Research article

Women's desire to limit child-bearing and its associated factors in rural Ethiopia: A multilevel analysis

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ABSTRACT

Introduction: Ethiopia ranks twelfth globally and second in Africa by population size. High fertility rates, especially in rural areas, contribute to rapid population growth, impacting the country's economy. The decision of women to control the number of children they have is a crucial factor influencing population growth and contributing to elevated health risks for both women and children.

Objective: the purpose of this study was to assess women desire to limit childbearing and its associated factor among rural women in Ethiopia.

Methods: A cross-sectional survey dataset of Ethiopian demographic and health survey 2016 was used for this study. A total of 12,019 rural women were included in the study. A multilevel binary logistic regression was used to identify the predictors of women's desire to limit childbearing. The adjusted odds ratio with respective 95 % confidence interval was used to declare statistically significant variables.

Result: In rural Ethiopia, 33.04 % of women had a desired to limit their childbearing. Women in the age group of 25–34 years (AOR = 1.61, 95 % CI = 1.28,2.13), 35–49 years (AOR = 4.96, 95 % CI = 3.64, 6.65), had no children (AOR = 0.06, 95 % CI = 0.04, 0.09), having children 1–3 (AOR = 0.29, 95 % CI = 0.23, 0.36), married (AOR = 0.45, 95 % CI = 0.27, 0.75), living in small peripherals region (AOR = 0.33,95 % CI = 0.24, 0.45) and community level poverty (AOR = 0.72, 95 % CI = 0.57, 0.89) were significant predictors of women's desire to limit the number of children they bear.

Conclusion: In rural Ethiopia, there is a limited inclination to control childbearing. Older women and those with higher number of children express a stronger desire to limit childbearing. Conversely, married women, from smaller peripheral regions and those residing in areas with a higher community poverty rate are less likely to have a desire to limit childbearing. Thus, promoting education on the advantages of smaller family sizes and offering family planning services could be crucial in fostering women's willingness to limit their childbearing.

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1. Introduction

The global population has now attained 7.9 billion as of March 2022 report [1]. Out of the top ten fastest-growing countries/regions, nine are located in Africa [2].

As of March 10, 2022, Ethiopia's population is expected to be 119,750,048 with an annual growth rate of 2.57 %, making it one of the fastest-growing nations in the world. The population of the nation makes up 8.17 % of all people in Africa and 1.47 % of all people in the World. This represents Ethiopia being the twelfth and second-most populous country in the world and in Africa, respectively. Approximately 78.7 % of Ethiopia's population resides in rural areas. At its current growth rate, Ethiopia's population will be projected to double in the next 30 years [3,4]. High fertility poses substantial challenges on developing nations like Ethiopia. High fertility rate hinder economic development, raise health risks for women and children, and lower the quality of life by limiting access to education, nutrition, employment, and essential resources like clean water [5]. It significantly negatively impact a country's economic performance [6]. In addition, increases in childbearing or fertility affect the health of the mother, which might end with death.

The Pregnancy-Related Mortality Ratio (PRMR) in Ethiopia was 412 deaths per 100,000 live births, as per the Ethiopian demographic health survey (EDHS) 2016. This shows that each set of 1000 live births in Ethiopia within the 7 years prior to the 2016 EDHS, approximately four women died from a period of pregnancy up to 2 months postpartum. Moreover, of 1000 women of the exact age of 15, approximately 21 (one per 48 women) would die before reaching 50 due to complications from pregnancy, labor, or within the initial two months following delivery [7]. Despite efforts to reduce the overall fertility rate in Ethiopia from 7.7 children per woman in 1990 to around 4.0 by 2015 involved expanding clinical and community-based contraceptive distribution services [8], the overall fertility rate in rural areas of Ethiopia remains high. Based on the 2016 EDHS survey, the total fertility rate in rural Ethiopia was 5.2 %, while in urban areas it was 4.6 % and the contraceptive prevalence rate (CPR) for married women aged 15–49 was reported to be 36 % [7]. Moreover, EDHS 2016 indicated that Ethiopia's desired total fertility rate stands at 3.6 children, contrasting the given current total fertility rate of 4.6 children. Women in Ethiopia, on average, have about one more child than they desire. This suggests that the Total Fertility Rate (TFR) is roughly 28 % higher than it would have been if unwanted births had been avoided [9].

As per the information obtained from the 2005 and 2011 EDHS, the desired of married women in rural Ethiopia to limit childbearing decreased from 41.4 % in 2005 to 36.9 % in 2011 [10,11]. In Ethiopia, it is common practice for women to have too many children. High fertility has consequences on family wellbeing which puts financial pressure on poor households, reduce resources accessible for nourishing, educating, and offering healthcare to children [12]. It poses health risk for children their mothers and slows economic growth [13]. The percentage of women intending to limit child bearing directly affects population growth and indicates a group at risk for unwanted births. Ethiopia's high fertility rate and rapid population growth pose challenges for improving living standards. Limiting childbearing not only reduces fertility rates but also prevents negative effects on the health of mother, children and families due to large family sizes. Thus, understanding the factors influencing women's desire to limit childbearing is crucial especially for countries like Ethiopia aiming to reduce fertility through population policies. This study contributes to the development of effective fertility control strategies. Therefore, this study aimed to assess women's desire to limit childbearing and the factors related with it in rural Ethiopia.

2. Methods of the study

2.1. Study design and setting

The data was sourced from the official Demographic and Health Survey (DHS) program database website (https://dhsprogram.com). This study utilized the 2016 EDHS dataset for the analysis. The fourth survey administered by the Central Statistical Agency (CSA) in Ethiopia was the Ethiopian Demographic and Health Survey (EDHS), aimed to furnish current estimates of essential indicators related to population and health. The EDHS offers a detailed analysis of population, maternal, and child health care concerns across national, regional, urban and rural levels. The survey was conducted across nine regional states and two city administrations, covering 68 zones, 817 districts, and 16,253 kebeles in the country's administrative structure.

A survey with a cross-sectional design was carried out across nine regional states and two city administrations, covering 68 zones, 817 districts, and 16,253 kebeles in the country's administrative structure. The sample for the 2016 EDHS was stratified and chosen using a two-stage process. Regions were divided into urban and rural segments, yielding 21 sampling strata. Initially, 645 enumeration areas (EAs) were chosen, comprising 202 in urban regions and 443 in rural regions, with a probability proportional to the size of the enumeration area in each sampling stratum. To simplify household listing, large selected EAs in the 2016 EDHS were segmented. Only one segment was selected for the survey with probability proportional to segment size.

Household listing was conducted only in the selected segment, categorizing a cluster in the 2016 EDHS as either an enumeration area (EA) or a subsection of an EA. Then in the subsequent stage, 28 households per cluster were systematically selected from the newly created household listing. All women age 15–49 individuals eligible for interviews were either permanent residents of the chosen households or visitors who had spent the night there before the survey [14].

This research included a weighted sample of 12,019 women in rural areas, excluding those who were infecund or sterilized. The exclusion was made on the premise that sterilized and infecund women are presumed to have limited or no influence on future fertility and are assumed to lack the desire for additional children.

2.2. Study variables

The outcome variable of the study was women's desire to limit childbearing. It is determined through the DHS, which assesses whether a woman desires another child soon, after two years, or prefers no further children. Based on the response to these questions, it was categorized as a dummy variable (yes/no) which is the first category (yes) indicates that women who desire to limit childbearing, while the second category (no) encompasses those women who desire a child within two years, after two years, unsure about timing or desire to have more children. Women who are sterilized and declared in-fecund were excluded from the study.

Independent variable of the study consists of individual-level factors: women's age, wealth index, marital status, education level, media exposure (TV, radio, or newspaper at least once a week), and employment status/occupation.

Community-level variables: regions categorized as large central regions (Tigray, Amhara, Oromo, and South Nations and Nationalities), small peripheral regions (Afar, Somali, Gambella, and Beninshangul Gumz), and metropolis (Diredawa, Harar, and Addis Ababa). Other community variables were derived from individual-level factors such as community-level media exposure (high/low), community-level illiteracy proportion (high/low), and community poverty (high/low). These variables were categorized as high or low according to a median value of 50 % since the distribution was not normally distributed.

2.3. Data processing and analysis

Data were cleaned and categorized using Stata version 16. Missing data was managed and complete case analysis was done. Descriptive statistics by considering weighting using women's sample weight, frequency, mean, and standard deviation were conducted for each variable in the study. The findings were presented through text, tables, and graphs. Bi-variable binary logistic regression model were used at community-level (model II) and individual level (model III). Variables with p-value of less than 0.25 in the bi-variable model were considered for inclusion in the multivariable multilevel logistic regression. Multilevel modeling was employed due to the hierarchical nature of the EDHS data. This indicates the use of traditional models may not be appropriate. Hence, a model that accounts for the cluster effect should be considered. Multilevel or hierarchical modeling explicitly accounts for the clustering of the units of analysis, individuals nested within groups. Multilevel model were good in estimating standard errors than ordinary logistic regression. Four models such as model I/Null model, model II incorporating community-level variables, model III integrating individual-level variables, and model IV combining both community and individual level variables were fitted step by step.

The null model (model I/Null) were fitted without any independent variables which is used to assess the extent of the cluster variation on the Variance partition coefficient (VPC) or Intra-class correlation (ICC). The second model (model II) focuses community-level variables, model III on individual-level variables, and model IV on the combined effect of both individual and community -level variables.

The best fitted model was selected by using information criteria LLR, AIC, and BIC. The best-fitted model was selected which is a

Table 1
Weighted individual and community-level characteristics of study participants, EDHS 2016 (N = 12,019).

Variables	Categories	Frequency (%)
Educational status	No education	6773 (56.36)
	Primary	4306 (35.8)
	Secondary and above	940 (7.82)
Working status	Not working	8663 (72.08)
	Working	3356 (27.92)
Region	Larger central	11,373 (94.62)
	Small peripherals	605 (5.04)
	Metropolis	41 (0.34)
Media exposure	No	10,258 (85.35)
	Yes	1761 (14.65)
Number of living children	No	3444 (28.65)
	1–3	4053 (33.72)
	4 and above	4522 (37.62)
Knowledge of family planning method	No	237 (1.97)
	Yes	11,782 (98.03)
Family planning use	No	6980 (58.07)
	Yes	5039 (41.93)
Family planning a professional visit	No	8998 (74.86)
	Yes	3021 (25.14)
Family planning message	No	9565 (79.58)
	Yes	2454 (20.42)
Fertility preference	No	8048 (66.96)
	Yes	3971 (33.04)
Community media exposure	Low	6247 (51.97)
	High	5772 (48.03)
Community illiteracy proportion	Low	6678 (55.56)
	High	5341 (44.44)
Community-level poverty	Low	7859 (65.39)
	High	4160 (34.61)

model with, lowest AIC. The model with the lowest AIC was considered the best, which in this study was the full model, displaying the lowest AIC value among all models. Those variables with P-value <0.05 in multi-variable logistic regression analysis were considered as statistically significant and a measure of association; adjusted odd ratio (AOR) with 95 % CI was reported.

3. Result

3.1. Individual and community-level characteristics of study participants

This study included 12,019 rural women. Most of these participants, 4675 (38.9 %), fell within the 15–24 age group, while 4063 (33.8 %) were in the 25–34 range, and 3281 (27.3 %) were aged between 35 and 49. Regarding marital status, more than half 8259 (68.72 %) of respondents were married, 2663 (22.15 %) not married, and 1097 (9.13 %) others (divorced and widowed). Around 4619 (38.43 %) women were Orthodox, 4160(34.62 %) Muslim, 2941(24.47 %) Protestants and the remaining were other religion followers. Nearly half, 5269(43.84 %) of women were poor, 2898(24.11 %) middle and 3852(35.02 %) rich wealth status. More than half, 6773 (56.36 %) of women had no formal education and the rest 35.8 % and 7.82 % had primary and secondary education, respectively. Majority of women 10,258 (85.35 %) had no media exposure such as newspaper, TV and radio. Around 5772 (48.03 %) of the participants had a high community media exposure, while about 5341 (44.44 %) come from a communities with high illiteracy proportion. Almost all, 11,782 (98.03 %) of women had knowledge of family planning method. Regarding their working status, majority 8663 (72.08 %) of women were not working (Table 1).

Table 2
Multilevel binary logistic regression analysis showing factors associated with women's desire to limit childbearing, EDHS 2016.

Variables	Categories	Desire		Model II(community level)	Model III(individual level)	Model IV (full model)
		No	Yes	–		
Age category	15–24	4205	470	–	Ref	Ref
	25–34	2744	1319	–	1.65 (1.28,2.13)*	1.61 (1.25,2.09)*
	35–49	1100	2181	–	5.08 (3.76, 6.86)*	4.92 (3.64,6.65)*
Education level	no education	3826	2947	–	Ref	Ref
	Primary	3379	927	–	0.98 (0.79,1.20)	0.96 (0.78,1.18)
	Secondary and above	843	97	–	0.71 (0.45,1.12)	0.71 (0.45,1.12)
Wealth index	Rich	2572	1280	–	Ref	Ref
	Middle	3492	1777	–	0.82 (0.67,0.99)*	0.83 (0.68,1.01)
	Poor	1984	914	–	1.08 (0.87,1.35)	1.20 (0.96,1.51)
Religion	Orthodox	2978	1641	–	1.01 (0.58,1.76)	1.004 (0.58,1.74)
	Protestant	1968	973	–	0.95 (0.55,1.64)	0.92 (0.53,1.59)
	Muslim	2888	1272	–	0.71 (0.39,1.27)	0.86 (0.48,1.52)
	Other	214	85	–	Ref	Ref
Media exposure	Yes	1276	485	–	Ref	Ref
	No	6772	3486	–	1.04 (0.78,1.40)	1.06 (0.79, 1.43)
Number of children	No	3201	243	–	0.063 (0.04, 0.10)*	0.06 (0.04, 0.09)*
	1–3	3040	1013	–	0.30 (0.24, 0.37)*	0.29 (0.23, 0.36)*
	4 and above	1807	2715	–	Ref	Ref
Knowledge of FP	Yes	7856	3926	–	Ref	Ref
	No	192	45	–	0.62 (0.31, 1.25)	0.91 (0.45,1.86)
Marital status	Not married	2449	213	–	Ref	Ref
	Married	5079	3181	–	0.43 (0.25,0.72)*	0.45 (0.27,0.75)*
	Widowed/divorced	520	577	–	1.47 (0.91,2.39)	1.52 (0.94,2.47)
Use of FP	Yes	2976	2063	–	Ref	Ref
	No	5072	1908	–	0.91 (0.76, 1.10)	0.96 (0.79,1.15)
FP professional visit in the last 12 months	Yes	1865	1156	–	Ref	Ref
	No	6183	2815	–	1.002 (0.85,1.18)	1.01 (0.85, 1.19)
Working status	Working	2097	1259	–	Ref	Ref
	Not working	5951	2712	–	0.86 (0.71, 1.04)	0.86 (0.71, 1.04)
Region	larger central	7511	3862	Ref	–	Ref
	Small peripherals	510	95	0.39 (0.32, 0.49)*	–	0.33 (0.24,0.45)*
	Metropolis	27	13	0.99 (0.79, 1.26)	–	1.21 (0.89,1.64)
Community illiteracy proportion	Low	4486	2191	Ref	–	Ref
	High	3562	1780	1.11 (0.94,1.30)	–	0.89 (0.71,1.11)
Community media exposure	Low	4068	2179	Ref	–	Ref
	High	3980	1792	0.88 (0.75,1.02)	–	0.91 (0.73,1.12)
Community-level poverty	Low	5187	2672	Ref	–	Ref
	High	2861	1299	0.91 (0.77,1.08)	–	0.72 (0.57,0.89)*

Ref = Reference, * = Statistically Significant Variables.

3.2. Women's desire to limit childbearing

In rural Ethiopia, around 3971(33.04 %) of women desired to limit childbearing with a 95 % confidence interval found between 32.2 % and 33.9 %.

3.3. Factor associated with women's desire to limit childbearing

Among those variables entered in multivariable analysis, women's age, number of children, marital status, region and community level wealth index were significantly associated with women's desire to limit childbearing in rural Ethiopia.

Women aged 25–34 years were 1.61 times more likely to have a desire to limit childbearing (AOR = 1.61,95 % CI = 1.28,2.13), while those aged 35–49 years were 4.92 times (AOR = 4.96, 95 % CI = 3.64, 6.65) more likely to desire limiting childbearing as compared to other age groups. The other important significant factor which contributed to women's desire to limit childbearing was the number of children. A woman with no children and 1–3 children was 94 % (AOR = 0.06, 95 % CI = 0.04, 0.09), and 71 %(AOR = 0.29, 95 % CI = 0.23, 0.36) less likely to desire limiting childbearing respectively as compared to those with four or more children. Regarding marital status, married women were 57 %(AOR = 0.45, 95 % CI = 0.27, 0.75) less likely to desire limiting child bearing. Additionally, the region of the country was a significant predictor of limiting childbearing. Women residing in small peripherals regions of Ethiopia like Afar, Somali, Gambella, and Beninshangul Gumz were 67 % (AOR = 0.33,95 % CI = 0.24, 0.45) less likely to desire limiting childbearing as compared to those in large central regions of Ethiopia. Lastly, community level poverty proportion was significantly associated with limiting child bearing. Those community with high poverty proportion were less likely to limit child bearing that was decreased by 28 % (AOR = 0.72, 95 % CI = 0.57, 0.89) as compared to those with lower poverty proportion levels (Table 2).

3.4. Community-level variance and model fitness

The community level variance of both null and full model was 0.27 and 0.38 respectively. This indicated that the variance was greater than zero signifying the areas were heterogeneous. In terms of model comparison, the best fitted model was the full model, which included both individual and community level variables. The fitted model had low AIC/BIC and high LLR as compared to the previous models (Table 3).

4. Discussion

Weighted sample of 12,019 rural women of reproductive age were included in the study, with 218 women being excluded.

In this study, about 33.04 % of women had a desire to limit childbearing. Across different countries, this proportion varies widely, from 3 % in Chad to 71 % in Brazil, according to DHS reports [15]. This finding was lower than what was observed in studies conducted in Ethiopia (37.7 %), Northern Malawi (41 %), Oromia region (44.9 %), and other studies in Oromia region based on EDHS 2005 (47 %), Pakistan (47 %), and Aksum (69.2 %) [9,16–21]. Similarly, our study finding was lower than those in a Nepal study where over 80 % expressed no desire for more children [22], but higher than those in studies conducted based on EDHS 2011(30 %) and sub-Saharan Africa (31 %) [23,24]. This study's finding were higher than the study conducted in rural Mozambique (28 %) [25]. Similarly, this finding was higher than study conducted in sub Saharan African countries [24]. The possible difference in the prevalence of limiting childbearing might be attributed to variations in the study settings and sample sizes.

Regarding the factors, in multivariable analysis, five variables were significantly associated with the dependent variable. Women's age, number of children, marital status, region, and community-level wealth index were significantly associated with the desire to limit childbearing among rural Ethiopian women. The likelihood of desiring to limit childbearing increased with women's age. Women within the specified age of 25–34 and 35–49 were more likely to have a desire to limit childbearing, aligning with findings from studies conducted in Aksum and sub-Saharan African countries [17,24]. This is also consistent with study results in Northern Malawi, Pakistan, and Oromia region [16,18,20,26]. Another study conducted in Ethiopia based on EDHS 2011 supported that as women were old, their desire for no more children also increased [23]. Whereas a study conducted in Kenya showed that younger women were unlikely to stop having children [27].

Concerning the number of children, this study found, that women who had no children and those with 1–3 children were less likely

Table 3
Variance at the community level in the multilevel model predicting women's desire to limit child-bearing, based on EDHS 2016.

Random effect	Null model	Full model
Variance at community level	0.27	0.38
PCV	Reference	15.6
MOR)	1.34	1.59
ICC	7.6	1.05
AIC	14895.38	11078.94
BIC	14909.83	11259.48
LLR	−7445.69	−5514.47

to have a desire to limit childbearing. Similar findings were reported in studies done in Ethiopia, Oromia region, and Kenya, where the desire to limit childbearing were significantly linked with the number of children [16,23,27–29]. Other study in Ethiopia indicated that the desire for additional children or intentions to limit childbearing depended on the number of children women already had [18, 29].

Another notable factor influencing the desire to limit childbearing was marital status. According to the results of this study, married women were less likely to have a desire to limit childbearing. This finding was aligned with the findings of studies conducted in Malawi and southern Mozambique which reported that married individuals had a lower likelihood to have desire to limit childbearing [30,31]. However, a study carried out in Sweden found that marital status didn't show not significant association with childbearing intentions [32].

The geographical areas within the country were found to have a significant association with women's desire to limit childbearing. This is supported by a DHS report, indicating that the desire to stop childbearing is dramatically different among countries and regions of the developing world [15]. Furthermore, studies carried out in Malawi demonstrated that the region of residence is significantly related to the desire to limit children [30]. Another study in Malawi similarly identified a significant association between region and fertility intention [33].

Women residing in communities with a high poverty level were less likely to limit childbearing. This study finding was supported by many studies [16,21,23,29]This might be because of women with a lower wealth index often perceive their children as valuable assets and an investment who pay back during their old age [29].

4.1. Limitation of the study

This study relied on secondary data from EDHS 2016 data, which provided ample variables for analysis. However, due to the cross-sectional nature of the study, establishing temporal relationships between variables wasn't possible.

5. Conclusion

The results of this study indicated that there is a low desire to limit childbearing compared to other countries. Women who are older and with larger families were more interested to limit childbearing, whereas married individuals, those from smaller peripheral regions, and those residing in areas with a higher community poverty proportion rate were less likely to limit childbearing.

Understanding the desire of women seeking to limit child bearing is essential for predicting fertility patterns. Consequently, offering community education on the advantage of smaller family size and supporting their intention through the provision of family planning services would be crucial in fostering women desired to limit child bearing.

Ethics approval and consent to participate

Not applicable

Consent for publication

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Data availability statement

The data utilized in this analysis can be accessed online through the DHS program website (http://www.measuredhs.com) and is also available at the hand of all authors.

CRediT authorship contribution statement

Atitegeb Abera Kidie: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Setognal Birara Aychiluhm:** Writing – review & editing, Writing – original draft, Formal analysis. **Birtukan Gizachew Ayal:** Writing – review & editing. **Tsion Kokeb Kodo:** Writing – review & editing, Formal analysis. **Elsa Awoke Fentie:** Writing – review & editing, Formal analysis. **Seteamlak Adane Masresha:** Writing – review & editing. **Abayneh Tunta Boye:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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List of abbreviations and acronyms

AIC	Akaike Information Criteria
AOR	Adjusted Odds Ratio
BIC	Bayesian Information Criteria
DHS	Demographic and Health Survey
EA	Enumeration Area
EDHS	Ethiopian demographic health survey
FP	Family Planning
ICC	Intra-Class Correlation
PCV	Proportional Change in Variance

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