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Modeling Desire for More Children Among Childbearing Women in Ethiopia: Application of a Generalized Estimating Equation

Kassu Mehari Beyene[1, *], **Sara Abera Bekele**[1], **Shiferaw Gedefa Fentie**[2]

[1]Department of Statistics, Wollo University, Dessie, Ethiopia
[2]School of Medicine, Wollo University, Dessie, Ethiopia

Email address:
m2kassu@gmail.com (Kassu Mehari Beyene)

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Abstract: It is well documented that high fertility rates can have an adverse effect on the health of women and children, especially in developing countries that lack health infrastructure. The fertility rate in Ethiopia is one of the highest in the world. In 2019 the estimated total fertility rate is 4.15 births per woman. Although, the total fertility rate of the country is far above the acceptable level, many married women want to have another child. In 2016 it is estimated that fifty-six percent of currently married women age 15-49 want to have another child. The main objective of this study is to model desire for more children among childbearing women using longitudinal approaches as well as to evaluate the determinant factors for the desire for more children among childbearing women in Ethiopia. The source of data for this study is the 2016 Ethiopian Demographic and Health Survey (EDHS) which was a nationally representative survey of women in the age group 15-49 years. Data about desire for more children among childbearing women will be analysed. The statistical method used to analyze the data is a marginal longitudinal model, specifically the generalized estimating equation (GEE). The generalized estimating equations analysis revealed that the desire for more children was significantly higher among women aged 15-44 (specifically in the groups 15-19, 20-24, 25-29, 30-34, 35-39, and 40-44), women with 0-3 and 4-5 living children, and women not using contraceptives, compared to their counterparts. Conversely, the desire for more children was significantly lower among women with no, and primary education; women with 0-3 and 4-5 ideal number of children; and women residing in the Amhara, Southern Nations, Nationalities and Peoples Region (SNNPR), Oromia, Benishangul, Addis Ababa, Gambela, Tigray, Dire Dawa, and Harari regions, compared to their counterparts. The results revealed that the desire for more children generally increases with education level and ideal number of children. Conversely, women using contraceptives desire fewer children compared to those not using them. Therefore, federal and regional governments need to implement significant interventions to reduce fertility desire. Additionally, non-governmental organizations and civil societies can raise crucial awareness about the benefits of reduced fertility desire, especially among young women, women with no education, women with a high ideal number of children, women with fewer living children, and women who do not use contraceptives.

Keywords: Clustered Data, Desire, Generalized Estimating Equation, Maternal mortality, Fertility, Demographic and Health

1. Introduction

Annually, the world's population increases by an estimated 78 million, with approximately 97% of this growth occurring in low- and middle-income countries [**?**]. Recent evidence indicates declining total fertility rates (TFR) in both developed and much of the developing world [**?**]. However, some developing countries, particularly in sub-Saharan Africa, show stable or increasing fertility rates. Currently, nearly half of the global population resides in countries where lifetime fertility

is below 2.1 live births per woman. This decline has varied, ranging from 1.9 births per woman in Central and Southern Asia to 0.1 births per woman in Australia and New Zealand, Europe, and Northern America. In sub-Saharan Africa, the region with the highest fertility levels, the change in TFR has been less pronounced, decreasing from 6.3 births per woman in 1990 to 4.6 in 2019, which remains almost double the global fertility rate [**?**].

Fertility rates vary considerably within and between regions. Notably, in 2019, sub-Saharan Africa comprised the majority (33 out of 36) of countries with fertility levels above 4 births per woman [**?**]. The gradual decrease in fertility observed in some high-fertility nations of this region since 2010 is associated with the limited use of modern contraceptives and family planning methods [**?** **?** **?** **?**], leading to increased mistimed and unwanted pregnancies and a high youth dependency ratio. This also reflects a strong preference for larger families among women of reproductive age, where contraceptive prevalence among married women is estimated to be under 22%, and in certain areas, over half of women with four or more children still desire additional children [**?** **?**].

While having many children is often considered a blessing in most developing countries, high fertility rates can negatively impact the health of women and children, particularly in developing nations with limited health infrastructure. Annually, an estimated 529,000 women die during pregnancy or childbirth [34], and for every maternal death, up to 30 others experience chronic illness or disability. Additionally, over 46 million women resort to induced abortions each year, with 18 million occurring under unsafe conditions. Consequently, approximately 68,000 women die annually from unsafe abortions, and tens of thousands more suffer severe complications such as chronic infection, pain, and infertility [**?**]. Overall, pregnancy-related deaths account for 25% to 50% of deaths among women of childbearing age. For both physiological and social reasons, pregnancy is the primary cause of death for young women aged 15-19 globally, with childbirth complications and unsafe abortion being major contributing factors [34]. Furthermore, each year, 3.3 million babies are stillborn, over 4 million die within the first 28 days of life, and another 6.6 million children die before reaching age 5 [**?**]. In Ethiopia, the pregnancy-related mortality ratio was estimated at 412 deaths per 100,000 live births during the seven years preceding the 2016 EDHS survey, meaning that for every 1,000 live births, approximately four women died due to pregnancy, childbirth, or within two months postpartum [**?**].

According to the 2016 EDHS data reported by the Central Statistical Agency (CSA), 56% of currently married women aged $15 - 49$ desire another child: 18% want one within two years, and 36% prefer to wait at least two years. A significant portion (37%) of currently married women wish to limit childbearing, stating they want no more children or have been sterilized. Among currently married men aged $15 - 49$, a higher percentage (69%) want another child, with 22% desiring one within two years and 44% wanting to wait at least two years; 3% were undecided about the timing. Twenty-seven percent of currently married men want no more children or are sterilized. This strong inclination towards having more children is mirrored in their desired family size. On average, Ethiopian men and women want a similar number of children (4.6 and 4.5, respectively). The ideal family size is slightly larger among currently married individuals compared to all women and men. Specifically, 63% of women aged $15 - 49$ consider four or more children ideal, while 27% prefer three or fewer [**?**].

Fertility desire can be influenced by a number of factors that operate at the societal and individual levels. At the societal level, fertility desire is largely driven by social cultural pressures, religion and the need to maintain stability of the union [**?** **?** **?**]. At the individual level, several factors have been associated with fertility desire including age of individuals [**?** **?** **?**], number of living children [**?** **?** **?**], partner fertility desire [**?** **?** **?**], educational level [**?** **?**], enrollment on antiretroviral therapy (among Human Immunodeficiency Virus (HIV)-positive individuals) [**?** **?**]; and knowledge of one's HIV-positive status [**?** **?** **?** **?**]. The other important predictors/factors that have significant effect on the desire for more children are wealth index, parity, place of residence, ideal number of children, decision making autonomy, current use of contraceptives and exposure to mass media [**?**].

However, although there is clear documentation of the factors affecting fertility desire in different settings, most studies have been conducted among HIV-positive individuals (and especially among HIV-positive women) and married men and women living with HIV [**?** **?** **?** **?** **?** **?**]; no studies have explored fertility desire from a general population perspective, including among childbearing women. Therefore, this study aims to model the desire for more children among women of childbearing age and determine the socioeconomic and demographic factors influencing this desire, providing empirical evidence from the 2016 EDHS. Specifically, the study seeks to assess the overall prevalence of the desire for more children while identifying its key determinants. Furthermore, it aims to evaluate the specific impact of these factors on desire for more children.

2. Methods

2.1. Study Design and Data Source

This population-based cross-sectional study uses data from the 2016 EDHS, obtained from the CSA. It is the fourth survey conducted in Ethiopia as part of the worldwide Demographic and Health Surveys project. The survey was undertaken to provide current and reliable data on fertility and family planning behavior, child mortality, fertility preferences, adult and maternal mortality, nutritional status of children, use of maternal and child health services, female genital mutilation, domestic violence, knowledge of HIV/AIDS(Acquired Immunodeficiency Syndrome), and prevalence of HIV/AIDS and anaemia. The survey was conducted from January 18, 2016, to June 27, 2016, based on

a nationally representative sample. To generate a nationally representative sample of households, two-stage stratified sampling was used. The first stage involved selecting clusters (i.e. enumeration areas) from recent nationwide survey sampling frames using probability proportional to cluster size, and the second stage involved selecting households in each cluster using an equal probability systematic selection method. For more details about the sampling method, the reader is referred to [**?**]. This study utilized the data from 8,142 women of reproductive age for which complete information was collected.

2.2. Study Variables

Outcome variable: The desire for more children, our outcome variable, was derived from a 2016 EDHS question: "Would you like another child or no more?" Responses were "want a child" (coded 1) and "want no more" (coded 0). Women with other responses ("cannot get pregnant," "undecided," "don't know") were excluded due to unclear fertility desires.

Predictor variables: The predictor variables are classified into two groups: socioeconomic and demographic. The choice of the predictors is guided by the determinants of desire for more children literature. The predictor variables considered were: age, highest educational level, partner's highest educational level, region, current use of contraceptives, ideal number of children, number of living children, place of residence and wealth status.

2.3. Statistical Analysis

The statistical analyses were done using the statistical software `SAS` version 9.4. The socioeconomic and demographic characteristics of the respondents and the desire for more children were summarized using frequencies and proportions. It is important to consider the features of the data, as well as the data collection method, when performing any statistical modeling. Clustered data occurs when the data collection methods or experimental design group observations together, resulting in observations within the same cluster being more similar to each other than observations from different clusters. This creates correlation between observations within a cluster. To obtain accurate inferences and efficient estimates for the parameters of interest, it is necessary to account for this correlation using appropriate analysis methods. Marginal or population-averaged models are designed for analyzing correlated data, such as longitudinal or clustered observations, where standard linear regression's independence assumption is violated [**?**]. These models focus on understanding the effect of predictors on the population average response, accounting for the correlation within clusters or subjects without conditioning on random effects or prior responses. Generalized Estimating Equations (GEE) are a key tool within this framework, extending quasi-likelihood methods to handle correlated measurements by specifying a working correlation structure to capture the association between outcomes and providing consistent estimates for regression parameters, even with potential misspecification of this correlation structure. In the absence of logical order for observations within clusters, an exchangeable correlation matrix is recommended, particularly for clustered data that are not time-series [**?** **?**]. Consequently, this study used a generalized estimating equation model with an exchangeable working correlation matrix to determine factors affecting the desire for more children. The odds ratios(OR) in relation to a reference category, along with their 95% confidence intervals(CI) obtained from the GEE analysis was use to estimate the association between variables while controlling for potential confounders.

3. Results

3.1. Socio-economic and Demographic Characteristics of Respondents and Desire for More Children

Table 1 presents the distribution of socioeconomic and demographic characteristics and the distribution of the desire for more children among women of reproductive age. Among the 8,142 women included in the study, about 70% expressed a desire for more children. Of the total respondents, about 30% (2,666) were between 25 and 29 years old, 62.2% (5,527) had no education, 81.5% (7,244) were rural residents, 71.4% (6,344) did not use contraceptives, 50.9% (4,523) considered six or more children as ideal, 52.8% (4,692) were in the lowest wealth quintile, 52.6% (4,675) had three or fewer living children, 47.2% (4,194) had a husband/partner with no education, and 14.6% (1,297) were from the Oromia region.

The highest proportion of desire for more children was observed among women aged 15-19 years (88%), in contrast to the lowest percentage (24.2%), which was observed among women aged 45-49 years. The proportions of women desiring more children in the age groups 20-24, 25-29, 30-34, 35-39, and 40-44 years were approximately 86.6%, 79.1%, 63.8%, 52.0%, and 35.5%, respectively.The proportion of women desiring more children varied across women's highest educational levels. The desire for more children was highest (77.1%) among women with a secondary education, compared to those with no education (68.1%), primary education (72.6%), and a higher educational level (76.6%). Similarly, the percentage of women desiring more children also varied based on their partner's education: 70.4% for those whose partners had no education, 67.8% for those whose partners had primary education, approximately 74.7% for those whose partners had a secondary education, and 74.2% for those whose partners had a higher educational level. Higher proportion of women living in urban parts of Ethiopia express a desire for more children (73.2%) compared to those in rural areas (69.6%). Similarly, the proportion of women desiring more children is higher among those who did not use contraception (72.9%) than among those who did (63.8%). In addition, the desire for more children is highest (76.6%) among women whose ideal number of children is six or more, followed by those

with an ideal of 4-5 children (67.7%) and then those with an ideal of 0-3 children (56.0%). Women with three or fewer living children showed the highest proportion wanting more children (82.28%). In contrast, the smallest percentage (45.9%) was observed among women with six or more living children. Among women with four to five living children, the proportion wanting more children was 66.6%. The proportion of women who want to have more children in households with poor, middle, and rich wealth indices were 73.4%, 64.1%, and 68.0%, respectively. The percentage of women who want more children varies by region, with the highest rates in Somali (94.3%), Afar (90.8%), and Tigray (74.2%), followed by Gambela (69.6%), Addis Ababa (67.0%), Dire Dawa (66.7%), Harari (65.9%), Benishangul-Gumuz (64.9%), SNNPR (64.4%), Oromia (56.4%), and Amhara (54.0%).

Table 1. *Socio-economic and demographic characteristics of women in reproductive age by their desire for more children status.*

Variable	**Categories**	**Desire for more children**		**Total**
		Yes	**No**	
		Frequency(%)	**Frequency(%)**	**Frequency(%)**
Age	15-19	264(88.00)	36(12.00)	300(3.68)
	20-24	1539(86.56)	239(13.44)	1778(21.84)
	25-29	1932(79.15)	509(20.85)	2441(29.98)
	30-34	1146(63.84)	649(36.16)	1795(22.05)
	35-39	657(52.02)	606(47.98)	1263(15.51)
	40-44	155(35.47)	282(64.53)	437(5.37)
	45-49	31(24.22)	97(75.78)	128(1.57)
Highest educational level	No education	3447(68.10)	1615(31.90)	5062(62.17)
	Primary	1567(72.6)	590(27.35)	2157(26.49)
	Secondary	464(77.08)	138(22.92)	602(7.39)
	Higher	246(76.64)	75(23.36)	321(3.94)
Type of place of residence	Urban	1101(73.20)	403(26.80)	1504(18.47)
	Rural	4623(69.64)	2015(30.36)	6638(81.53)
Contraceptive use	No	4240(72.90)	1576(27.10)	5816(71.43)
	Yes	1484(63.80)	842(36.20)	2326(28.57)
Ideal number of children	0-3	738(55.95)	581(44.05)	1319(16.20)
	4-5	1816(67.69)	867(32.31)	2683(32.95)
	6+	3170(76.57)	970(23.43)	4140(50.85)
Number of living children	0-3	3520(82.19)	763(17.82)	4283(52.60)
	4-5	1390(66.63)	696(33.37)	2086(25.62)
	6+	814(45.91)	959(54.10)	1773(21.78)
Wealth Index	Poor	3158(73.44)	1142(26.56)	4300(52.81)
	Middle	743(64.05)	417(35.95)	1160(14.25)
	Rich	1823(67.97)	859(32.03)	2682(32.94)
Husband/partner's education level	No education	2705(70.35)	1140(29.65)	3845(47.22)
	Primary	1837(67.76)	874(32.24)	2711(33.30)
	Secondary	663(74.75)	224(25.25)	887(10.89)
	Higher	519(74.25)	180(25.75)	699(8.59)
Region	Tigray	516(74.24)	179(25.76)	695(8.54)
	Afar	694(90.84)	70(9.16)	764(9.38)
	Amhara	395(53.96)	337(46.04)	732(8.99)
	Oromia	670(56.35)	519(43.65)	1189(14.60)
	Benishangul	458(64.87)	248(35.13)	706(8.67)
	SNNPR	728(64.42)	402(35.58)	1130(13.88)
	Gambela	409(69.56)	179(30.44)	588(7.22)
	Harari	304(65.94)	157(34.06)	461(5.66)
	Addis Adaba	250(67.02)	123(32.98)	373(4.58)
	Dire Dawa	287(66.74)	143(33.26)	430(5.28)
	Somali	1013(94.32)	61(5.68)	1074(13.19)
Overall		5724(70.30)	2418(29.70)	8142(100.00)

3.2. Socio-demographic and Demographic Predictors of Desire for More Children

Using a generalized estimating equation with an exchangeable working correlation structure, we investigated the influence of several predictor variables on the desire for more children. These variables included age, highest educational level, type of place of residence, contraceptive use, ideal number of children, number of living children, wealth index, husband's educational level, and region. The findings from this analysis, as shown in Table 2, indicate a significant relationship between the desire for more children and age, highest educational level, type of place of residence, contraceptive use, ideal number of children, number of living children, and region. For the sake of brevity, we would like to emphasize in the following interpretations that all conclusions about the effect of a particular predictor variable on a response are based on the assumption that the remaining predictor variables in the model have been kept constant.

Compared to women aged 45-49, the odds of desiring more children decreased significantly with increasing age. The odds ratios(OR) for women aged 15-19 (OR=14.57, 95% CI: 6.978-30.41), 20-24 (OR=12.65, 95% CI: 6.809-23.50), 25-29 (OR=8.79, 95% CI: 4.967-15.57), 30-34 (OR=5.83, 95% CI: 3.298-10.31), 35-39 (OR=4.00, 95% CI: 2.329-6.878), and 40-44 (OR=2.167, 95% CI: 1.187-3.958) all indicated substantially higher odds of wanting more children than women aged 45-49. Women with no education (OR=0.540 [95% CI: 0.344-0.847]) and those with primary education (OR=0.571 [95% CI: 0.374-0.872]) had significantly lower odds of desiring more children compared to women with a higher educational level. Specifically, the odds were reduced by approximately 46 percent and 43 percent, respectively. A women who lives in rural area, the likelihood of desire for more children was 1.249[95% CI: 0.923-1.691] times more likely than women who was living in urban area. The likelihood of desire for more children among women who did not use contraceptive is 1.183 [95% CI: 1.007-1.390] higher than the women who use contraceptive. Compared to women whose ideal number of children was six or more, women who considered zero to three children as ideal were about 80 percent less likely (OR=0.196, 95% CI: 0.153-0.252) and those who considered four to five children as ideal were about 63 percent less likely (OR=0.373, 95% CI: 0.305-0.455) to desire more children. Women with zero to three living children had nearly an eight-fold higher odds (OR=8.304, 95% CI: 6.145-11.220) and women with four to five living children had about a three-fold higher odds (OR=2.963, 95% CI: 2.355-3.727) of desiring more children compared to women with six or more living children. The likelihood of desiring more children is notably lower for women in Addis Ababa (OR=0.071, 95% CI: 0.037, 0.136), Amhara (OR=0.053, 95% CI: 0.029, 0.095), Benishangul (OR=0.064, 95% CI: 0.035, 0.116), Dire Dawa (OR=0.062, 95% CI: 0.032, 0.120), Gambela (OR=0.071, 95% CI: 0.036, 0.140), Harari (OR=0.072, 95% CI: 0.036, 0.143), Oromia (OR=0.062, 95% CI: 0.035, 0.112), SNNPR (OR=0.084, 95% CI: 0.046, 0.154), and Tigray (OR=0.118, 95% CI: 0.065, 0.214) when compared to women residing in the Somali region.

Table 2. *Result of generalized estimating equation analysis of desire for more children among women of reproductive age group in Ethiopia.*

Variable	Categories	Estimated Odds Ratio	95% CI for Odds Ratio	
			Lower	Upper
Age	15-19	14.57	6.978	30.41
	20-24	12.65	6.809	23.50
	25-29	8.794	4.967	15.57
	30-34	5.830	3.298	10.31
	35-39	4.002	2.329	6.878
	40-44	2.167	1.187	3.958
	45-49 (Ref)	1.000		
Highest educational level	No education	0.540	0.344	0.847
	Primary	0.571	0.374	0.872
	Secondary	0.794	0.518	1.217
	Higher (Ref)	1.000		
Type of place of residence	Rural	1.249	0.923	1.691
	Urban	1.000		
Contraceptive use	No	1.183	1.007	1.390
	Yes (Ref)	1.000		
Ideal number of children	0-3	0.196	0.153	0.252
	4-5	0.373	0.305	0.455
	6+ (Ref)	1.000		
Number of living children	0-3	8.304	6.145	11.220
	4-5	2.963	2.355	3.727
	6+ (Ref)	1.000		

Variable	Categories	Estimated Odds Ratio	95% CI for Odds Ratio	
			Lower	Upper
Wealth Index	Middle	0.959	0.741	1.241
	Poor	0.926	0.744	1.152
	Rich (Ref)	1.000		
Husband/partner's education level	No education	1.212	0.846	1.737
	Primary	1.189	0.853	1.656
	Secondary	1.211	0.866	1.693
	Higher (Ref)	1.000		
Region	Addis Adaba	0.071	0.037	0.136
	Afar	1.069	0.413	2.769
	Amhara	0.053	0.029	0.095
	Benishangul	0.064	0.035	0.116
	Dire Dawa	0.062	0.032	0.120
	Gambela	0.071	0.036	0.140
	Harari	0.072	0.036	0.143
	Oromia	0.062	0.035	0.112
	SNNPR	0.084	0.046	0.154
	Tigray	0.118	0.065	0.214
	Somali (Ref)	1.000		

4. Discussion

This study examined the prevalence and factors associated with the desire for more children among 8,142 women of childbearing age in Ethiopia. The finding of this study revealed that large proportion (about 70%) of the study participants want more children. This result closely aligns with the findings of the current study [**?**] but a bit higher than what was reported in [**?**]. This desire varies across socioeconomic and demographic characteristics of women of reproductive age in Ethiopia. The prevalence is highest among women who are 15-19 years old (88.0%), have secondary education (77.1%), reside in rural areas (73.2%), do not use contraceptives (72.9%), have 0-3 living children (82.2%), consider a high ideal number of children (76.6%), have poor wealth status (73.4%), whose husbands/partners have secondary education (74.8%), and who are from the Somali region (94.3%).

This study revealed a significant relationship between age, educational level, contraceptive use, ideal number of children, number of living children, and region with desire for more children among childbearing women in Ethiopia. On the other hand, the type of place of residence, wealth index, and husbands'/partners' education were not significantly associated with the desire for more children. The study revealed an inverse relationship between age and the desire for more children, meaning that as age increases, the desire for more children decreases. Compared with women aged 45-49 years, women in the age groups 15-19, 20-24, 25-29, 30-34, 35-39, and 40-44 were more likely to desire more children. This finding aligns with other studies conducted in Ethiopia and sub-Saharan Africa [**? ? ? ? ?**]. This can be explained by the fact that as women age, their likelihood of changing their beliefs or attitudes about fertility desire may decrease. Another explanation is that with increasing age, women's views on their ideal family size tend to become more stable.

In this study, the likelihood of desire for more children among women with no education and primary education was 46% and 43% lower, respectively, compared with women with higher education and statistically significant. On the other hand, the odds of desire for more children among women with secondary education was not significantly different from that of women with higher education. The study also indicated that women in rural areas were more likely to desire more children compared to their urban counterparts, this finding consistent with previous studies [**? ?**]. However, contrary to the cited studies, this difference in likelihood was not statistically significant in our analysis. The study also found that the odds of desiring more children were higher among women who did not use contraceptives, a result consistent with previous studies[**? ? ? ? ?**]. This is probably because these women may be planning or open to having more children.

Another predictor variable significantly correlated with the desire for more children is the ideal number of children, with the desire for more children increasing as the ideal number increases. Women who considered zero to three and four to five children ideal were about 80% and 63% less likely, respectively, to desire more children compared to those whose ideal was six or more. The present finding aligns with evidence from related research [**?**]. The number of living children is also significantly associated with the desire for more children. As the number of living children increases, women's desire for more children decreases. Compared with women who had six or more living children, those with zero to three living children were eight times more likely, and those with four to five living children were two times more likely, to desire more children. This might be because women with fewer children may feel they need more to reach their desired family size. In addition, statistically significant association was found between the region of residence and women's desire for more children. Women in Amhara, SNNPR, Oromia, Benishangul-Gumuz,

Addis Ababa, Gambela, Tigray, Dire Dawa, and Harari regions had a lower likelihood of desiring more children than those in the Somali region. However, this difference was not significant when comparing the Afar and Somali regions, a similarity that may stem from their shared cultural and religious heritage.

Finally, this study benefits from a robust methodology, utilizing a large, nationally representative dataset to provide reliable insights into the current desire for more children among childbearing women and its determinant factors. The clustered structure of the 2016 EDHS data was appropriately addressed in the analysis using generalized estimating equations. Nevertheless, it is important to acknowledge that secondary datasets like the 2016 EDHS may lack some potentially influential variables concerning desire for more children. Moreover, the inherent limitations of self-reported data, including potential recall and social desirability biases, should be considered when interpreting the findings.

5. Conclusion

This study found a high desire for more children in Ethiopia among women of reproductive age (approximately 70%). The significant factors influencing the desire for more children were age, education level, contraceptive use, ideal family size, number of living children, and region. Notably, higher education and a larger ideal family size increased this desire, whereas older age and more living children decreased it. Addressing higher desire for more children in Ethiopia requires substantial governmental and non-governmental efforts to promote the benefits of lower fertility, especially targeting young, rural women, those with high ideal family sizes, women with fewer living children, and non-contraceptive users.

ORCID

0000-0002-2067-6054 (Kassu Mehari Beyene)

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
CI	Confidence Interval
CSA	Central Statistical Agency
EDHS	Ethiopian Demographic and Health Survey
GEE	Generalized Estimating Equations
HIV	Human Immuno Deficiency Virus
OR	Odds Ratio
SNNPR	Southern Nations, Nationalities and Peoples Region
TFR	Total Fertility Rates

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Author Contributions

Kassu Mehari Beyene: Conceptualization, Data curation, Software, Formal Analysis, Investigation, Methodology, Project administration, Validation, Writing – original draft

Sara Abera Bekele: Data curation, Formal Analysis, Methodology, Software, Validation, Writing – review & editing

Shiferaw Gedefa Fentie: Conceptualization, Supervision, Validation, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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