65) and first birth (HR = 2.26, 95% CI: 2.06–2.48). Higher education reduced the hazards of marriage (HR = 0.51, 95% CI: 0.46–0.56) and first birth (HR = 0.85, 95% CI: 0.77–0.94), while premarital birth delayed marriage (HR = 0.37, 95% CI: 0.35–0.40). Significant community-level variation was observed for both outcomes.

Conclusions

The timing of first marriage and first birth after premarital sexual debut varies substantially across regions and birth cohorts in Nigeria and is influenced by individual and community characteristics. Policies that promote female education and strengthen adolescent and reproductive health services while addressing regional inequalities may facilitate healthier transitions to marriage and parenthood.

Background of the study

Premarital sexual debut refers to the first experience of sexual intercourse occurring before an individual's first marriage has become a growing public health concern globally, particularly in sub-Saharan Africa (SSA), where it is associated with unwanted pregnancy, induced abortion, school dropout, sexually transmitted infections (STIs), and HIV/AIDS (Kupoluyi, 2025). Although cultural norms on marriage and sex vary across sub-Saharan Africa including Nigeria, Premarital sexual debut remains unacceptable to most cultures and religions, and its

increasing prevalence has generated significant concern among stakeholders, researchers, and policymakers (Kupoluyi, 2025).

Nigeria, Africa's most populous nation, presents a complex demographic landscape. A UNICEF report reveals that 43% of Nigerian girls and women were married or in a union before the age of 18 years, making Nigeria the country with the largest number of child brides in West and Central Africa [(Federal Ministry of Health and Social Welfare (FMOHSW), National Population Commission (NPC) & ICF, 2024). Despite this, premarital sexual activity remains prevalent. The prevalence of premarital sexual debut among never-married women aged 15–24 in Nigeria declined steadily from 36.8% in 2008 to 26.6% in 2018 across three waves of the Nigeria Demographic and Health Survey (NDHS), though the overall burden remains substantial (FMOHSW, 2024). Among young women aged 15–24 in sub-Saharan Africa, the prevalence of premarital sexual debut was 39.4% in 2018, reflecting the scale of premarital sexual activity across the region (Budu et al., 2023).

Sexual debut is a critical life-course event, as it marks the onset of exposure to pregnancy risk and STIs. (Nguyen and Eaton, 2022). Early sexual debut has been associated with higher rates of STIs, increased risk of engaging in risky sexual behaviours, and adverse maternal and child health outcomes (Nguyen and Eaton, 2022). In Nigeria, factors associated with the timing of sexual debut include community affluence, ethnic diversity, and women's empowerment at the community level, alongside individual characteristics such as education, religion, and place of residence (Odimegwu and Somefun, 2022). A multi-cluster survival analysis identified that early sexual debut carries significant implications for reproductive health in Nigeria, with religious affiliation, wealth, and region emerging as key determinants (Correa et al., 2025)

The transition from premarital sexual debut to marriage and first birth is shaped by a complex interplay of individual and structural factors. A multilevel analysis of factors associated with female child marriage in Nigeria using the 2018 NDHS found that young Muslim women, those residing in the North East and North West, had significantly higher odds of marrying before age 18, while women with secondary education and above, and those in richer wealth quintiles, had significantly lower odds (Bolarinwa et al., 2022). These regional disparities reflect deep-seated cultural and religious norms, particularly the influence of Islamic practices in northern Nigeria, where cultural traditions associate a girl's virginity with family honour and support early marriage as a means of preventing premarital pregnancy and family dishonor (Mobolaji et al., 2020). Women from the North East and North West of Nigeria have consistently been found to marry earlier than those from other regions, while women from the South South marry at later ages (Bolarinwa et al., 2023).

Education plays a transformative role in shaping reproductive transitions. Educated women are more likely to marry later, delay the onset of childbearing, have smaller family sizes, and make informed decisions about their health (Olowolafe et al., 2025). Uneducated women consistently exhibit higher fertility rates than educated women across all survey years and regions in Nigeria. The nexus between women's empowerment and delayed childbearing is gaining increasing attention in Nigeria, with higher education, decision-making autonomy, and control over reproductive health associated with postponement of motherhood, particularly in the southern regions (Ayodeji and Adekunle, 2025).

The consequences of premarital sexual activity and subsequent reproductive transitions carry profound public health implications. A 2024 scoping review found that unintended pregnancies among unmarried adolescents in Nigeria ranged from 23.4% to 92.7%, with contraceptive use notably low at 21.5% and induced abortions ranging from 20.2% to 51.0% (Ayamolowo et al. 2024) Factors driving these outcomes included lack of awareness of

modern contraceptives, limited access to sexual and reproductive health information, conservative community norms, and economic barriers, particularly in rural settings.

Despite the growing literature on premarital sexual behaviour and its determinants in Nigeria, studies examining the time intervals between premarital sexual debut, marriage, and first birth, particularly across birth cohorts and geopolitical regions, remain scarce. Understanding these transitions is critical for designing targeted reproductive health interventions. This study therefore aimed to estimate the time interval between premarital sexual debut and marriage and first birth among Nigerian women using data from the 2023/2024 NDHS. Kaplan–Meier survival estimates were used to describe transition times, while multilevel mixed-effect parametric survival regression models were employed to account for the hierarchical structure of the NDHS data, where women are nested within communities. This approach enabled the simultaneous assessment of individual- and community-level determinants while accounting for unobserved community-level heterogeneity, thereby providing more robust and reliable estimates of the factors associated with the timing of marriage and first birth following premarital sexual debut.

Methods

Study Design and Setting

This study was based on a secondary analysis of the Nigeria Demographic and Health Survey (NDHS) 2024, a nationally representative cross-sectional survey. The NDHS was conducted among women of reproductive age (15–49 years) across Nigeria's six geopolitical zones: North Central, North East, North West, South East, South South, and South West providing broad geographic coverage representative of the national population.

Data Source and Study Participants

The NDHS 2024 employed a stratified two-stage cluster sampling design. In the first stage, 1,376 enumeration areas (EAs) were selected as primary sampling units (PSUs). In the second stage, households were systematically sampled within each EA. From the full sample of 39,050 women with complete reproductive histories, 17,052 who reported premarital sexual debut were included in this analysis.

Study Variables

Outcome Variables

Two time-to-event outcomes were examined: transition to first marriage and transition to first birth following premarital sexual debut. Time to first marriage was defined as the interval between age at premarital sexual debut and age at first marriage, while time to first birth was defined as the interval between age at premarital sexual debut and age at first birth. Women who had not experienced the respective event at the time of the survey were treated as censored observations. Censoring time was calculated as the difference between age at survey interview and age at premarital sexual debut.

Explanatory Variables

Individual- and contextual-level characteristics were included as explanatory variables. Individual-level factors comprised birth cohort, age at sexual debut, educational attainment, religious affiliation, household wealth index, reproductive health knowledge, age at first marriage and premarital birth status. Reproductive health knowledge was measured using a composite index derived from knowledge of the ovulatory cycle and contraceptive methods. Contextual variables included geopolitical region and place of residence (urban/rural).

Statistical Analysis

Descriptive statistics were used to summarize participants’ characteristics. Kaplan–Meier survival analysis was employed to estimate median transition times from premarital sexual debut to first marriage and first birth, and survival curves were compared across selected subgroups. To account for the hierarchical structure of the data, multilevel mixed-effects parametric survival regression models were fitted with women nested within enumeration areas. Fixed effects were reported as hazard ratios (HRs) with 95% confidence intervals (CIs), while random effects captured unobserved cluster-level variation. Model fit was assessed using log-likelihood statistics. All analyses incorporated sampling weights to adjust for the complex survey design and ensure national representativeness. Statistical analyses were conducted using Stata version 16 (StataCorp LLC, College Station, TX, USA).

Ethical Considerations

Ethical approval and informed consent were obtained by the Demographic and Health Surveys (DHS) Program before data collection in accordance with national and international ethical standards. As the dataset contained no personally identifiable information, additional ethical approval was not required for this secondary analysis.

Results

Socio-demographic Characteristics of Study Participants

Table 1 presents the socio-demographic characteristics of the 17,052 women who experienced premarital sexual debut in the 2023/2024 Nigeria Demographic and Health Survey (NDHS). The largest proportion belonged to the 1990–1999 birth cohort, 6,216 (36.5%), followed by the 1980–1989 cohort, 5,398 (31.7%). Nearly half had secondary education, 7,861 (46.1%), 11,876 (69.7%) were Christians, and over half were from rich households, 9,619 (56.4%). Most women had partial reproductive health knowledge, 11,681 (68.5%), while 9,339 (54.8%) resided in urban areas. The highest regional representation was from the South South, 3,708 (21.8%), followed by the North West, 3,533 (20.7%). Regarding sexual and reproductive characteristics, 8,427 (72.5%) initiated sexual intercourse at 18 years or older, 7,805 (45.8%) married at 25 years or older, and the majority, 14,408 (84.5%), had no premarital birth.

Table 1
Frequency Distribution of Women Who Experienced Premarital
Sex by Socio-economic and Demographic Factors – 2023/2024
Nigeria Demographic and Health Survey (NDHS), N = 17,052

Variables	Number of women (%)
Independent variables	
Birth cohort	
1970–1979	2130(12.6)
1980–1989	5398(31.7)
1990–1999	6216(36.5)
2000–2009	3308(19.4)
Educational Level	
No education	3395 (19.9)
Primary	1912(11.2)
Secondary	7861(46.1)
Higher	3884(22.8)
Religion	
Christian	11876(69.7)
Islam	5082(29.8)
Others	94(0.6)
Wealth index	
Poor	4182(24.5)
Middle	3251(19.1)
Rich	9619(56.4)
Knowledge of reproductive health	
No knowledge	665(3.9)
Partial knowledge	11681(68.5)
Full knowledge	4706(27.6)
Place of residence	
Urban	9339(54.8)
Rural	7713(45.2)
Region	

Variables	Number of women (%)
Independent variables	
Birth cohort	
North Central	1746(10.2)
North East	1829(10.7)
North West	3533(20.7)
South East	3080(18.1)
South South	3708(21.8)
South West	3150(18.5)
Sexual debut	
Less than 15 years	2046(17.6)
15–17 years	1144(9.9)
18 years and above	8427(72.5)
Age at marriage	
Less than 18 years	1991(11.7)
18–24 years	7256(42.6)
25 years and above	7805(45.8)
Premarital birth	
No	14408(84.5)
Yes	2644(15.5)

Table 2 presents the Kaplan–Meier estimates of the time interval between premarital sexual debut and first marriage across birth cohorts and geopolitical regions in Nigeria. Nationally, the median time (50th percentile) from premarital sexual debut to first marriage remained relatively stable, ranging from 4 years among the 1990–1999 cohort to 5 years among the other cohorts, while the 75th percentile ranged from 9 to 10 years. Regional variations were evident across all cohorts. The North West consistently recorded the shortest transition to marriage, with median times decreasing from 2 years in the 1970–1979, 1980–1989, and 1990–1999 cohorts to 1 year among the 2000–2009 cohort. In contrast, the South South and South East exhibited the longest intervals, with median times ranging from 7 to 9 years in the South South and 5 to 7 years in the South East. The North East also showed relatively short transitions, with median times declining from 4 years in the 1970–1979 cohort to 2 years among the 2000–2009 cohort. At the 75th percentile, the South South consistently recorded the longest duration to marriage (11–12 years), whereas the North West had the shortest duration (2–6 years), indicating substantial regional differences in the timing of marriage following premarital sexual debut.

Table 2

Kaplan-Meier estimates of the time interval between premarital sexual debut and first marriage across four birth cohorts and six geopolitical regions in Nigeria *Note: NC-North central, NE-North east, NW-North west, SE-South east, SS-South south, SW-South west*

		east, SE South/South, SW South/West						
1970–1979			1980–1989		1990–1999		2000–2009	
	Time (years)	Confidence Interval	Time (years)	Confidence Interval	Time (years)	Confidence Interval	Time (years)	Confidence Interval
Nigeria								
50%	5	0.51–0.55	5	0.52–0.54	4	0.49–0.51	5	0.51–0.56
75%	9	0.72–0.76	9	0.75–0.77	9	0.77–0.79	10	0.69–0.80
NC								
50%	4	0.46–0.56	4	0.44–0.50	4	0.50–0.56	4	0.44–0.52
75%	9	0.75–0.83	9	0.76–0.80	8	0.74–0.79	8	0.71–0.85
NE								
50%	4	0.47–0.60	3	0.47–0.55	3	0.47–0.55	2	0.46–0.56
75%	8	0.68–0.79	6	0.70–0.78	6	0.70–0.77	7	0.66–0.80
NW								
50%	2	0.37–0.51	2	0.47–0.55	2	0.53–0.60	1	0.57–0.68
75%	6	0.70–0.82	5	0.75–0.82	4	0.75–0.81	2	0.73–0.82
SE								
50%	5	0.44–0.54	5	0.46–0.52	5	0.50–0.55	7	0.41–0.60
75%	11	0.74–0.81	10	0.74–0.79	10	0.75–0.81	10	0.76–0.78
SS								
50%	7	0.50–0.59	7	0.47–0.52	7	0.48–0.54	9	0.42–0.61
75%	12	0.70–0.78	12	0.72–0.77	12	0.71–0.77	11	0.58–0.96
SW								
50%	5	0.48–0.57	5	0.50–0.56	4	0.47–0.53	6	0.45–0.59
75%	9	0.72–0.80	8	0.71–0.76	7	0.70–0.75	9	0.50–0.76

From Table 3 below; nationally, the median interval between premarital sexual debut and first birth was 5 years across all birth cohorts, with the 75th percentile declining from 10 years (1970–1979) to 8–9 years in more recent cohorts. Regional differences were evident. The South South recorded the longest median intervals (6–7 years), followed by the South East and South West (5–6 years each) with 75th percentile estimates reaching up to 11–12 years in these regions. The North Central remained stable at 5 years across all cohorts. The North East declined from 5 years in the 1970–1979 cohort to 3 years in the 2000–2009 cohort, while the North West

showed the sharpest decline from 5 years to 3 years at the median and from 7 to 4 years at the 75th percentile. Figure 2 displays the survival curve

Table 3

Kaplan-Meier estimates of the time interval between premarital sexual debut and first birth across four birth cohorts and six geopolitical regions in Nigeria

	1970–1979		1980–1989		1990–1999		2000–2009	
	Time (years)	Confidence Interval	Time (years)	Confidence Interval	Time (years)	Confidence Interval	Time (years)	Confidence Interval
Nigeria								
50%	5	0.46–0.50	5	0.48–0.51	5	0.54–0.56	5	0.52–0.57
75%	10	0.74–0.78	9	0.74–0.77	8	0.73–0.76	9	0.70–0.79
NC								
50%	5	0.47–0.57	5	0.45–0.50	5	0.52–0.58	5	0.49–0.59
75%	10	0.72–0.80	9	0.72–0.77	8	0.72–0.77	8	0.68–0.84
NE								
50%	5	0.46–0.59	4	0.45–0.54	4	0.50–0.57	3	0.45–0.57
75%	10	0.69–0.80	7	0.69–0.77	7	0.74–0.81	6	0.71–0.84
NW								
50%	5	0.50–0.64	4	0.48–0.56	3	0.44–0.52	3	0.56–0.67
75%	7	0.66–0.79	7	0.73–0.80	5	0.71–0.77	4	0.70–0.81
SE								
50%	6	0.46–0.55	6	0.50–0.57	5	0.48–0.54	6	0.44–0.61
75%	12	0.73–0.81	10	0.74–0.79	9	0.71–0.77	11	0.54–0.88
SS								
50%	6	0.48–0.57	6	0.47–0.53	6	0.46–0.52	7	0.43–0.56
75%	11	0.74–0.82	11	0.73–0.78	11	0.72–0.78		
SW								
50%	5	0.42–0.61	5	0.47–0.53	5	0.53–0.59	6	0.44–0.60
75%	9	0.71–0.79	9	0.76–0.81	8	0.74–0.80	10	0.50–0.92

Note: NC-North central, NE-North east, NW-North west, SE-South east, SS-South south, SW-South west

Table 4 shows that more recent birth cohorts had progressively higher hazards of marriage relative to the 1970–1979 cohort, with the 2000–2009 cohort showing the strongest association (HR = 1.85, CI: 1.66–2.06). Higher

and secondary education were associated with a significantly reduced hazard of marriage (HR = 0.51, C.I.:0.46–0.56 and HR = 0.83, C.I.: 0.75–0.91) respectively. Muslim women had a significantly higher hazard of marriage compared to Christians (HR = 1.50, CI: 1.39–1.61). Rural women had a higher hazard of marriage than urban women (HR = 1.16, CI: 1.08–1.24). All geopolitical regions recorded significantly lower hazards compared to North Central, with the South South (HR = 0.44, C.I.: 0.39–0.50) and South East (HR = 0.47, C.I.: 0.47) showing the longest intervals to marriage. Women with sexual debut at age 18 and above had the highest hazard of marriage (HR = 1.52, CI: 1.40–1.65) relative to those who debuted before age 15. Premarital birth was strongly associated with a reduced hazard of marriage (HR = 0.37, C.I.:0.35–0.40). There was significant community-level variance (0.10, CI: 0.086–0.123). Wealth index and reproductive health knowledge showed no significant associations.

Table 4
Factors associated with time to first marriage after premarital sexual debut using Multilevel mixed effect model

Variables	Hazard ratio (HR)	95% Confidence interval (C.I)	p-value
Independent variables			
Birth cohort			
1970–1979	Reference		
1980–1989	1.22	1.13–1.31	< 0.001
1990–1999	1.46	1.34–1.58	< 0.001
2000–2009	1.85	1.66–2.06	< 0.001
Educational Level			
No education	Reference		
Primary	1.09	0.99–1.19	0.081
Secondary	0.83	0.75–0.91	< 0.001
Higher	0.51	0.46–0.56	< 0.001
Religion			
Christian	Reference		
Islam	1.50	1.39–1.61	< 0.001
Others	1.35	0.99–1.83	0.057
Wealth index			
Poor	Reference		
Middle	1.03	0.95–1.12	0.516
Rich	1.01	0.92–1.10	0.832
Knowledge of reproductive health			
No knowledge	Reference		
Partial knowledge	1.08	0.96–1.21	0.216
Full knowledge	1.12	0.99–1.28	0.069
Place of residence			
Urban	Reference		
Rural	1.16	1.08–1.24	< 0.001
Region			
North Central	Reference		

Variables	Hazard ratio (HR)	95% Confidence interval (C.I)	p-value
Independent variables			
Birth cohort			
North East	0.66	0.59–0.74	< 0.001
North West	0.56	0.41–0.62	< 0.001
South East	0.47	0.42–0.54	< 0.001
South South	0.44	0.39–0.50	< 0.001
South West	0.61	0.54–0.68	< 0.001
Premarital Sexual debut			
Less than 15 years	Reference		
15–17 years	1.18	1.09–1.28	< 0.001
18 years and above	1.52	1.40–1.65	< 0.001
Premarital birth			
No	Reference		
Yes	0.37	0.35–0.40	< 0.001
ln_p	0.37	0.35–0.38	
Random effect			
Cluster / community variance	0.103	0.086–0.123	
Log likelihood ratio test	-33551.157		< 0.001

Table 5 show that more recent birth cohorts had progressively higher hazards of first birth relative to the 1970–1979 cohort, with the 2000–2009 cohort showing the strongest association (HR = 1.70, CI: 1.54–1.89). Primary and secondary education were associated with a higher hazard of first birth compared to no education (HR = 1.24, CI: 1.12–1.38 and HR = 1.12, C.I: 1.02–1.23) respectively, while higher education significantly reduced the hazard (HR = 0.85, CI: 0.77–0.94). Muslim women and those of other religions had modestly higher hazards than Christians (HR = 1.11 C.I: 1.03–1.19 and HR = 1.24, C.I: 1.00–1.53) respectively. Middle wealth was associated with a slightly higher hazard than poor (HR = 1.09, C.I: 1.00–1.19), while rich wealth index and reproductive health knowledge showed no significant associations.

Rural women had a higher hazard of first birth than urban women (HR = 1.08, CI: 1.06–1.15). Among regions, only the North West (HR = 0.90, C.I: 0.82–0.99) and South South (HR = 0.87, C.I: 0.77–0.99) differed significantly from North Central. Later sexual debut was strongly associated with higher hazards of first birth, with women debuting at 18 and above recording the highest hazard (HR = 2.26, CI: 2.06–2.48). Age at marriage was the strongest predictor; women marrying at 25 and above had a markedly reduced hazard (HR = 0.11, CI: 0.09–0.12), followed by those marrying at 18–24 years (HR = 0.42), indicating that later marriage substantially delayed first birth. Community-level variance was a significant factor (0.09, CI: 0.08–0.11).

Table 5
Factors associated with time to first birth after premarital sexual debut using Multilevel mixed effect model

Variables	Hazard ratio (HR)	95% Confidence interval (C.I)	p-value
Independent variables			
Birth cohort			
1970–1979	Reference		
1980–1989	1.24	1.14–1.34	< 0.001
1990–1999	1.40	1.29–1.52	< 0.001
2000–2009	1.70	1.54–1.89	< 0.001
Educational Level			
No education	Reference		
Primary	1.24	1.12–1.38	< 0.001
Secondary	1.12	1.02–1.23	0.013
Higher	0.85	0.77–0.94	0.001
Religion			
Christian	Reference		
Islam	1.11	1.03–1.19	0.006
Others	1.24	1.00-1.53	0.046
Wealth index			
Poor	Reference		
Middle	1.09	1.00-1.19	0.040
Rich	1.02	0.94–1.12	0.521
Knowledge of reproductive health			
No knowledge	Reference		
Partial knowledge	1.01	0.89–1.15	0.850
Full knowledge	1.03	0.90–1.18	0.657
Place of residence			
Urban	Reference		
Rural	1.08	1.06–1.15	0.031
Region			
North Central	Reference		

Variables	Hazard ratio (HR)	95% Confidence interval (C.I)	p-value
Independent variables			
Birth cohort			
North East	0.99	0.89–1.01	0.826
North West	0.90	0.82–0.99	0.038
South East	0.90	0.79–1.01	0.073
South South	0.87	0.77–0.99	0.029
South West	1.10	0.99–1.23	0.089
Premarital Sexual debut			
Less than 15 years	Reference		
15–17 years	1.38	1.27–1.50	< 0.001
18 years and above	2.26	2.06–2.48	< 0.001
Age at marriage			
Less than 18 years	Reference		
18–24 years	0.42	0.38–0.46	< 0.001
25 years and above	0.11	0.09–0.12	< 0.001
ln_p	0.58	0.56–0.60	< 0.001
Random effect			
Cluster / community variance	0.09	0.08–0.11	
Log likelihood ratio test	-3225		< 0.001

Discussion

This study examined the transitions from premarital sexual debut to marriage and first birth among Nigerian women using data from the 2023–2024 Nigeria Demographic and Health Survey (FMoHSW, NPC & ICF, 2024). The findings revealed significant generational and regional variation in these reproductive transitions, shaped by educational attainment, religion, place of residence, age at sexual debut, and the occurrence of premarital births.

The national level, the median interval between premarital sexual debut and first marriage remained largely unchanged across birth cohorts, ranging from 4 to 5 years. This suggests that the timing of first marriage following premarital sexual debut has remained relatively stable across generations in Nigeria. The estimates suggest that many Nigerian women experience an extended period between sexual debut and family formation. This finding is consistent with evidence from sub-Saharan Africa showing that the interval between sexual initiation and marriage has widened over successive cohorts, increasing the duration of premarital sexual

exposure and associated reproductive health risks (Nguyen & Eaton, 2022; Budu et al., 2023; Govender, Naidoo & Taylor, 2022).

At the national level, the median interval between premarital sexual debut and first birth remained constant at five years across all birth cohorts, indicating little evidence of generational change in the timing of first birth following premarital sexual debut in Nigeria. This finding is consistent with previous studies reporting that the timing of first birth among Nigerian women has remained largely influenced by socio-demographic and cultural factors rather than birth cohort (Moradeyo et al., 2025).

A notable finding was the progressive shortening of the interval from premarital sexual debut to marriage among more recent birth cohorts, with women born between 2000 and 2009 exhibiting the highest hazard of marriage relative to those born between 1970 and 1979. Although previous studies have documented increasing ages at first sexual intercourse and substantial cohort variation across sub-Saharan Africa (Nguyen & Eaton, 2022), our findings suggest that, among women who initiate sex before marriage, the transition to marriage has become increasingly compressed in recent generations. This pattern may reflect changing social expectations, economic pressures, and evolving marriage norms.

Regional disparities were among the most striking findings. The North West consistently recorded the shortest interval between premarital sexual debut and marriage, whereas the South South and South East experienced the longest intervals. These regional differences likely reflect longstanding variations in cultural norms, religion, educational attainment, and marriage practices. Previous multilevel and spatial analyses have similarly shown that women residing in northern Nigeria, particularly the North East and North West, are significantly more likely to experience early marriage than those in southern regions (Bolarinwa et al., 2022; Oluwaseun & Fagbamigbe, 2023). Likewise, the higher hazards of marriage and first birth observed among Muslim women are consistent with earlier studies reporting strong associations between religious affiliation, ethnicity, and child marriage in Nigeria (Mobolaji, Fatusi & Adedini, 2020; Bolarinwa et al., 2022).

The protective effect of higher education against earlier marriage and first birth observed in this study agrees with a substantial body of demographic literature. Education increases women's opportunities for continued schooling, employment, and economic independence, thereby delaying marriage and childbearing. Recent evidence from Nigeria demonstrated that educational attainment contributes substantially to fertility differentials by postponing marriage and reducing exposure to childbearing (Oluwaseun & Adedokun, 2025). These findings reinforce the importance of sustained investment in girls' education as a strategy for promoting healthier reproductive transitions.

Women residing in rural areas experienced earlier transitions to marriage than their urban counterparts. This finding is consistent with studies showing that rural communities in Nigeria continue to experience higher levels of child marriage, limited educational opportunities, reduced access to reproductive health services, and stronger adherence to traditional gender norms (Bolarinwa et al., 2022; Ayamolowo et al., 2024). These structural disadvantages may accelerate transitions into marriage and childbearing.

Women who initiated sexual activity at age 18 years or older experienced significantly faster transitions to both marriage and first birth than those whose sexual debut occurred before age 15 years. This pattern suggests that later sexual debut frequently occurs within the context of established partnerships or impending marriage, whereas early sexual debut is more likely to occur outside marriage and be followed by a prolonged premarital

period. Similar associations between early sexual debut and adverse reproductive outcomes, including increased sexual risk behaviours, have been reported among Nigerian adolescents and young women (Correa, Omaku & Braimah, 2025; Kupoluyi, 2025).

Premarital childbirth substantially reduced the likelihood of subsequent marriage, indicating that women who gave birth before marriage experienced much longer transitions to marriage. This finding reflects the continuing social stigma associated with premarital childbearing in Nigeria, where unmarried mothers frequently encounter social exclusion and economic disadvantage (Ayamolowo et al., 2024). Furthermore, the strong negative association between later age at marriage and the hazard of first birth supports evidence that delayed marriage is a major determinant of delayed childbearing and reflects broader processes of women's empowerment and demographic transition (Oluwaseun & Adedokun, 2025; Wassie et al., 2025; Moradeyo et al., 2025).

The significant community-level variance observed in both models confirms that reproductive transitions are influenced not only by individual characteristics but also by contextual factors. Previous multilevel studies have shown that community socioeconomic conditions, educational attainment, ethnic composition, and women's empowerment significantly influence the timing of sexual initiation and subsequent reproductive transitions among Nigerian women (Odimegwu & Somefun, 2022; Bolarinwa et al., 2022).

This study's strengths include the use of nationally representative 2023/2024 NDHS data, a large sample size, and multilevel survival analysis, which accounted for the hierarchical structure of the data and simultaneously assessed individual- and community-level determinants of the timing of first marriage and first birth after premarital sexual debut. However, the cross-sectional design limits causal inference, while self-reported measures of sexual debut, marriage, and first birth may be subject to recall and social desirability bias.

Overall, these findings demonstrate that reproductive transitions in Nigeria are shaped by complex interactions between individual, household, and community factors. They underscore the need for region-specific policies that expand girls' educational opportunities, strengthen adolescent sexual and reproductive health services, delay child marriage, and address the broader structural determinants influencing the transition from premarital sexual debut to marriage and first birth.

Declarations

Funding Declaration

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author Contribution

MDM conceptualized the study as part of her doctoral thesis, conducted the data curation and statistical analyses, interpreted the findings, and drafted the manuscript. AOA and OBY supervised the doctoral research, contributed to the study design and methodology, provided intellectual guidance throughout the research, critically reviewed and revised the manuscript for important intellectual content, and approved the final version for publication. All authors read and approved the final manuscript.

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Figures

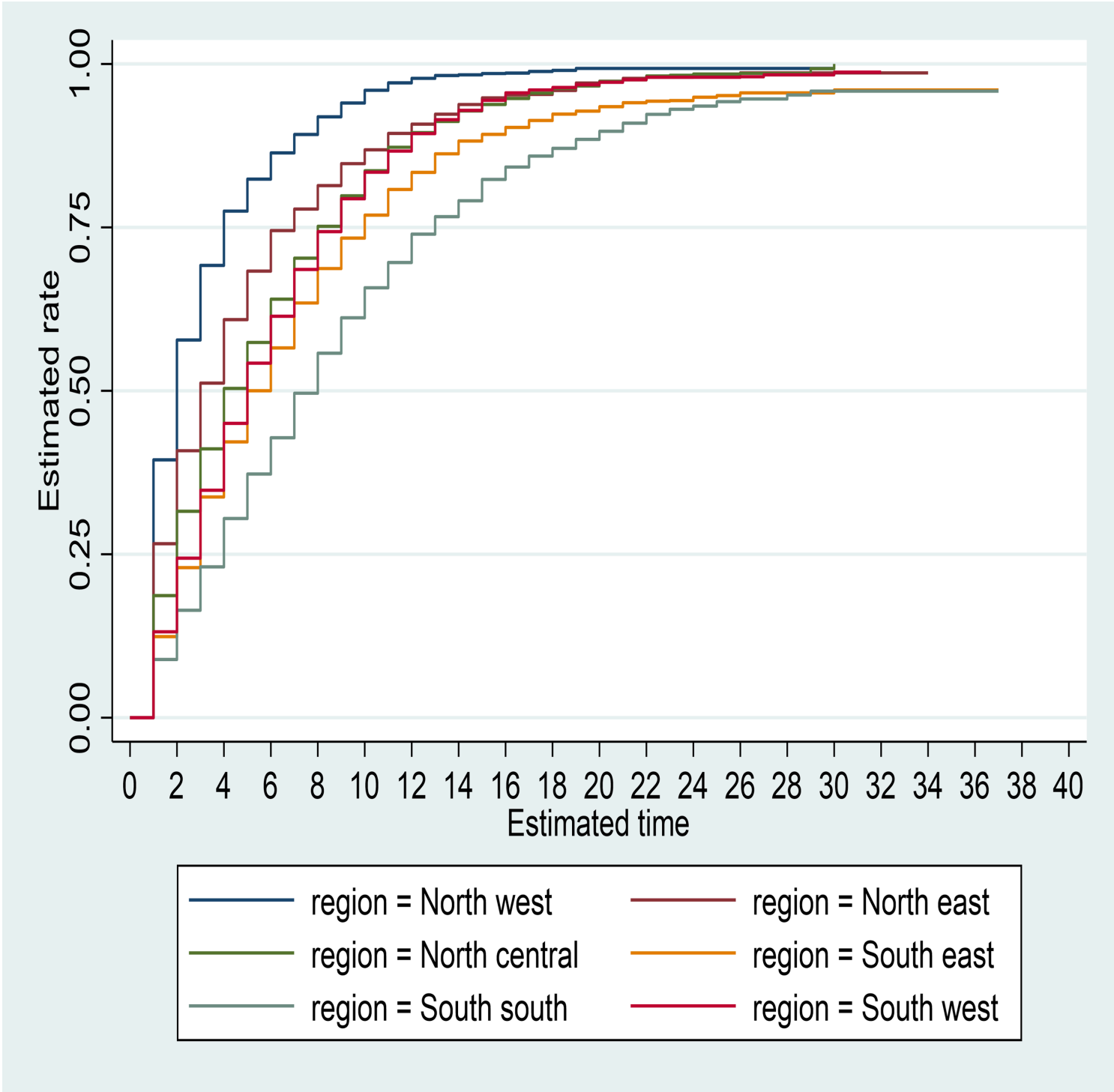


Figure 1

Geographical variation of time interval between Premarital Sexual debut and Marriage in six geographical regions in Nigeria

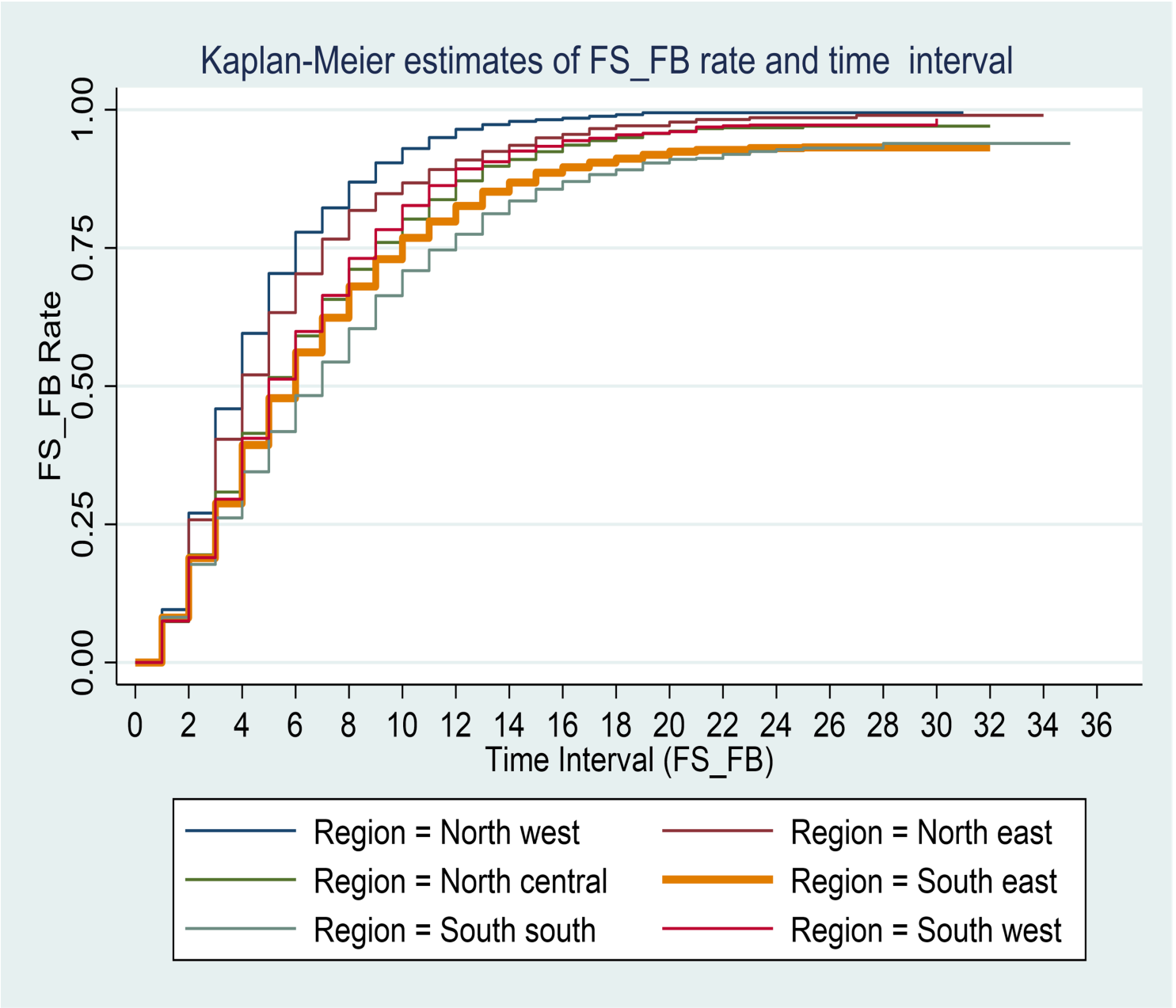


Figure 2

Geographical variation of time interval between Premarital Sexual debut and first birth in six geographical regions in Nigeria