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Geographical Inequalities in Teenage Pregnancy in Nigeria: Evidence from the Nigeria Demographic and Health Survey

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Abstract Teenage pregnancy remains a major public health and socio-economic challenge in Nigeria, with persistent inequalities across socio-demographic groups and regions. This study assessed the prevalence, socioeconomic distribution, and determinants of teenage pregnancy between 2013 and 2018, focusing on rural–urban and regional disparities. The study employed a cross-sectional analytical design using nationally representative data from the 2013 and 2018 Nigeria Demographic Health Survey. The study population comprised adolescent girls aged 15–19 years. Data from 16,328 female adolescents aged 15–19 years were drawn from the 2013 and 2018 NDHS. The Erreygers normalized concentration index (ECI) and concentration curves were used to quantify and visualize the magnitude of geographical inequality in teenage pregnancy. Decomposition analysis following Wagstaff et al. (2003) and Erreygers (2009) was conducted to identify factors contributing to the observed inequalities. All analyses were weighted using NDHS sampling weights to ensure national representativeness. The findings showed a consistent pro-poor concentration of teenage pregnancy across both survey years, with higher prevalence among adolescents in poorer households and rural areas. Geographical analysis showed pronounced regional disparities, with the North-West and North-East regions recording the highest rates of teenage pregnancy, while the South-West exhibited the lowest. Decomposition results indicated that educational attainment, household wealth, and marital status were the dominant contributors to the observed geographical and socioeconomic inequalities. Although the magnitude of inequality slightly declined between 2013 and 2018, disparities remained substantial. The study highlights persistent geographical and socioeconomic inequalities in teenage pregnancy in Nigeria, predominantly disadvantaging adolescents in poor and rural communities. Targeted interventions aimed at improving girls' education, economic empowerment, and access to adolescent-friendly reproductive health services are essential to reduce these disparities and achieve equitable reproductive health outcomes across regions.

Keywords Teenage Pregnancy, Geographical Inequalities, Reproductive Health, Decomposition analysis, Contraceptive use

1. Introduction

Teenage pregnancy, defined as pregnancy among girls aged 15–19 years, remains a significant global public health and socio-economic concern. Each year, approximately 21 million girls in developing regions become pregnant, with 16 million giving birth [1,2]. These pregnancies contribute substantially to maternal and child morbidity and mortality, with complications of pregnancy and childbirth remaining the leading cause of death among adolescent girls worldwide [3,4]. Beyond health risks, teenage pregnancy often leads to school dropout, limited economic opportunities, and intergenerational cycles of poverty, thereby hindering global progress toward the Sustainable Development Goals (SDGs) [5,6].

In sub-Saharan Africa, teenage pregnancy is particularly prevalent, accounting for nearly half of adolescent births worldwide [7,8]. The high rates in this region are linked to entrenched poverty, gender inequality, early marriage, and limited access to reproductive health services [9]. In many communities, adolescent fertility is normalized, reflecting cultural expectations around marriage and childbearing. This regional burden has wide-ranging implications for human capital development and socio-economic growth [10,11].

Nigeria, the most populous country in Africa, exemplifies the challenges posed by adolescent fertility. According to

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the 2018 Nigeria Demographic and Health Survey (NDHS), 19% of adolescent girls aged 15–19 years had begun childbearing, 14% had given birth, and 4% were pregnant with their first child [12]. However, this national average conceals stark geographical inequalities. In the North West, nearly one-third (29%) of adolescents had begun childbearing, compared with only 6% in the South West [13,14]. Similarly, rural adolescents (27%) were almost three times more likely to have begun childbearing than their urban counterparts (10%). These disparities demonstrate the strong influence of geography, region, and place of residence on adolescent fertility patterns in Nigeria [15,16].

The implications of these inequalities are far-reaching. Teenage mothers in high-prevalence regions, particularly in rural and northern Nigeria, face greater barriers to healthcare, education, and economic opportunities. Their children are also at higher risk of neonatal mortality, malnutrition, and poor educational outcomes [17,18]. Persistent geographical disparities in adolescent fertility not only undermine health equity but also slow Nigeria's progress toward SDGs 3 (health), 4 (education), and 5 (gender equality) [19,20]. Despite various government and non-governmental interventions, including efforts to expand contraceptive access and promote girls' education [21,22], teenage pregnancy rates remain high, with inequalities largely unchanged [2]. While previous studies have highlighted the overall prevalence of teenage pregnancy, fewer have systematically examined its geographical dimensions using nationally representative datasets. Therefore, this study assessed geographical inequalities in teenage pregnancy in Nigeria using evidence from the Nigeria Demographic and Health Survey to understand how teenage pregnancy varies across regions and between rural and urban populations, which is critical for designing targeted, context-specific interventions.

This conceptual framework illustrates how socioeconomic and regional factors interact to influence teenage pregnancy in Nigeria. Grounded in the Social Determinants of Health perspective, it posits that adolescents' reproductive outcomes are shaped by the socioeconomic conditions in which they live [1]. Socioeconomic factors, such as household income, parental education, and employment opportunities, affect access to schooling, autonomy, and reproductive health information, thereby shaping vulnerability to early pregnancy [5]. Regional factors, particularly urban–rural disparities, cultural norms, and infrastructural differences, further condition adolescents' exposure to risk. Rural areas often experience limited access to contraception and adolescent-friendly services [12].

The framework also highlights the mediating role of access to sexual and reproductive health services, education, peer influences, and policy implementation, which help explain how broader social and regional inequalities translate into adolescent fertility patterns [19]. Teenage pregnancy emerges as the final outcome of these intersecting determinants, with well-documented consequences such as school dropout, health complications, and intergenerational poverty [15]. The framework reveals that teenage pregnancy is not merely a product of individual behavior but a reflection of structural and contextual inequalities, underscoring the need for multisectoral interventions that address both socioeconomic deprivation and regional disparities.

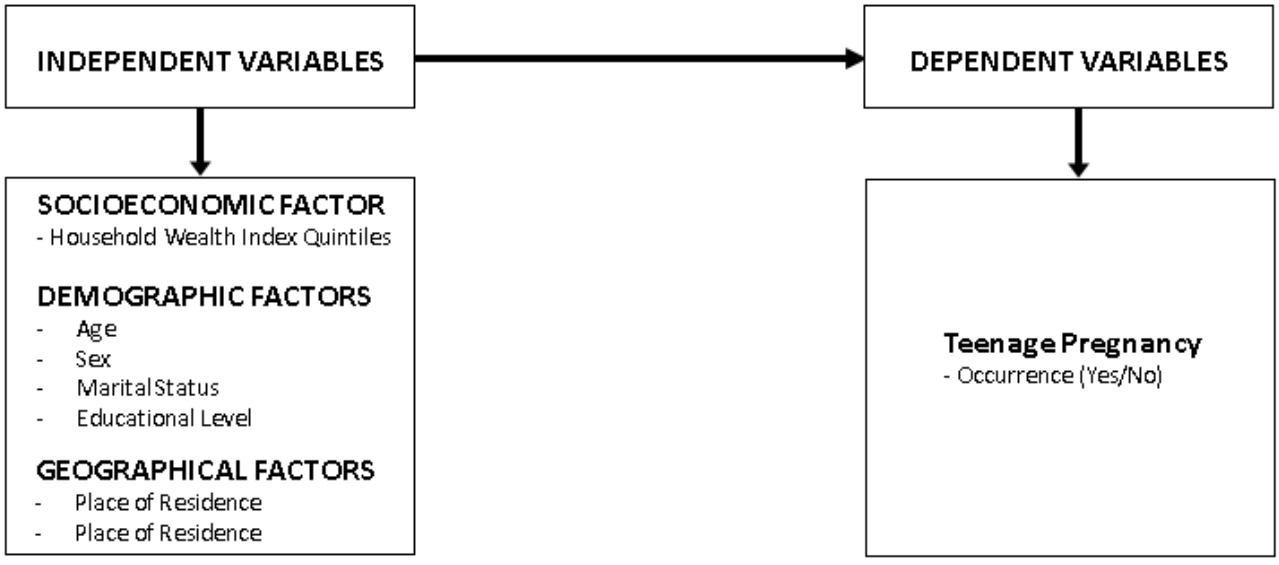

Figure 1. Conceptual framework. Source: Author's illustration based on literature review

2. Methods

2.1. Study Area, Data, and Data Source

The study area is Nigeria, with an estimated population of 198 million in 2018 [23]. About 70% of the population resides in rural areas, while only about 30% live in urban areas. With 32.4% of the population below the age of 18 years and over 23% adolescents/teenagers, Nigeria has a large youth population [2]. Administratively, the country is divided into six geopolitical zones: North Central, North East, North West, South East, South West, and South South. Among these geopolitical zones in Nigeria, the southern states had the highest youth literacy rate, while the northern states had the lowest. Approximately 21.3% of youths aged 15–19 had never been to school [2].

Data for this study were obtained from the 2013 and 2018 Nigeria Demographic and Health Survey (NDHS) women recode files (IR), conducted by the National Population Commission (NPC) in collaboration with ICF. The NDHS employed a multi-stage, stratified two-stage cluster sampling design, involving the selection of enumeration areas (EAs) based on probability proportional to size, followed by systematic sampling of households within each EA. These surveys are widely recognized for their methodological rigour, national representativeness, and comparability across years. The datasets are well-suited for inequality analysis as they contain detailed information on health outcomes, socioeconomic status, and demographic characteristics.

The final analytic sample comprised 16,328 adolescent girls aged 15–19 years drawn from the 2013 and 2018 NDHS datasets. The study focused on examining geographical inequalities in teenage pregnancy among this population group in Nigeria.

2.2. Study Variables

The variables for the study are classified into two independent variables and dependent variable. The independent variables include socioeconomic factors such as household wealth index quintiles (poorest to richest), demographic factors such as age, sex, and marital status (married/cohabiting, single, widowed/divorced), educational level (none, primary, secondary, higher), and geographic factors including place of residence (urban or rural) and region. Socioeconomic ranking is derived from the household wealth index in the NDHS dataset, constructed through principal component analysis (PCA) using information on asset ownership, housing characteristics, and access to basic services. Households are ranked from poorest to richest and classified into quintiles for analysis. The dependent variable is teenage pregnancy.

2.3. Data Analysis and Statistical Technique

2.3.1. Measuring Socioeconomic Inequalities in Teenage Pregnancy

2.3.1.1. Concentration Index (CI)

The empirical analysis follows two main stages: measurement of inequality using the Erreygers Normalized Concentration Index (ENCI) and decomposition analysis to attribute the observed inequality to specific socioeconomic and demographic determinants. The health variable under consideration is bounded within the range [0, 1], making the ENCI the appropriate measure instead of the standard concentration index (CI). The explanatory variables include socioeconomic, demographic, and geographic characteristics theoretically and empirically relevant to health inequality analysis.

Also, the computation of the standard concentration index (C) for the bounded health outcome is computed using:

$$\mathrm{C} = \frac{\mathrm{y}}{\mu_{\mathrm{y}}}\mathrm{Cov}(\mathrm{y_i}, \mathrm{R_i})$$

Where: $\boldsymbol{\mu}_y$= mean of y.

y_i = health outcome for individual i.

R_i= fractional rank of individual iii in the socioeconomic distribution.

2.3.1.2. Erreygers Normalized Concentration Index (ENCI)

The general formula for Erreygers (2009) proposed a normalized Concentration Index is given by:

$$EN\ CI = \frac{4 * \mu * C}{(b - a)}$$

Where: μ is the average health variable. C is the standard concentration index. Also, a, and b are the minimum and maximum bounds of the variable (for proportions, a=0, b=1).

2.3.1.3. Decomposition of ENCI

The decomposition is based on the linear additive model:

$$y_i = \alpha + \sum_k \beta_k X_{ki} + \varepsilon_i$$

Where:

y_i is the health outcome for individual i.

X_{ki} are the k explanatory variables.

β_k are the coefficients from regression.

ε_i is the error term.

Also, the concentration index for y (C y) can be expressed as:

$$C_y = \sum_k \left(\frac{\beta_k * \mu_k}{\mu_y}\right) + C_k + \frac{G_\varepsilon}{\mu_y}$$

Where:

μ_k is the mean of X_k

μ_y is the mean of y.

C_k is the concentration index for X_k.

G_ε is the generalized concentration index of the residual.

For the ENCI, the decomposition applies as:

$$ENCI = \frac{4 * \mu * C}{(b - a)}$$

$ENCI = \sum_k \left(\frac{4\beta_k * \mu_k * C_k}{(b-a)}\right) + \text{Residual Component.}$

The contribution of each determinant k to the ENCI is:

$$Contribution_k = \sum_k \left(\frac{4\beta_k * \mu_k * C_k}{(b-a)}\right)$$

The dataset was weighted using the sampling weight provided in the NDHS to obtain estimates that are representative of all teenagers in Nigeria. Data analysis was conducted using Stata version 17.0, applying appropriate statistical techniques to examine the extent and determinants of inequality in teenage pregnancy. Descriptive statistics such as frequencies and percentages were first generated to summarize the characteristics of respondents and to describe the distribution of teenage pregnancy across key socioeconomic and demographic groups.

To measure and visualize inequality, concentration indices and concentration curves were computed using the conindex command in Stata. The analysis employed the Erreygers normalized concentration index to account for the binary nature of the outcome variable. Furthermore, the decomposition of the concentration index was carried out following the approaches proposed by Wagstaff et al. (2003) and Erreygers (2009).

3. Results

Table 1: Distribution of Socio-Demographic Characteristics of Respondents

The table below presents the distribution of socio-demographic characteristics of female adolescents aged 15–19 years in Nigeria, based on data obtained from the Nigeria Demographic and Health Survey (NDHS). The results show the majority of the respondents, 16,003 (98.01%), reported no history of pregnancy termination, while only 325 (1.99%) indicated that they had ever terminated a pregnancy. Concerning contraceptive use, the findings showed that the majority of respondents, 15,216 (93.19%), were not using any contraceptive method at the time of the survey, whereas only 1,112 (6.81%) reported that they were currently using a method of contraception.

In terms of age distribution, the results show that 4,118 (25.22%) of the respondents were aged 15 years, 3,099 (18.98%) were aged 16 years, 2,949 (18.06%) were aged 17 years, 3,720 (22.78%) were aged 18 years, and 2,442 (14.96%) were aged 19 years. The data reveal that the largest proportion of respondents were in the lower adolescent age category, with a gradual decline in representation as age increased.

The current marital status of respondents indicates that a majority, 12,371 (75.77%), had never been married, while 3,843 (23.54%) were currently married, and 114 (0.70%) were formerly married. Religion plays a significant role in Nigeria's social context, and the data indicate that 8,202 (50.33%) of respondents identified as Muslims, while 7,983 (48.98%) identified as Christians. A smaller proportion, 75 (0.46%), practiced traditional religion, and 37 (0.23%) belonged to other religious groups. Educational attainment among respondents varied considerably. The findings show that 4,010 (24.56%) had no formal education, 1,891 (11.58%) had completed primary education, 10,104 (61.88%) had secondary education, and only 323 (1.98%) had higher education. The majority of adolescents were therefore found to have attained at least secondary-level education, although a considerable number had little or no formal schooling.

Table 1. Distribution of Socio-demographic characteristics of the respondents

Variable	Frequency (%)
History of pregnancy termination	
No	16003 (98.01)
Yes	325 (1.99)
Contraceptive Use	
No	15216 (93.19)
Yes	1112 (6.81)
Current Age	
15 yrs	4118 (25.22)
16 yrs	3099 (18.98)
17 yrs	2949 (18.06)
18 yrs	3720 (22.78)
19 yrs	2442 (14.96)
Current marital status	
Never in married	12371 (75.77)
Currently married	3843 (23.54)
Formerly married	114 (0.70)
Religion	
Christian	7983 (48.98)
Islam	8202 (50.33)
Traditional	75 (0.46)
Others	37 (0.23)
Maternal Education	
No Education	4010 (24.56)
Primary	1891 (11.58)
Secondary	10104 (61.88)
Higher	323 (1.98)
Currently working	
No	11244 (68.86)
Yess	5084 (31.14)
Wealth Index	
Poorest	2707 (16.58)
Poorer	3334 (20.42)
Middle	3712 (22.73)
Richer	3548 (21.73)
Richest	3027 (18.54)
Place of residence	
Urban	6540 (40.05)
Rural	9788 (59.95)
Region of residence	
North Central	2868 (17.56)
North East	2969 (18.18)
North West	4181 (25.61)
South East	1954 (11.97)
South South	2305 (14.12)
South West	2051 (12.56)

In terms of employment, most respondents, 11,244 (68.86%), were not currently working, while 5,084 (31.14%) were engaged in one form of work or another. The wealth index distribution showed that 2,707 (16.58%) of respondents were in the poorest category, 3,334 (20.42%) in the poorer category, 3,712 (22.73%) in the middle, 3,548 (21.73%) in the richer, and 3,027 (18.54%) in the richest category. With respect to place of residence, 6,540 (40.05%) of the respondents lived in urban areas, while 9,788 (59.95%) resided in rural areas. Finally, the regional distribution of respondents reveals that 2,868 (17.56%) were from the North Central region, 2,969 (18.18%) from the North East, 4,181 (25.61%) from the North West, 1,954 (11.97%) from the South East, 2,305 (14.12%) from the South South, and 2,051 (12.56%) from the South West. The North West had the largest proportion of adolescent respondents, while the South East had the smallest representation. See Table 1 above.

Discussion of Figure 2: Concentration Curve for Teenage Pregnancy by Place of Residence

This figure compares the distribution of teenage pregnancy between urban and rural areas using concentration curves. A concentration curve plots the cumulative proportion of the population (ordered by socio-economic status) on the x-axis against the cumulative proportion of the health variable, in this case, teenage pregnancy, on the y-axis. In Figure 2, both the urban and rural curves lie below the line of equality, indicating that teenage pregnancy is more prevalent among poorer households, regardless of residence. However, the urban curve lies further from the line of equality compared to the rural curve, indicating greater inequality in the distribution of teenage pregnancy among urban adolescents.

In summary, the figure demonstrates strong evidence of socioeconomic inequality in teenage pregnancy in Nigeria, with the burden heavily skewed toward the poorest.

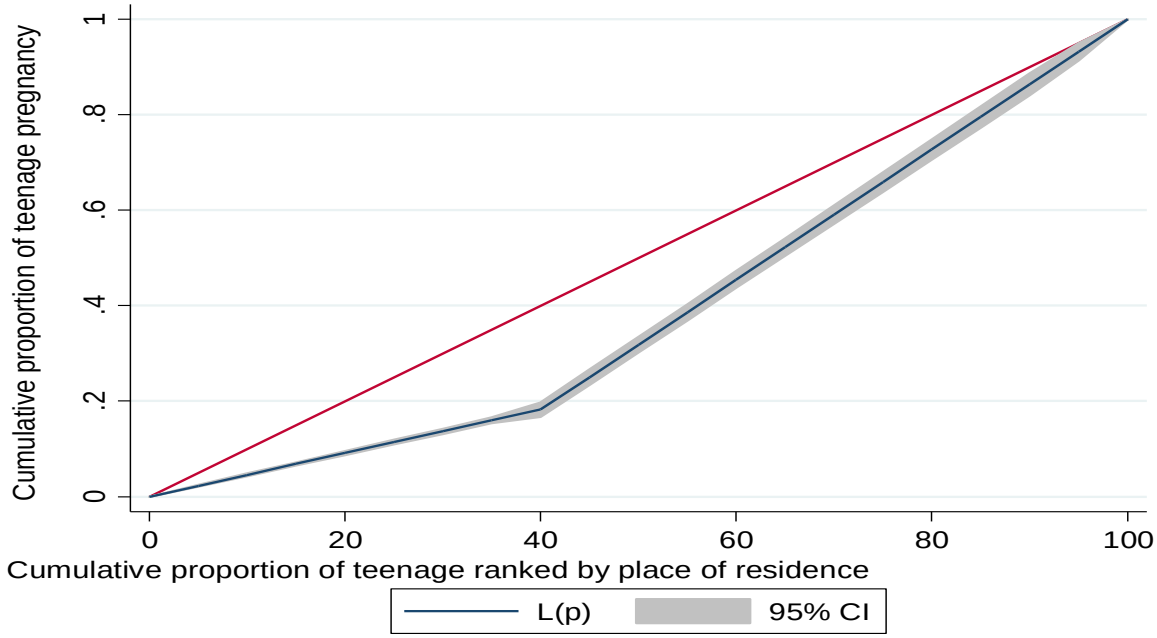

Figure 2. Concentration curve for teenage pregnancy by place of residence

Discussion of Figure 3: Concentration Curve for Teenage Pregnancy by Region of Residence

Figure 3 presents concentration curves showing the distribution of teenage pregnancy across different regions in relation to socioeconomic status. As with standard concentration curves, the x-axis represents the cumulative proportion of adolescents ranked from the poorest to the richest, while the y-axis captures the cumulative proportion of teenage pregnancies. The diagonal 45-degree line serves as the line of equality. Across all regions, the concentration curves lie below the line of equality, indicating a consistent pro-poor concentration of teenage pregnancy nationwide. This means that, irrespective of region, adolescents from lower socioeconomic backgrounds experience a disproportionately higher burden of teenage pregnancy compared to their wealthier peers. However, the curves reveal important regional differences in the magnitude of inequality. The curve for the South-West region is the furthest from the line of equality, suggesting the highest level of socioeconomic disparity in teenage pregnancy. This implies that poverty plays a significant role in shaping teenage pregnancy outcomes in this region. In contrast, the South-East region has a curve that lies closest to the equality line, indicating comparatively lower inequality, though still pro-poor. This suggests that while teenage pregnancy remains more common among the poor in the South-East, the gap between poor and rich households is narrower.

These regional variations highlight the need for region-specific strategies. In regions with higher inequality, such as the South-West, interventions should prioritize disadvantaged

adolescents and address socioeconomic barriers to reproductive health services. In regions with lower inequality, efforts may focus on broader determinants such as cultural norms, education, and access to adolescent-friendly services.

In summary, Figure 3 reinforces that while teenage pregnancy is universally skewed towards poorer adolescents across regions, the severity of inequality differs among regions.

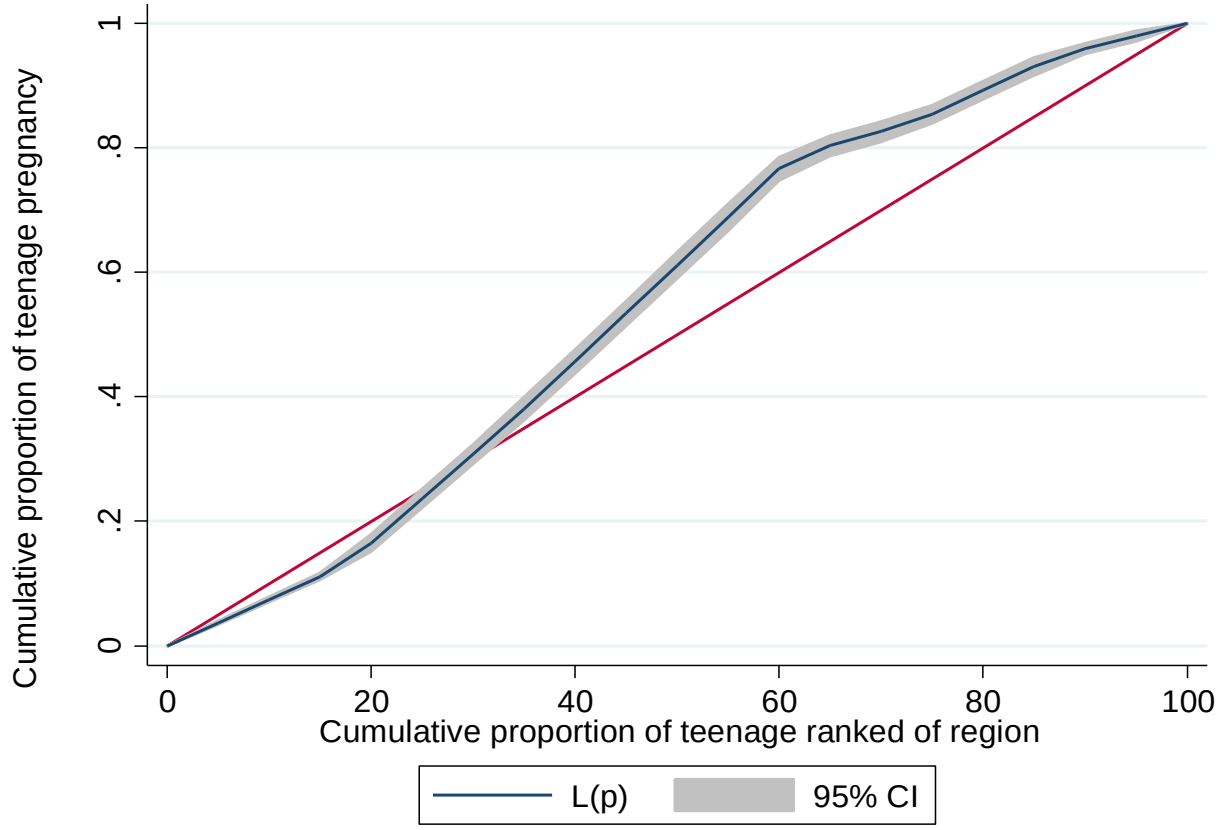

Figure 3. Concentration curve for teenage pregnancy by region of residence

Discussion of Table 2: Erreygers Normalised Concentration Indices for Teenage Pregnancy in Nigeria (2013 and 2018)

The table presents the Erreygers normalised concentration indices for teenage pregnancy in Nigeria for the years 2013 and 2018, derived from the Nigeria Demographic and Health Surveys (NDHS). The Erreygers concentration indices quantify the degree of socioeconomic inequality in teenage pregnancy. The table shows that in 2013, the Erreygers normalised concentration index for teenage pregnancy was –0.3393 (SE = 0.0147), and the result was statistically significant at $p < 0.001$. This negative value demonstrates that teenage pregnancy was disproportionately concentrated among poorer and less privileged segments of the population during that period. The relatively large absolute value of the index suggests a substantial level of inequality, with teenage pregnancy being more common among adolescent girls from low-income and disadvantaged households. Also by 2018, the Erreygers concentration index was 0.3037, with a standard error of 0.0155, statistically significant at $p < 0.001$. Although the index remained negative, indicating continued pro-poor inequality, its magnitude slightly decreased compared to 2013 (from –0.3393 to –0.3037). This suggests a modest narrowing of socioeconomic inequality in teenage pregnancy between 2013 and 2018.

Table 2. Erreygers' normalised concentration indices for teenage pregnancy in Nigeria for 2013 and 2018

Year	Index Value	Std Error	Z-stat (P-value)
2013	-0.3393*	0.0147	1.6600 (0.0964)
2018	-0.3037*	0.0155	

*Significant with p<0.001
*Std Error: Standard Error

Discussion of Table 3: Residential Disparity in Teenage Pregnancy

This table stratifies inequality by residential context. In both urban and rural areas, teenage pregnancy is concentrated among poorer households. The index for urban areas (-0.2440, SE = 0.0259) is slightly more negative than for rural areas (-0.2089, SE = 0.0115), suggesting that while prevalence may be lower in urban areas overall, the relative disadvantage among the poorest urban adolescents

is more pronounced. In summary, the findings confirm that socioeconomic inequality plays a significant role in teenage pregnancy in both settings, but disparities are more pronounced in urban areas, where the poorest adolescents are particularly vulnerable.

Table 3. Erreygers' normalised concentration indices for teenage pregnancy in Nigeria for Residential disparity

Place of Residence	Index Value	Std Error	Z-stat (P-value)
Urban	-0.2440*	0.0259	1.2300 (0.2169)
Rural	-0.2089*	0.0115	

*Significant with p<0.001
*Std Error: Standard Error

Table 4: Regional Disparities in Teenage Pregnancy in Nigeria

Table 4 presents the Erreygers Normalised Concentration Indices (ECI) for teenage pregnancy across Nigeria's six geopolitical regions. The regional decomposition of concentration indices highlights heterogeneity in the inequality burden. All six geopolitical zones exhibit pro-poor concentration, with the South-West reporting the steepest inequality (-0.3436), followed by North Central (-0.2922). The South-East had the least negative value (-0.0975), indicating relatively more equitable distribution, albeit still biased against the poor. The observed regional differences are statistically significant, as indicated by an F-statistic of 6.2754 ($p < 0.001$), suggesting that subnational disparities in teenage pregnancy inequality are substantial and policy-relevant. In summary, the ENCI results highlight that socioeconomic status remains a consistent determinant of teenage pregnancy across all regions, but the extent of inequality differs considerably.

Table 4. Erreygers normalised concentration indices for teenage pregnancy in Nigeria for Regional disparity

Region	Index Value	Std Error	F-stat (P-value)
North Central	-0.2922*	0.0305	6.2754 (<0.001)
North East	-0.1881*	0.0202	
North West	-0.2105*	0.0162	
South East	-0.0975*	0.0487	
South South	-0.2364*	0.0332	
South West	-0.3436*	0.0489	

*Significant with p<0.001
*Std Error: Standard Error

Table 5: Decomposition of Teenage Pregnancy in Nigeria for 2013 and 2018

The decomposition analysis using the Erreygers approach quantifies the contribution of each determinant to inequality in teenage pregnancy. Table 5 presents the decomposition of socioeconomic and demographic determinants of teenage pregnancy in Nigeria for 2013 and 2018. The results show that most variables contributed only minimally to inequality, although some determinants showed modest but notable effects. The reference categories, such as no history of pregnancy termination, non-use of contraceptives, age 15, never married, no education, unemployed, poorest households, urban residence, and the North Central region recorded elasticity and concentration values of 1.000, indicating their role as baseline categories.

History of pregnancy termination showed no contribution to inequality, as both elasticity and concentration index values for those with previous termination were essentially zero. Contraceptive use showed a similarly minimal influence, although contraceptive users had a slight negative contribution, suggesting a marginal reduction in inequality among adolescents who used contraception.

Age differences demonstrated negligible contributions across categories. While older adolescents (18–19 years) displayed slightly higher elasticity scores, their overall percentage contributions remained zero, indicating that age variation alone did not meaningfully explain socioeconomic inequality in teenage pregnancy. Marital status, however, revealed a more pronounced effect. Adolescents who were currently married contributed negatively to inequality, showing that teenage marriage was more common among poorer households and slightly reinforced the pro-poor concentration of teenage pregnancy. Those formerly married contributed almost nothing.

Religion showed contrasting contributions. Christian adolescents exhibited a small positive contribution, while Muslim adolescents showed a negative contribution, suggesting that teenage pregnancies among Muslims were more concentrated among poorer households, whereas the burden among Christians was slightly more evenly distributed across socioeconomic groups. However, both contributions remained relatively small in magnitude.

Educational attainment contributed only marginally to inequality. Adolescents with primary education recorded a slight positive contribution, while those with secondary and higher education showed no meaningful influence on inequality. Employment status followed a similar pattern, with working adolescents contributing negatively, indicating that teenage employment, like teenage pregnancy, was more prevalent among poorer households.

The wealth index emerged as one of the stronger factors shaping inequality. The richest households consistently showed negative contributions, confirming that teenage pregnancy remained concentrated among the poorest socioeconomic groups. Middle and richer categories showed negligible or negative contributions, reinforcing this pro-poor pattern. Place of residence also played a notable role. Rural residence contributed negatively to inequality, indicating that teenage pregnancy was more prevalent among adolescents living in poorer rural settings.

Regional differences contributed modestly. Small negative contributions from regions such as the North East and South East suggest a slightly higher concentration of teenage pregnancy among poorer households in these areas. On the other hand, slight positive contributions in the South-South region indicate a more mixed distribution of teenage pregnancy across socioeconomic groups in southern Nigeria, although these effects were still marginal.

Table 5. Decomposition of teenage pregnancy in Nigeria for 2013 and 2018

Variable	η_k	E_k	% Contr.
History of pregnancy termination			
No	1.000	1.000	1.000
Yes	0.000	-0.000	0.000
Contraceptive Use			
No	1.000	1.000	1.000
Yes	0.003	-0.003	-0.002
Current Age			
15 yrs	1.000	1.000	1.000
16 yrs	0.000	0.005	-0.000
17 yrs	-0.000	0.005	-0.000
18 yrs	0.000	0.008	0.000
19 yrs	0.000	0.008	0.000
Current marital status			
Never in married	1.000	1.000	1.000
Currently married	0.020	-0.012	-0.002
Formerly married	0.001	-0.000	-0.000
Religion			
Christian	-0.011	0.086	0.012
Islam	0.012	0.098	-0.012
Traditional	-0.001	0.000	0.000
Others	1.000	1.000	1.000
Maternal Education			
No Education	1.000	1.000	1.000
Primary	-0.000	0.004	0.001
Secondary	0.000	-0.000	0.000
Higher	0.000	-0.000	0.000
Currently working			
No	1.000	1.000	1.000
Yes	-0.001	0.001	-0.002
Wealth Index			
Poorest	1.000	1.000	1.000
Poorer	0.000	0.000	0.000
Middle	0.000	-0.002	0.000
Richer	-0.000	0.000	0.000
Richest	-0.000	-0.003	-0.000
Place of residence			
Urban	1.000	1.000	1.000
Rural	-0.001	-0.003	-0.000
Region of residence			
North Central	1.000	1.000	1.000
North East	-0.000	-0.001	0.000
North West	0.001	0.002	-0.000
South East	-0.000	-0.001	0.000
South South	0.002	0.003	0.002
South West	0.000	0.001	0.000
Place of residence			
Urban	1.000	1.000	1.000
Rural	0.000	0.007	0.000
Total	**0.024**	**-0.005**	**-0.002**

η_k is the elasticity of the kth variable, is the Erreygers' normalised corrected concentration index, Contr. is the contribution, % Contr. is the percentage contribution

In summary, the total contribution value of –0.002 reflects a marginal decline in inequality between 2013 and 2018. The negative value confirms that teenage pregnancy in Nigeria remains disproportionately concentrated among poorer households. Although the magnitude of inequality is small, the persistence of a pro-poor pattern underscores the continued vulnerability of adolescents from low-income backgrounds to early pregnancy.

4. Discussion

In Figure 2, both the urban and rural curves lie below the line of equality, confirming that teenage pregnancy is more concentrated among the poorer households, irrespective of residence. However, the urban curve lies further from the line of equality compared to the rural curve, indicating greater inequality in the distribution of teenage pregnancy among urban adolescents. These spatial variations echo findings from a multilevel logistic regression analysis of NDHS data, emphasizing regional heterogeneity in adolescent pregnancy [14]. These findings are also consistent with those of Okoli et al. [2] in Nigeria and Temane et al. [24] in South Africa, who reported that teenage pregnancy is concentrated among the poorest wealth quintiles due to limited access to education and reproductive health services. Similarly, Nshutiyukuri et al. [25] confirmed that adolescents from low-income households and with little education were more likely to experience early pregnancy. Lai et al. [26] further emphasized increasing urban inequality, aligning with the current finding that urban poor adolescents face greater vulnerability. Conversely, Asmamaw et al. [5] found that teenage pregnancy was more prevalent in rural areas due to early marriage and limited educational opportunities, while Osborne et al. [27] suggested that socioeconomic inequality in adolescent fertility was less distinct in urban settings because of better access to information and services.

In summary, the present study reinforces that poverty remains a key determinant of teenage pregnancy, but highlights a growing urban inequality, where the poorest adolescents in cities are most affected. Figure 3 displays regional concentration curves, illustrating how teenage pregnancy is distributed across different regions relative to socioeconomic status. From the patterns observed, all regional curves lie below the line of equality, again confirming a pro-poor distribution of teenage pregnancy in every region. However, the degree of inequality varies across regions: The South-West curve is the furthest below the line, indicating the highest inequality, and the South-East curve is closest to the line, implying less severe inequality. The findings are consistent with those of Bolarinwa et al. [28] and Mbulu et al. [29], who used NDHS data and similarly discovered that teenage pregnancy is heavily concentrated among poorer households across all geopolitical zones.

Additionally, Ahinkorah et al. [19] reported that adolescent fertility in sub-Saharan Africa is strongly linked to poverty, emphasizing that regional factors such as education levels,

cultural norms, and health infrastructure influence inequality. The Erreygers normalised concentration indices show that teenage pregnancy in Nigeria remains disproportionately concentrated among poorer households in both survey years. Although the degree of inequality slightly reduced between 2013 and 2018, teenage pregnancy continues to affect the poorest segments more severely. This modest improvement suggests that progress has been made, possibly due to national adolescent reproductive health programs, expanded access to family planning, and increased awareness, but socioeconomic disparities persist.

The findings are consistent with Crooks et al. [30] and Nduhuye et al. [31] in Rwanda, who reported that teenage pregnancy and early childbearing are more common among adolescents from poorer, rural, and less-educated backgrounds. Similarly, Li et al. [32] and Singh et al. [33] found that socioeconomic disadvantage strongly predicts teenage pregnancy in sub-Saharan Africa. Educational attainment plays a pivotal role, as low education contributes to inequality, consistent with Njeru et al. [34] and Okoli et al. [2]. Marital status also contributes notably, as many teenage pregnancies occur within marriage, particularly in regions where child marriage is culturally accepted [35,36].

Regional and rural–urban inequalities further reinforce this pattern. Teenage pregnancy is more common in rural areas and northern regions, where access to education, contraception, and adolescent-friendly health services is limited [37]. This north–south divide mirrors findings from Onakalu et al. [38], who observed that rural and northern adolescents face compounded disadvantages due to poverty, restrictive gender norms, and weak health infrastructure.

5. Conclusions

This study examined geographical inequalities in teenage pregnancy in Nigeria using data from the 2013 and 2018 Nigeria Demographic and Health Surveys (NDHS) and applied the Erreygers normalised concentration index and decomposition analysis to quantify and explain disparities. The findings reveal a persistent pro-poor inequality in teenage pregnancy across both survey years, indicating that adolescent girls from poorer households continue to bear a disproportionate burden of early childbearing. Although the overall magnitude of inequality showed a slight decline between 2013 and 2018, progress has been marginal, underscoring the resilience of structural and contextual determinants.

The analysis further highlights that wealth, education, and marital status are the leading drivers of teenage pregnancy inequality in Nigeria, while regional and rural–urban disparities remain evident. Inequality was most pronounced in the South-West and North-Central regions and least severe in the South-East, reflecting the interplay of socioeconomic development, cultural norms, and access to reproductive health services. The concentration of teenage pregnancy among the poorest urban adolescents also suggests widening inequities within cities, likely tied to urban poverty, informal settlements, and limited youth-friendly reproductive health services.

These findings underscore the need for context-specific, equity-oriented interventions to reduce teenage pregnancy and its associated socioeconomic consequences. Efforts should prioritize girls' education, economic empowerment, delay of early marriage, and expanded access to modern contraceptive methods, especially among poor and rural populations. Strengthening adolescent sexual and reproductive health policies and integrating regional and community-level programming will be crucial to achieving inclusive progress toward the Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being) and SDG 5 (Gender Equality). This ensures that improvements in teenage pregnancy are captured among the most vulnerable groups and that no region or socioeconomic group is left behind.

In conclusion, despite modest improvements, teenage pregnancy in Nigeria remains deeply rooted in socioeconomic and geographical inequality. A comprehensive approach that simultaneously addresses poverty, education, and sociocultural barriers is essential to close the inequality gap and ensure that every Nigerian adolescent, regardless of where she lives or her economic background, has the opportunity to achieve healthy reproductive outcomes and a better future. Policymakers should prioritise regions and states identified with the highest levels of inequality by expanding adolescent-friendly reproductive health services through mobile clinics, community health extension programmes, and youth-friendly service corners in primary healthcare centres.

Limitations

This study has several limitations. First, the data are drawn from cross-sectional surveys, which provide only a snapshot in time and do not allow for causal inferences; therefore, it is not possible to determine whether poverty directly causes higher teenage pregnancy or whether other unmeasured factors play a role.

Second, the data are self-reported, which may introduce recall bias or underreporting, particularly given the social stigma associated with teenage pregnancy. Third, the socioeconomic ranking used in the concentration index is based primarily on household wealth and may not fully capture other dimensions of disadvantage, such as education, access to reproductive health services, or broader social determinants. Finally, unmeasured contextual factors, including cultural norms, family structure, and peer influence, could also affect teenage pregnancy but are not accounted for in the index, potentially limiting the comprehensiveness of the inequality assessment.

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