



Unravelling the interplay between economic empowerment, gender equality, and desire for additional children among married women in sub-Saharan Africa: a confirmatory factor analysis approach

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Abstract

Sub-Saharan Africa (SSA) continues to grapple with high fertility, often linked to women's fertility desire for more children. However, this desire can be impacted by low economic empowerment and prevailing gender inequalities. Therefore, this study aimed at understanding how these two factors influence the desire for additional children in the region. This study analysed pooled weighted Demographic and Health Surveys (DHS) data (2015–2022) from 167,462 women across 23 SSA countries. Descriptive statistics characterised the sample and bivariate analyses explored variable relationships. Exploratory and Confirmatory Factor Analyses identified and validated latent constructs of economic empowerment and gender equality. Structural equation modelling assessed the direct and indirect effects of these constructs on women's desire for additional children. The study revealed that 62.5% of married women in the 23 SSA countries desired additional children, with a higher desire in Western and Central Africa (68.5% and 66.8%) compared to East and Southern Africa (53.5% and 52.6%). Besides, all indicators significantly loaded onto their constructs ($p < 0.001$). Specifically, married women's education attainment ($\beta = 2.2243$) and working status ($\beta = 1.5047$) strongly and positively predicted economic empowerment. Decision-making autonomy regarding healthcare ($\beta = 1.1436$), household purchases ($\beta = 1.1353$), contraceptive use ($\beta = 0.4588$), and earnings ($\beta = 0.7937$) were positively associated with gender equality. Women's economic empowerment ($\beta = -0.027$, $SE = 0.002$, $P < 0.001$), household autonomy ($\beta = -0.0805$, $SE = 0.0019$, $p < 0.001$), and reproductive health autonomy ($\beta = -0.0203$, $SE = 0.0022$, $p < 0.001$) were all linked with lower desire for additional children among married women. Overall, the model revealed that both economic empowerment and gender equality exhibited marginal, yet statistically significant, positive effects on the desire for additional children ($\beta = 0.0001$ and $\beta = 0.0004$, $p < 0.001$),

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alongside a significant positive covariance between the two predictor constructs ($\beta=0.0252$). This study has quantified the latent constructs of economic empowerment, gender equality and desire for additional children among married women in SSA. While economic empowerment and gender equality demonstrated significant positive associations, with desire for additional children, these effects were notably small in magnitude. Therefore, although it is important to enhance their economic empowerment and address gender inequalities to potentially reduce their desire for additional children, other factors specific to this region are likely just as important.

Keywords Desire for additional children · Reproductive health · Economic empowerment · Gender equality · Confirmatory factor analysis · Sub-Saharan Africa

Introduction

Sub-Saharan Africa (SSA) is a region marked by significant disparities in gender equality, economic empowerment, and high fertility (Atake et al., 2019). While considerable progress has been made in recent decades, challenges persist, particularly for married women fertility reproductive health choices. The relationship between economic empowerment, gender equality, and fertility intentions has been extensively explored in various contexts (Chowdhury et al., 2023; Fox et al., 2019; Upadhyya et al., 2014). Economic empowerment, often measured by factors such as education, employment, and income, has been linked to lower desire for additional children and few children overall. This association is attributed to several mechanisms, including increased opportunity costs of childbearing, enhanced decision-making power within households, and improved access to family planning services (Starbird et al., 2016; Stover et al., 2016; Tessema et al., 2016).

Gender equality, encompassing dimensions like reproductive health rights, social norms, legal rights, and political participation, also plays a pivotal role in shaping fertility intentions. When women have greater autonomy and agency, they are more likely to make informed choices about their reproductive health choices (Bermúdez et al., 2023; Muñoz Boudet et al., 2013; Wigle et al., 2022; WHO, 2017). Moreover, gender-equitable societies tend to invest more in education and healthcare, which can further contribute to reduced desire for additional children and ultimately lower fertility rates (Bongaarts, 2020; Götmark & Andersson, 2020; Kim, 2023).

However, the relationship between these factors is not straightforward and can vary across different cultural and socio-economic contexts. In SSA, where traditional gender roles and patriarchal norms remain prevalent, the impact of economic empowerment and gender equality on fertility intentions may be more complex (Muñoz Boudet et al., 2013; Upadhyya et al., 2014). For instance, some studies have shown that increased female education can lead to higher fertility rates, particularly in rural areas, due to factors such as early marriage and limited access to modern contraception (Kebede et al., 2022; Kim, 2023).

Theoretically, this study is based on two broad concepts of economic empowerment and gender equality of women as key determinants of women's desires for

additional children in SSA. Drawing upon scholars such as Dalal (2011), Dyson and Moore (1983); Kabeer (1999); Malhotra and Schuler (2005); Perkins and Zimmerman (1995) and Zimmerman (2000), this study argues that economic empowerment, defined as women's access to and control over economic resources, labour force participation, and asset ownership, can enhance their agency and bargaining power within households, potentially leading to a greater ability to make choices regarding desire for additional children (Chompa, 2022; Prata et al., 2017; Dyson & Moore, 1983, UNWomen, 2024). Besides, economists such as Becker (1992) have argued that women with higher incomes may have a greater opportunity cost associated with childbearing and childcare.

Additionally, gender equality, defined as males and females possessing equal entitlements and availability of assets, prospects, and authority in choices regardless of sex, represents another element potentially influencing married women's desire for additional children (Agassi, 1989; McDonald, 2000). Societies with enhanced equitable gender roles and norms have experienced shifts in traditional family structures and reproductive roles and rights (Mason, 2001). Besides, greater gender equality may enhance women's access to education, awareness of their reproductive health rights, information, and healthcare; and within households, it can foster shared childcare responsibilities, potentially reducing the desire for additional children (Anderson & Kohler, 2015; Brewster & Rindfuss, 2000; Kim, 2023; Sen & Mukerjee, 2017).

While economic empowerment can provide women in SSA with greater autonomy, deeply entrenched patriarchal norms and gender inequalities may constrain their ability to exercise their reproductive health decision-making (Bongaarts, 2002). From the foregoing, the effect of economic empowerment on fertility desires may be contingent upon the prevailing levels of gender equality within SSA. For instance, a woman with significant economic resources may still desire additional children if societal norms dictate that a woman's primary role is motherhood and that more children confer desired social status (Atake et al., 2019). Moreover, the above theoretical underpinning in SSA assumes that women's desire for additional children is shaped by both economic empowerment and gender equality.

Despite the increasing body of research exploring the links between economic empowerment, gender equality, and fertility intentions in SSA, a crucial question remains unanswered: how do these factors collectively influence women's desires for additional children? To address this research gap, this study aimed to investigate the interplay between economic empowerment, gender equality, and the desire for additional children among married women in SSA. Specifically, the study sought to: (1) measure the latent constructs of economic empowerment, gender equality, and desire for additional children among married women in SSA, and (2) examine the relationships between economic empowerment, gender equality, and the desire for additional children among married women in SSA. It is anticipated that the findings of this study will contribute to the existing body of knowledge on women's empowerment, gender equality, and fertility intentions in SSA, and specifically provide novel insights for policymakers and program implementers in the region.

Methodology

Design and sources

The study employed a secondary cross-sectional design, analysing a recent pooled sample of 167 462 married women from nationally representative Demographic and Health Surveys (DHS) collected between 2015 and 2022 across four regions of 23 SSA countries. The analysis utilised the women recode file, which contains the necessary variables for this study, such as bio-demographic and socio-economic characteristics, and proxy indicators on gender equality (e.g., decision-making) and sexual reproductive health (e.g., desire for children, family planning). The regional distribution of the sample is as follows: Central Africa (Cameroon and Gabon: 7206), East Africa (Burundi, Rwanda, Tanzania and Uganda: 22895), West Africa (Burkina Faso, Benin, Côte d'Ivoire, Ghana, The Gambia, Liberia, Mali, Mauritania, Nigeria, Sierra Leone, Senegal: 96400) and Southern Africa (Madagascar, Malawi, Mozambique, South Africa, Zambia and Zimbabwe: 40961).

Study variables

Outcome

The outcome variable for this study was 'v602=desire for an additional child', selected based on similar studies (Akinyemi & Odimegwu, 2021; Ahinkorah et al., 2020; Muluneh & Moyehodie, 2021) among married women in 23 SSA African countries. The variable was coded 0 = 'No' if a woman was undecided or wanted no more children, and 1 = 'Wants another' if a woman wanted a child within two years, after two years or wants, unsure about the timing.

Independent variables

The independent variables used in this study included women's age (15–24, 25–34 and 35 years and above); age at first birth (< 18 years, ≥ 18 years, never given birth); age at first marriage (< 18 years, ≥ 18 years); sex preference (no preference, girl child and boy child); education level (none, primary, secondary and tertiary); employed (no, yes); household size (5 or fewer members, 6 or more members); wealth index (poor, middle and rich), religion (Catholic, Protestant and other); place of residence (urban, rural), media exposure and family planning message exposure (no, yes).

Dummy variables for factor analysis

The dummy variables used in both the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) in this study included economic empowerment factors: educational attainment (none, primary and more), working status (no, yes), earning type (not paid, cash and in kind), earns more than partner (less or don't know, more or about the same); gender equality: decision-making on modern contraceptive use, own healthcare, household purchases, family visit, and household earnings

(partner or someone else, alone or jointly; Negash et al., 2023; Forty et al., 2022); and desire for additional child: woman's and husband's desire for more children (no, yes), number of living children, and number of living children and pregnant (none, at least 1). These variables were used, emanating from recent methodological advancements that support the inclusion of dummy variables to capture the interconnected relationships between constructs (Kamata & Bauer, 2008; Rhemtulla et al., 2020). In our study, the dummy variables represent theoretically meaningful binary distinctions integral to the underlying latent factors, thereby providing a more comprehensive understanding of the factor structure (Asparouhov & Muthen, 2020).

Data analysis

Descriptive statistics (univariate and bivariate) were used to characterise the study population and examine relationships between married women's characteristics and desire for additional children using frequency distributions and chi-square tests. Further, multiple binary logistic regression was used to determine the relationship between desire for additional children and independent variables. However, this was only done after conducting a pairwise correlation which showed minimal multicollinearity among the variables. All the regression results are reported at the 95% significance level. Importantly, normalisation weights were applied to the pooled data to ensure representation of the four regions within SSA. To identify the underlying economic empowerment and gender equality factors and patterns, exploratory factor analysis (EFA) was applied, which also helped to eliminate poorly performing observed variables. Specifically, the Bartlett Test of Sphericity was used to assess the suitability of the data for factor analysis and test if the correlation was an identity or non-identity matrix; and Kaiser-Mere-Olkin measure of sampling adequacy was used for factor analysis and evaluation of the proportion of variance in the correlation matrix that was explained by the factors. Furthermore, the principal component analysis (PCA) with varimax rotation was used to determine the factor loadings. Factors with eigenvalues of greater than 1, loadings greater than 0.4, and with lower Aikake information criteria (AIC) than Bayesian information criteria (BIC) were used to evaluate better loadings. Lastly confirmatory factor analysis (CFA) was used to validate the factor structure of the economic empowerment and gender equality using the maximum likelihood estimation based on the EFA results in the SSA context, and to rigorously assess their direct and indirect relationship with women's desire for additional children. CFA in this study was used to test the theoretical framework, ensuring that the measures used accurately reflects the outcomes. Besides, structural equation modelling (SEM) in Stata was utilised to examine relationships between constructs. The goodness-of-fit indices, such as root mean standardised error of approximation (RMSEA) < 0.08, comparative fit index (CFI) and Tucker-Lewis's index (TLI) of ≥ 0.90 , and standardised root mean square residual (SRMR) and coefficient of determination (CD) of less than 0.10 and closer to 1, indicating better fit model.

Results

Characteristics of study respondents

Results in Table 1 shows the characteristics of the married women. The majority of participants (40.2%) were aged 25–34 years, and over half (63.5% and 55.6%) had their first birth and marriage at 18 years or older, respectively. Furthermore, 64.1% reported no sex preference. Most the married women had no formal education (39.1%), with only 5.1% having tertiary level education. Slightly less than two-thirds (64.9%) were employed.

The majority of participants resided in large households with six or more members (53.8%). Approximately two-thirds (64.4%) lived in rural areas. Regarding socioeconomic status, less than half (39.9%) were from households classified as poor, while 40.5% were from rich households. In terms of religious affiliation, most women identified as belonging to other (44.6%) or Catholic (32.2%) religions.

Regarding exposure to information, slightly more than two-thirds (67.1%) reported exposure to media, whereas only 41.9% had been exposed to family planning messages. The majority of the respondents were from West Africa (57.6), while the fewest were from Central Africa (4.3%).

Table 2 presents the results of the crosstabulation between married women's desire for an additional child and their bio-demographic and socioeconomic characteristics. Overall, results show a significant disparity between married women's desires for an additional child. While 62.7% of married women expressed a desire to have another child, only 37.3% indicated otherwise, revealing a twofold preference for more children.

Younger married women (≤ 24 years) and those aged 18 or older or who had never given birth had significantly more desire for another child than older women (89.7%, 61.0%, and 95.1%, respectively, $p < 0.001$). Additionally, married women who preferred a boy child exhibited more desire for an additional child (66.9%, $p < 0.001$).

Married women with secondary (67.0%) and tertiary education (65.5%) had a statistically significantly higher desire for additional children than those with primary education or less (59.3%, $p < 0.001$). Unemployed women (67.3%) also expressed a greater desire for another child compared to employed women (61.4%, $p < 0.001$). Furthermore, women with 5 or fewer children (70.7%), from households with a poor wealth index (64.7%), and those identifying with Catholic or other religious faiths (65.3% and 63.4%, respectively) exhibited a significantly higher desire for an additional child (all $p < 0.001$).

Exposure to media was associated with a statistically significantly higher desire for an additional child among married women (62.8%, $p < 0.01$). Conversely, women who were not exposed to family planning messages expressed a greater desire for another child (63.4%, $p < 0.001$).

The region in which the countries in SSA are located was found to be significantly associated with desire for additional children. Specifically, seven in every ten women who resided in West and Central SSA regions exhibited a desire for additional children compared to five in every ten women in Eastern and Southern Africa ($p < 0.001$).

Table 1 Percentage distribution of married women's bio-demographic and socio-economic characteristics in SSA, DHS 2015–2022

Variable	Percent	Count
<i>Age</i>		
24 years or less	22.7	37,958
25–34 years	40.2	67,398
35 or more years	37.1	62,107
<i>Age at first birth</i>		
Less than 18 years	30.0	50,224
18 years or more	63.5	106,362
Never given birth	6.5	10,875
<i>Age at first marriage</i>		
below 18 years	44.4	74,398
18 years or more	55.6	93,064
<i>Sex preference</i>		
No preference	64.1	107,366
Girl Child	14.3	24,016
Boy Child	21.5	36,079
<i>Educational level</i>		
None	39.1	65,510
Primary	30.8	51,599
Secondary	25.0	41,811
Tertiary	5.1	8,542
<i>Employed</i>		
No	35.1	58,700
Yes	64.9	108,763
<i>Household size</i>		
5 or less members	46.2	77,441
6 or more members	53.8	90,021
<i>Wealth index</i>		
Poor	39.9	66,830
Middle	19.6	32,782
Rich	40.5	67,851
<i>Religion</i>		
Catholic	32.2	53,866
Protestant	23.3	38,979
Others	44.6	74,618
<i>Place of residence</i>		
Urban	35.6	59,694
Rural	64.4	107,769
<i>Media exposure</i>		
Unexposed	32.9	55,115
Exposed	67.1	112,347
<i>Family planning message exposure</i>		
Unexposed	58.1	97,296
Exposed	41.9	70,166
<i>Sub-Saharan Region</i>		
Central Africa	4.3	7,206
East Africa	13.7	22,895

Table 1 (continued)

Variable	Percent	Count
Southern Africa	24.5	40,961
West Africa	57.6	96,400
Total	100	167,462

Determinants of desire for children among women in SSA

Results presented in Table 3 indicate that older women (25–34 and 35 or more years) had lower odds of desiring additional children compared to those aged 24 years or below (AOR = 0.3, 95% CI: 0.3–0.3 and AOR = 0.1, 95% CI: 0.1–0.1). Women whose age at first birth was 18 years or more, or those who had never given birth at the time of the survey, had a higher desire for additional children than those who married before the age of 18 years (AOR = 1.4, 95% CI: 1.4–1.5 and AOR = 6.8, 95% CI: 5.9–7.8). Similarly, women whose age at first marriage was 18 years and above, and whose Sex preference was for a boy child, had higher odds of desiring additional children than those whose age at first marriage was below 18 years or had no sex preference for children (AOR = 1.2, 95% CI: 1.2–1.3 and AOR = 1.2, 95% CI: 1.1–1.2).

Women who had primary, secondary, and secondary education exhibited lower odds of desiring additional children compared to those with no education (AOR = 0.9, 95% CI: 0.8–1.0; AOR = 0.8, 95% CI: 0.7–0.8; and AOR = 0.9, 95% CI: 0.8–0.9). Likewise, women who resided in households with six or more members had decreased odds of desiring additional children compared to their counterparts from households with five or fewer members (AOR = 0.6, 95% CI: 0.6–0.7).

Furthermore, the household wealth index of the women at the time of the survey, religious affiliation, and place of residence were associated with married women's desire for additional children. Specifically, women whose household wealth index was poor or middle exhibited higher odds of desiring additional children (AOR = 1.1, 95% CI: 1.1–1.2 and AOR = 1.1, 95% CI: 1.0–1.1) compared to those from rich households. Women whose religious affiliation was Catholic or other (Muslim, Hindu, African Traditional etc.) exhibited higher odds of desiring additional children than those who were Protestants (AOR = 1.2, 95% CI: 1.2–1.3 and AOR = 1.2, 95% CI: 1.1–1.2). Similarly, women who resided in rural areas of SSA exhibited higher odds of desiring additional children compared to their urban counterparts (AOR = 1.1, 95% CI: 1.1–1.2).

Women who were not exposed to media exhibited lower odds of desiring additional children compared to those who were exposed (AOR = 0.9, 95% CI: 0.8–0.9). Conversely, women who were exposed to family planning messages (AOR = 1.0, 95% CI: 1.0–1.1). Furthermore, compared to women in the Southern African region of SSA, women from Central, East, and West African regions exhibited higher odds of desiring additional children (AOR = 3.0, 95% CI: 2.7–3.4; AOR = 1.4, 95% CI: 1.3–1.5 and AOR = 3.0, 95% CI: 2.8–3.1).

Table 2 Percentage distribution of married women's bio-demographic and socio-economic characteristics on desire for additional children in SSA, DHS 2015–2022

Variable	Desire for Children (<i>N</i> = 167,462)	
	No	Wants another
	%[CI]	%[CI]
<i>Age</i>	***	
24 years or less	10.3[9.8,10.8]	89.7[89.2,90.2]
25–34 years	26.9[26.3,27.4]	73.1[72.6,73.7]
35 or more years	65.8[65.2,66.3]	34.2[33.7,34.8]
<i>Age at first birth</i>	***	
Less than 18 years	41.4[40.7,42.1]	58.6[57.9,59.3]
18 years or more	39.0[38.5,39.5]	61.0[60.5,61.5]
Never given birth	4.9[4.4,5.5]	95.1[94.5,95.6]
<i>Age at first marriage</i>	NS	
below 18 years	37.5[36.9,38.1]	62.5[61.9,63.1]
18 years or more	37.6[37.1,38.1]	62.4[61.9,62.9]
<i>Sex preference</i>	***	
No preference	38.8[38.3,39.3]	61.2[60.7,61.7]
Girl Child	38.4[37.6,39.3]	61.6[60.7,62.4]
Boy Child	33.1[32.3,33.8]	66.9[66.2,67.7]
<i>Educational level</i>	***	
None	36.8[36.2,37.5]	63.2[62.5,63.8]
Primary	42.6[42.0,43.2]	57.4[56.8,58.0]
Secondary	33.0[32.3,33.7]	67.0[66.3,67.7]
Tertiary	34.5[33.2,35.9]	65.5[64.1,66.8]
<i>Employed</i>	***	
No	32.7[32.0,33.4]	67.3[66.6,68.0]
Yes	40.1[39.6,40.6]	59.9[59.4,60.4]
<i>Household size</i>	***	
5 or less members	29.3[28.8,29.8]	70.7[70.2,71.2]
6 or more members	44.6[44.0,45.3]	55.4[54.7,56.0]
<i>Wealth index</i>	***	
Poor	35.3[34.6,35.9]	64.7[64.1,65.4]
Middle	38.2[37.4,39.0]	61.8[61.0,62.6]
Rich	39.4[38.8,40.1]	60.6[59.9,61.2]
<i>Religion</i>	***	
Catholic	34.7[34.0,35.5]	65.3[64.5,66.0]
Protestant	43.3[42.5,44.0]	56.7[56.0,57.5]
Others	36.6[35.9,37.2]	63.4[62.8,64.1]
<i>Place of residence</i>	NS	
Urban	37.9[37.1,38.6]	62.1[61.4,62.9]
Rural	37.4[36.8,37.9]	62.6[62.1,63.2]
<i>Media exposure</i>	**	
Unexposed	38.3[37.6,39.0]	61.7[61.0,62.4]
Exposed	37.2[36.7,37.7]	62.8[62.3,63.3]
<i>Family planning message exposure</i>	***	
Unexposed	36.6[36.0,37.1]	63.4[62.9,64.0]
Exposed	38.9[38.3,39.4]	61.1[60.6,61.7]
<i>Sub-Saharan Region</i>		

Table 2 (continued)

Variable	Desire for Children (<i>N</i> = 167,462)	
	No	Wants another
	%[CI]	%[CI]
Central Africa	33.2[31.0,35.5]	66.8[64.5,69.0]
East Africa	46.5[45.6,47.5]	53.5[52.5,54.4]
Southern Africa	47.4[46.7,48.2]	52.6[51.8,53.3]
West Africa	31.5[31.0,32.0]	68.5[68.0,69.0]
Total	37.3[37.1,38.0]	62.7[62.0,62.9]

*** $P < 0.001$; ** $p < 0.01$; NS=Not significant; and CI=Confidence Interval

Factor analysis

Table 4 presents the variables employed in both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The economic empowerment variables composed of married women's educational attainment, employment status, type of earnings, and earning more than their partners. Notably, 60.9% had completed at least primary education, 64.9% were currently employed, 51.6% received cash or in-kind payments for their work, and 9.7% earned more than their husbands.

Regarding gender equality, the observed factors considered for the analysis included women's decision-making regarding modern contraceptive use, their own healthcare, household purchases, family visits, and the management of their earnings. 60% were able to make independent or joint decisions on modern contraceptive use, 56.7% on their own healthcare, 53.5% on household purchases, 64.0% on family visits, and 65.5% on their own or their husband's earnings.

The desire for additional children was assessed using women's and their husbands' preferences, the number of living children, and whether the woman was pregnant at the time of the survey. Approximately two-thirds of the married women and their husbands expressed a desire for more children (62.5% and 69.1%, respectively). Over 90% of the women had at least one living child or were pregnant at the time of the survey (92.7% and 95.0%, respectively).

Exploratory factor analysis

To investigate the relationship between economic empowerment, gender equality, and married women's desire for additional children, we conducted an exploratory factor analysis. Using maximum likelihood extraction with oblique 'promax,' rotation, we assumed that all the observed dummy-variables were continuous. This approach allowed us to identify latent constructs representing economic empowerment and gender equality, which we then examined for their association with the desire for additional children.

Table 5 indicates that the observed dummy variables related to economic empowerment converged into a single factor, appropriately labelled 'economic empowerment' This factor was significantly associated with respondents' working status (0.6334), earning types (0.9670), and earning more than their partners (0.3349).

Table 3 Adjusted regression results on the association between socio-economic factors and desire for additional children among married women in SSA

Variable	AORs	95%CI
<i>Age</i>		
24 years or less	1	
25–34 years	0.3***	0.3–0.3
35 or more years	0.1***	0.1–0.1
<i>Age at first birth</i>		
Less than 18 years	1	
18 years or more	1.4***	1.4–1.5
Never given birth	6.8***	5.9–7.8
<i>Age at first marriage</i>		
below 18 years	1	
18 years or more	1.2***	1.2–1.3
<i>Sex preference</i>		
No preference	1	
Girl Child	1.0	1.0–1.1
Boy Child	1.2***	1.1–1.2
<i>Educational level</i>		
None	1	
Primary	0.9*	0.8–1.0
Secondary	0.8***	0.7–0.8
Tertiary	0.9***	0.8–0.9
<i>Employed</i>		
No	1.0	0.9–1.0
Yes	1	
<i>Household size</i>		
5 or less members	1	
6 or more members	0.6***	0.6–0.7
<i>Wealth index</i>		
Poor	1.1***	1.1–1.2
Middle	1.1*	1.0–1.1
Rich	1	
<i>Religion</i>		
Catholic	1.2***	1.2–1.3
Protestant	1	
Others	1.2***	1.1–1.2
<i>Place of residence</i>		
Urban	1	
Rural	1.1***	1.1–1.2
<i>Media exposure</i>		
Unexposed	0.9***	0.8–0.9
Exposed	1	
<i>Family planning message exposure</i>		
Unexposed	1.0*	1.0–1.1
Exposed	1	
<i>Sub-Saharan Region</i>		
Central Africa	3.0***	2.7–3.4
East Africa	1.4***	1.3–1.5

Table 3 (continued)

Variable	AORs	95%CI
Southern Africa	1	
West Africa	3.0***	2.8–3.1

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; and CI = Confidence Interval

However, married women's educational attainment demonstrated a weak relationship with economic empowerment (0.0865).

The extracted factor exhibited an Eigenvalue of 1.5. To validate the factor structure, both a Scree plot and postestimation factor analysis were conducted. The Scree plot identified the optimal number of factors based on the 'elbow' or 'knee' point where Eigenvalues dropped significantly. Additionally, the postestimation analysis compared the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) values. The lower AIC value (1093.99) compared to the BIC (1134.10) supported the decision to retain a single factor for economic empowerment.

The goodness of fit for the economic empowerment model was assessed using various indices. The results indicated a significant fit, as evidenced by a correlation coefficient of 0.552, a chi-square value of 99650.70 with 6 degrees of freedom ($p < 0.001$), and a Kaiser-Meyer-Olkin measure of 0.6.

The factor analysis presented in Table 6 reveals that the observed gender equality dummy variables converge into two distinct constructs: 'household autonomy' and 'reproductive health autonomy.' As evidenced by the factor loadings, married women's decision-making regarding their own health, household purchases, family visits, and household earnings exhibit a strong association with household autonomy (0.8097, 0.8148, 0.7375, and 0.5562, respectively). Conversely, women's decision-making concerning modern contraceptive use is closely linked to reproductive health autonomy (0.7839) and had a weak inversely association with household autonomy (-0.0014).

The validity of this two-factor solution is further supported by the Eigenvalue of 2.31912, as well as the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values. The AIC consistently yielded lower values than the BIC (636.04 and 409.49 versus 686.18 and 499.75, respectively), suggesting a parsimonious and well-fitting model. Moreover, the model's goodness of fit indices, including the correlation coefficient ($r = 0.213$), chi-square statistic ($\chi^2 = 260,000.00$, $df = 10$, $p < 0.001$), and Kaiser-Meyer-Olkin measure (0.8), provide strong evidence of its reliability and validity.

Table 7 reveal the results of the gross effect of the economic empowerment latent factor on married women's desire for additional children. We found that married women's economic empowerment was negatively associated with this desire ($\beta = -0.027$, $SE = 0.002$, $p < 0.001$). However, when considering husbands desire for another child, the number of living children and the number of living children and whether the woman was currently pregnant, economic empowerment had a positive and statistically significant association ($\beta = 0.030$, $SE = 0.002$; $\beta = 0.020$, $SE = 0.001$; and $\beta = 0.012$, $SE = 0.001$, respectively, $p < 0.001$ for all).

The gross effects of the latent factors of household and reproductive health autonomy on gender equality are presented in Table 8. The findings indicate a negative

Table 4 Distribution of married economic empowerment, gender equality and desire for additional children among married women in SSA, DHS 2015–2022

Variable	Percent	Count
Economic empowerment		
Educational attainment		
No education	39.1	65,513
Any education	60.9	101,949
Working status		
No	35.1	58,700
Yes	64.9	108,763
Type of earnings		
Not paid	48.4	81,048
Cash and in kind	51.6	86,415
Earns more than partner		
Less or don't know	90.3	151,255
More or about the same	9.7	16,207
Gender equality		
Decision Making on Modern Contraception use		
Partner or someone else	38.0	63,629
Alone or jointly	62.0	103,833
Decision Making on Health Care grouped		
Partner or someone else	43.3	72,589
Alone or jointly	56.7	94,873
Decision Making on Household purchases		
Partner or someone else	46.5	77,852
Alone or jointly	53.5	89,610
Decision Making on Family Visits		
Partner or someone else	36.0	60,289
Alone or jointly	64.0	107,173
Decision Making on Household Earnings dummy		
Partner or someone else	34.5	57,693
Alone or jointly	65.5	109,769
Desire for children		
Desire for more children dummy		
No	37.5	62,849
Wants Another	62.5	104,613
Husband desire for more children		
No	30.9	51,691
Yes	69.1	115,764
Number of living children		
None	7.3	12,146
At least 1	92.7	155,317
Number of living children and pregnant		
None	5.0	8,386
At least 1	95.0	159,077
Total	100	167,462

Table 5 Factor loadings of the economic empowerment observed dummy variables among married women on one latent economic empowerment variable in SSA, DHS 2015–2022

Variable	Economic empowerment
Education attainment	0.0865
Working Status	0.6334
Earning Type	0.9670
Earns more than partner	0.3349

Table 6 Factor loadings of the gender equality observed dummy variables among married women on two latent gender equality variables in SSA, DHS 2015–2022

Variable	Gender Equality	
	Household autonomy	Reproductive health autonomy
Decision on modern contraceptive use	-0.0014	0.7839
Decision-making on own healthcare	0.8097	0.0188
Decision-making on household purchases	0.8148	-0.0167
Decision-making on family visit	0.7375	0.0014
Decision-making on household earnings	0.5562	0.0306

Table 7 Gross effect of the economic empowerment latent factor on desire for children among married women in SSA, DHS 2015–2022

Variable	β	SE	<i>p</i>
Woman’s desire for another child			
Economic empowerment	-0.027(-0.031–0.024)	0.002	0.000
Constant	0.625(0.621–0.630)	0.002	0.000
Husband’s desire for another child			
Economic empowerment	0.030(0.026–0.033)	0.002	0.000
Constant	0.691(0.686–0.696)	0.002	0.000
Number of living children			
Economic empowerment	0.020(0.018–0.022)	0.001	0.000
Constant	0.927(0.925–0.929)	0.001	0.000
Number of living children and currently pregnant			
Economic empowerment	0.012(0.010–0.013)	0.001	0.000
Constant	0.950(0.948–0.951)	0.001	0.000

β =coefficient; SE=Standard error and *p*=*p*-value

association between both household and reproductive health autonomy and married women’s inclination to have another child ($\beta = -0.0805$, SE=0.0019, and $\beta = -0.0203$, SE=0.0022, $p < 0.001$).

In addition, statistically significant positive links were observed between household and reproductive health autonomy and several other factors. These included married women’s husbands’ desire for a further child ($\beta = 0.0119$, SE=0.0024 and $\beta = 0.0224$, SE=0.0025, $p < 0.001$), the number of living children ($\beta = 0.0202$, SE=0.0009 and $\beta = 0.0179$, SE=0.0011, $p < 0.001$), and the total number of living children a woman had, including being currently pregnancies ($\beta = 0.3012$, SE=0.0008 and $\beta = 0.0143$, SE=0.0010, $p < 0.001$).

The study further applied EFA to help classify the observed dummy variables on desired additional children by married women in SSA. Table 9 shows that the

Table 8 Gross effect of gender equality latent factor on married women's desire for additional children among married women in SSA, DHS 2015–2022

Latent Variable	β	SE	<i>p</i> -value
	Woman's desire for another child		
Household autonomy	-0.0805(-0.0842–0.0767)	0.0019	0.000
Reproductive health autonomy	-0.0203(-0.0247–0.0159)	0.0022	0.000
Constant	0.6249(0.6210–0.6288)	0.0020	0.000
	Husband's desire for another child		
Household autonomy	0.0119(0.0073–0.0166)	0.0024	0.000
Reproductive health autonomy	0.0224(0.0176–0.0274)	0.0025	0.000
Constant	0.6912(0.6863–0.6961)	0.0025	0.000
	Number of living children		
Household autonomy	0.0202(0.0184–0.0220)	0.0009	0.000
Reproductive health autonomy	0.0179(0.0156–0.0201)	0.0011	0.000
Constant	0.9274(0.9257–0.9291)	0.0009	0.000
	Number of living children and currently pregnant		
Household autonomy	0.3012(0.117–0.0148)	0.0008	0.000
Reproductive health autonomy	0.0143(0.0124–0.0162)	0.0010	0.533
Constant	0.9499(0.9484–0.9513)	0.0007	0.000

β = coefficient; SE=Standard error and *p*=*p*-value

Table 9 Factor loadings on the desire for additional children by married women in SSA, DHS 2015–2022

Variable	Desire for more children
Woman desire for additional child	-0.1883
Husband desire for additional child	0.0306
Number of living children	0.9877
Number of living children and pregnant	0.8314

desired additional children dimensions loaded on one factor labelled 'desire for more children.' The variable 'women desire for additional child' loaded with a factor of -0.1883 whereas 'husbands desire for additional child, number of living children, and number of living children and a woman being currently pregnant' loaded with factor loadings of 0.0306, 0.9877 and 0.8314. This single factor loading is supported by the Eigenvalue of 1.7, with an AIC value of 101.77, which is lower than the BIC of 141.89. The model's goodness of fit test further supports these results ($r=0.314$; $\chi^2 = 194000.00$, $df=6$, $p<0.001$; and Kaiser-Meyer-Olkin=0.52).

Confirmatory factor analysis

Results of the CFA in Table 10 indicate a moderately strong relationship between married women's education attainment and the latent economic empowerment variable ($\beta=0.4276$, $SE=0.0128$, $p<0.001$). Women's working status and earning type

Table 10 Confirmatory factor analysis model for the married womens economic empowerment dimensions

Latent variable	β	SE	<i>p</i>
Education attainment	0.4276(0.4025–0.4527)	0.0128	0.000
Working Status	3.0506(3.0043–3.0969)	0.0236	0.000
Earning Type	4.8767(4.7737–4.9796)	0.0525	0.000
Earns more than partner	1.000	0.000	0.000

β = coefficient; SE=Standard error and *p*=*p*-value

Table 11 Confirmatory factor analysis model for the married gender equality dimensions

Latent variable	β	SE	<i>p</i>
Decision-making on modern contraceptive use	0.4339(0.4268–0.4410)	0.0036	0.000
Decision-making on own healthcare	1.1442(1.1368–1.1517)	0.0038	0.000
Decision on household purchases	1.1322(1.1247–1.1396)	0.0038	0.000
Decision-making on family visit	1.000	0.000	0.000
Decision-making on household earnings	0.7664(0.7594–0.7735)	0.0036	0.000

β = coefficient; SE=Standard error and *p*=*p*-value

Table 12 Confirmatory factor analysis model for married women desire for additional child

Latent variable	β	SE	<i>p</i>
Woman desire for additional child	-6.4607(-7.4971–5.4243)	0.5288	0.000
Husband desire for additional child	1.000	0.000	0.000
Number of living children	18.0687(15.1789–20.9585)	1.4744	0.000
Number of living children and pregnant	12.7865(10.7614–14.8117)	1.0333	0.000

β = coefficient; SE=Standard error and *p*=*p*-value

indicators also demonstrated significant associations with economic empowerment ($\beta=3.0506$, $SE=0.0236$ and $\beta=4.8767$, $SE=0.0525$, $p<0.001$). Model fit indices were excellent, further validating the construct validity of the economic empowerment measure. The RMSEA of 0.057, CFI of 0.989, TLI of 0.967, SRMR of 0.023, and CD of 0.938 all fell within acceptable or excellent ranges, suggesting a robust model fit.

Table 11 indicates a weak association between married women's decision-making regarding modern contraceptive use and the gender equality latent factor ($\beta=0.4339$, $SE=0.0036$, $p<0.001$). Conversely, women's decision-making autonomy in areas such as healthcare, household purchases, and earnings demonstrated strong, significant relationships with their corresponding latent variables ($\beta=1.1442$, 1.1322, and 0.7664, respectively; $SE=0.004$, $p<0.001$). These findings are supported by an excellent model fit (RMSEA of 0.027, CFI and TLI values of 0.998 and 0.995, and SRMR and CD of 0.009 and 0.850).

The CFA results for married women's desire for an additional child are presented in Table 12. The latent variable of desire for additional children demonstrated a

Table 13 Overall model fit

Indicator	β	SE	<i>p</i>
<i>Economic empowerment</i>			
Education attainment	2.2243(2.1648–2.2838)	0.0304	0.000
Working Status	1.5047(1.4611–1.5482)	0.0222	0.000
Earns more than partner	1.000	0.0000	0.000
<i>Gender equality</i>			
Decision-making on modern contraceptive use	0.4588(0.4516–0.4660)	0.0037	0.000
Decision-making on own healthcare	1.1436(1.1362–1.1511)	0.0038	0.000
Decision on household purchases	1.1353(1.1278–1.1427)	0.0038	0.000
Decision-making on family visit	1.000	0.0000	0.000
Decision-making on household earnings	0.7937(0.7866–0.8008)	0.0036	0.000
<i>Desire for additional children</i>			
Woman's desire for additional child	-6.4246(-7.4569–5.3922)	0.5267	0.000
Husband desire for additional child	1.000	0.0000	0.000
Number of living children	17.7495(14.9109–20.5882)	1.4483	0.000
Number of living children and pregnant	12.7052(10.6893–14.7211)	1.0285	0.000
Desire for additional children on economic empowerment	0.0001(0.0001–0.0001)	0.0000	0.000
Desire for additional children on gender equality	0.0004(0.0003–0.0005)	0.0000	0.000
Economic empowerment with gender equality	0.0252(0.0246–0.0257)	0.0003	0.000

β =coefficient; SE=Standard error and p = p -value

strong negative relationship with this desire ($\beta = -6.4607$, $SE=0.5288$, $p<0.001$). Conversely, the number of living children, and the status of having living children and being pregnant were positively associated with this latent variable ($\beta=18.0687$, $SE=1.4744$ and $\beta=12.7865$, $SE=1.0333$, $p<0.001$). These findings were further supported by the well-fitting model, as evidenced by RMSEA (0.017), CFI (1.00), TLI (0.999), SRMR (0.007), and CD (0.977).

Table 13 presents the results of the overall fit model using Structural Equation Modelling (SEM), detailing the standardised factor loadings (β), standard errors (SE), and corresponding p -values for each indicator. Nonetheless, it should be noted that married women earning type was excluded in the final model to help improve the model. The analysis reveals that all indicators exhibited statistically significant loadings ($p<0.001$), affirming their substantial contribution to defining their respective latent constructs.

Within the economic empowerment construct, both education attainment ($\beta=2.2243$, $SE=0.0304$, $p<0.001$) and working status ($\beta=1.5047$, $SE=0.0222$, $p<0.001$) demonstrated strong positive associations with the latent variable.

For the gender equality construct, decision-making on own healthcare ($\beta=1.1436$, $SE=0.0038$, $p<0.001$) and decision on household purchases ($\beta=1.1353$, $SE=0.0038$, $p<0.001$) showed robust positive relationships. Further, decision-making on modern contraceptive use ($\beta=0.4588$, $SE=0.0037$) and decision-making on household earnings ($\beta=0.7937$, $SE=0.0036$, $p<0.001$) also loaded significantly and positively onto this factor.

In the 'desire for additional children' construct, woman's desire for an additional child was negatively related to the latent construct ($\beta=-6.4246$, $SE=0.5267$, $p<0.001$). Both number of living children ($\beta=17.7495$, $SE=1.4483$, $p<0.001$) and number of living children and a woman being pregnant ($\beta=12.7052$, $SE=1.0285$, $p<0.001$) displayed substantial positive loadings.

The pathways from the latent constructs to 'desire for additional children' were both statistically significant ($p<0.001$), with both economic empowerment and gender equality showing small positive effect ($\beta=0.0001$, $SE=0.000$ and $\beta=0.0004$, $SE=0.0000$, $p<0.001$). Additionally, the covariance between economic empowerment and gender equality was positive and statistically significant ($\beta=0.0252$, $SE=0.0003$, $p<0.001$).

Discussion

This study aimed to investigate the intricate relationship between economic empowerment, gender equality, and married women's desire for additional children in Sub-Saharan Africa. By employing a confirmatory factor analysis (CFA) approach, we delved into the underlying dimensions of these constructs and their influence on desire for additional children.

The desire for additional children among married women of reproductive age in SSA is indeed high (62.7%). A regional breakdown reveals significant disparities, with West and Central Africa reporting the most substantial desires for additional children at 68.5% and 66.8%, respectively. In contrast, Eastern and Southern Africa exhibits the lowest desire (53.5% and 52.8%). This finding aligns with the conclusions of other studies, such as Ahinkora et al., (2020) and Ouedraogo et al. (2021). Several factors contribute to desire for additional children in some regions of SSA compared to others. Cultural norms and traditional factors especially in Central and West and African regions often view large families as a sign of wealth and security, particularly in rural areas where children provide labour and economic support. Additionally, limited access to education and family planning services, especially for women in Central Africa, can lead to unintended pregnancies and larger family sizes (Bongaarts, 2020; Kasonde et al., 2022; Mulenga et al., 2020; Troutman et al., 2020; Yazdkhasti et al., 2015).

In contrast, while the overall desire for additional children in SSA is high, there are studies that have reported lower levels of desire among certain groups of married women of reproductive age. For example, studies have shown that women with higher

levels of education, career aspirations and empowerment, those living in urban areas which are highly modernised, and those who have access to family planning services emanating from greater autonomy and decision-making power tend to have lower desires for additional children especially in Southern Africa (Ahinkorah et al., 2020; Akinyemi & Odimegwu, 2021). This is because modernisation for example leads to enhanced positive behaviour especially towards fertility preference with women opting for few children and increased uptake of modern contraceptive use.

Additionally, it is clear that addressing the high desire for additional children in SSA and regions within SSA requires a multidimensional approach. This includes investing in adolescent girls' and young women education, women's empowerment and gender equality programs to increase access to sexual and reproductive health information (Mmari et al., 2024; Nkhoma et al., 2020). Expanding access to a diverse range of contraceptives and providing comprehensive family planning education empowers women to make informed reproductive health choices (der Hatcher et al., 2023; Hellwig et al., 2024). Moreover, addressing socioeconomic disparities, such as poverty and inequality, can alleviate the economic pressures that often drive desire for additional children. Besides, promoting positive attitudes towards smaller families and challenging traditional gender roles can contribute to a shift in social norms and reduce the desire for additional children for women in SSA (Atake & Ali, 2019; Dabla-Norris et al., 2015; Khosa-Nkatini et al., 2023).

Given the aforementioned, our findings align with the established literature demonstrating a significant negative association between women's economic empowerment and their desire for more children (Adera & Abdisa, 2023; Bliznashka et al., 2021). As women gain economic independence, they are better equipped to make informed choices about fertility and reproductive desires and timing, often opting for smaller families. However, the positive association between economic empowerment and the number of living children, and number of living children and current pregnancy status is a complex finding. It suggests that economic empowerment may lead to increased desire for more children among women who are economically stable and have the resources to support an additional child (Chowdhury et al., 2023). This suggests that economic empowerment may influence fertility decisions differentially based on existing family circumstances for certain married women.

Regarding gender equality, our study identified two distinct constructs: household decision-making autonomy and reproductive health autonomy. Both constructs were negatively associated with desire for additional children among married women in SSA. This suggests that as women's autonomy in both household choices and their own reproductive health increases, their inclination to have additional children tends to decrease. This underscores the importance of empowering women to make informed reproductive health choices, which can contribute to smaller family sizes and improved sexual and reproductive health outcomes in SSA (Prata et al., 2017; Yaya et al., 2018).

The CFA provides strong evidence for the validity and reliability of the latent constructs. The strong factor loadings and good model fit indices provides an indication that the measures accurately capture the underlying dimensions of economic empowerment, gender equality, and the desire for additional children. The overall SEM analysis, supports the hypothesised relationships between these constructs,

demonstrated a satisfactory fit of the model or impact of economic empowerment and gender equality on women's desire for additional children. Moreover, the fact that married women's economic empowerment consistently had higher coefficients on desire for additional children compared to that of gender equality indicates that economic empowerment may have more influence on women's fertility intentions in SSA. This suggests that as women who experience greater economic autonomy and gender parity, their inclination towards having additional children slightly increases, a finding contrary to what similar studies have found in developed countries (Balasubramanian et al., 2024; Castro et al., 2022).

In the SSA context, the perception of children, especially sons, as vital for married women's economic security in their later years persists; enhanced economic independence for women in these regions might paradoxically lead to desire for additional children to reinforce this future support, particularly where property rights and social safety nets are weak (Ahinkorah et al., 2020; Church et al., 2023). This is further compounded by entrenched socio-cultural and religious norms that often link a woman's status to her number of offspring (Dubik et al., 2022). Conversely, developed nations typically feature robust social security systems, diminishing the need for children as old-age support. Economic empowerment in these contexts tends to elevate the opportunity cost of additional children due to career ambitions and the financial demands of raising children in developed countries (Bloom et al., 2024). Moreover, greater gender equality fosters shared childcare responsibilities, potentially leading to smaller family sizes influenced by both partners' desires and evolving social norms shaped by urbanisation, increased education, and shifting values around individual autonomy and women's roles.

Conclusion and policy implications

This study provides compelling evidence of the relationship between economic empowerment, gender equality, and married women's desire for additional children in SSA, revealing notable regional variations. While increased gender equality, particularly in household decision-making and reproductive health autonomy, consistently correlates with a reduced desire for additional children, the relationship with economic empowerment is more complex. Contrary to findings in developed nations, our analysis suggests that, within the SSA context, enhanced economic empowerment may, in certain circumstances, paradoxically increase the desire for additional children, potentially driven by the perceived need for future economic security in the absence of robust social safety nets and within prevailing socio-cultural norms. Our findings have significant implications for policymakers and reproductive health programs in SSA. These findings underscore the point that SSA governments need to invest in gender equality and simultaneously promote married women's economic independence, while also addressing deeply rooted socio-cultural factors and strengthening social support systems to effectively influence reproductive health choices and outcomes across the region.

Further research

Future research could explore the specific mechanisms through which economic empowerment and gender equality influence fertility intentions. Longitudinal studies can track changes in women's attitudes, behaviours, and life circumstances over time to better understand the causal pathways. Additionally, qualitative research can provide valuable insights into the cultural and social factors that shape women's reproductive decisions and choices.

Limitations and strengths

The study has several limitations stemming from the nature of the data source. Firstly, the DHS is a cross-sectional survey, collecting data at a single point in time. This design constraint precludes the capture of changes in economic empowerment and gender equality factors over time, as these were reported by respondents at a specific moment. Consequently, it is challenging to establish causal relationships between these factors and the desired number of children. Secondly, the outcome variable, the desired number of children, is based on the respondent's current intentions. These intentions may evolve as economic empowerment and gender equality dynamics shift in the future. This potential for change entails that the generalisability needs to be done cautiously. Lastly, pooling data across different groups may obscure significant differences in the desire for additional children between subgroups defined by the two dimensions of economic empowerment and gender equality. While the study faces limitations due to the cross-sectional nature of the data and the potential for changes in respondents' intentions, it offers several strengths. The DHS provides a large and representative sample, allowing for robust statistical analysis. The inclusion of multiple dimensions of economic empowerment and gender equality allows for a deeper understanding of their interplay with fertility intentions. Additionally, the study's focus on the number of additional children, rather than actual fertility outcomes, provides insights into individuals' reproductive intentions, which can inform future trends in fertility behavior among married women in SSA.

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Author contributions BBB conceived the study, contributed to its design, analysed data, and co-authored the manuscript. CO, ML and CCM interpreted the results and helped write the manuscript. All authors reviewed and approved the final manuscript before submission.

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Data availability This research utilised data acquired from the Demographic and Health Surveys (DHS) Program. The DHS Program offers unrestricted access to these datasets following a straightforward online registration process available at their website: <https://dhsprogram.com/data/available-datasets.cfm>.

Declarations

Consent for publication Not applicable.

Competing interests The authors declare no competing interests.

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