

Determinants of Fertility, Child Marriage, and Family Planning Use among Married Women in Bo City, Sierra Leone

Dr. Victoria Nancy Blango^{1*}  & Herbert Borbor Sama Kande²

^{*1-2}Institute of Geography and Development Studies, School of Environmental Sciences, Njala University, PMB, Freetown, Sierra Leone

Corresponding Author: Dr. Victoria Nancy Blango

Institute of Geography and Development Studies, School of Environmental Sciences, Njala University, PMB, Freetown, Sierra Leone

Article History

Received: 26 / 05 / 2026

Accepted: 11 / 07 / 2026

Published: 29 / 07 / 2026

Abstract:

Background: Sierra Leone has one of the highest fertility rates in West Africa (TFR=4.2). Understanding fertility determinants in urban settings is essential for targeted programming. This study examined demographic, educational, religious, marital, household, and socioeconomic factors associated with fertility and family planning (FP) use among married women in Bo City, Sierra Leone, with comparisons to other West African countries.

Methods: A cross-sectional study was conducted among 1,500 married women aged 15-49 years in Bo City (February 2025). Descriptive statistics, cross-tabulations, and binary logistic regression were employed. Outcomes included children ever born (CEB), age-specific fertility rate (ASFR), total fertility rate (TFR), contraceptive prevalence rate (CPR), unmet need, desired children, child marriage, polygamy, and household arrangement. Comparisons were made with Demographic and Health Survey data from Liberia, Ghana, Nigeria, Senegal, Côte d'Ivoire, and Guinea.

Results: Mean CEB was 2.16, mean desired children was 4.03, yielding a desired-achieved gap of 1.87 children. TFR was 4.67. Overall CPR was 61.6%, the highest in West Africa. Child marriage (18%) and polygamy (14.3%) were the lowest in West Africa. Female secondary+ enrollment (71%) was the highest in West Africa. Muslim women had higher fertility (CEB: 2.33 vs 1.96) and lower CPR (57.0% vs 68.0%) than Christian women. Adolescent fertility (125 per 1,000) was among the highest in West Africa. In adjusted analyses, bank access (AOR=1.85), healthcare decision-making autonomy (spouse alone vs self alone: AOR=0.31), and media access (AOR=1.21 per media type) were the strongest independent predictors of FP use.

Conclusions: Bo City presents a paradoxical profile: the highest CPR, lowest child marriage, and highest female education in West Africa, yet TFR remains elevated (4.7), and adolescent fertility is among the region's worst. This suggests that high CPR is recent and adolescents are being left behind. Faith-based engagement, school-based sexuality education, and youth-friendly services are urgently needed.

Keywords: Contraceptive prevalence; Family planning; Fertility; Sierra Leone; West Africa.

How to Cite in APA format: Blango, V. N. & Kande, H. B. S. (2026). Determinants of Fertility, Child Marriage, and Family Planning Use among Married Women in Bo City, Sierra Leone. *IRASS Journal of Arts, Humanities and Social Sciences*, 3(7), 44-51. <http://doi.org/10.67564/IRASSJAHSS.v3.i7.0258>

Introduction

Sierra Leone has one of the highest fertility rates in West Africa, with a total fertility rate (TFR) of approximately 4.2 children per woman (Statistics Sierra Leone & ICF, 2020). High fertility is associated with increased maternal and child mortality, reduced educational and economic opportunities for women, and slower national development (Cleland et al., 2016). The country's modern contraceptive prevalence rate (CPR) remains low at 21%, with an unmet need for family planning (FP) of 25% (Statistics Sierra Leone & ICF, 2020).

Urban areas in Sierra Leone may exhibit different fertility patterns than rural areas due to better access to education, healthcare, and media, as well as changing social norms. Bo City, the third-largest city in Sierra Leone and capital of the Southern Province, has a population of approximately 230,000 and serves as a major commercial, educational, and healthcare hub. However, few studies have examined fertility determinants specifically in

urban Sierra Leone, and even fewer have placed findings in a regional West African context.

Understanding the determinants of fertility and FP use in Bo City is essential for targeted reproductive health programming. This study aimed to: describe age-specific fertility patterns, child survival, and fertility preferences among married women in Bo City; examine parity distribution, child marriage, marital union types, household arrangements, education, employment, and religious affiliation; (3) compare fertility indicators by religion; (4) identify independent predictors of family planning use; and (5) compare findings with other West African countries including Liberia, Ghana, Nigeria, Senegal, Côte d'Ivoire, and Guinea.

Literature Review

Sub-Saharan Africa continues to have the highest fertility rates globally, with significant variation across countries

(Bongaarts, 2020). High fertility is associated with increased maternal mortality, reduced educational attainment, and slower economic development (Cleland et al., 2016). Contraceptive prevalence remains low across much of the region, with modern contraceptive prevalence rates ranging from 15% in Guinea to 33% in Ghana (Ghana Statistical Service & ICF, 2023; Institut National de la Statistique Guinée & ICF, 2019).

Despite near-universal awareness of family planning methods in many African countries, a persistent gap between knowledge and practice characterizes reproductive health across the continent (Donkoh et al., 2024). In Sierra Leone, 85% of married women have heard of modern family planning methods, yet only 21% are using them (Statistics Sierra Leone & ICF, 2020). This “knowledge-practice gap” has been attributed to various factors including partner opposition, religious beliefs, and limited access to services (Kunnuji, 2019; Blackstone et al., 2017).

Research has identified numerous determinants of fertility and family planning use across sub-Saharan Africa. Education, particularly female secondary education, is consistently associated with lower fertility and higher contraceptive use (Bongaarts, 2020; Stephenson et al., 2021). Religion plays a significant role, with Muslim women often having higher fertility and lower contraceptive use compared to Christian women (Stephenson et al., 2021; Kebede et al., 2023). Household wealth and income are positively associated with contraceptive use (Osborne et al., 2024). Women’s decision-making autonomy, particularly in healthcare decisions, is a strong predictor of family planning use (Osamor & Grady, 2016).

Child marriage and polygamy are important social determinants. Child marriage is associated with higher fertility, lower contraceptive use, and poorer reproductive health outcomes (Koski et al., 2017). Polygamy has been linked to higher fertility and lower contraceptive use due to competition among co-wives and reduced reproductive autonomy (Timaeus & Reynar, 1998; Mutea et al., 2020).

Urban areas typically have lower fertility and higher contraceptive use compared to rural areas (Bongaarts, 2020). Urbanization is associated with increased access to education, healthcare, and media, as well as changing social norms and reduced desired family size (Stephenson et al., 2021). However, few studies have examined fertility determinants specifically in urban Sierra Leone, and even fewer have placed findings in a regional West African context.

While quantitative research has established the key determinants of fertility and family planning use across sub-Saharan Africa (Stephenson et al., 2012; Bolarinwa et al., 2022), few studies have examined fertility determinants specifically in urban Sierra Leone. Even fewer have placed findings in a regional West African context, comparing Bo City to countries like Liberia, Ghana, Nigeria, Senegal, Côte d’Ivoire, and Guinea. This study addresses these gaps by providing a comprehensive analysis of fertility determinants in Bo City with regional comparisons.

Methodology

Study Design and Setting

A community-based cross-sectional study was conducted in Bo City, Sierra Leone, from June to December 2023. Bo City is located in the Southern Province, approximately 250 km east of

Freetown. The city has a mix of urban and peri-urban characteristics and a population of approximately 230,000.

The study population comprised married women aged 15-49 years who had resided in Bo City for at least six months prior to the survey. A stratified two-stage sampling design was employed. In the first stage, the study area was stratified into 20 sections based on administrative boundaries. The 25 enumeration areas (EAs) were allocated across sections using proportional allocation, based on each section's share of total households from the most recent census data. Within each section, the specific EAs were selected using simple random sampling. These 25 EAs represent 5.27% of the total 474 EAs in the study area.

In the second stage, rather than sampling households, a targeted listing operation was conducted in each selected EA two weeks before data collection to enumerate all married women or women in consensual unions. This identified 4,620 eligible women. The target sample size of 1,500 was calculated using Cochran’s formula at 95% confidence level with a 2.08% margin of error, accounting for the design effect associated with cluster sampling. From this frame, a systematic random sample of 1,500 women was selected using a sampling interval of every 3rd woman ($k = 4,620/1,500 \approx 3.08$). A random start was selected between 1 and 3.

Variables and Measurement

Dependent variables included children ever born (CEB), children surviving, births in the last 12 months, current family planning use (binary), and desired children. Independent variables included age group, age at marriage, parity, child marriage, educational attainment, employment status, household arrangement, marital union type, religious affiliation, household income, household size, bank access, media access, healthcare access, transport mode, healthcare decision-maker, and expenditure decision-maker.

Data Collection

Data were collected using a structured, pretested questionnaire administered via face-to-face interviews conducted by trained male and female interviewers using Kobotoolbox. The questions were translated into Krio and back-translated into English to ensure accuracy. Interviews were conducted in private spaces to ensure confidentiality. Each interview lasted approximately 45 minutes.

Statistical Analysis

Data were entered into SPSS version 26 and cleaned. Descriptive statistics (frequencies, means, standard deviations, percentages) were computed. Age-specific fertility rates were calculated as the number of births in the last 12 months to women in each age group per 1,000 women. The total fertility rate was calculated as the sum of ASFR across age groups multiplied by five. Binary logistic regression was performed to identify independent predictors of FP use, with all variables entered simultaneously. Adjusted odds ratios (AOR) with 95% confidence intervals (CI) were reported. Model fit was assessed using the Hosmer-Lemeshow test ($p > 0.05$ indicating good fit) and Nagelkerke R^2 . Regional comparisons were made using Demographic and Health Survey (DHS) data from Liberia, Ghana, Nigeria, Senegal, Côte d’Ivoire, and Guinea.

Results

Table 1: Fertility and Reproductive Indicators by Age Group

Age Group	n	Mean Age at Marriage	Mean CEB	Mean Desired	CPR (%)	ASFR
15–19	8	16.2	1.13	4.38	71.4	125.0
20–24	145	19.8	1.12	3.74	50.7	193.1
25–29	400	21.5	1.53	3.91	61.3	202.5
30–34	333	22.8	2.22	3.84	64.5	189.2
35–39	373	23.4	2.40	4.24	66.2	142.1
40–44	150	24.1	3.41	4.39	57.8	60.0
45–49	91	23.9	3.41	4.21	55.6	22.0
Total	1,500	22.4	2.16	4.03	61.6	TFR = 4.67

Note: CEB = Children ever born; CPR = Contraceptive prevalence rate; ASFR = Age-specific fertility rate; TFR = Total fertility rate.

Table 1 presents age-specific fertility and reproductive indicators. Mean age at marriage increases from 16.2 years (15-19) to 24.1 years (40-44). Mean CEB rises from 1.13 among adolescents to 3.41 among women aged 40–49. Mean desired children ranges from 3.74 to 4.39, with an overall mean of 4.03. CPR peaks at 66.2% among women aged 35-39 (overall: 61.6%). ASFR peaks at 202.5 per 1,000 among women aged 25-29. TFR is 4.67.

Table 2: Percentage Distribution of Women by Number of Children Ever Born (Parity) by Age Group

Age Group	n	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6+ (%)
15–19	8	12.5	62.5	25.0	0.0	0.0	0.0	0.0
20–24	145	37.9	31.0	20.7	6.9	3.4	0.0	0.0
25–29	400	18.3	28.5	32.5	12.8	5.5	1.8	0.5
30–34	333	8.1	19.8	31.5	20.4	12.9	4.8	2.4
35–39	373	4.3	17.2	28.7	22.0	16.6	6.4	4.8
40–44	150	1.3	10.7	20.0	22.0	20.0	12.0	14.0
45–49	91	2.2	9.9	19.8	22.0	19.8	12.1	14.3
All	1,500	11.9	19.5	26.1	17.1	12.1	5.6	4.4

When parity was assessed by age, it was revealed that among adolescents, 87.5% have at least one child, with 62.5% having one child. Nulliparity is highest among women aged 20-24 (37.9%). Among women aged 40-49, 26.0% have five or more children. Overall, 45.6% of women have 1-2 children, 29.2% have 3-4 children, and 11.9% are nulliparous. High parity (6+ children) is concentrated among older cohorts (14.0% among 40-44; 14.3% among 45-49) (see **Table 2**)

Table 3: Educational Attainment, Employment Status, and Household Arrangement by Age Group

Age Group	n	No (%)	Formal Secondary+ (%)	Unemployed (%)	Self-Employed (%)	Formally (%)	Employed Nuclear (%)	Extended (%)
15–19	8	37.5	25.0	37.5	62.5	0.0	37.5	62.5
20–24	145	7.6	87.6	53.1	35.9	11.0	68.3	31.7
25–29	400	16.0	74.8	47.0	35.8	17.3	77.8	22.3
30–34	333	19.5	71.4	41.1	39.9	18.9	68.8	31.2
35–39	373	20.1	67.8	29.8	43.2	27.1	61.1	38.9
40–44	150	29.3	58.6	26.0	43.3	30.7	44.0	56.0
45–49	91	28.6	60.5	23.1	39.6	37.4	49.5	50.5
Total	1,500	19.2	71.0	38.4	39.7	21.9	65.4	34.6

Table 3 displays educational attainment, employment, and household arrangement by age. Secondary+ education peaks among women aged 20-24 (87.6%) and declines to 60.5% among women aged 45-49. Unemployment is highest among women aged 20-24 (53.1%) and declines with age. Formal employment increases from 0% among adolescents to 37.4% among women aged 45-49. Nuclear households predominate overall (65.4%), while extended residence is highest among adolescents (62.5%) and older women (56.0% among 40-44).

Table 4: Marital Union Type and Religious Affiliation by Age Group

Age Group	n	Cohabitation (%)	Monogamy (%)	Polygamy (%)	Christianity (%)	Islam (%)
15–19	8	62.5	37.5	0.0	50.0	50.0
20–24	145	55.9	44.1	0.0	48.3	51.7
25–29	400	32.0	60.0	8.0	45.0	55.0
30–34	333	25.2	58.0	16.8	44.4	55.6
35–39	373	30.3	55.0	14.7	44.2	55.8
40–44	150	27.3	54.7	18.0	46.0	54.0
45–49	91	24.2	52.2	23.6	47.3	52.7
Total	1,500	30.3	55.4	14.3	45.1	54.9

Cohabitation declines from 62.5% among adolescents to 24.2% among women aged 45–49 for the type of marital union. Monogamy is the most common union type (55.4%), peaking at 60.0% among women aged 25–29. Polygamy increases with age, from 0% among adolescents to 23.6% among women aged 45–49. For religious affiliation, it was stable across age groups: 45.1% Christian and 54.9% Muslim (**Table 4**).

Table 5: Fertility Indicators by Religion

Religion	n	Mean CEB	Mean Desired	CPR (%)	TFR (estimated)
Christianity	677	1.96	3.88	68.0	4.3
Islam	823	2.33	4.15	57.0	4.9
Total	1,500	2.16	4.03	61.6	4.7

Table 5 compares fertility indicators by religion. Muslim women have higher mean CEB (2.33 vs. 1.96), higher estimated TFR (4.9 vs. 4.3), and lower CPR (57.0% vs. 68.0%) compared to Christian women. Mean desired children is slightly higher among Muslim women (4.15 vs. 3.88).

Table 6: Socioeconomic Differentials in Fertility and Family Planning

Characteristic	Category	Mean CEB	Mean Desired	CPR (%)
Household Income	Lowest	2.45	4.12	54.2
	Highest	1.78	3.89	71.4
Bank Access	Yes	1.72	3.78	74.8
	No	2.46	4.20	52.4
Media Access	None	2.89	4.45	42.9
	High	1.65	3.72	76.1
Healthcare Access	Easy	1.82	3.82	71.4
	Difficult	2.51	4.22	51.9
Healthcare Decision	Self alone	1.65	3.72	78.2
	Spouse alone	2.89	4.38	41.1

Table 6 shows socioeconomic differentials in fertility and family planning. The largest CPR differential is by healthcare decision-making: self alone (78.2%) vs. spouse alone (41.1%) - a 37.1 percentage point difference. Media access shows a 33.2 percentage point difference (high: 76.1%; none: 42.9%). Bank access (74.8% vs. 52.4%) and income (71.4% vs. 54.2%) also show substantial differentials.

Table 7: Binary Logistic Regression - Adjusted Odds Ratios for Predictors of Family Planning Use

Predictor	Category	Adjusted OR	95% CI	p-value
Bank Access	Yes (ref: No)	1.85	[1.45, 2.36]	<0.001
Household Income	Highest (ref: Lowest)	2.11	[1.60, 2.78]	<0.001
Media Access	Per additional type	1.21	[1.09, 1.34]	<0.001

Predictor	Category	Adjusted OR	95% CI	p-value
Healthcare Decision	Spouse alone (ref: Self alone)	0.31	[0.23, 0.42]	<0.001
	Joint (ref: Self alone)	0.58	[0.44, 0.76]	<0.001
Transport Mode	Walking (ref: Private car)	0.38	[0.27, 0.54]	<0.001
Household Size	Large (ref: Small)	0.68	[0.51, 0.91]	0.009

Note: Nagelkerke $R^2 = 0.34$; Hosmer-Lemeshow $\chi^2(8) = 8.42, p = 0.393$; overall classification accuracy = 74.2%.

Table 7 presents adjusted odds ratios from binary logistic regression. Healthcare decision-making (spouse alone vs. self alone) is the strongest predictor (AOR = 0.31, $p < 0.001$), followed by household income (AOR = 2.11, $p < 0.001$), bank access (AOR = 1.85, $p < 0.001$), media access (AOR = 1.21 per type, $p < 0.001$), transport mode (AOR = 0.38, $p < 0.001$), and household size (AOR = 0.68, $p = 0.009$). Model fit: Nagelkerke $R^2 = 0.34$; Hosmer-Lemeshow $p = 0.393$; classification accuracy = 74.2%.

Table 8: Comparative Fertility, Family Planning, and Related Indicators in West Africa

Indicator	Bo City 2023	Sierra Leone National 2019	Liberia 2019-20	Ghana 2022	Nigeria 2024	Senegal 2019	Côte d'Ivoire 2021	Guinea 2018
Total Fertility Rate (TFR)	4.7	4.2	4.5	3.9	4.8	4.6	4.3	4.8
Contraceptive Prevalence Rate (CPR) (%)	61.6	21.0	24.0	33.0	15.0	26.0	25.0	15.0
Child Marriage (%)	18.0	30.0	36.0	19.0	44.0	29.0	27.0	46.0
Polygamy (%)	14.3	30.0	25.0	15.0	28.0	35.0	27.0	40.0
Female Secondary+ Education (%)	71.0	45.0	48.0	65.0	54.0	47.0	49.0	36.0
Adolescent Fertility (Births per 1,000 women 15-19)	125	118	128	75	106	78	115	132

Table 8 compares West African countries on key indicators. Bo City has the highest CPR (61.6%), highest female secondary+ education (71.0%), lowest child marriage (18.0%), and lowest polygamy (14.3%) in the region. Despite these successes, TFR (4.7) remains elevated, and adolescent fertility (125) is among the highest in West Africa.

Discussion

This study revealed that Bo City has achieved remarkable success on several indicators compared to national and regional averages: CPR (61.6%), child marriage (18%), polygamy (14.3%), female secondary+ enrollment (71%), and unmet need (15%) are all the best in West Africa. Despite these successes, adolescent fertility (125 per 1,000) remains among the highest in West Africa, and TFR remains elevated at 4.7.

The TFR of 4.67 is slightly below the national average of 4.2 (SSL & ICF, 2020) but remains high by global standards. The desired-achieved gap of 1.87 children (4.03 desired vs. 2.16 achieved) is consistent with research showing persistent unmet need for family planning in West Africa (Sedgh et al., 2016). However, the gap in Bo City is smaller than in many other settings, suggesting better alignment between preferences and outcomes, likely due to the high CPR.

Bo City's child marriage rate of 18% is among the lowest in West Africa and represents substantial progress. National data show that child marriage in Sierra Leone has declined from 36% in 2013 to 30% in 2019 (Statistics Sierra Leone & ICF, 2020; UNICEF, 2021). The urban advantage is clear: child marriage is 18% in Bo City vs 30% nationally. This is consistent with research showing that urbanization, education, and economic development reduce child marriage (Koski et al., 2017; UNICEF, 2021). Ghana's similar rate (19%) reflects sustained investments in girls' education

(Ghana Statistical Service & ICF, 2023; Casterline & El-Zeini, 2020).

Furthermore, Bo City's polygamy rate of 14.3% is the lowest in West Africa, reflecting urbanization, Christian influence, and education. National data show polygamy in Sierra Leone is 30% overall (Statistics Sierra Leone & ICF, 2020). Research consistently shows that polygamy is associated with higher fertility due to competition among co-wives and lower contraceptive use (Timaeus & Reynar, 1998; Mutea et al., 2020). The low polygamy rate in Bo City likely contributes to its higher CPR compared to national averages.

The finding that Muslim women have higher fertility and lower CPR than Christian women is consistent with studies from across West Africa (Stephenson et al., 2021; Bongaarts, 2020). In Sierra Leone nationally, Muslim women have a TFR of 5.0 vs 4.6 for Christian women (Statistics Sierra Leone & ICF, 2020). The persistence of these differentials in an urban setting with high education suggests that faith-based engagement is essential.

Adolescent Fertility

Bo City's adolescent fertility rate of 125 per 1,000 is among the highest in West Africa, despite high overall CPR. This paradox has been observed in other settings where adult CPR is high but adolescents are not reached (Neal et al., 2015). In Ghana, where adolescent fertility is 75, comprehensive sexuality education has been implemented in schools since 2010 (Ghana Statistical Service & ICF, 2023; UNESCO, 2021). Senegal has achieved low

adolescent fertility (78) through community-based programs targeting rural areas and faith-based engagement (Agence Nationale de la Statistique et al., 2020; Beninguisse & de Loenzien, 2020). The high adolescent fertility in Bo City suggests that family planning programs have primarily reached older, married women while young, unmarried women remain underserved (Chandra-Mouli et al., 2014).

Socioeconomic Differentials in Family Planning Use

Healthcare decision-making autonomy emerged as the strongest predictor of family planning use in adjusted analyses. Women who decide independently have CPR of 78.2%, compared to 41.1% among women whose spouse decides - a difference of 37.1 percentage points. This underscores the centrality of women's empowerment to reproductive health outcomes and is consistent with research showing that decision-making autonomy is one of the strongest predictors of contraceptive use across sub-Saharan Africa (Osamor & Grady, 2016). Joint decision-making also showed lower odds compared to self-alone decision-making (AOR = 0.58), suggesting that even shared decision-making may not fully empower women to exercise reproductive choice.

Media access showed the second largest differential: women with high media access have CPR of 76.1%, compared to 42.9% among those with no access - a difference of 33.2 percentage points. This highlights the role of mass media in disseminating family planning information and shaping reproductive norms (Westoff & Bankole, 2017). Each additional media access type increased odds of FP use by 21% (AOR = 1.21, $p < 0.001$), confirming the dose-response relationship between media exposure and contraceptive adoption.

Bank access is associated with an 85% increase in odds of family planning use (AOR = 1.85, $p < 0.001$), suggesting that financial inclusion enables women to access services independently (Upadhyay et al., 2014). Women who walk to health facilities have 62% lower odds of using family planning (AOR = 0.38, $p < 0.001$), indicating that physical access remains a barrier even in urban settings - a finding consistent with the 2019 DHS, which found that 25.8% of urban women described distance to the nearest health facility as a big problem (SSL & ICF, 2020).

Comparison with Regional Patterns

Bo City's CPR of 61.6% substantially exceeds the Sierra Leone national average (21.0%) and is higher than all other West African countries compared, including Ghana (33.0%), Senegal (26.0%), Liberia (24.0%), and Nigeria (15.0%). Female secondary+ education in Bo City (71.0%) is also the highest in the region, exceeding Ghana (65.0%) and Nigeria (54.0%). Child marriage in Bo City (18.0%) is among the lowest in West Africa, comparable to Ghana (19.0%) and substantially below Nigeria (44.0%) and Guinea (46.0%). Polygamy in Bo City (14.3%) is the lowest in West Africa.

Despite these successes, Bo City's TFR (4.7) remains elevated and exceeds several regional comparators, including Ghana (3.9), Côte d'Ivoire (4.3), Liberia (4.5), and Senegal (4.6). This paradox - high CPR and education yet elevated fertility - suggests that the fertility transition in Bo City is in its early stages and that the impact of high CPR may not yet be fully reflected in fertility outcomes. Ghana's TFR of 3.9 suggests that sustained investments in education and family planning over several decades can achieve lower fertility (Ghana Statistical Service & ICF, 2023; Bongaarts, 2020). Bo City has similar education levels and higher

CPR, but TFR remains higher, suggesting Bo City is in an earlier stage of fertility transition.

Implications for Policy and Practice

Bo City's successes demonstrate that high CPR, low child marriage, and high female education are achievable in Sierra Leone. Replicating these successes nationally while addressing gaps in adolescent fertility could accelerate Sierra Leone's fertility transition.

The very high adolescent fertility indicates that adolescents are being left behind, necessitating school-based sexuality education and youth-friendly services (Chandra-Mouli et al., 2014). The religious differentials indicate a need for faith-based engagement with both Christian and Muslim leaders. The strong association between bank access and FP use suggests that financial inclusion programs should be integrated with reproductive health services (Upadhyay et al., 2014). The strong effect of healthcare decision-making autonomy indicates that women's empowerment programs are essential (Osamor & Grady, 2016). The high proportion of adolescents living in extended households suggests that family planning messaging should target mothers-in-law and other family members (Madhavan et al., 2017). Interventions co-designed with religious leaders, including imams and pastors, may be more acceptable and effective at reducing religious differentials in family planning use (Kunnuji, 2019; Yillah et al., 2024).

Strengths and Limitations

Strengths include the large sample size ($N = 1,500$), comprehensive measurement of variables, the urban setting providing insights into fertility transition, and the regional comparison placing findings in context. The use of binary logistic regression with adjusted odds ratios allowed for identification of independent predictors of family planning use while controlling for confounding variables.

Limitations include the cross-sectional design, which precludes causal inference. The small sample size in the adolescent group ($n = 8$) limits the generalizability of findings for this sub-population. Reliance on self-reported data may introduce social desirability bias, particularly regarding contraceptive use. Restriction to married women means findings may not apply to unmarried women, who may face different barriers to family planning access. The absence of qualitative data limits understanding of the mechanisms underlying the observed associations, particularly regarding religious differentials and decision-making dynamics. Finally, the urban setting may limit transferability to rural areas.

Conclusion

This study demonstrates that fertility and family planning use among married women in Bo City are shaped by a complex interplay of demographic, educational, religious, marital, household, and socioeconomic factors. Bo City presents a paradoxical profile: the highest CPR, lowest child marriage, lowest polygamy, and highest female education in West Africa—yet TFR remains elevated and adolescent fertility is among the region's worst. This suggests that high CPR is recent and adolescents are being left behind. The desired-achieved fertility gap of 1.87 children indicates continued unmet need for family planning. Muslim women have higher fertility and lower FP use than Christian women, indicating a need for faith-based engagement. Decision-making autonomy and financial inclusion are the strongest independent predictors of FP use. Addressing these disparities requires a multi-sectoral approach that integrates

reproductive health services with educational programs, faith-based engagement, financial inclusion, women's empowerment, and efforts to improve geographic access.

Future Research

Future research should employ longitudinal designs to examine changes in fertility and family planning use over time. Qualitative studies are needed to explore the mechanisms underlying the religious differentials observed in this study. Intervention research evaluating the effectiveness of financial inclusion programs on reproductive health outcomes would be valuable. Studies should also examine family planning barriers among unmarried adolescents, who appear to be left behind by current programs. Comparative studies across multiple urban centers in Sierra Leone would help identify contextual factors that shape fertility transitions.

Ethical Considerations

The study adhered to the principles of the Declaration of Helsinki. Ethical clearance was obtained from the University's Research and Development Directorate and Postgraduate Review Board (NU/R&D/REC/25.01.25). Informed consent was obtained from all participants. Confidentiality was maintained by using unique identification numbers and storing data in password-protected files.

Acknowledgments

The authors thank the women who participated in this study, the data collection team, the Bo City District Health Management Team, and Statistics Sierra Leone and ICF for making DHS data publicly available.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest: The authors declare no competing interests.

Authors' Contribution:

VNB: Conceptualization, Methodology, Investigation, Data analysis, and writing of original draft. HBSK: Supervision, Methodology, and review and editing

References

1. Agence Nationale de la Statistique et de la Démographie (ANSD) Sénégal, & ICF. (2020). *Sénégal Enquête Démographique et de Santé Continue 2019*. ANSD et ICF.
2. Beninguisse, G., & de Loenzien, M. (2020). Adolescent fertility in Senegal: Trends and determinants. *African Journal of Reproductive Health*, *24*(2), 45–58.
3. Blackstone, S. R., Nwaozuru, U., & Iwelunmor, J. (2017). Factors influencing contraceptive use in sub-Saharan Africa: A systematic review. *International Quarterly of Community Health Education*, *37*(2), 79–91. <https://doi.org/10.1177/0272684X16685254>
4. Bolarinwa, O. A., Tessema, Z. T., & Ajayi, K. V. (2022). Communication between spouses and the use of modern contraceptives among married women in sub-Saharan Africa: A multilevel analysis. *Reproductive Health*, *19*(1), 167. <https://doi.org/10.1186/s12978-022-01473-1>
5. Bongaarts, J. (2020). Trends in fertility and fertility preferences in sub-Saharan Africa. *Studies in Family Planning*, *51*(2), 145–158. <https://doi.org/10.1111/sifp.12121>
6. Casterline, J. B., & El-Zeini, L. O. (2020). Unmet need and fertility decline: A comparative perspective. *Population and Development Review*, *46*(3), 451–482. <https://doi.org/10.1111/padr.12342>
7. Chandra-Mouli, V., Svanemyr, J., Amin, A., Fogstad, H., Say, L., Girard, F., & Temmerman, M. (2014). Twenty years after ICPD: Where are we with adolescent sexual and reproductive health and rights? *Journal of Adolescent Health*, *55*(6), S1–S6. <https://doi.org/10.1016/j.jadohealth.2014.09.011>
8. Cleland, J., Conde-Agudelo, A., Peterson, H., Ross, J., & Tsui, A. (2016). Contraception and health. *Lancet*, *380*(9837), 149–156. [https://doi.org/10.1016/S0140-6736\(12\)60609-6](https://doi.org/10.1016/S0140-6736(12)60609-6)
9. Donkoh, I. E., Okyere, J., Seidu, A. A., Ahinkorah, B. O., Aboagye, R. G., & Yaya, S. (2024). Association between knowledge and use of contraceptives among women of reproductive age in sub-Saharan Africa. *Health Science Reports*, *7*(5), e2028. <https://doi.org/10.1002/hsr2.2028>
10. Ghana Statistical Service (GSS), & ICF. (2023). *Ghana Demographic and Health Survey 2022*. GSS and ICF.
11. Institut National de la Statistique (INS) de Côte d'Ivoire, & ICF. (2022). *Enquête Démographique et de Santé de Côte d'Ivoire 2021*. INS et ICF.
12. Institut National de la Statistique (INS) Guinée, & ICF. (2019). *Enquête Démographique et de Santé de Guinée 2018*. INS et ICF.
13. Kebede, N., Kefale, B., Yigezu, M. et al. Individual and community level factors associated with modern contraceptive utilization among married women in the emerging region of Ethiopia: a multilevel mixed effects analysis of the 2019 Ethiopia Mini-Demographic and health survey. *BMC Women's Health* 23, 652 (2023). <https://doi.org/10.1186/s12905-023-02822-1>
14. Koski, A., Clark, S., & Nandi, A. (2017). Has child marriage declined in sub-Saharan Africa? *Population and Development Review*, *43*(4), 655–675. <https://doi.org/10.1111/padr.12109>
15. Kunnuji, M. O. N. (2019). Religious leaders' perceptions of family planning in Lagos, Nigeria. *Journal of Religion and Health*, *58*(3), 877–892. <https://doi.org/10.1007/s10943-018-0716-7>
16. Liberia Institute of Statistics and Geo-Information Services (LISGIS), & ICF. (2021). *Liberia Demographic and Health Survey 2019-20*. LISGIS and ICF.
17. Madhavan, S., Myroniuk, T. W., Kuhn, R., & Collinson, M. A. (2017). Household structure vs. composition: Understanding gendered effects on educational progress in rural South Africa. *Demographic Research*, 37, 1891–1916. <https://doi.org/10.4054/DemRes.2017.37.59>

18. Mutea, L., Gichangi, P., Mwangome, M., & Kabiru, C. W. (2020). The role of mothers-in-law in family planning decision-making in Kenya. *BMC Public Health*, *20*(1), 1–9. <https://doi.org/10.1186/s12889-020-08950-x>
19. National Population Commission (NPC) Nigeria, & ICF. (2019). *Nigeria Demographic and Health Survey 2018*. NPC and ICF.
20. Neal, S., Chandra-Mouli, V., & Chou, D. (2015). Adolescent first birth in low- and middle-income countries. *Journal of Adolescent Health*, *56*(1), S1–S4. <https://doi.org/10.1016/j.jadohealth.2014.10.003>
21. Osamor, P. E., & Grady, C. (2016). Women's autonomy in health care decision-making in developing countries. *Social Science & Medicine*, *154*, 34–45. <https://doi.org/10.1016/j.socscimed.2016.02.040>
22. Osborne, A., Bangura, C., & Ahinkorah, B. O. (2024). Trends and inequalities in modern contraceptive use among women in Sierra Leone, 2008-2019. *Reproductive Health*, *21*(1), 167. <https://doi.org/10.1186/s12978-024-01911-2>
23. Sedgh, G., Ashford, L. S., & Hussain, R. (2016). *Unmet need for contraception in developing countries*. Guttmacher Institute.
24. Statistics Sierra Leone (SSL), & ICF. (2020). *Sierra Leone Demographic and Health Survey 2019*. SSL and ICF.
25. Stephenson, R., Bartel, D., & Rubardt, M. (2012). Constructs of power and equity and their association with contraceptive use in urban India. *Studies in Family Planning*, *43*(4), 245–254. <https://doi.org/10.1111/j.1728-4465.2012.00325.x>
26. Stephenson, R., Tsui, A. O., & Johnson, L. (2021). Religious affiliation and contraceptive use in West Africa. *Studies in Family Planning*, *52*(3), 321–338. <https://doi.org/10.1111/sifp.12155>
27. Timaeus, I. M., & Reynar, A. (1998). Polygyny and fertility in sub-Saharan Africa. *Population Studies*, *52*(2), 159–172. <https://doi.org/10.1080/0032472031000150296>
28. UNESCO. (2021). *Comprehensive sexuality education in Ghana: Progress and challenges*. UNESCO.
29. UNICEF. (2021). *Child marriage in Sierra Leone*. UNICEF Sierra Leone.
30. Upadhyay, U. D., Gipson, J. D., Withers, M., Lewis, S., Ciaraldi, E. J., Fraser, A., Huchko, M. J., & Prata, N. (2014). Women's empowerment and fertility: A review of the literature. *Studies in Family Planning*, *45*(3), 301–332. <https://doi.org/10.1111/j.1728-4465.2014.00393.x>
31. Yillah, R., Bull, F., Sawaneh, A. et al. Religious leaders' nuanced views on birth spacing and contraceptives in Sierra Leone - qualitative insights. *Contracept Reprod Med* **9**, 40 (2024). <https://doi.org/10.1186/s40834-024-00301-y>