

RESEARCH

Open Access



Inequalities in contraceptive prevalence among married women of reproductive age in Sierra Leone, 2008–2019

Augustus Osborne^{1*} , Camilla Bangura¹ and Umaru Sesay^{2,3}

Abstract

Background Family planning, through access to safe and effective contraception, empowers women to make informed choices about their reproductive health. It is crucial in reducing unintended pregnancies, maternal mortality, and improving overall well-being. However, achieving equitable access to contraception remains a challenge in many low- and middle-income countries, including Sierra Leone. This study investigated the inequalities in contraceptive prevalence among married women of reproductive age (15–49 years) in Sierra Leone in 2008, 2013 and 2019.

Methods This study employed time-trend study design utilizing data from three rounds of the Sierra Leone Demographic Health Survey conducted in 2008, 2013, and 2019. The health equity assessment toolkit software, developed by the World Health Organisation, was utilised to calculate various inequality measures. These include simple measures such as difference and ratio, as well as complex measures such as population attributable risk and fraction.

Results The prevalence of contraceptive use among reproductive-aged married women in Sierra Leone increased from 8.2% in 2008 to 21.2% in 2019. The inequality in married women's age in contraceptive prevalence between older and younger women decreased slightly from 7.5 percentage points in 2008 to 7.2 percentage points in 2019. The ratio also decreased, indicating a narrowing gap in contraceptive prevalence between the age groups over time. Inequality in economic status in contraceptive prevalence between married women in the richest and poorest wealth index decreased from 15.7 percentage points in 2008 to 9.9 percentage points in 2019. The population attributable fraction and population attributable risk decreased notably, suggesting that economic status became less of a determinant factor in contraceptive prevalence over time. The educational inequality in contraceptive prevalence between married women with secondary or higher education and those with no education experienced a decline from 16.5 percentage points in 2008 to 12.6 percentage points in 2019. Place of residence inequality in contraceptive prevalence between married women in urban and rural areas decreased from 11.2 percentage points in 2008 to 7.4 percentage points in 2019. Provincial inequality in contraceptive prevalence between married women in the Western area and Northwestern province decreased from 16.7 percentage points in 2008 to 8.6 percentage points in 2019.

Conclusion The prevalence of contraceptive use among reproductive-aged married women in Sierra Leone has notably increased over the past decade, accompanied by notable reductions in inequalities across age, economic

*Correspondence:
Augustus Osborne
augustusosborne2@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

status, education, place of residence, and geographic provinces. While inequalities persist, the narrowing gaps underscore progress in improving equitable access to contraceptive services. These findings underscore the importance of sustained efforts to address remaining inequalities and further enhance access to family planning resources for all women, particularly those in underserved populations.

Keywords Contraception, Health, Inequality, Sierra Leone, Demographic Health Survey

Text box 1. Contributions to the literature

- By examining inequalities in contraceptive prevalence in Sierra Leone, it contributes to understanding the barriers faced by women in accessing these essential services.
- This study enriches our understanding of family planning, equity, and reproductive health, providing valuable information for policymakers, practitioners, and researchers.
- Inequalities in contraceptive use based on economic status, education, place of residence, and province have all decreased over time in Sierra Leone, suggesting successful interventions to reach marginalized groups.

Introduction

Contraceptive prevalence refers to the percentage of women between the ages of 15 and 49 who presently use contraception or whose sexual partner is currently using contraception [1]. Contraceptive use, defined as the practice of employing various methods or devices to prevent pregnancy during sexual intercourse, encompasses a wide range of approaches, including modern or traditional [2]. Modern contraceptive also referred to as contemporary contraception encompassing female and male sterilisation, intra-uterine devices, implants, injectables, oral contraceptive pills, male and female condoms, vaginal barrier methods (such as the diaphragm, cervical cap, and spermicidal foam, jelly, cream, and sponge), the lactational amenorrhoea method, emergency contraception, and other contemporary methods. Traditional forms of contraception encompasses rhythm approaches (such as fertility awareness-based methods and periodic abstinence), withdrawal, and other conventional techniques [2]. The utilisation of modern contraceptive techniques is a highly effective approach to diminish the likelihood of unwanted pregnancies, empowering women and couples to strategise the number and timing of their offspring [1], unlike traditional methods, which have a relatively low efficacy.

Globally, the utilisation of modern contraception by women experienced an almost twofold increase, rising from 467 million in 1990 to 874 million in 2021 [3]. In 1990, 35% of women utilised a modern form of contraception; while in 2021, this figure rose to 45% [3]. The utilisation of traditional contraceptive techniques among women of reproductive age has increased from 84 million in 1990 to 92 million in 2021, despite a decrease in the proportion from 6% to 5% worldwide [1]. These patterns of contraceptive utilization vary across

regions and countries, especially in sub-Saharan Africa, a region lagging in contraceptive use. For instance, a multi-country study constituting 21 sub-Saharan African countries revealed a contraceptive prevalence of 24.32%, with Chad accounting for the highest prevalence of 66.81% and Zambia the lowest with 5.07% [4]. Cultural restrictions on interaction, lack of access, religious objection, and fear of health risk were drivers of the low contraceptive use reported in that study [4]. In Ethiopia, a study revealed that the overall prevalence of contraceptive use among married women was 53.5% [5]. The authors reported that women with larger family sizes, excellent self-reported health, and those living in higher socioeconomic families were more likely to use contraceptives, whilst living in female-headed households and those over 40 years were less likely to use contraceptives [5].

Sierra Leone, a fragile health country in West Africa, has made remarkable progress in increasing national contraceptive prevalence in recent years [6]. In 2019, the contraceptive prevalence rate (CPR) in Sierra Leone was 24% for all women, 21% for women who were currently married, and 53% for sexually active unmarried women [6]. The predominant modern contraceptive methods employed by women include injectables (9%), implants (7%), and the pill (4%) within the same year [6]. To optimize the use of contraceptives, the Government of Sierra Leone, in collaboration with local and international organisations, has implemented several initiatives to enhance the utilization of contemporary contraception methods. This encompasses initiatives to implement family planning services in healthcare facilities nationwide [7]. Mass media and community outreach programmes aim to rectify misunderstandings and enhance public knowledge of the advantages of family planning [8]. Nevertheless, challenges persist, disproportionately affecting women residing in rural regions who frequently face geographical barriers in accessing these services compared to their urban compatriots [7].

Previous studies in Sierra Leone have examined inequalities in modern contraceptive use [8], the drivers of unmet needs for contraception [9], trends and determinants of modern contraceptive utilization among women aged 15–19 years [10], and determinants of quality contraceptive counselling information among young women [11]. To date, no study has comprehensively examined the trends and inequalities of contraceptive prevalence, combining traditional and modern methods.

This study was conducted to address this knowledge gap. Understanding contraceptive prevalence is crucial for informing public health strategies and improving reproductive health outcomes. By combining traditional and modern contraceptive methods in our research, we can obtain a comprehensive view of contraceptive use patterns and preferences within diverse populations. This approach acknowledges the cultural importance of traditional methods while underscoring the role of modern methods in enhancing contraceptive efficacy and accessibility. Furthermore, it allows for a more nuanced analysis of barriers to contraceptive uptake and informs targeted interventions that respect cultural contexts, ultimately contributing to improved family planning services and better health outcomes. Hence, this study investigates the inequalities in contraceptive prevalence among married women in Sierra Leone from 2008 to 2019 using data from the Sierra Leone Demographic Health Survey (SLDHS). By examining these disparities, the study aims to identify the most significant factors contributing to unequal access to contraception. It also provides valuable evidence to inform policymakers and program implementers in designing targeted interventions to bridge these gaps and ensure equitable access to contraception for all women in Sierra Leone.

Methods

Study design and source

This study employed time-trend study design, reporting contraceptive prevalence among married women of reproductive age, but does not specify whether these rates account for sexual activity as the denominator. The study utilises data extracted from 2008, 2013, and 2019 SLDHS. The SLDHS is a comprehensive national survey designed to detect trends and differentials in demographic indicators, health indicators, and social issues across both genders and age groups. The SLDHS employed a cross-sectional design, selecting women through a stratified multi-stage cluster sampling method and the report comprehensively explains the sampling process [6]. This study included women between 15 and 49 participating in the 2008, 2013, and 2019 SLDHS cycles, and the surveys data were accessible for immediate utilisation through the World Health Organization (WHO) Health Equity Assessment Toolkit (HEAT) online platform [12]. This study was carefully designed by following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline [13].

Variables

The outcome variable used in this study was contraceptive use. Married women who utilised modern and traditional contraceptives were categorised as “yes”, while the non-contraceptive users were classified as “no”. The

assessment of inequality in the prevalence of contraceptives employed five categories: Age was categorised as 15–19 and 20–49 and economic status was assessed based on the wealth quintile, divided into five categories (quintiles 1, 2, 3, 4, 5). The level of education was categorised into three groups: no education, primary education, and secondary/higher education. The place of residence was classified as either rural or urban. The sub-national province was divided into five regions: Eastern, Northern, Northwestern, Southern, and Western.

Data analysis

The study was conducted using the WHO HEAT software [12]. Five exposure variables were used to analyse the utilisation of contraceptive prevalence among married women in Sierra Leone. The characteristics considered include age, socio-economic status, educational attainment, place of residence, and sub-national province. Contraceptive prevalence among married women was assessed by calculating estimates and confidence intervals (CI). The denominator was defined as women who were married or living with a man, aligning with typical practices for assessing contraceptive use in demographic studies. Four metrics were employed to calculate inequality: Difference (D), Population Attributable Risk (PAR), Population Attributable Fraction (PAF), and Ratio (R). Population Attributable Risk (PAR) is a measure that quantifies the proportion of a disease or health outcome in the population that can be attributed to a specific risk factor. Whilst Population Attributable Fraction (PAF) is the proportion of a specific disease or health outcome in the population that can be attributed to a particular risk factor. Two fundamental metrics, D and R, remain unaffected by weight; however, PAR and PAF were altered by weight. R and PAF are measurements that are relative to something else. Nevertheless, D and PAR are unequivocal metrics. The consideration of summary measures were based on the acknowledgement by the WHO that absolute and relative summary measures are crucial for obtaining policy-driven conclusions. Unlike basic measurements, complex measures consider the magnitude of categories within a particular population subset. The literature fully explains the World Health Organization's summary measurements and calculations [14, 15]. Utilizing sample sizes of 5,524 in 2008, 10,902 in 2013, and 9,714 in 2019, HEAT calculated the following metrics:

D, R, PAR, and PAF. Below, we provide definitions, formulae, and examples for each metric, using education as the variable of interest.

1. Difference (D):

The difference in contraceptive prevalence is calculated by subtracting the percentage of contraceptive use in the

disadvantaged group (e.g., women with no formal education) from that in the advantaged group (e.g., women with secondary or higher education). $D = Y_{\text{high}} - Y_{\text{low}}$.

Example If 40% of women with secondary or higher education use contraceptives (Y_{high}) and 20% of women with no formal education use contraceptives (Y_{low}), the difference is: $D = 40 - 20 = 20\%$. This indicates a 20% higher contraceptive prevalence among women with secondary or higher education compared to those with no education.

2. Ratio (R):

The ratio compares contraceptive prevalence in the advantaged group to that in the disadvantaged group.

$$R = Y_{\text{high}} / Y_{\text{low}}.$$

Example Using the same data as above, the ratio is:

$R = 40/20 = 2$. This means that women with secondary or higher education are twice as likely to use contraceptives as those with no formal education.

3. Population Attributable Risk (PAR):

PAR quantifies the absolute difference between the national prevalence of contraceptive use (Y_{ref}) and the prevalence in the reference (advantaged) category.

$$PAR = Y_{\text{ref}} - Y_{\text{high}}.$$

Example If the national prevalence of contraceptive use (Y_{ref}) is 30% and the prevalence among women with secondary or higher education (Y_{high}) is 40%, the PAR is:

$PAR = 30 - 40 = -10\%$. This negative value indicates that the national prevalence is 10% points lower than the prevalence in the advantaged group.

4. Population Attributable Fraction (PAF):

PAF reflects the proportion of inequality in contraceptive use attributable to the reference group. It is calculated by dividing the PAR by the national prevalence (Y_{ref}).

$$PAF = PAR / Y_{\text{ref}}.$$

Example Using the same data, where $PAR = -10\%$ and $Y_{\text{ref}} = 30\%$, the PAF is:

$PAF = -10/30 = -0.33$ or -33% . This indicates that 33% of the inequality in contraceptive prevalence is attributable to differences associated with education.

Results

Trends in contraceptive prevalence among married women in Sierra Leone, 2008–2019

Table 1 shows the trends in contraceptive prevalence among married women in Sierra Leone from 2008 to 2019. The national prevalence of contraceptive use increased notably from 8.2% in 2008 to 21.2% in 2019. Younger married women (15–19) have shown an increase

Table 1 Trends in contraceptive prevalence among married women in Sierra Leone by different inequality dimensions, 2008–2019

Dimension	2008		2013		2019	
	N	% (LB-UB)	N	%. (LB-UB)	N	%. (LB-UB)
Age						
15–19	358	1.1 (0.3–4.3)	729	7.7 (5.7–10.3)	477	14.3 (11.1–18.3)
20–49	5166	8.6 (7.6–9.8)	10,173	17.2 (15.9–18.6)	9237	21.5 (20.3–22.9)
Economic status						
Quintile 1 (poorest)	1178	4.4 (3.1–6.0)	2341	12.5 (10.6–14.5)	2079	16.1 (14.4–18.0)
Quintile 2	1143	3.5 (2.4–5.0)	2323	12.0 (10.3–13.9)	2134	18.3 (16.0–21.0)
Quintile 3	1185	4.5 (3.3–6.1)	2306	12.7 (10.9–14.9)	1979	20.9 (18.5–23.4)
Quintile 4	1050	10.6 (8.7–12.8)	2086	20.4 (18.0–22.9)	1770	26.2 (24.1–28.4)
Quintile 5 (richest)	966	20.1 (16.7–24.0)	1845	28.1 (24.9–31.4)	1750	26.0 (23.0–29.3)
Education						
No education	4280	5.7 (4.9–6.6)	7869	14.2 (12.9–15.6)	5956	17.0 (15.7–18.4)
Primary education	601	10.8 (8.3–13.9)	1425	19.2 (16.7–21.9)	1297	24.6 (21.6–27.8)
Secondary or higher education	643	22.2 (18.7–26.2)	1607	25.9 (22.9–29.1)	2460	29.6 (27.4–32.0)
Place of residence						
Rural	3964	5.0 (4.2–5.9)	7980	12.9 (11.7–14.3)	6136	18.4 (16.9–20.1)
Urban	1560	16.2 (13.6–19.2)	2922	26.5 (23.9–29.4)	3578	25.9 (23.9–28.0)
Region						
Eastern	1027	6.1 (4.7–7.8)	2557	17.3 (15.1–19.7)	2007	23.7 (21.1–26.5)
Northern	2434	4.3 (3.5–5.4)	4398	12.2 (10.4–14.3)	2172	18.0 (15.2–21.3)
Northwestern	NA	NA	NA	NA	1760	16.0 (13.6–18.6)
Southern	1205	8.4 (6.6–10.6)	2434	17.2 (15.1–19.5)	1894	23.6 (21.1–26.4)
Western	857	21.1 (17.5–25.2)	1512	27.1 (22.7–31.9)	1880	24.6 (21.7–27.9)

Table 2 Inequality of estimates in contraceptive prevalence among married women in Sierra Leone, 2008–2019

Dimension	2008			2013			2019		
	Est.	LB	UB	Est.	LB	UB	Est.	LB	UB
Age(25–49 age group minus 15–19 age group)									
D	7.5	5.6	9.3	9.5	6.8	12.1	7.2	3.4	11.0
PAF	5.9	5.9	5.9	3.8	3.8	3.8	1.6	1.6	1.6
PAR	0.4	0.3	0.5	0.6	0.4	0.7	0.3	0.1	0.5
R	7.3	1.9	27.0	2.2	1.6	3.0	1.5	1.1	1.9
Economic status(Richest minus poorest)									
D	15.7	11.8	19.6	15.6	11.8	19.3	9.9	6.2	13.5
PAF	146.0	145.8	146.3	69.0	68.9	69.1	22.8	22.7	22.9
PAR	11.9	9.9	14.0	11.4	9.6	13.2	4.8	3.0	6.6
R	4.5	3.1	6.6	2.2	1.8	2.7	1.6	1.3	1.9
Education(Secondary or higher education minus no education)									
D	16.5	12.7	20.3	11.7	8.3	15.0	12.6	9.9	15.3
PAF	171.6	171.3	172.0	56.0	55.9	56.1	39.7	39.6	39.7
PAR	14.0	11.3	16.8	9.3	7.4	11.2	8.4	6.9	9.9
R	3.9	3.1	4.8	1.8	1.5	2.1	1.7	1.5	1.9
Place of residence(Urban minus rural)									
D	11.2	8.2	14.1	13.6	10.5	16.6	7.4	4.8	10.0
PAF	98.0	97.8	98.2	59.9	59.8	59.9	22.1	22.1	22.2
PAR	8.0	6.7	9.3	9.9	8.6	11.2	4.7	3.6	5.7
R	3.2	2.5	4.1	2.0	1.7	2.3	1.4	1.2	1.5
Region (Western area minus Northwestern region)									
D	16.7	12.7	20.7	14.8	9.8	19.7	8.6	4.7	12.6
PAF	157.7	157.4	158.0	63.0	62.9	63.1	16.2	16.1	16.3
PAR	12.9	10.7	15.1	10.4	8.4	12.4	3.4	1.7	5.1
R	4.8	3.6	6.4	2.2	1.7	2.7	1.5	1.2	1.8

in contraceptive use by 13.2%, from 1.1% in 2008 to 14.3% in 2019, compared with their older counterpart (20–49) increasing by 12.9%, from 8.6 to 21.5% in that same period. There is a clear gradient with economic status; with every wealth quintile increasing across the survey years, with married women in the richer quintiles having the highest contraceptive prevalence increasing from 20.1% in 2008 to 26.0% in 2019. However, married women in the poorest quintile experienced the lowest increase, increasing from 4.4 to 16.1%. Despite married women in quintile 5 showing the highest contraceptive prevalence overtime, the greatest improvement was observed among married women in the middle class (quintile 3), increasing by 16.4%, from 4.5% in 2008 to 20.9% in 2019, followed by their counterpart in quintile 4, increasing by 15.6%, from 10.6 to 26.2%, in that same period.

Education appears to have a strong influence on contraceptive use. Married women with secondary or higher education had the highest contraceptive prevalence throughout the years, increasing from 22.2% in 2008 to 29.6% in 2019, while those with no education showed the lowest prevalence of contraceptive use throughout the years. The greatest improvement in contraceptive prevalence was observed among married women with primary education, increasing by 13.8%, from 10.8% in 2008 to 24.6% in 2019.

Urban areas have a consistently higher prevalence of contraceptive use compared to rural areas. In 2019, the prevalence of contraceptive use among married women who resided in urban areas was 25.9% compared to their counterparts in rural areas with 18.4%. There are regional disparities in contraceptive use. Married women who resided in the Western area, encompassing the capital city of Freetown, consistently exhibited the highest contraceptive prevalence across the survey years, with a peak in 2019 at 24.6%. Those who resided in the Northwestern region (excluding the surveys of 2008 and 2013 due to its establishment after these assessments period) recorded a contraceptive prevalence of 16.0% in 2019. The Eastern region showed the most notable improvement increasing by 17.6%, from 6.1% in 2008 to 23.7% in 2019.

Inequalities in contraceptive prevalence among married women in Sierra Leone, 2008–2019

Table 2 shows inequality of contraceptive prevalence among married women in Sierra Leone from 2008 to 2019. The D in age in contraceptive prevalence decreased slightly from 2008 to 2019. The PAF and PAR both decreased significantly, with PAF decreasing from 5.9% to 1.6% whilst PAR decreased from 0.4% to 0.1%. The confidence intervals for both dimensions suggest the decrease

were statistically significant. The ratio also decreased from 7.3 in 2008 to 1.5 in 2019, with the confidence intervals suggesting a statistically significant association, disproportionately affecting the married women aged 15–19 years.

The D in economic status decreased from 15.7% points in 2008 to 9.9% points in 2019. The confidence intervals suggest the differences were statistically significant. Both the PAF and PAR decreased significantly, with PAF decreasing from 146% to 22.8%, whilst the PAR decreased from 11.9% to 4.8% between 2008 and 2019, respectively. The confidence interval for both dimensions (PAF and PAR) were statistically significant. The ratio also decreased from 4.5 to 1.6 between 2008 and 2019, however, inequality persisted disproportionately affecting married women in poorest quintile. For educational status, the D decreased from 16.5% points in 2008 to 11.7% points in 2013 and slight increased to 12.6 in 2019. The confidence interval shows the differences were statistically significant. The PAF decreased from 171.6% to 39.7% between 2008 and 2019, whilst the PAR also decreased from 14.0% points to 8.4% points. The confidence intervals for both PAF and PAR shows the difference were statistically significant. Furthermore, the ratio also decreased from 3.9 to 1.7, and the confidence intervals shows the decrease was statistically significant, disproportionately affecting married women with no education.

The D and ratio for place of residence decreased over time, with D decreasing from 11.2% points in 2008 to 7.4% points in 2019; and the confidence intervals suggest the decrease in difference was statistically significant. For PAF and PAR, both decrease significantly with PAF decreasing from 98.0% in 2008 to 22.1% in 2019, whilst the PAR decreased from 8.0% to 4.7% in that same period. The confidence intervals for both dimensions (PAF and PAR) suggest the decrease was statistically significant. The ratio decreased from 3.2 to 1.4 between the same period, and the confidence interval suggest the differences were statistically significant, disproportionately affecting married women residing in the rural areas.

At the regional level, the D decreased from 16.7% points in 2008 to 8.6% points in 2019, and the confidence intervals suggest this decrease were statistically significant. The PAF and PAR both decreased overtime, with PAF decreasing from 157.7% in 2008 to 16.2% in 2019, whilst the PAR decreased from 12.9% to 3.4% within the same period. The confidence intervals for both PAF and PAR suggest the decrease were statistically significant. The ratio also decreased from 4.8 to 1.5 between 2008 and 2019, and the confidence intervals suggest the decrease were statistically significant.

Discussion

This study examines inequalities in contraceptive prevalence among married women of reproductive age in Sierra Leone between 2008 and 2019. The prevalence of contraceptive increased from 8.2% in 2008 to 21.2% in 2019. Inequalities in contraceptive prevalence based on economic status, education, place of residence, and region decreased over time.

The increase in contraceptive prevalence among married women in Sierra Leone from 2008 to 2019 could be attributed to several factors including government commitment to family planning through policy changes that prioritize access to contraceptives and reproductive health services [7]. This include increased funding for family planning programs, streamlining service delivery pathways, or removing legal barriers to contraceptive access. The expansion of family planning programs to reach more women across the country could be an important factor [8]. This involve establishing new clinics or mobile health services, particularly in underserved rural areas. A wider range of safe and effective contraceptive methods becoming more readily available in health facilities and pharmacies could have contributed to the rise in use [16]. Increased public awareness campaigns through radio, television, or community outreach programs could have improved knowledge about contraception and its benefits [17].

Married women aged 20–49 in Sierra Leone had a higher prevalence of contraceptive compared to younger women. This finding aligns with a previous study in Ghana [18]. Younger women may have limited access to comprehensive sex education, leaving them with insufficient knowledge about contraception, the options available, and their benefits [19, 20]. The social stigma surrounding adolescent sexuality and family planning discussions could discourage young women from seeking information or discussing contraception with healthcare providers or family members [20, 21]. Healthcare facilities might not have dedicated youth-friendly services or counselling specifically tailored to the needs and concerns of younger adolescents [22, 23]. Another critical factor that likely contributed to the higher prevalence of contraceptive use among women aged 20–49, compared to their counterparts aged 15–19, is the desire for birth spacing and the postponement of pregnancy for various reasons. Women in the 20–49 age group are typically at their most productive stage and are often engaged in income-generating activities or pursuing higher education. As a result, they view contraceptive use as a vital strategy for preventing unintended pregnancies, recognizing that such pregnancies could diminish their productivity and adversely impact their ability to generate income for themselves and their families. This perspective likely accounts for the increased contraceptive use

observed among women aged 20–49 in this study. To address this gap, implementing comprehensive sex education programs in schools or youth centers can improve knowledge about contraception and empower young women to make informed choices. Establishing dedicated youth-friendly clinics with trained providers who can offer confidential counselling and a wider range of contraceptive options without age restrictions (where applicable) could improve access. Developing targeted information campaigns for young people using accessible platforms like social media or youth-oriented television shows can improve awareness and address misconceptions. By addressing these challenges and creating a more supportive environment, Sierra Leone can foster progress in closing the gap in contraceptive use between younger adolescents and women aged 20–49.

Women from wealthier quintiles in Sierra Leone have a higher prevalence of contraceptive use compared to poorer women. This finding aligns with a previous study in Brazil [24]. Even with government efforts, some contraceptive methods might still require user fees, which can be a significant barrier for women with limited financial resources [25, 26]. Travelling to healthcare facilities offering family planning services, especially in rural areas, can involve transportation costs that poorer women might struggle to afford [27]. Poorer women are more likely to live in remote rural areas with limited access to healthcare facilities and family planning services compared to richer women in urban areas [28]. Women from poorer backgrounds might have lower levels of education, limiting their knowledge about contraception options available and their benefits [29, 30]. Consequently, the need for contraceptive use among this disadvantage group (poorer women) are often left unmet, likely resulting in the low prevalence of contraceptive use observed in this study. This low prevalence of contraceptive use poses a significant risk of unwanted pregnancy and contracting sexually transmitted infection. Considering almost 60% of the Sierra Leonean population live below \$1 per day by end of 2024, it is imperative for government with support from health development partners to take proactive actions to enhance the easy accessibility and use of contraceptive among disadvantage population (poorer women). To address this gap, government or donor-funded programs should subsidize or eliminate user fees for contraception to make it more accessible for poorer women. Expanding mobile outreach clinics or community-based service delivery can bring family planning services closer to women in remote areas. Engaging local women's groups and community health workers can promote awareness about contraception and address social and cultural barriers within communities. By implementing these strategies and addressing the various financial, access, knowledge, and social barriers faced by

poorer women, Sierra Leone can work towards achieving greater equity in contraceptive use across all economic backgrounds.

Women in the western area of Sierra Leone have a higher contraceptive prevalence than those in the northern region. The western area, hosting the capital city named Freetown is urbanized than the North. Urban areas often have a higher concentration of healthcare facilities and family planning services, making them more accessible to women [31]. The western area have better infrastructure and transportation networks, enabling women to travel more easily to clinics or service points offering contraception [32]. The western area have a higher average income compared to the North. This could translate to women having more financial resources to pay for user fees, transportation costs, or preferred contraceptive methods [8]. Women in the Western area have greater exposure to information campaigns about family planning through radio, television, or community outreach programs than those in the North [32]. Furthermore, the observed higher prevalence of contraceptive use among women in the Western area, as compared to their counterparts in the Northern province, might be attributed to several factors related to socioeconomic engagement. Women in the Western area are frequently involved in various socioeconomic activities, which enhances their perception of contraceptive use as a crucial strategy for mitigating the risk of unintended pregnancies. This perception is further influenced by concerns that pregnancy could adversely affect their ability to perform daily tasks essential for income generation, thereby increasing their motivation to utilize contraceptive methods. In contrast, women in other regions, particularly the Northern province, encounter socioeconomic and cultural barriers that hinder their access to contraceptive use. These barriers are often exacerbated by spousal disapproval, as women who seek to use contraceptives are often perceived as disloyal. Such cultural perceptions create substantial obstacles to contraceptive acceptance and utilization, thereby contributing to the disparities observed in this region. To address this disparity, there should be increased investment in healthcare facilities, mobile clinics, and trained providers in the North, which can improve access to family planning services. Developing culturally sensitive information campaigns in local languages specifically for the northern province can raise awareness about contraception and address misconceptions. Engaging with local religious leaders and community influencers can promote dialogue and address social and cultural barriers to family planning in the North. Considering regional variations in user fees or implementing targeted subsidy programs for contraception in the North can make it more accessible. By improving service availability, addressing knowledge

gaps, promoting open dialogue within communities, and potentially mitigating financial barriers, Sierra Leone can work towards reducing disparities in contraceptive use between the western and northern provinces.

Limitations of the analysis

The reliance on overall contraceptive prevalence as the primary outcome measure limits the ability to answer key questions about the drivers of changes in contraceptive use. For example, the analysis does not explore whether the observed increase in contraceptive prevalence reflects a reduction in unmet need for contraception or a shift in women's fertility preferences, such as a greater desire to limit rather than space births. Similarly, the study does not examine the types of contraceptive methods being used, which could provide insights into whether women are accessing a broader range of options or whether certain methods are more accessible than others. Additionally, the analysis does not adjust for potential confounders such as age, marital status, parity, or sexual activity, which could influence contraceptive use. This limits the ability to fully understand the complex relationships between these factors and contraceptive behavior. Future research incorporating multivariate analyses and additional dimensions of contraceptive use would provide a more comprehensive understanding of these dynamics.

Speculations and programmatic context

Despite these limitations, it is possible to make some educated speculations about the factors contributing to the observed trends in contraceptive use based on programmatic and policy changes in Sierra Leone and similar contexts.

Government commitment to family planning

The increase in contraceptive prevalence likely reflects the Sierra Leone government's commitment to improving access to family planning services. Policy changes prioritizing reproductive health, such as the National Family Planning Costed Implementation Plan (2018–2022), may have played a critical role [7]. These efforts likely included increasing funding for family planning programs, expanding service delivery networks, and addressing legal or logistical barriers to contraceptive access. Similar trends have been observed in countries such as Rwanda and Ethiopia, where strong government leadership and investments in family planning have led to substantial increases in contraceptive use [33].

Expansion of service delivery

The expansion of family planning services to underserved areas, particularly rural areas, may have contributed to the observed reduction in regional and socio-economic

disparities. Mobile health clinics, community-based distribution programs, and task-shifting initiatives to train lower-level health workers in providing contraceptive services are strategies that have been successfully implemented in other low-income countries and may have been adopted in Sierra Leone [34].

Increased availability of contraceptive methods

The availability of a wider range of contraceptive methods in health facilities and pharmacies could have improved access and choice for women. Evidence from other countries suggests that expanding the method mix can lead to increased contraceptive prevalence, as women are more likely to find a method that suits their needs and preferences [35].

Public awareness campaigns

Increased public awareness campaigns through radio, television, and community outreach programs may have played a role in improving knowledge about contraception and its benefits. Similar campaigns in low- and middle-income countries have been shown to increase contraceptive uptake and reduce stigma associated with family planning [36].

Persistent gaps among adolescents

The persistent disparity in contraceptive prevalence among adolescents (15–19) may reflect unique barriers faced by this age group, including limited access to youth-friendly services, insufficient sex education, and social stigma surrounding adolescent sexuality. Addressing these challenges requires targeted interventions, such as school-based comprehensive sex education programs, youth-friendly clinics, and confidential counseling services. Evidence from Ghana suggests that such interventions can significantly improve contraceptive use among adolescents [37].

Economic and social barriers

Despite progress, married women from poorer quintiles still have lower contraceptive prevalence than wealthier women. This may reflect financial barriers, such as user fees for contraceptives and transportation costs, as well as social and cultural factors that limit access to family planning services. Addressing these barriers requires targeted subsidies, mobile outreach programs, and community engagement initiatives to promote awareness and reduce stigma.

Conclusion

The prevalence of contraceptive in Sierra Leone more than doubled between 2008 and 2019, with notable reductions in disparities based on age, economic status, education, place of residence, and province. Efforts

to improve contraceptive use in Sierra Leone should focus on expanding access to youth-friendly services, implementing comprehensive sex education programs, and addressing financial barriers such as user fees and transportation costs. Additionally, increasing investment in healthcare infrastructure and outreach programs in underserved areas, coupled with culturally sensitive awareness campaigns, can help close remaining gaps in access and knowledge. While this study provides valuable insights into overall contraceptive prevalence and inequalities, future research should explore unmet need for contraception, fertility preferences, and method mix to provide a more nuanced understanding of contraceptive behavior. Sustained efforts to monitor progress and evaluate the effectiveness of family planning programs will be essential to achieving equitable access to reproductive health services for all women in Sierra Leone.

Abbreviations

D	Difference
HEAT	Health equity assessment toolkit
DHS	Demographic health survey
PAF	Population attributable fraction
PAR	Population attributable risk
R	Ratio
SDG	Sustainable development goal
WHO	World health organization

Acknowledgements

We are grateful to MEASURE DHS and the World Health Organization for making the dataset and the HEAT software accessible.

Author contributions

AO and CB contributed to the study design and conceptualisation. AO and CB performed the analysis. AO and CB developed the initial draft. US critically reviewed the manuscript and provided valuable insights into the study methodology, analysis, and interpretation of the findings. All the authors critically reviewed the manuscript for its intellectual content. All authors read and amended drafts of the paper and approved of the final version. AO had the final responsibility of submitting it for publication.

Funding

This study received no funding.

Data availability

The dataset used can be accessed at <https://whoequity.shinyapps.io/heat/>.

Declarations

Ethics approval and consent to participate

This study did not seek ethical clearance since the WHO HEAT software and the dataset are freely available in the public domain.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Biological Sciences, School of Basic Sciences, Njala University, PMB, Freetown, Sierra Leone

²African Field Epidemiology Network, Freetown, Sierra Leone

³Africa Centers for Disease Control and Prevention, Addis Ababa, Ethiopia

Received: 20 June 2024 / Accepted: 8 June 2025

Published online: 18 June 2025

References

1. United Nations Department of Economic and Social Affairs, Population Division. (2022). World family planning 2022: meeting the changing needs for family planning: contraceptive use by age and method. UN DESA/POP/2022/TR/NO. 4 (https://www.un.org/development/desa/pd/sites/www.un.org/development/desa/pd/files/files/documents/2023/Feb/undesa_pd_2022_worl-d-family-planning.pdf)
2. Hubacher D, Trussell J. A definition of modern contraceptive methods. *Contraception*. 2015;92(5):420–1.
3. D'Souza P, Bailey JV, Stephenson J, Oliver S. Factors influencing contraception choice and use globally: a synthesis of systematic reviews. *Eur J Contracept Reproductive Health Care*. 2022;27(5):364–72.
4. Donkoh IE, Okyere J, Seidu AA, Ahinkorah BO, Aboagye RG, Yaya S. Association between knowledge and use of contraceptive among women of reproductive age in sub-Saharan Africa. *Health Sci Rep*. 2024;7(5):e2028.
5. Berhane HY, Abdelmenan S, Workneh F, Tewahido D, Shifraw T, Yibeltal K, Tarekegn W, Fasil N, Wang D, Partap U, Fawzi W. Socio-Economic determinants of contraceptive use among married women in the addis urban health and demographic surveillance system (Addis-HDSS) in Ethiopia. *Ethiop J Health Sci*. 2024;34.
6. Statistics Sierra Leone - StatsSL, ICF. Sierra Leone demographic and health survey 2019. *StatsSL/ICF*. 2020.
7. Family Planning. UNFPA Sierra Leone. Available from: <https://sierraleone.unfpa.org/en/topics/family-planning-6> 2017 [cited 2024 Jun 10].
8. Osborne A, Bangura C, Ahinkorah BO. Trends and inequalities in modern contraceptive use among women in Sierra Leone, 2008–2019. *Reproductive Health*. 2024;21(1):167.
9. Osborne A, James PB, Bangura C, Kangbai JB. Exploring the drivers of unmet need for contraception among adolescents and young women in Sierra Leone. A cross-sectional study. *Contracept Reproductive Med*. 2024;9(1):25.
10. Olal E, Grovogui FM, Nantale R, Sserwanja Q, Nakazwe C, Nuwabaine L, Mukunya D, Ikoona EN, Benova L. Trends and determinants of modern contraceptive utilisation among adolescent girls aged 15–19 years in Sierra Leone: an analysis of demographic and health surveys, 2008–2019. *J Global Health Rep*. 2023;7:1.
11. Sserwanja Q, Nuwabaine L, Kamara K, Musaba MW. Determinants of quality contraceptive counselling information among young women in Sierra Leone: insights from the 2019 Sierra Leone demographic health survey. *BMC Womens Health*. 2023;23(1):266.
12. Health Equity Assessment Toolkit (HEAT). Software for exploring and comparing health inequalities in countries. In: Built-in database edition. Version 6.0. Geneva: World Health Organization; 2024.
13. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Int J Surg*. 2014;12(12):1495–9.
14. WHO. Handbook on health inequality monitoring with a special focus on low and middle-income countries. Geneva World Health Organization; 2013.
15. Hosseinpoor AR, Nambiar D, Schlottheuber A, Reidpath D, Ross Z. Health equity assessment toolkit (HEAT): software for exploring and comparing health inequalities in countries. *BMC Med Res Methodol*. 2016;16(1):1–10.
16. Corroon M, Kebede E, Spektor G, Speizer I. Key role of drug shops and pharmacies for family planning in urban Nigeria and Kenya. *Global Health: Sci Pract*. 2016;4(4):594–609.
17. The Impact of Mass Media and Family Planning Campaigns on Contraception Use in Burkina Faso [The Abdul Latif Jameel Poverty Action Lab. Available from: <https://www.povertyactionlab.org/evaluation/impact-mass-media-and-family-planning-campaigns-contraception-use-burkina-faso> 2015 [cited 2024 Jun 11].
18. Appiah F, Seidu AA, Ahinkorah BO, Baatiema L, Ameyaw EK. Trends and determinants of contraceptive use among female adolescents in Ghana: analysis of 2003–2014 demographic and health surveys. *SSM-population Health*. 2020;1(10):100554.
19. Chandra-Mouli V, Akwara E. Improving access to and use of contraception by adolescents: what progress has been made, what lessons have been learnt, and what are the implications for action? *Best Pract Res Clin Obstet Gynecol*. 2020;66:107–18.

20. Janighorban M, Boroumandfar Z, Pourkazemi R, Mostafavi F. Barriers to vulnerable adolescent girls' access to sexual and reproductive health. *BMC Public Health*. 2022;22(1):2212.
21. Baigry MI, Ray R, Lindsay D, Kelly-Hanku A, Redman-MacLaren M. Barriers and enablers to young people accessing sexual and reproductive health services in Pacific island countries and territories: a scoping review. *PLoS ONE*. 2023;18(1):e0280667.
22. Lawrence RS, Gootman JA, Sim LJ, National Research Council. Current adolescent health services, settings, and providers. In *Adolescent health services: missing opportunities 2009*. National Academies Press (US).
23. DeCosta D. Adolescent and Youth-Friendly Health Services [The Challenge Initiative. Tciurbanhealth.org. Available from: <https://tciurbanhealth.org/courses/adolescent-youth-sexual-reproductive-health-services-supply/lessons/adolescent-and-youth-friendly-services-3/> 2017 [cited 2024 Jun 11].
24. Machado AK, Gräf DD, Höfs F, Hellwig F, Barros KS, Moreira LR, Crespo PA, Silveira MF. Prevalence and inequalities in contraceptive use among adolescents and young women: data from a birth cohort in Brazil. *Cad Saude Publica*. 2021;12(37):e00335720.
25. Korachais C, Macouillard E, Meessen B. How user fees influence contraception in low and middle-income countries: a systematic review. *Stud Fam Plann*. 2016;47(4):341–56.
26. Tiendrebeogo CO, Joseph V, Bicaba F, Bila A, Bicaba A, Druetz T. Does abolishing user fees for family planning increase contraception use? An impact evaluation of the national policy in Burkina Faso. *J Global Health*. 2022;12.
27. Ngacha JK, Ayah R. Assessing the cost-effectiveness of contraceptive methods from a health provider perspective: case study of Kiambu County hospital, Kenya. *Reproductive Health*. 2022;19(1):11.
28. Samuel O, Zewotir T, North D. Decomposing the urban-rural inequalities in the utilisation of maternal health care services: evidence from 27 selected countries in sub-Saharan Africa. *Reproductive Health*. 2021;18:1–2.
29. Dehlendorf C, Rodriguez MI, Levy K, Borrero S, Steinauer J. Disparities in family planning. *Am J Obstet Gynecol*. 2010;202(3):214–20.
30. Makumbi FE, Nabukeera S, Tumwesigye NM, Namanda C, Atuyambe L, Mukose A, Ssali S, Ssenyonga R, Tweheyo R, Gidudu A, Sekimpi C. Socio-economic and education related inequities in use of modern contraceptive in seven sub-regions in Uganda. *BMC Health Serv Res*. 2023;23(1):201.
31. LEONE SI. Joseph M Macarthy (PhD) Abu Conteh. 2018.
32. Sserwanja Q, Turimumahoro P, Nuwabaine L, Kamara K, Musaba MW. Association between exposure to family planning messages on different mass media channels and the utilisation of modern contraceptives among young women in Sierra Leone: insights from the 2019 Sierra Leone demographic health survey. *BMC Womens Health*. 2022;22(1):376.
33. Hellwig F, Moreira LR, Silveira MF, Vieira CS, Rios-Quitizaca PB, Masabanda M, Serucaca J, Rudasingwa S, Nyandwi A, Mulu S, Rashad H. Policies for expanding family planning coverage: lessons from five successful countries. *Front Public Health*. 2024;12:1339725.
34. Perry HB, Sachs JD. The investment case for strengthening primary healthcare and community health worker programs in low-and lower-middle-income countries. In *Oxford Res Encyclopedia Global Public Health 2024* Jul 17.
35. Jain R, Muralidhar S. Contraceptive methods: needs, options and utilization. *J Obstet Gynecol India*. 2011;61:626–34.
36. Rogers D, Snyder LB, Rego M. The impact of mass media-delivered family planning campaigns in low-and middle-income countries: a meta-analysis of advertising and entertainment-education format effects. *Stud Fam Plann*. 2021;52(4):439–65.
37. Aninanya GA, Debpuur CY, Awine T, Williams JE, Hodgson A, Howard N. Effects of an adolescent sexual and reproductive health intervention on health service usage by young people in northern Ghana: a community-randomised trial. *PLoS ONE*. 2015;10(4):e0125267.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.