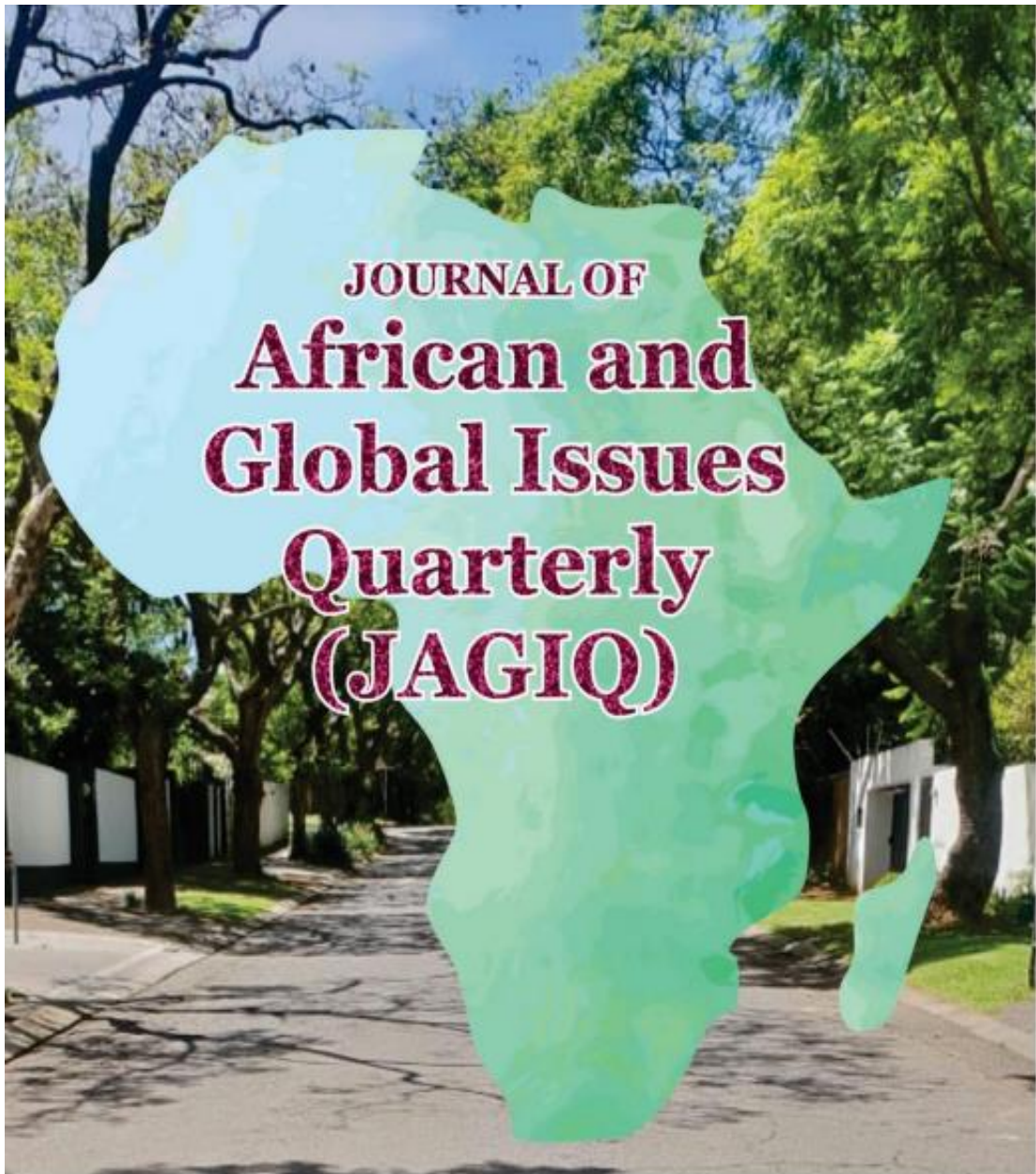




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Editorial Note

Indigenous Knowledge, Institutional Capacity, And Africa's Quest For Self-Determination

Welcome to the October 2026 issue of the African and Global Issues Quarterly. The collection of articles assembled here reflects the journal's enduring commitment to interrogating the multifaceted challenges and opportunities confronting the African continent and its place in the global order. The contributions in this volume share a common thread: a determination to look inward for solutions while engaging critically with external frameworks and legacies.

Several articles in this issue foreground the imperative of harnessing indigenous knowledge and frameworks as vehicles for progress. Nkemakolam and Amaechi propose "Igbozealotism" as an indigenous framework for socio-political and economic advancement, challenging scholars and policymakers to centre African philosophical traditions in contemporary governance discourse. Similarly, Mthethwa, Kolanisi, and Singh explore the repositioning of indigenous knowledge in fostering "studentpreneurship," while Mahlala and colleagues examine indigenous governance systems through a public administration lens. Kilonzo and her co-authors contribute a profile of indigenous banana cultivars, reminding us that agricultural biodiversity and traditional knowledge are integral to food security and rural livelihoods. These contributions collectively affirm that sustainable development in Africa must be rooted in, rather than detached from, local epistemologies and practices.

The issue also engages critically with questions of institutional effectiveness and the delivery of public goods. Lamidi and Hofisi examine the implementation gap in South African public service delivery, highlighting the centrality of bureaucratic capacity. Malope's study of community health worker programmes illuminates the intersection of recruitment, governance, and the democratisation of public administration. These articles underscore that institutional strengthening is not merely a technical exercise but a deeply political one, requiring accountability, inclusivity, and responsiveness to community needs.

On the continental and global stage, Odaudu's analysis of post-Françafrique dynamics in the Sahel offers a penetrating account of shifting dependencies and external realignments in Mali, Burkina Faso, and Niger, a region of immense strategic significance. Taleat, Lukamba, and Diedericks examine the localisation of the Sustainable Development Goals, arguing that global agendas must be adapted to local

realities if they are to deliver meaningful prosperity. Maeresera's study of strategic communication and nation branding during Zimbabwe's COMESA chairmanship illustrates the role of media in projecting regional leadership.

Finally, the issue addresses pressing social and demographic concerns. Omopo and Pillay investigate the psychological distress associated with food insecurity and housing conditions among school-going children and adolescents, while Ifanayajo, Palamuleni, and Adebowale provide a decomposition analysis of fertility rates among women of reproductive age in Sub-Saharan Africa.

Taken together, these thirteen articles offer a rich and diverse body of scholarship. They challenge us to think deeply about the relationship between indigenous agency and institutional effectiveness, between local realities and global agendas. We trust that this issue will stimulate further research and debate and contribute meaningfully to the advancement of knowledge on African and global affairs.

We thank our authors, reviewers, and readers for their continued support.

Editor

Dr. Nicholas Idris Erameh

Nigerian Institute of International Affairs

Lagos, Nigeria

Email. Eramehnickolas@gmail.com

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PARITY PROGRESSION RATIO AND DECOMPOSITION OF FERTILITY RATES AMONG WOMEN OF REPRODUCTIVE AGE IN SUB-SAHARAN AFRICA

Ifanayajo Oluwafemi,

*Department of Epidemiology and Medical Statistics,
Faculty of Public Health, University of Ibadan,
Ibadan, Nigeria*

*Corresponding: ifanayajo@gmail.com

ORCID ID: <https://orcid.org/0009-0001-6236-2176>

Palamuleni Martin E.,

*Population and Health Research Entity, North West University,
Mafikeng, South Africa*

ORCID ID: <https://orcid.org/0000-0003-2190-9582>

Adebowale Ayo S.

*Department of Epidemiology and Medical Statistics,
Faculty of Public Health, University of Ibadan,
Ibadan, Nigeria*

&

*Population and Health Research Entity, North West University,
Mafikeng, South Africa*

ORCID ID: <https://orcid.org/0000-0002-2096-7716>

Abstract

Fertility is a key component of population change. Most countries in sub-Saharan Africa (SSA) have high fertility, driven largely by cultural preferences for larger families and limited access to family planning. This study assessed fertility rates among women of reproductive age in Sub-Saharan Africa (SSA) using PPR and decomposition analysis. This cross-sectional design study utilizes Demographic and Health Surveys (DHS) data from eight countries selected from each of the four regional blocks in SSA. Across countries, fertility rates peaked consistently among women aged 20–29 years and were consistently higher in rural areas than in urban areas. Contributions to rural-urban fertility differences declined steadily with age, as they became minimal among women aged 45–49 years. The PPRs from 0 to 1, from 1 to 2, and from 3 to 4 were

projected to remain high across the studied countries. Persistently high PPR from 0 to the 4th birth suggests that most women in the analyzed countries are likely to progress to at least two births, which indicates sustained childbearing behaviour across the reproductive lifespan rather than a direct measure of fertility preference. Urban-rural differences in fertility were driven predominantly by women aged 20-29 years, identifying a critical age gap for policy intervention.

Keywords: *Parity progression ratio, Fertility, Decomposition, Women of reproductive age, Sub-Saharan Africa*

Background

Fertility rate in Sub-Saharan Africa (SSA) remains high at about 4.4 births per woman on average throughout her reproductive years, which is well above replacement level and in other world sub-regions like North America (1.6), Latin America and the Caribbean (1.7), Asia (1.8), Europe (1.4), and Oceania (2.0) (Population Reference Bureau (PRB), 2024). In all four regional blocks in SSA, only Southern Africa, with a TFR below 2.5, can be said to undergo swift fertility transition, while in other regions (Eastern Africa (4.2), Central Africa (5.5), West Africa (4.5), the TFR is still above 4.0 (PRB, 2024). The high fertility in SSA poses challenges for population policy, social development, and economic growth (Tesfa et al., 2023).

The United Nations projected that SSA's population would double by 2050 (Kaneda et al., 2021), with significant implications for demographic and economic transformations regionally and globally (IMF, 2023). The young population structure in many SSA countries will sustain rapid population growth, as a large portion of the population continues entering reproductive years

(African Development Bank Group, 2024). Despite high fertility rates in most SSA countries, there has been a decline in recent times, but at a slow rate. This has the tendency to delay fertility transition to replacement level if the current fertility situation is sustained in the region (IMF, 2023; Bongaarts, 2020; Lerch, 2019). The slow pace of fertility decline in SSA could hinder efforts in the achievement of the Sustainable Development Goal 3 (SDG) – good health and well-being by the deadline if unchecked (United Nations, 2015)

Fertility trends vary across SSA countries. Nigeria, Africa's most populous country with 234.7 million people, demonstrates a slow fertility decline, with TFR decreasing from 6.3 in 2008 to 4.8 in 2024 (National Population Commission & ICF, 2024). Most countries in Southern Africa have made significant progress in reducing fertility rates, but high fertility rate is still prevalent in other countries in SSA like Central African Republic (6.4), Niger (6.1), Somalia (6.1), Mali (5.7), Mozambique (4.9), and a host of others (PRB, 2024). The achievement of fertility milestones in many countries in the region was facilitated by higher

educational attainment, increased contraceptive use, marriage postponement, harsh economic conditions, women's empowerment, delayed childbearing, and erosion of cultural practices that promote high fertility desires (Tesfa et al., 2023). Most high-fertility countries in SSA, especially those with >4 TFR, face challenges associated with rapid population growth, reproductive health, economic development, and environmental sustainability, and an increase in child and maternal mortality (Tesfa et al., 2023). The key drivers of high fertility are early sexual debut, child marriage, early childbearing which elongates the duration of woman's exposure to the pregnancy risks, and short birth interval are common practices in many SSA countries (Adhikari et al., 2023; Lerch, 2019; Bongaarts, 2020; Lerch, 2019; Towriss & Timæus, 2018). These indices define how women progress in parity during their reproductive years.

Parity Progression Ratio (PPR) is the proportion of women who progress from one parity level to the next, and it provides insight into both the timing and sequencing of births (Moultrie & Zaba, 2013; Rossa & Palma, 2020). PPR accounts for the number of children already born, recognizing that reproductive decisions are often based on family size rather than age alone (Moultrie & Zaba, 2013). The PPR is pertinent to understanding the timing and distribution of births, which allows for comparisons across demographic

contexts, and it measures the subtle fertility changes that may not immediately decrease overall birth rates but gradually shift family size preferences through delayed or spaced births (Moultrie & Zaba, 2013; Hinde, 1998). Examining fertility patterns using PPR is necessary because, unlike conventional fertility measures like Total Fertility Rate (TFR), Age-Specific Fertility Rate (ASFR), etc., PPR focuses on the likelihood of having subsequent births based on parity, or the number of previous children. The approach has been widely used for fertility estimation in diverse contexts, including Gambia, India, Iran, and low-fertility countries (Adebowale et al., 2024; Naderi et al., 2023; Bharti et al., 2019; Zeman et al., 2018).

Understanding parity dynamics is essential in managing future population growth and addressing associated challenges. PPR uses past fertility trends to predict future parity (Shakya, 2020; Moultrie & Zaba, 2013). PPR projections enable policymakers to assess the impact of family planning programs. Integrating decomposition analysis with PPR estimates aids in determining the role childbearing behavior shifts play in urban-rural differences. Fertility declines in some countries have been attributed partly to extended birth spacing rather than family size limitation (Bongaarts, 2020; Lerch, 2019; Towriss & Timæus, 2018). This emphasizes the importance of analyzing the sequential nature of childbearing to understand fertility

transitions. The decomposition method captures this process by treating childbearing as a series of transitions from lower to higher parities, which reveals the cumulative and dynamic aspects of fertility behaviour (Zeman et al., 2018). PPR was included to provide insights into the effectiveness of family planning programs, the impact of women's education, and the evolving fertility norms in shaping birth intervals and family size preferences. Together, PPR and decomposition analyses provide a critical avenue for exploring fertility in greater depth, as they allow researchers to identify fertility dynamics in SSA (Rossa & Palma, 2020; Moultrie & Zaba, 2013) that inform the design and implementation of effective population growth.

Despite these important implications of PPR on population dynamics, limited research on PPR exists in SSA. Fertility analysis from the dimensions of PPR, decomposition, and standardization are grey research areas in this African sub-region. Therefore, the current study was implemented to fill in the gap. The objectives of this study are to determine the observed and projected PPRs, examine the rural-urban difference in standardized fertility rate, and identify which age group contributes most to the rural-urban difference in standardized fertility rate in some selected countries in SSA. The assessment of these indices in SSA, a region where persistent poor reproductive health outcomes and accelerated population growth rates have been reported (PRB, 2024), will

provide information that can assist policymakers and population experts in their quests to resolve high fertility, high maternal and childhood mortality, and problems associated with high growth rates in some countries in the region.

Methods

Study Design and Data Source

This study design was cross-sectional and used Demographic and Health Surveys (DHS) data from eight countries selected from each of the four regional blocks in SSA. Countries were drawn purposively from each of the four recognized regional blocks in SSA to ensure the analysis captured the demographic and socio-cultural heterogeneity of the sub-region rather than being concentrated in a single geographic cluster. Countries with the most recent publicly available DHS dataset in each regional block were selected to reflect recent parity and fertility patterns obtainable for each block. The countries selected were: West Africa (Nigeria (2018), Ghana (2022)), East Africa (Tanzania (2022), Kenya (2022)), Central Africa (Cameroon (2020), Angola (2015-2016), and Southern Africa (Mozambique (2022-2023), Gabon (2019-2021)). The selected countries represent a cross-section of SSA, capturing regional diversity and variations in demographic transitions (Yoshida & Tsutsumi, 2018). This approach to sample selection resulted in survey years that are not perfectly

aligned across countries, ranging from 2015 – 2016 (Angola) to 2022 – 2023 (Mozambique). The divergence in survey timing implies that cross-country comparisons of ‘current’ fertility levels should be interpreted as broadly indicative of recent patterns within each country’s own survey periods rather than strictly synchronous cross-sectional comparisons.

The Demographic and Health Surveys (DHS) of each country provided comprehensive information on the full birth histories of women of reproductive age. The data were used to provide estimates of parity progression ratio, age order-specific fertility rate, standardization, and decomposition. The data were extracted from the DHS database (www.measure.dhs). The approach used by the data originators was standardized across countries, and they ensured that the data were nationally representative using appropriate sampling methodologies based on DHS protocols. The sampling frame included women aged 15-49 years, which ensured the analysis captured the dynamics of childbearing among women of reproductive age.

Sampling Methodology

The original sample selected for each country, based on the individual recode file which forms the basis of analysis in this study, was Nigeria (41, 821), Ghana (15,014), Kenya (32, 156), Tanzania (15, 254), Cameroon (14, 677), Gabon (11,043), Mozambique (13, 138), and Angola (14, 379). Further

expositions on the sampling design and strategy are available at (www.measure.dhs) for each country.

Data Analysis

The data analysis of this study was based on the information provided by women of childbearing age (15-49 years) on their complete birth histories. To ensure a nationally representative estimate, survey weight (v005/100000) was computed and applied before data analysis. The study adopted the predefined NDHS age classifications, which were constructed based on respondents' age at last birthday at the time of the survey. In this study, we considered women who had multiple births (e.g., twin births) as having a single parity. This was with a view to removing the bias associated with parity and the number of children ever born. In this context, parity was defined as the number of times that a woman has given birth to a liveborn, even if the child lives for a few seconds after delivery. For uniformity and comparability of the outcome variable, women above the age of 49 years were excluded from the sample in Cameroon and Gabon, as data for women above 49 years were available in their datasets. The data were extracted and managed using Stata MP/17, and standardization, decomposition, and parity progression ratios were estimated using Microsoft Excel.

Estimation of Parity Progression Ratio (PPR)

The following procedures were used for the estimation of PPR in each of the studied countries, as contained in the tool for demographic estimation (Moultrie et al., 2013). Additional mathematical expositions involved in the computations are available in the referenced material.

Computation of the observed proportion ever-attaining parity order i is the proportion of women aged x to $x+5$ who have had i or more births

$$M_{x,x+5}(i) = \frac{1}{N_{x,x+5}}. \quad (1)$$

$$\sum_{j=i}^x N_{x,x+5}(j)$$

Where: $N_{x,x+5}(i)$ is the number of women in each age group ($x,x+5$), by number parity, i and $N_{x,x+5}$ is the total number of women in each age group ($x,x+5$)

The estimation of the observed parity progression ratio of women aged 15-49 years; age-order specific fertility rates for women in each age group, 15-19 to 45-49; and cumulated age-order specific fertility rates up to age $x+5$ for order i was obtained using equations 2, 3, and 4, respectively.

$$a_{x,x+5}(i) = \frac{M_{x,x+5}(i+1)}{M_{x,x+5}(i)}$$

(2)

$$AOSFR_{x,x+5}(i) = \frac{B_{x,x+5}(i)}{N_{x,x+5}}$$

(3)

$$TOFR_{x,x+5}(i) = 5. \sum_{j=i}^x AOSFR_j(i). \quad (4)$$

We calculated the proportions of the total order-specific rate by summing the rates up to the upper age limit of the group, i.e., 19.5, 24.5, ..., 49.5, and this sum was expressed as a proportion of the total order-specific rate

$$\theta_{x,x+5} = \frac{TOFR_{x,x+5}(i)}{TOFR_{5,45}(i)}$$

(5)

The proportion of order fertility achieved by the midpoint of each interval $\theta^*_{x,x+5}$ and the age-order rates were interpolated to match the central age of each group using proportions of total order-specific rates. The interpolation was done using a Gompit transformation due to the quadratic nature of the fertility schedule, and an anti-Gompertz model was used afterward to return to the original scale. The Gompit transformation ensures accurate proportions are calculated for central ages of each group.

$$5\theta * x(i) = \exp(-\exp(-(0.4 \times (-\ln(-\ln(5\theta x - 5(i)))) + 0.6 \times (-\ln(-\ln(5\theta x(i)))))) \quad (6)$$

The expected future order increment was estimated by calculating the additional proportion of women

reaching each parity from the mid-point of each age group to the end of the childbearing period. The expected future increment was therefore determined by subtracting the total fertility rate (TOFR) at the mid-point from the TOFR at the end of childbearing, adjusted by the current proportion.

$$TOFR_{5,45}(i) - TOFR_{x,x+5}(i) = TOFR_{5,45}(i) \cdot (1 - \theta^*_{x,x+5}) \quad (7)$$

The next step involved the derivation of the projected cumulated parity progression ratios and projected parity progression ratios, which were calculated by adding future order increments to the observed cumulated progression. The proportion of women projected to achieve at least parity is determined by

$$M^*_{x,x+5}(i) = M_{x,x+5}(i) + TOFR_{5,45}(i) \cdot (1 - \theta^*_{x,x+5}) \quad (8)$$

Thereafter, the projected parity progression ratios between parity i and $i+1$ were derived using equation 9.

$$a^*_{x,x+5}(i) = \frac{M^*_{x,x+5}(i+1)}{M^*_{x,x+5}(i)} \quad (9)$$

Note: PPR projection from a cross-sectional DHS dataset rest on several assumptions. Because respondents are observed at a single time point, projected values for younger age

groups are obtained by extrapolating from the childbearing experience of older cohorts, which assumes a degree of continuity in fertility behaviour across cohorts that may not hold where rapid social or demographic change is occurring. Also, projected estimates are sensitive to censoring, since women who have not completed childbearing at the time of the survey contribute only partial exposure, and to cohort effects, where younger and older cohorts may follow different fertility trajectories due to changing access to education, contraception, and reproductive health services. These assumptions should be borne in mind when interpreting the projected PPR values reported in this study.

Standardization of Fertility Rates

The direct method was used to standardize the Current Fertility Rate (CFR) by urban-rural distribution. Direct standardization was used to compare current fertility rates with differing age structures with the aim of eliminating the effects of these structural differences, providing a fair basis for comparison. Age-specific fertility rates were estimated using births in the past year before the survey and the age distribution of women. This was standardized using the combined age distribution of the analyzed women. The direct method was calculated using the age-specific rates in the rural and urban data. In this method, the expected number of births in a standard population is computed, that is, one with a fixed or defined age distribution,

if these rates are applied. Thus, the standard population was used to derive all the age-adjusted rates in the rural and urban areas in the selected countries. The expected fertility rates were summed to generate the Standardized Current Fertility Rate (SCFR).

Decomposition

Kitagawa's decomposition method separates the observed differences between two populations (rural-urban) into a composition effect and a rate effect. The composition effect captures a portion of the rural-urban fertility gap attributable to differences in the age distribution of women in each residence category, while the rate effect captures the portion of the gap attributable to differences in age-specific fertility behaviour itself, independent of age structure. The sum of composition and rate effects across all age groups results in the total rural-urban difference in the current fertility rate (Kitagawa, 1955). This decomposition, used in prior literature (Zeman et al., 2018; Adebawale et al., 2024), allows the study to distinguish whether rural-urban fertility gaps rise mainly due to differences in rural and urban population age structure, because women of the same age behave differently depending on residence.

$$\Delta = CFR^R - CFR^U = \sum F_i^R \cdot C_i^R - \sum F_i^U \cdot C_i^U \quad (i)$$

Where; F_i^R is the fertility rate in rural areas; F_i^U is the fertility rate in urban areas; C_i^R is the proportion of women in rural areas, and C_i^U is the proportion of women in urban.

$$= \frac{\sum F_i^R \cdot C_i^R}{2} + \frac{\sum F_i^R \cdot C_i^R}{2} - \frac{\sum F_i^U \cdot C_i^U}{2} - \frac{\sum F_i^U \cdot C_i^U}{2} + \frac{\sum F_i^U \cdot C_i^R}{2} + \frac{\sum F_i^R \cdot C_i^U}{2} - \frac{\sum F_i^R \cdot C_i^U}{2}$$

(ii)

$$= \sum_i C_i^R \left[\frac{F_i^R + F_i^U}{2} \right] - \sum_i C_i^U \left[\frac{F_i^R + F_i^U}{2} \right] + \sum_i F_i^R \left[\frac{C_i^R + C_i^U}{2} \right] - \sum_i F_i^U \left[\frac{C_i^R + C_i^U}{2} \right]$$

(iii)

$$\Delta = \sum (C_i^R - C_i^U) \left[\frac{F_i^R + F_i^U}{2} \right] + \sum (F_i^R - F_i^U) \left[\frac{C_i^R + C_i^U}{2} \right]$$

(iv)

Δ = Composition Effect + Rate Effect.

The composition effect reflects how the distribution of women in different age groups influences fertility differences. The rate effect is the difference in fertility behaviours that contribute to the overall fertility gap.

Ethical Consideration

This study used secondary data. Permission to use the data was granted by the data originator. Respondents gave informed consent at the point of data collection, and the anonymity of

the information provided was assured. Additionally, any means that could be used to track each respondent to the information they provided were removed from the original data.

Results

Table 1 below presents descriptive analysis of the study. Nigeria and Angola have high mean children ever born of 3.1 ± 2.95 and 2.9 ± 2.6 , respectively, while Ghana had the lowest children ever born (CEB) (2.3 ± 2.3). The mean CEB in Kenya, Tanzania, Mozambique, Gabon, and Cameroon exhibited intermediate fertility levels, with values ranging

from 2.4 to 2.6 children. The mean ages of respondents were between 27.7 years in Angola and 29.5 years in Ghana. Mean age at first birth indicated differences in reproductive timing, where Mozambique and Angola recorded the youngest averages with 18.5 ± 3.8 and 18.8 ± 9.3 years, respectively. However, Ghana's mean age at first birth (20.8 ± 4.2 years) indicates delayed childbearing. The mean age at first union varied, with Mozambique recording the lowest mean (18.2 ± 4.5 years) and Gabon having the highest (22.1 ± 6.7 years). Other countries ranged from 18.5 and 19.1 years.

Table 1: Mean children ever born, age, age at first birth, and age at first marriage of the analyzed women by country

Variables	Nigeria	Ghana	Kenya	Tanz.	Gabon	Cam.	Moz.	Angola
Mean $\pm$ σ								
CEB	3.1 $\pm$ 3.0	2.3 $\pm$ 2.3	2.4 $\pm$ 2.4	2.6 $\pm$ 2.5	2.4 $\pm$ 2.4	2.5 $\pm$ 2.6	2.6 $\pm$ 2.4	2.9 $\pm$ 2.6
Age	29.2 $\pm$ 9.7	29.5 $\pm$ 9.6	29.1 $\pm$ 9.5	29.3 $\pm$ 9.8	29.4 $\pm$ 9.8	27.8 $\pm$ 9.4	28.3 $\pm$ 9.7	27.7 $\pm$ 9.3
AFB	19.7 $\pm$ 4.5	20.8 $\pm$ 4.2	19.9 $\pm$ 3.9	19.6 $\pm$ 3.7	19.4 $\pm$ 4.3	19.2 $\pm$ 4.1	18.5 $\pm$ 3.8	18.8 $\pm$ 9.3
AFU	18.5 $\pm$ 5.1	20.3 $\pm$ 4.9	19.7 $\pm$ 4.5	19.5 $\pm$ 4.5	22.1 $\pm$ 6.7	19.0 $\pm$ 5.1	18.2 $\pm$ 4.5	19.1 $\pm$ 5.2

Moz: Mozambique; AFB: Age at first birth; AFM: Age at First Marriage

Standardized Current Fertility Rate (SCFR) in SSA

Table 2 presents the age-specific fertility rates (ASFR) and standardized current fertility rate (SCFR) of selected countries in Sub-Saharan Africa. Among the countries, Angola had the highest SCFR of 218.3 per 1,000 women, while Kenya recorded

the lowest SCFR (121.2). Nigeria (180.5), Cameroon (166.6), and Mozambique (163.2) exhibited high SCFRs, but Ghana (129.5) and Gabon (137.8) also exhibited lower SCFRs. Across the countries, fertility peaked in the age range 25-29, except in

Tanzania, where fertility peaked in the age range 20-24 with an ASFR of 238.2 per 1000 women. Fertility declined among the older age groups consistently. Among adolescents, fertility was highest in Angola (161.5 per 1000 women) and Mozambique (129), and lowest in Ghana (59.2), with remaining countries falling between these extremes.

Table 2: Standardized Current Fertility Rate (SCFR) in SSA

ASFR per 1000						Expected birth			
Age	Nigeria	Ghana	Kenya	Tanz.	Std.	Nigeria	Ghana	Kenya	Tanz.
15-19	79.5	59.2	69.9	94.5	31,767	2524752	1882162	2221175	3000635
20-24	246.9	161.8	190.6	238.2	28,255	6977479	4571331	5386717	6731203
25-29	301.7	214.0	199.5	235.4	26,688	8051318	5711022	5324320	6282213
30-34	249.2	189.5	145.8	197.3	21,869	5449067	4143985	3189153	4314077
35-39	172.2	148.4	102.2	169.7	19,468	3352512	2888494	1990050	3303989
40-44	92.3	48.6	43.2	72.4	14,833	1368800	720250	641300	1074295
45-49	25.7	15.6	5.5	17.3	12,451	320367	193795	68210	215277
					155,332	28044295	20111038	18820926	24921689
					SCFR	180.5	129.5	121.2	160.4
Age	Cam.	Gabon	Moz.	Angola	Std	Cam.	Gabon	Moz.	Angola
15-19	105.5	82.0	129.0	161.5	31,767	3350513	2603636	4098107	5130636
20-24	232.5	176.3	243.2	292.0	28,255	6569564	4980375	6872508	8249464
25-29	259.1	217.1	220.4	310.0	26,688	6915234	5793509	5882008	8272500
30-34	216.9	186.0	186.6	278.3	21,869	4743816	4067403	4081346	6085994
35-39	163.3	135.8	142.2	198.6	19,468	3178490	2642881	2767885	3865438
40-44	63.1	78.2	81.9	134.0	14,833	935264	1160599	1214153	1987114
45-49	15.4	13.0	34.6	25.9	12,451	191443	161495	430812	322735
					155,332	25884324	21409897	25346820	33913880
					SCFR	166.6	137.8	163.2	218.3

Moz: Mozambique; Cam: Cameroun; Tanz: Tanzania; Std: Standard population in million

The SCFR in Sub-Saharan Africa exhibited differentials between urban and rural areas across selected countries. Figure 1 below presents the rural-urban fertility of selected countries in sub-Saharan Africa. The figure shows that rural fertility rates were consistently higher than urban fertility rates across the countries. Angola recorded the highest SCFR in both rural (295.5) and urban (186.1) populations. Cameroon followed, with rural and urban SCFRs of 211.7

and 131, respectively. Similarly, Nigeria reported high fertility levels, where the rural SCFR was 207.6 compared to the urban SCFR of 148.1. Mozambique’s rural fertility level nearly doubled its urban fertility, with SCFRs of 192 and 117.9, respectively. Gabon and Tanzania had lower fertility rates in both rural and urban areas. Ghana and Kenya reported the lowest overall rates, with urban/rural SCFRs of 102.6/165.6 and 96.7/141.3, respectively.

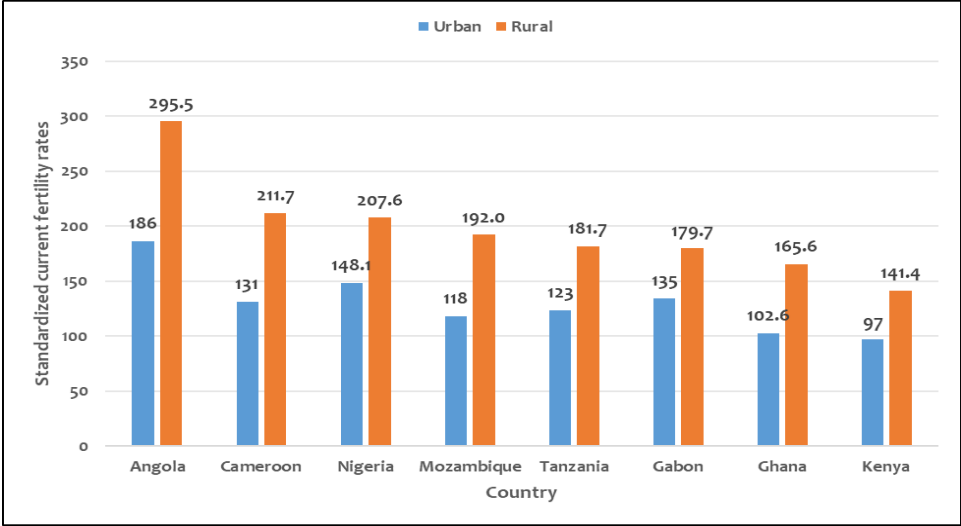


Figure 1: Standardized Current Fertility Rates by Urban and Rural Residence

In the rural areas, fertility peaked in the age range 20-29 and steadily declined towards the older age groups, as shown in Table 3 below. Adolescent

ASFR was highest in Angola (219.4 per 1000 women aged 15-19) and lowest in Kenya (76.9), with other countries falling between these values.

Table 3: Rural-Urban Standardized Current Fertility Rate (SCFR) in SSA

ASFR per 1000	Expected birth
RURAL	

Age	Nigeria	Ghana	Kenya	Tanz.	Std.	Nigeria	Ghana	Kenya	Tanzania
15-19	111.6	83.4	76.9	110.0	31,767	3544508	2648143	2441682	3494815
20-24	293.9	212.4	239.0	260.9	28,255	8304424	6000458	6751932	7371564
25-29	324.3	276.6	232.9	258.2	26,688	8655588	7381588	6216430	6891750
30-34	275.5	223.7	159.2	237.6	21,869	6024823	4891443	3482145	5196316
35-39	190.1	174.8	120.0	188.6	19,468	3700314	3403344	2335778	3671201
40-44	108.1	70.2	44.0	89.3	14,833	1603612	1040673	652437.8	1324621
45-49	27.9	28.8	6.5	21.7	12,451	346787.8	358996.3	81325.95	270691.4
					155,332	32180056	25724647	21961731	28220958
					<i>Rural SCFR</i>	<i>207.2</i>	<i>165.6</i>	<i>141.4</i>	<i>181.7</i>

Age	Cam.	Gabon	Moz.	Tanz.	Std.	Cam.	Gabon	Moz.	Tanzania
15-19	135.6	133.6	160.3	219.4	31,767	4308450	4245062	5091463	6969776
20-24	299.2	290.1	282.7	404.8	28,255	8454052	8196948	7987030	11436662
25-29	315.4	210.4	248.7	426.2	26,688	8418390	5616519	6637370	11375781
30-34	275.3	224.4	210.2	365.4	21,869	6021181	4907873	4597844	7990104
35-39	206.1	192.0	165.0	273.1	19,468	4013019	3737474	3213093	5317586
40-44	84.7	73.8	118.1	155.9	14,833	1256078	1094086	1752539	2312027
45-49	32.9	9.7	43.2	36.2	12,451	409156.5	120366	537304	451110.7
					155,332	32880327	27918329	29816643	45853046
					<i>Rural SCFR</i>	<i>211.7</i>	<i>179.7</i>	<i>192.0</i>	<i>295.2</i>

URBAN

Age	Nigeria	Ghana	Kenya	Tanz.	Std.	Nigeria	Ghana	Kenya	Tanz.
15-19	40.5	39.0	53.4	65.1	31,767	1285297	1239725	1696684	2067961
20-24	184.1	124.5	138.3	199.5	28,255	5202286	3517127	3907574	5637736
25-29	274.0	170.5	166.8	197.4	26,688	7312097	4551176	4452707	5268679
30-34	221.3	163.1	128.9	129.9	21,869	4839445	3566262	2818906	2841249
35-39	153.6	130.1	75.9	136.4	19,468	2990299	2531792	1477452	2655916
40-44	73.1	32.0	41.9	40.5	14,833	1083953	474232	620891	601277
45-49	23.2	5.1	3.1	7.0	12,451	289436	63356	38816	87077

155,332						23002814	15943671	15013031	19159895
Urban SCFR						148.1	102.6	96.7	123.3
Age	Cam.	Gabon	Moz.	Angola	Std.	Cam.	Gabon	Moz.	Angola
15-19	80.2	77.7	84.9	139.2	31,767	2546557	2467585	2696515	4421558
20-24	184.6	167.2	177.5	247.4	28,255	5215361	4725413	5014446	6989495
25-29	216.0	217.5	173.8	263.0	26,688	5764769	5803854	4638905	7018038
30-34	169.2	183.3	150.4	240.9	21,869	3699540	4009165	3290004	5268933
35-39	127.8	131.7	110.3	162.9	19,468	2488886	2564504	2147452	3170318
40-44	43.5	78.7	21.2	122.1	14,833	644730	1166719	314258	1811022
45-49	0.0	13.5	17.2	18.5	12,451	0	168086	214774	229948
155,332						20359844	20905327	18316354	28909312
Urban SCFR						131.1	134.6	117.9	186.1

Moz: Mozambique; Cam: Cameroun; Tanz: Tanzania; Std: Standard population in million

Decomposition of Age-Specific Contributions to Rural-Urban Fertility Differences in SSA

Using the Kitagawa decomposition method, Table 4 below presents the decomposition of rural-urban fertility differences across several sub-Saharan African countries by age group. Across all the countries, the decomposition of the rural-urban fertility differences revealed a consistent negative contribution across all age groups, which indicates that urban women tend to have lower fertility rates than rural women. The largest fertility gap was observed in Angola with a total contribution of -0.100, while the smallest fertility gap was reported in Kenya with a total contribution of -

0.026. Ghana, Nigeria, and Tanzania showed closely similar rural-urban fertility gaps, with total contributions of -0.058, -0.058, and -0.052, respectively. Total contributions to the rural-urban fertility gap were -0.075 in Mozambique and -0.076 in Cameroon. The fertility gap was pronounced in younger age groups (15-29), with fertility rates converging in older age groups. The decomposition highlighted that both the composition and rate effects played roles in shaping fertility differences, with younger urban women contributing more to the overall fertility gap in each country.

Table 4: Decomposition of Age-Specific Contributions to Rural-Urban Fertility Differences in SSA

Age	Cu	Cr	Fu	Fr	Cu - Cr	(Fu + Fr)/2	Fu - Fr	(Cr + Cu)/2	Ai
Nigeria									
15-19	0.199	0.205	0.040	0.112	-0.006	0.076	-0.071	0.202	-0.015
20-24	0.153	0.173	0.184	0.294	-0.020	0.239	-0.110	0.163	-0.023
25-29	0.170	0.176	0.274	0.324	-0.006	0.299	-0.050	0.173	-0.010
30-34	0.157	0.140	0.221	0.275	0.016	0.248	-0.054	0.148	-0.004
35-39	0.140	0.123	0.154	0.190	0.017	0.172	-0.036	0.131	-0.002
40-44	0.093	0.095	0.073	0.108	-0.002	0.091	-0.035	0.094	-0.004
45-49	0.089	0.088	0.023	0.028	0.001	0.026	-0.005	0.089	0.000
									-0.058
Ghana									
15-19	0.170	0.189	0.039	0.083	-0.019	0.061	-0.044	0.180	-0.009
20-24	0.181	0.177	0.124	0.212	0.004	0.168	-0.088	0.179	-0.015
25-29	0.161	0.148	0.171	0.277	0.013	0.224	-0.106	0.155	-0.014
30-34	0.148	0.152	0.163	0.224	-0.004	0.193	-0.061	0.150	-0.010
35-39	0.142	0.130	0.130	0.175	0.012	0.152	-0.045	0.136	-0.004
40-44	0.111	0.113	0.032	0.070	-0.002	0.051	-0.038	0.112	-0.004
45-49	0.086	0.090	0.005	0.029	-0.004	0.017	-0.024	0.088	-0.002
									-0.058
Kenya									
15-19	0.136	0.223	0.053	0.077	-0.087	0.065	-0.023	0.179	-0.010
20-24	0.219	0.164	0.138	0.239	0.055	0.189	-0.101	0.192	-0.009
25-29	0.219	0.148	0.167	0.233	0.071	0.200	-0.066	0.183	0.002
30-34	0.152	0.133	0.129	0.159	0.019	0.144	-0.030	0.143	-0.002
35-39	0.132	0.135	0.076	0.120	-0.003	0.098	-0.044	0.134	-0.006
40-44	0.083	0.105	0.042	0.044	-0.022	0.043	-0.002	0.094	-0.001
45-49	0.059	0.092	0.003	0.007	-0.032	0.005	-0.003	0.075	0.000
									-0.026
Tanzania									

15-19	0.196	0.205	0.065	0.110	-0.009	0.088	-0.045	0.201	-0.010
20-24	0.185	0.175	0.200	0.261	0.010	0.230	-0.061	0.180	-0.009
25-29	0.175	0.161	0.197	0.258	0.013	0.228	-0.061	0.168	-0.007
30-34	0.143	0.132	0.130	0.238	0.010	0.184	-0.108	0.138	-0.013
35-39	0.125	0.123	0.136	0.189	0.003	0.163	-0.052	0.124	-0.006
40-44	0.101	0.106	0.041	0.089	-0.005	0.065	-0.049	0.103	-0.005
45-49	0.076	0.097	0.007	0.022	-0.021	0.014	-0.015	0.086	-0.002
-0.052									

Cameroon

15-19	0.239	0.248	0.080	0.136	-0.010	0.108	-0.055	0.244	-0.015
20-24	0.187	0.166	0.185	0.299	0.020	0.242	-0.115	0.176	-0.015
25-29	0.182	0.173	0.216	0.315	0.009	0.266	-0.099	0.178	-0.015
30-34	0.144	0.146	0.169	0.275	-0.002	0.222	-0.106	0.145	-0.016
35-39	0.109	0.111	0.128	0.206	-0.003	0.167	-0.078	0.110	-0.009
40-44	0.076	0.085	0.043	0.085	-0.009	0.064	-0.041	0.081	-0.004
45-49	0.064	0.070	0.000	0.033	-0.006	0.016	-0.033	0.067	-0.002
-0.076									

Gabon

15-19	0.174	0.179	0.078	0.134	-0.005	0.106	-0.056	0.176	-0.010
20-24	0.186	0.183	0.167	0.290	0.003	0.229	-0.123	0.184	-0.022
25-29	0.185	0.134	0.217	0.210	0.051	0.214	0.007	0.160	0.012
30-34	0.152	0.131	0.183	0.224	0.021	0.204	-0.041	0.142	-0.001
35-39	0.128	0.114	0.132	0.192	0.014	0.162	-0.060	0.121	-0.005
40-44	0.105	0.120	0.079	0.074	-0.015	0.076	0.005	0.112	-0.001
45-49	0.070	0.140	0.013	0.010	-0.069	0.012	0.004	0.105	0.000
-0.028									

Mozambique

15-19	0.247	0.221	0.085	0.160	0.026	0.123	-0.075	0.234	-0.015
20-24	0.197	0.209	0.177	0.283	-0.012	0.230	-0.105	0.203	-0.024

25-29	0.162	0.169	0.174	0.249	-0.007	0.211	-0.075	0.166	-0.014
30-34	0.122	0.118	0.150	0.210	0.003	0.180	-0.060	0.120	-0.007
35-39	0.121	0.107	0.110	0.165	0.014	0.138	-0.055	0.114	-0.004
40-44	0.086	0.091	0.021	0.118	-0.005	0.070	-0.097	0.088	-0.009
45-49	0.065	0.084	0.017	0.043	-0.019	0.030	-0.026	0.075	-0.003
-0.075									
Angola									
15-19	0.248	0.220	0.139	0.219	0.029	0.179	-0.080	0.234	-0.014
20-24	0.218	0.198	0.247	0.405	0.020	0.326	-0.157	0.208	-0.026
25-29	0.175	0.162	0.263	0.426	0.013	0.345	-0.163	0.168	-0.023
30-34	0.125	0.123	0.241	0.365	0.002	0.303	-0.124	0.124	-0.015
35-39	0.102	0.112	0.163	0.273	-0.010	0.218	-0.110	0.107	-0.014
40-44	0.080	0.099	0.122	0.156	-0.019	0.139	-0.034	0.090	-0.006
45-49	0.052	0.086	0.018	0.036	-0.034	0.027	-0.018	0.069	-0.002
-0.100									

Figure 2 below presents the decomposition of age-specific contributions to rural-urban fertility differences in SSA, which revealed variation across countries and age groups. Among adolescents aged 15-19, the contribution to rural-urban fertility was generally low, ranging from 0.009 in Ghana to 0.0150 in Nigeria, Gabon, and Mozambique. Angola (0.014) also recorded a higher contribution in this age group. For

women aged 20-24, Angola (0.026), Mozambique (0.024), and Nigeria (0.023) exhibited the largest contribution for the group. In other countries, contributions ranged from 0.009 to 0.015. Contributions varied more widely in the age group 25-29 years, while Angola (0.026) reported the largest contributions, and Kenya (0.002) recorded a markedly lower value.

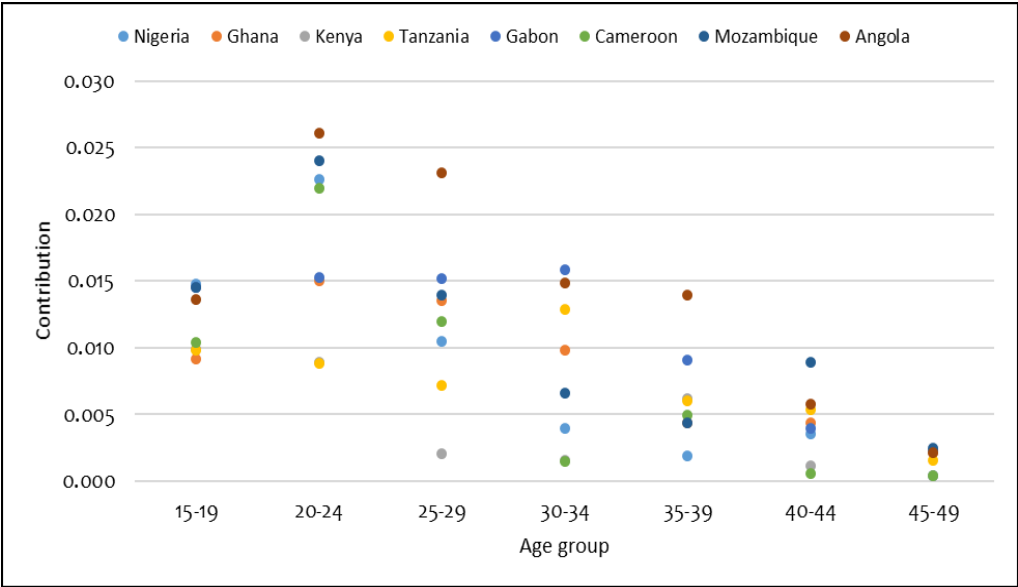


Figure 2. Age-Specific Contributions to Rural-Urban Fertility Differences in Selected SSA Countries

Contributions at 30-34 were the highest in Gabon (0.015) and Angola (0.016) and lowest in Cameroon (0.001). At age 35-39, values were more evenly distributed (0.002-0.006), with Angola highest (0.014). Mozambique (0.009) stood out at 40-44 years, while women aged 45-49 contributed the least overall, from 0.000 in Nigeria, Kenya, and Cameroon to 0.004 in Mozambique.

Observed Parity Progression Ratios

The observed PPRs for women across different age groups reveal patterns in fertility behaviour, and childbearing progression is presented in Figure 3 below. In the age group 15-19, PPRs were generally lower across the countries. Progression from 0 to at least 1 child ranged from 10.9% in Ghana to 28.8% in Angola and Mozambique. Second child progression was highest in Cameroon

(21.3%). For ages 20-24, the first birth progression increased from 46.8% in Ghana to 80.2% in Mozambique and 63% in Nigeria. Second-child progression was highest in Nigeria with PPR of 61.7%, and third-child progression peaked in Cameroon with PPR of 48.3%, and Mozambique showed faster transitions to higher parities. Among women 25-29 (*Figure 3c*), first-birth progression exceeded 85% in several countries, second-child progression ranged from 60.7% in Ghana to 86.1% in Mozambique, while third-child progression peaked in Angola (62.5%), with higher parities declining faster in Ghana than in Nigeria.

For women 30-34 as presented in Figure 3d below, first birth progression surpassed 90% in most countries, and second child progression remained high, ranging from 68.8% in Ghana to

92.7% in Mozambique. PPR declined at higher orders, nearing 30% by parity 8 in Nigeria and Kenya. Parity progression remained high for earlier births in women aged 35-39 (Figure 3e), exceeding 94% for births. Second-

child progression ranged from 81.8% in Ghana to 95.7% in Kenya, with declines at higher parities across all countries. Women aged 40-44 had over 95% first-birth progression (Figure 3f).

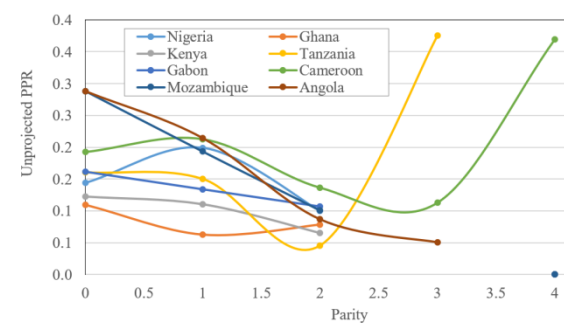


Figure 3a: Observed parity progression of women aged 15-19 years with at least i children

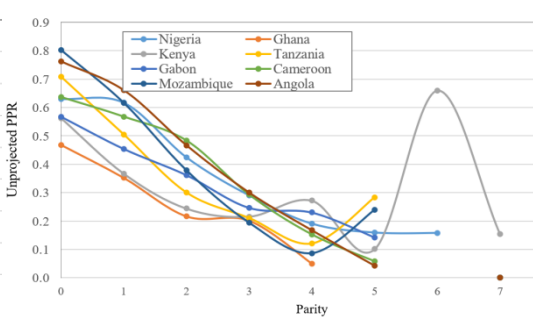


Figure 3b: Observed parity progression of women aged 20-24 years with at least i children

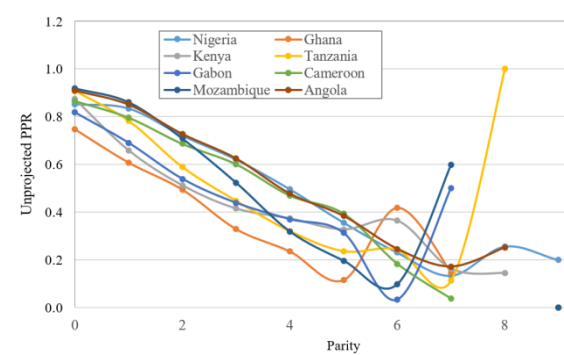


Figure 3c: Observed parity progression of women aged 25-29 years with at least i children

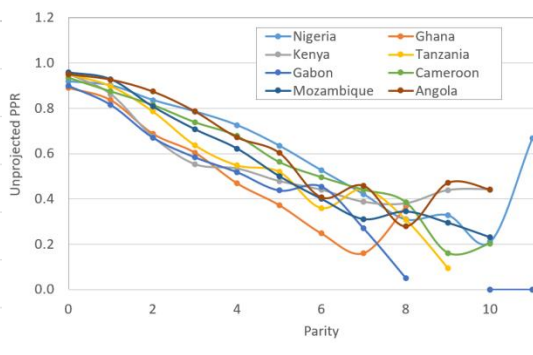


Figure 3d: Observed parity progression of women aged 30-34 years with at least i children

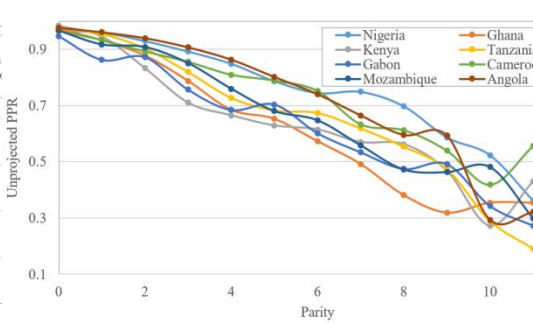
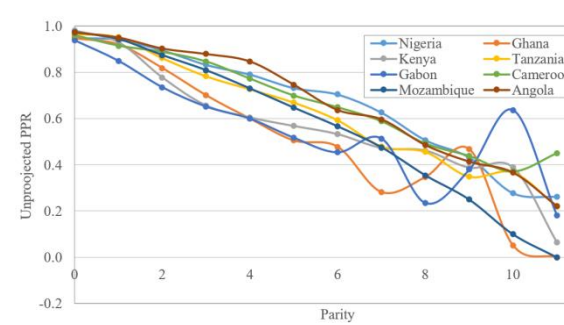


Figure 3e: Observed parity progression of women aged **35-39 years** with at least *i* children

Figure 3f: Observed parity progression of women aged **40-44 years** with at least *i* children

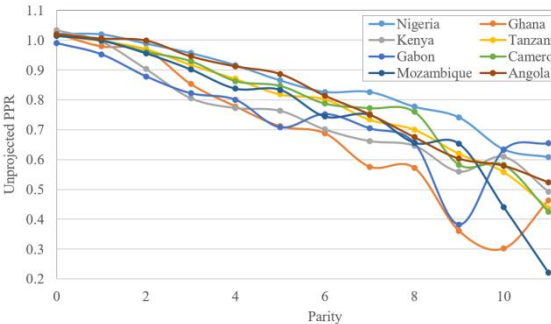


Figure 3g: Observed parity progression of women aged **45-49 years** with at least *i* children

Second-child progression remained high, ranging from 87.7% in Ghana to 94.9% in Angola, but declined at higher parities; by parity 5, Nigeria (74.4%) and Kenya (61.4%) exceeded Ghana (57.2%). Among women 45-49, parity progression was highest, with over 97% reaching their first birth. Second-child progression was 91.9% and 60.3% in Cameroon for parity 9. The analysis of average PPRs across

countries presented in Figure 4 below revealed significant variations in fertility behaviour and transitions in parities. The average parity progression ratio (PPR) declined consistently with increasing parity across countries, indicating that although progression to early births is prevalent, progression to higher-order births becomes progressively less common as parity increases.

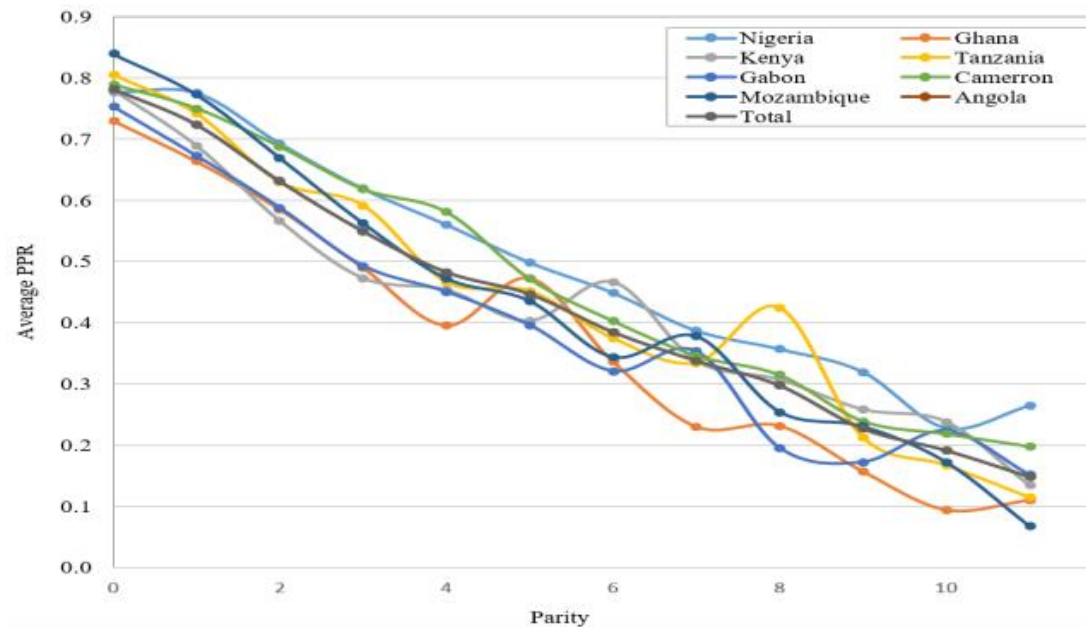


Figure 4: Average Parity Progression Ratios (*PPR*) by Country and Parity in Sub-Saharan Africa

The highest level of PPRs is observed at low parities (0-2), indicating that there is almost universal transition to motherhood and second births, though the levels are sharply declining at mid to high parities, indicating growing stopping behaviour. Despite the country-specific trends, the general trend is that of a slow diminishing movement of very large family sizes across Sub-Saharan Africa, translating to lower PPR at high parities.

Projected Parity Progression

The projected PPR for women aged 20-24, first birth progression was highest in Ghana (103.7%) and Nigeria (102.2%), while Kenya reported 94.3%. The second birth progression is relatively high in

Mozambique (110.3%). Values exceeding 100% are not biologically plausible and are interpreted here as an artifact of the projection procedure rather than a substantive finding. This can arise when projections extrapolate from a relatively small number of women within a given age-parity cell, or when incomplete cohort exposure at younger ages amplifies the future increment added to the observed cumulated progression. These estimates should therefore be looked at as indicating a trend toward near-universal progression to first and second births in these countries, rather than as literal probabilities, and recommend caution in readers' interpretation.

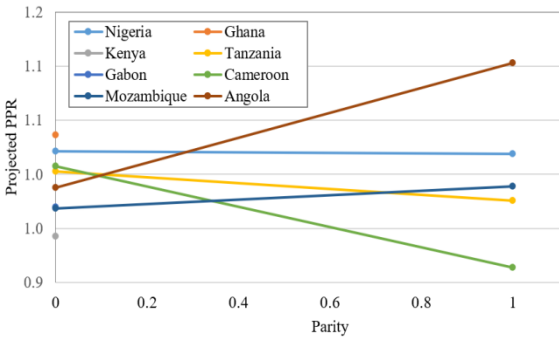


Figure 5a: Projected parity progression ratios 20-24

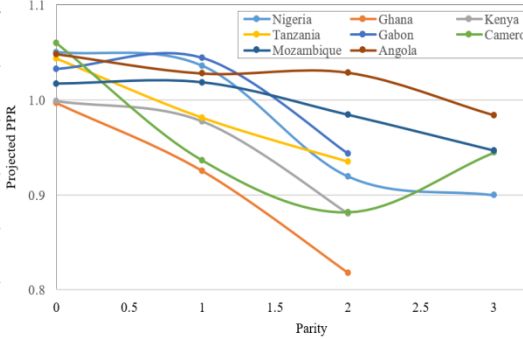


Figure 5b: Projected Parity Progression Ratios 25-29

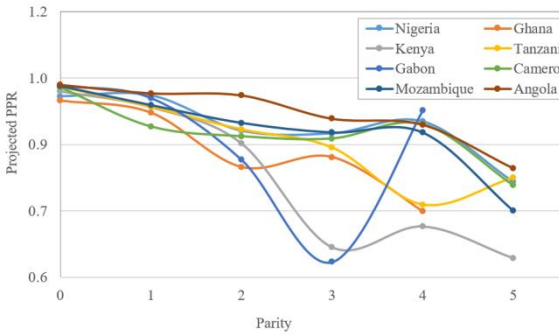


Figure 5c: Projected Parity Progression Ratios 30-34

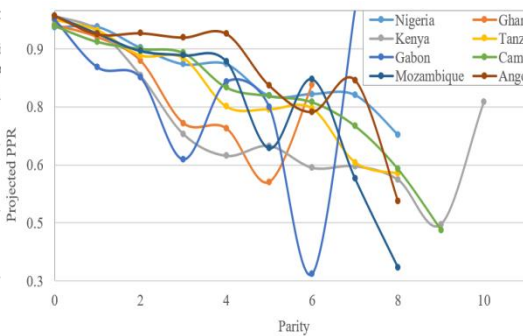


Figure 5d: Projected Parity Progression Ratios 35-39

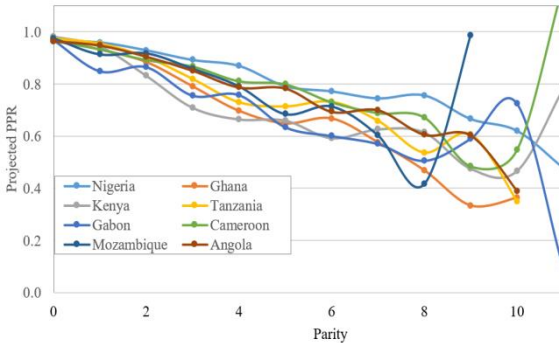


Figure 5e: Projected Parity Progression Ratios 40-44

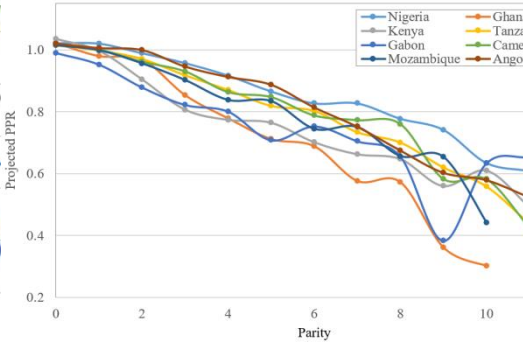


Figure 5f: Projected Parity Progression Ratios 45-49

Among women aged 25-29, first-birth progression remained near 100%, while second-birth progression rates declined in Ghana (87.2%) and Cameroon (88.6%), suggesting most

mothers in SSA are projected to have at least 2 births. Higher parity progression decreases further in older age groups, with Ghana and Kenya showing a significant drop at parity 4,

with projected PPR of 69.7% and 66.5%, respectively. By ages 45-49, parity 0 progression remains above 94%, but higher-parity births decline sharply.

Discussions

In SSA, fertility rates, although declining, remain high in some countries. Nigeria and Angola exhibited the highest SCFR, which corroborates earlier findings (Garenne, 2018; Bongaarts, 2020; Turner & Götmark, 2023) and possibly influenced by cultural preferences for large families and limited reproductive health access. High age-Specific fertility Rates (ASFRs) among women aged 20-34 years reflect peak fertility during early to mid-reproductive years in SSA (Garenne, 2018; Teshale et al., 2022), consistent with the onset of childbearing and high coital frequency or sexual exposure in marriage. Moderate fertility rates in Ghana, Gabon, and Kenya suggest these countries are undergoing a fertility transition (Schoumaker, 2019), with Kenya's fertility decline highlighting the impact of integrated family planning programs and community-based approaches (Garenne, 2018; Bongaarts, 2020; Odimegwu et al., 2018), alongside broader mechanisms such as education, delayed marriage, contraceptive use, and smaller family size preferences. (Bongaarts, 2020; Lerch, 2019; Teshale et al., 2022).

Rural areas consistently showed higher fertility than urban areas, which

is consistent with literature findings (Lerch, 2019; Tesfa et al., 2023). The divide likely reflects limited access to reproductive health services, traditional norms, and lower socio-economic development in rural populations (Adebawale et al., 2024; Agbaglo et al., 2022), compounded by educational disparities that give urban women greater access to family planning and later childbearing (Garenne, 2018; Lerch, 2019; Adebawale et al., 2024; Shapiro & Hinde, 2017). Poverty and pronatalist norms, where children are often seen as economic assets, further reinforce high rural fertility (Bongaarts, 2020), while urbanization and migration help diffuse fertility-reducing behaviours, as seen in Ghana (Towriess & Timæus, 2019). Age-specific decomposition revealed that fertility in early adulthood (20-24) and mid-life (30-34) drives disparities (Teshale et al., 2022), conforming with the mean age at first birth of approximately 20 years across most countries and with urban women in this age range delaying childbearing due to education and economic opportunities (Finlay et al., 2018), while rural women maintain higher fertility due to structural inequalities in service access (Bongaarts, 2020; Agbaglo et al., 2022; Ahinkorah et al., 2021).

Across age groups, observed PPR followed a consistent pattern. Progression to first and second birth rose sharply from adolescence, becoming near universal by age 25-29

and beyond, while progression to higher-order births declined steadily with increasing parity. This pattern is consistent with growing acceptance of smaller family sizes in some countries and persistent pronatalist norms in others. Lower adolescent PPRs may likely reflect delayed childbearing linked to education and family-planning awareness, as observed in Ghana (Towriss & Timæus, 2018), while higher PPRs in Angola and Mozambique may reflect more limited access to education and reproductive health services (Tesfa et al., 2023). Sharper declines at higher parities in Ghana, Kenya, and Tanzania suggest a shift towards family-size limitation and more effective fertility regulation, consistent with contraceptive use moderating higher-order births (Agbaglo et al., 2022) and with broader demographic transition patterns (Towriss & Timæus, 2018). In contrast, sustained high PPRs at higher parities in Angola and, to a lesser extent, Nigeria, point to slower transitions, limited birth spacing, and persistent pronatalist influence (Spoorenberg, 2019; Towriss & Timæus, 2018).

Projected PPRs broadly mirrored these patterns, as high projected progression for first and second births in Ghana, Nigeria, and Mozambique reflects cultural emphasis on early and continued childbearing (Lerch & Spoorenberg, 2020; Spoorenberg, 2019). However, Kenya's comparatively lower projections point

to the growing influence of urbanization and family planning (Bongaarts, 2020). Declines in projected higher-parity progression, particularly in Ghana, Kenya, and Cameroon, are consistent with a rise in contraceptive use and changing family-size preferences (Teshale et al., 2022; Adebowale et al., 2017), while sustained high projections in Angola may reflect continued limited access to reproductive health services (Spoorenberg, 2019).

Several limitations call for caution in interpreting these findings. Projected PPRs exceeding 100% in a few cases are not biologically plausible, as they likely reflect the procedure used for projection (small country-level cell sizes, extrapolation from partial cohort exposure), and not as literal probabilities; accurate PPR projection is best achieved with large-scale data, such as recent census datasets (Moultrie & Zaba, 2013), which many SSA countries lack, and for which the DHS data used may not fully represent recent trends or regional variation (Shakya, 2020). Comparisons between countries should be considered approximate and not strictly contemporaneous because of the non-uniformity of the DHS survey years (2015-2023). The cultural and socio-economic aspects, including polygyny and male preference (Spoorenberg, 2019), were not included in the PPR analysis, and even though they are mentioned as background, they were not explicitly modelled here, but can be

included in a multivariable analysis in future studies along with PPR and decomposition estimates. Also, potential underreporting of neonatal deaths cannot be excluded, and the PPRs are only informative for the sequence of childbearing, may be sensitive to censoring in cross-sectional data, and may mask underlying differences in fertility behaviour.

Conclusions

High fertility rate and parity progression rate were observed in SSA, but there was a disparity in these demographic indices in the countries analyzed. High PPR from 0 to 1 and 1 to 2 suggests that progression to at least two births remains near-universal among women in the analyzed SSA countries. This pattern indicates observed childbearing behavior rather than a direct measure of fertility preference, even though it is broadly consistent with sustained pronatalist norms reported elsewhere in the literature. However, the projected PPRs indicate that women are increasingly likely to have between 2 and 4 children. The PPRs observed in the countries provide additional insights into demographic shifts, indicating delayed childbearing among younger women and slower progression to higher-order births, signalling the gradual but uneven adoption of smaller family norms. Higher fertility rates in rural than urban areas across the countries investigated emphasize the disparities in values placed on sociocultural norms and access to reproductive health services. Country-specific fertility control programs that target women in the age group 20-34 years and high parity may help reduce the persistent high fertility rate in sub-Saharan African countries examined, though further research directly testing the socio-

cultural and economic factors discussed above would strengthen the evidence base for such interventions.

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Data availability

The data used for this study is available in the public domain at www.measuredhs.com, but access requires permission from the data originator.

Competing interests

The authors declare no financial or conflict of interest in writing this manuscript.

Author's contributions

IO and AAS conceived the idea. IO drew a plan for the study. All the authors implemented the study.

References

Adebowale, A. S., Afolabi, A., Haita, N., & Palamuleni, M. E. (2024). Rural-Urban Fertility Disparity in The Gambia: Standardized Rate, Decomposition, Parity Progression, and Determinants. *Journal of Population and Social Studies*, 33, 198–219. <https://doi.org/>

Adebowale, S. A., Fagbamigbe, F. A., & Bamgboye, E. A. (2017). Contraceptive Use: Implications for Completed Fertility, Parity Progression and Maternal Nutritional Status in Nigeria.

Adhikari, S., Lutz, W., & Kc, S. (2023). Rural/urban fertility differentials in the Global South: Is female education the key driver of declining birth rates?

African Development Bank Group, 2024. Human Development. <https://www.afdb.org/> (Accessed July 13th, 2024)

Agbaglo, E., Agbadi, P., Tetteh, J. K., Ameyaw, E. K., Adu, C., & Nutor, J. J. (2022). Trends in total fertility rate in Ghana by different inequality dimensions from 1993 to 2014. *BMC Women's Health*, 22(1), 49. <https://doi.org/10.1186/s12905-022-01629-w>

Ahinkorah, B. O., Budu, E., Duah, H. O., Okyere, J., & Seidu, A.-A. (2021). Socio-economic and geographical inequalities in adolescent fertility rate in Ghana, 1993–2014. *Archives of Public Health*, 79(1), 124. <https://doi.org/10.1186/s13690-021-00644-x>

Bharti, A., Kumar, A., & Singh, B. P. (2019). Trend Of Synthetic Parity Progression Ratio (Sppr) Of India: Evidence From National Family Health Surveys. *Journal of Reliability and Statistical Studies*, 153–172. <https://doi.org/10.13052/jrss2229-5666.12212>

Bongaarts, J. (2020). Trends in fertility and fertility preferences in sub-Saharan Africa: The roles of education and family planning programs. *Genus*, 76(1), 32. <https://doi.org/10.1186/s41118-020-00098-z>

Bosson-Amedenu, S, Bipembi, H, Toffe, G, Parity Progression Estimation and Categorical Analysis of Birth Cohort Data in Ghana: The Case of Birth Data Derived from Health Insurance Data, *International Journal of Probability and Statistics*, Vol. 8 No. 2, 2019, pp. 23-29.

Federal Ministry of Health and Social Welfare of Nigeria (FMoHSW), National Population Commission (NPC) [Nigeria], & ICF. (2024). Nigeria demographic and health survey 2023: Key indicators. Rockville, Maryland, USA: FMoHSW, NPC, & ICF.

Finlay, J. E., Mejía-Guevara, I., & Akachi, Y. (2018). Inequality in total fertility rates and the proximate determinants of fertility in 21 sub-Saharan African countries. *PLOS ONE*, 13(9), e0203344. <https://doi.org/10.1371/journal.pone.0203344>

Garenne, M. (2018). Family Planning and Fertility Decline in Africa: From 1950 to 2010. In Z. O. Amarin (Ed.), *Family Planning*. InTech. <https://doi.org/10.5772/intechopen.71029>

Ghana Statistical Service (GSS) and The DHS Program. (2024). Ghana DHS 2022 - final report. Rockville, Maryland, USA: ICF. Available at <https://www.dhsprogram.com>

.

Hinde, A. (1998). *Demographic methods*. London: Arnold

Institut National de la Statistique/INS and ICF. (2020). République du Cameroun Enquête Démographique et de Santé 2018. Yaoundé, Cameroun: INS and ICF. <https://www.dhsprogram.com/pubs/pdf/FR360/FR360.pdf>.

Instituto Nacional de Estatística (INE) & ICF. (2024). Inquérito Demográfico e de Saúde em Moçambique 2022–23. Maputo, Moçambique e Rockville, Maryland, EUA: INE e ICF.

Instituto Nacional de Estatística (INE/Angola), Ministério da Saúde (MINSA/Angola), Ministério do Planeamento e do Desenvolvimento Territorial (MINPLAN) and ICF. (2017). Inquérito de Indicadores Múltiplos e de Saúde em Angola 2015-2016. Luanda, Angola e Rockville, Maryland, EUA: INE, MINSA, MINPLAN and ICF.

International Monetary Fund (2023). African Century. A demographic transformation in Africa has the potential to alter the world order. <https://www.imf.org/en/>
(Accessed: October 13th, 2024)

Kaneda, T., Falk, M., & Patierno, K. (2021, March 27). *Understanding and comparing population projections in Sub-Saharan Africa*. Population Reference Bureau. <https://www.prb.org/resources/>

Kenya National Bureau of Statistics, & ICF. (2023). Kenya Demographic and Health Survey 2022: Volume 1. Nairobi, Kenya, and Rockville, Maryland, USA: KNBS and ICF.

Lerch, M. (2019a). Fertility Decline in Urban and Rural Areas of Developing Countries. *Population and Development Review*, 45(2), 301–320. <https://doi.org/10.1111/padr.12220>

Lerch, M. (2019b). Regional variations in the rural-urban fertility gradient in the global South. PLOS ONE, 14(7), e0219624. <https://doi.org/10.1371/journal.pone.0219624>

Lerch, M., & Spoorenberg, T. (2020). The emergence of birth limitation as a new stage in the fertility transition in sub-Saharan Africa. *Demographic Research*, 42, 827–858. <https://doi.org/10.4054/DemRes.2020.42.30>

Moultrie, T.A., & Zaba, B. (2013). Parity progression ratios. In Moultrie TA, Dorrington RE, Hill AG, Hill K, Timæus IM and Zaba B (Eds). Tools for Demographic Estimation. Paris: *International Union for the Scientific Study of Population*. <https://demographicestimation.iussp.org/>. Accessed 2024-08-13.

Muthui, P. M. (2014). Estimation of Fertility in Kenya Using the Projected Parity Progression Ratios: Evidence From 1999 and 2009 Censuses.

Naderi Beni, M., Sharifi, M., & Kord Zanganeh, J. (2023). Parity Progression Ratio Dynamics, Determinants, and Policy Approaches: A Study in Isfahan in 2020.

Epidemiology and Health System Journal, 10(2), 69–74.
<https://doi.org/10.34172/ehsj.2023.12>

Odimegwu, C. O., Akinyemi, J. O., Banjo, O. O., Olamijuwon, E., & Amoo, E. O. (2018). Fertility, Family Size Preference and Contraceptive Use in Sub-Saharan Africa: 1990-2014. *African journal of reproductive health*, 22(4), 44–53.
<https://doi.org/10.29063/ajrh2018/v22i4.5>

Otieno, V., Agwanda, A., & Khasakhala, A. (2019). Family Planning: The Anchor behind the Sub-Saharan African Fertility Progression. *The International Journal of Humanities & Social Studies*, 7(8).
<https://doi.org/10.24940/theijhss/2019/v7/i8/HS1908-068>

Rossa, A., & Palma, A. (2020). Predicting parity progression ratios for young women by the end of their childbearing life. *Statistics in Transition New Series*, 21(1), 55–71.
<https://doi.org/>

Schoumaker, B. (2019). Stalls in Fertility Transitions in sub-Saharan Africa: Revisiting the Evidence. *Studies in Family Planning*, 50(3), 257.
<https://doi.org/10.1111/sifp.12098>

Shakya, D. V. (2020). Estimation of Cohort Fertility Using Parity Progression Ratio. *Curriculum Development Journal*, 42, 18–28. <https://doi.org/10.3126/cdj.v0i42.33209>

Shapiro, D., & Hinde, A. (2017). On the pace of fertility decline in sub-Saharan Africa. *Demographic Research*, 37, 1327–1338. <https://doi.org/10.4054/DemRes.2017.37.40>

Spoorenberg, T. (2019). Forty years of fertility changes in the Sahel. *Demographic Research*, 41, 1289–1314. <https://doi.org/10.4054/DemRes.2019.41.46>

Tesfa, D., Tiruneh, S. A., Gebremariam, A. D., Azanaw, M. M., Engidaw, M. T., Kefale, B., Abebe, B., Dessalegn, T., & Tiruneh, M. (2023). The pooled estimate of the total fertility rate in sub-Saharan Africa using recent (2010–2018) Demographic and Health Survey data. *Frontiers in Public Health*, 10, 1053302.
<https://doi.org/10.3389/fpubh.2022.1053302>

Teshale, A. B., Worku, M. G., & Tesema, G. A. (2022). Fertility decision and its associated factors in Sub-Saharan Africa: A multilevel multinomial logistic regression analysis. *BMC Women's Health*, 22(1), 337. <https://doi.org/>

Towriss, C. A., & Timæus, I. M. (2018a). Modelling period fertility: Schooling and intervals following a birth in Eastern Africa. *Population Studies*, 72(1), 75–90. <https://doi.org/>

Towriss, C., & Timæus, I. (2018). Contraceptive use and lengthening birth intervals in rural and urban Eastern Africa. *Demographic Research*, 38, 2027–2052. <https://doi.org/>

Turner, N., & Götmark, F. (2023). Human fertility and religions in sub-Saharan Africa: A comprehensive review of publications and data, 2010-2020. *African Journal of Reproductive Health*, 27(1), 119–171

United Nations, Department of Economic and Social Affairs, Population Division. (2022). World family planning 2022 (UN DESA/POP/2022/TR/NO. 4). <https://www.un.org/>

United Nations. (n.d.). The 17 Goals. <https://sdgs.un.org/goals> (accessed January 10, 2025)

Yoshida, T., & Tsutsumi, M. (2018). Which country epitomizes the world? A study from the perspective of demographic composition. *ArXiv*. <https://arxiv.org/abs/1810.00210>

Zeman, K., Beaujouan, E., Brzozowska, Z., & Sobotka, T. (2018). Cohort fertility decline in low fertility countries: Decomposition using parity progression ratios. *Demographic Research*, 38, 651–690. <https://doi.org/10.4054/DemRes.2018.38.25>