

# Determinants of the Use of Family Planning Methods in Ethiopia Using a Multilevel Approach

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**Abstract:** Family planning is the most effective method to control the continuing growth of the population. Ethiopia is currently one of the fastest growing countries in the world, with a growth rate of 3.02% per year. In the next forty to fifty years, Ethiopia is predicted to account for a significant portion of the population growth expected throughout Africa. According to Ethiopia Mini Demographic and Health Survey (EMDHS) 2019, the intended use of family planning is only 36% in the country. Therefore, this study aimed to assessing the socio-demographic determinants of use of family planning among the community and regions in Ethiopia. A total of five thousand four hundred forty-three women in the age group 15 to 49 years were considered in the final data analysis. Descriptive statistics, chi-square test of independency and multilevel random coefficient model were used in the study. Sixty-four percent of the eligible women who were included in the study did not use family planning. The outcome also shows that regional and community differences accounted for almost 20% (18.6) and 22.2% (14.1) of the variation in family planning use, respectively. Women's preceding birth interval, residence (rural/urban), their educational level, number of living children, wealth status, educational level of their husbands, currently wanted pregnancy, sex of household head, their employment status, regions and exposure to mass media have been identified as an important determinant of intended use of family planning among women of Ethiopia. To address identified concerns and assure improved levels of family planning use, decisive action is needed. This action may include educational intervention, ongoing monitoring and evaluation of family planning services, and scheduling training for providers. This information is crucial for developing strategic policies and raising the standard of family planning services. This research is crucial for developing strategic policies and raising the standard of family planning services. To ensure the success of the national family planning initiatives, the government and relevant organizations must put plans into place that target these effects.

**Keywords:** Family Planning Methods, Multilevel Analysis, EMDHS, 2019

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## 1. Introduction

Family planning is the most effective methods to control the continuing growth of the population which is the headache problem of the world currently. With an annual growth rate of 3.02%, Ethiopia is currently among the nations with the quickest rates of economic expansion in the world. Ethiopia's population is expected to double in the next thirty years, reaching 210 million by 2060, if it continues at its current rate of development [1]. In the next forty to fifty

years, Ethiopia is predicted to account for a significant portion of the population growth expected throughout Africa [2].

The deliberate choice made by a couple to use contraceptives to reduce or space out the number of children they have is referred to as family planning [3]. It is the most effective methods to control the continuing growth of the population which is the headache problem of the world currently. Family planning methods are classified as modern or traditional. Many contemporary techniques are available, such as the intrauterine device (IUD), implants, injections,

the pill, emergency contraception, lactation amenorrhea method (LAM), male and female sterilization, and the standard day's method (SDM) [4]. By enabling people to achieve desired birth spacing and family size, family planning services promote the health of newborns, kids, women, and families [5].

Globally, 1.9 billion women between the ages of 15 and 49 require family planning in 2019. Of them, 270 million still lack access to contraception, while 842 million use contraceptive methods [6, 7]. The Sustainable Development Goals (SDGs) indicates that the proportion of family planning needs met using modern methods has stagnated worldwide at around 77% from 2015 to 2020, but increased from 55% to 58% in the African region. Condoms are the only contraceptive method that can prevent both pregnancy and sexually transmitted infections, including HIV. People's right to determine the number and spacing of their children is furthered by the use of contraception [8].

In Ethiopia, 36% of women aged 15-49 use family planning methods, with 35% using modern methods and 1% using traditional methods. Fifty-eight percent of sexually active unmarried women use contraceptive methods, 55% of which are modern and 3% are traditional [9]. Overall, 41% of women currently married use modern family planning methods and 1% use traditional methods [4].

In Ethiopia today, family planning issues were: fear of side effects, fear of costs to deal with side effects, fear of children dying under the age of 5, lack of participation of men and community leaders in family planning programs, many diminished with education levels and results children's desires health, education and community public services are less burdensome. Additional, maternal mortality, unplanned pregnancies, and unsafe abortions are among the effects of poor family planning. Moreover, modern families are failing to sustain the adequate needs of their growing number of children, which is also an outcome of poor family planning and low use of contraception. Therefore, this study was aimed to assessing the socio-demographic determinants of the intended use of family planning methods among the community and regions in Ethiopia using EMDHS, 2019 data.

## 2. Methodology

### 2.1. Data Source

The data used in this study was secondary sources of data that obtained from Ethiopian Mini Demographic and Health Survey (EMDHS) that conducted from March 21 to June 28, 2019.

### 2.2. Study Population

In this study, the target population was five thousand four hundred forty-three women in the age group (15-49) years. The planned use of methods for family planning in Ethiopia is determined by socioeconomic, demographic, and other health-related factors.

### 2.3. Study Variables

#### 2.3.1. Dependent Variables

The response variable was the intended use of family planning methods, which were categorized as do not use, use traditional and modern family planning methods.

#### 2.3.2. Independent Variables

The study includes a set of independent variables such as individual-level, community-level and regional level factors were included in the study to understand the extent and differentials in the level of intended family planning methods among women aged 15–65 years.

##### *Individual-Level Variables*

Preceding birth interval in months, sex of child, and number of existing children in the future, father and mother educational level, marital status, age of mothers, mother's occupational status, women wealth index, sex of household head, wanted pregnancy, visited healthy profession in last 12 months, media exposure).

##### *Community-level variables*

Place of residence

##### *Regional-level variables*

Region (The nine regions of Ethiopia)

### 2.4. Statistical Model

In the present study, the researchers used Chi-square test of independence as well as multilevel logistic regression model to identify the factors that are related to intended used of family planning among women in the age of 15–49 year. Chi-square test of association was used to test for the significance of each of the potential risk factor in bivariate analysis. Due to the stratified nature of data in EMDHS, the women are naturally nested into individuals, individuals are nested into community and community is nested into the region. Furthermore, multilevel logistic regression model was used to predict the methods of family planning as a function of community-level, regional-level, and individual-level factors. For empirical analysis, the researchers used multinomial logistic regression model that is helpful for categorical response variable with more than two possible values. The multinomial logit model is given as:

$$\text{logit} \left( \frac{P(y_i=k/x_1, x_2, \dots, x_p)}{1-P(y_i=k/x_1, x_2, \dots, x_p)} \right) = \beta_o^{(k)} + \beta_1^{(k)} x_1 + \dots + \beta_p^{(k)} x_p \quad (1)$$

For  $k = 1, \dots, K-1$ .

The ratio of any two group membership probabilities is a log-linear function of  $x$ .

$$\text{logit} \left( \frac{P(y_i=k/x_1, x_2, \dots, x_p)}{1-P(y_i=k/x_1, x_2, \dots, x_p)} \right) = \beta_o^{(j)} - \beta_o^{(k)} + \beta_1^{(j)} - \beta_1^{(k)} x_1 + \dots + \beta_p^{(j)} - \beta_p^{(k)} x_p \quad (2)$$

For any  $j$  and  $k$ , including the baseline category  $K$  if we take  $\beta_i^{(K)} = 0$  for  $i = 0, 1, \dots, p$ , a convenient choice to ensure model identifiability. The group membership probabilities can be solved for explicitly, and are given by;

$$P(y_k/x_1, x_2, \dots, x_p) = \frac{\exp(\beta_0^{(k)} + \beta_1^{(k)} x_1 + \dots + \beta_p^{(j)} x_p)}{\sum_{j=1}^k \exp(\beta_0^{(k)} + \beta_1^{(k)} x_1 + \dots + \beta_p^{(j)} x_p)} \quad (3)$$

The unknown parameters are estimated by the method of maximum likelihood [10]; maximum likelihood estimates are easily found using any statistical software package (though care must be taken to make sure the model parameterization is what the user understands it to be). In the classification problem, a new observation  $x_o$  is classified as belonging to the group  $k$  for which  $\hat{p}r(y = k/x_o)$  is maximized.

## 2.5. Bivariate Logistic Regression Analysis

A bivariate logistic regression analysis was carried out to select the candidate variables with p-values less than 0.25 for the multilevel logistic regression analysis model [11, 12]. Finally, variables with a p-value less than 0.05 with 95% C. I and adjusted odd ratio (AOR) were conducted.

## 2.6. Multilevel Logistic Regression Analysis

Three-level multilevel logistic regression analysis was applied to assess the effects of individual, community, and regional level factors on family planning methods among women in Ethiopia. The three-level multilevel logistic regression model is given as:

$$Y_{ijk} = \beta_0 + U_{ojk} + \varepsilon_{oijk} \quad (4)$$

Where,  $\beta_0$  the overall average of family planning methods,  $Y_{ijk}$  is the  $i^{th}$  women in the  $j^{th}$  community of  $k^{th}$  region of family planning status,  $U_{ojk}$  is the  $j^{th}$  community and  $k^{th}$  region random effect and  $\varepsilon_{oijk}$  is level one error.

### Intercept- only model

A three-level intercept only multilevel logistic regression model is expressed as follows:

$$Y_{ijk} = \beta_0 + U_{ojk} + \varepsilon_{oijk} \quad (5)$$

### Random intercept model

In this model the groups differ with respect to the average value of the family planning status among the women. Random intercept model expresses a log-odds, (logit of  $\pi$ ) as a sum of a linear function of the explanatory variables. That is,

$$\log\left(\frac{\pi}{1-\pi}\right) = \beta_{0j} + \beta_1 X_{i11} + \beta_2 X_{i22} + \dots, \beta_j X_{ijk} \quad (6)$$

Where  $\pi$  is the probability that the women slept under a net and the intercept term  $\beta_{0j}$  is assumed to vary randomly and is given by the sum of intercept  $\beta_0$  and group-dependent deviations  $U_{ujk}$ . That is  $\beta_{0j} = \beta_0 + U_{ojk}$ .

### Random coefficient model

The explanatory variables' coefficients in this model are regarded as random.

$$\log\left(\frac{\pi}{1-\pi}\right) = \beta_{0j} + \beta_{1j} X_{i11} + \beta_{2j} X_{i22} + \dots, \beta_{pj} X_{ipj} + U_{oj} \quad (7)$$

Let  $\beta_{0j} = \beta_0 + U_{ojk}$ , and  $\beta_{hj} = \beta_h + U_{hjk}$  where  $h=1,2,\dots$ ,

k to get

$$\log\left(\frac{\pi}{1-\pi}\right) = \beta_0 \sum_{h=1}^k \beta_h x_{hij} + U_{ojk} + \sum_{h=1}^k U_{hjk} x_{hijk} \quad (8)$$

$\beta_0 \sum_{h=1}^k \beta_h x_{hij}$  is the fixed part of the model and  $U_{ojk} + \sum_{h=1}^k U_{hjk} x_{hijk}$  is random part of the model, where  $\pi$  is the probability that the family planning methods slept under a net and the intercept term  $\beta_{0j}$  is assumed to vary randomly and is given by the sum of intercept  $\beta_0$  and group-dependent deviations  $U_{ujk}$ . That is  $\beta_{0j} = \beta_0 + U_{ojk}$ .

## 2.7. Parameter Estimation

Multilevel models are also generally estimated using maximum likelihood methods and combining multilevel and generalized linear models lead to complex models and estimation procedures. The most popular techniques are based on the link function's first or second order Taylor expansion. The approximation is known as the marginal quasi-likelihood (MQL) when it centers around the estimated fixed portion; it is known as the penalized or predictive quasi-likelihood when it centers around an estimate for the fixed plus random part [13, 14].

## 2.8. Measures of Variation

Intra-cluster Correlation (ICC): measures the proportion of variance in the outcome explained by the grouping structure and determined as follows;

ICC attributable to level 2

$$ICC(Community) = \frac{\delta^2_{community}}{\delta^2_{community} + \delta^2_{Region} + \frac{\pi^2}{3}} \quad (9)$$

ICC attributable to level 3

$$ICC(Region) = \frac{\delta^2_{Region}}{\delta^2_{community} + \delta^2_{Region} + \frac{\pi^2}{3}} \quad (10)$$

where  $\frac{\pi^2}{3}$  denotes the variation between individuals (level 1),  $\delta^2_{community}$  denote the variation between communities (level 2), and  $\delta^2_{Region}$  denote the variation between regions (level 3).

## 2.9. Model Comparisons

In this study, model comparisons were made between four models. Models including individual-level components, community-level factors, intercept-only factors, and both individual- and community-level factors are also available. The model comparison was done using AIC and model with a small value of AIC is a model that close to actual one and the model which have few parameters to be estimated [15].

## 3. Results

The result showed that the prevalence of family planning in Ethiopia was 53.7% of which 38.1% were used traditional

method whereas 15.6% were used modern contraception. Among the total women used the traditional family planning methods, only 583, 162, and 100 had attained a primary/secondary/higher educational level respectively, whilst the majority of the women (1231) had no formal educational level. However, among the total women used modern family planning methods, only 245, 48 and 28 had attained a primary/ secondary/higher educational level, whilst the majority of the women (526) had no formal educational level. Amongst women with husband who had no formal education level, 1283 of them were never used family planning methods, 909 of them were used traditional family planning methods, and 398 of them were used modern family

planning methods (Table 1).

A large percentage of women (1978) those who do not had planning to have 2 to 4 children in the future were used family planning (1717 of them were used traditional and 689 of them were used modern methods). However, the majority of women (527) those who do not had planning to have 4 or more children never used any intended family planning. Furthermore, Pearson chi-square test result revealed that place of residence, women education level, husband education level, regional differences and the number of existing children in the future was significantly associated to the intended use of family planning methods (Table 1).

**Table 1.** Socioeconomic, demographic, and other health-related characteristics of women in the age group 15 to 49 years by method of family planning.

Variables	Categories	Use of family planning			P-value for $\chi^2$
		Do not use Family Planning	Use Traditional Method	Use Modern Method	
Place of residence	Urban	452	398	126	< 0.001
	Rural	2068	1678	721	
	No education	1648	1231	526	
Mother educational level	Primary	610	583	245	< 0.001
	Secondary	171	162	48	
	Higher	91	100	28	
	Poorest	965	705	276	
Mother wealth index	Poorer	402	379	148	< 0.001
	Middle	346	292	139	
	Richer	336	251	132	
	Richest	471	449	152	
Age of Mothers	15-24	1233	1029	438	<0.001
	25-34	1139	929	372	
	35-44	136	107	34	
	45 and above	12	11	3	
	Never in Union	4	2	2	
Marital status	Living with partner	2434	2007	819	0.448
	Separated	82	67	26	
	No education	1283	909	398	
Father educational level	Primary	784	742	282	<0.001
	Secondary	245	208	107	
	Higher	208	217	60	
	Tigray	253	225	92	
	Afar	243	168	99	
Region	Amhara	284	171	84	<0.001
	Oromia	263	305	131	
	Somalia	377	237	106	
	Benishangul-Gumuz	244	148	61	
	SNNPR	328	326	136	
	Gambela	166	177	42	
	Harari	112	119	47	
	Addis Ababa	132	101	24	
	Dire Dawa	118	99	25	
	No	1816	1504	609	
Mother occupational status	Yes	704	572	238	<0.001
	1(First)	459	402	147	
	2-4	1158	943	390	
Birth order	>4	903	731	310	0.361
	Male	1241	1076	421	
	Female	1279	1000	426	
Sex of child	<24 months	677	497	205	<0.001
	>=24 months	1843	1579	642	
Birth interval	Male	1930	1626	657	<0.001
	Female	590	450	190	
Sex of HH head	Male	1930	1626	657	<0.001
	Female	590	450	190	

Variables	Categories	Use of family planning			P-value for $\chi^2$
		Do not use Family Planning	Use Traditional Method	Use Modern Method	
Number of children	<2	15	11	4	<0.001
	2-4	1978	1717	689	
	$\geq 4$	527	348	154	
Current pregnancy wanted	No	1798	1420	588	<0.001
	Yes	722	656	259	
Visited health professional	No	1282	1069	418	<0.001
	Yes	1238	1007	429	
Media exposure	No	1816	1504	609	<0.001
	Yes	704	572	238	

Before doing the multilevel analysis, a bivariate analysis was done for all independent variables separately. Those variables showing association with the use of family planning at p-value < 0.05 were selected and entered into the multilevel analysis. A bivariate result in Table 1 shows that a place of residence, mother's educational level, wealth index of mothers, age of mothers, father educational level, mother occupational status, region, sex of child, preceding birth interval (in months), current marital status, sex of household head, number of existing children in the future, current wanted pregnancy and media exposure was significantly associated to the intended use of family planning methods (Table 1).

### 3.1. Model Comparison

Once the set of candidate models has been chosen, the statistical analysis allows us to select the best of these models. Thus, the choice of a relevant multilevel model was selected using AIC comparison criteria.

The AIC/BIC for Use of family planning methods was better at Model V (Individual, Community, and Regional-level factors) because a small AIC/BIC become a better model by itself. Thus, the model that best fit the study data was Model V (Individual, Community, and Regional-level components) (Table 2).

**Table 2.** Model comparison between the models on use of family planning methods.

Response	Model Comparison Criteria	Null Model (Model I)	Individual-level factors (Model II)	Community-level factors (Model III)	Regional-level factor (Model IV)	Individual, Community, and Regional-level factors (Model V)
Family Planning	AIC	18365.14	15893.42	17654.33	11245.28	8934.67
	BIC	16541.24	14361.33	15648.78	10369.96	99541.22

### 3.2. Result of Null Multilevel Logistic Analysis

Before considering the multilevel analysis with all independent variables, the researchers identify whether there

is heterogeneity in the use of family planning methods at the community and region-level by using the null (with intercept term only) model.

**Table 3.** Results of a multilevel null logistic regression model.

Model	Estimate	Standard error	Z-value	P-value
Fixed intercept ( $\beta_0$ )	.13	.066	2.04	0.000
Random effect				
Variance (Regions)	.912			
Variance (Community)	.690			
ICC (Regions)	.186			
ICC (Community)	.141			

By using the p-value from the above table, which is 0.000, we reject the null hypothesis and conclude that there is a community and regional variation in the use of family planning methods (Table 3).

The result given in Table 3 shows that, the estimated variance for community and regional -level were  $\sigma_{ou}^2 = 0.912$  and  $\sigma_{ou}^2 = 0.690$ , respectively and significantly different from zero. Therefore, the result indicates that the

variations of use of family planning methods across the community and regional level of Ethiopia. The result of ICC revealed that that 18.6% of the variance in intended family planning methods are due to regional level variation, whereas 14.1% of the variance is due to within community variation. Thus, the remaining 67.3% variability is due to the variation within the women in the age group of 15-49 years.

Table 4. Analysis of random coefficient multilevel logistic models.

Determinants	Intended use of family Planning Method					
	Do not use Family Planning		Use Traditional Method		Use Modern Method	
	AOR [95% Conf. Interval]	P-value	AOR [95% Conf. Interval]	P-value	AOR [95% Conf. Interval]	P-value
Fixed part						
Constant	1.76 [1.09- 2.26]	0.000*	1.95 [1.11-2.12]	0.000*	1.83 [1.18-2.21]	0.000*
Birth interval (in months) (ref.<24 months)						
>=24 months	1.13 [1.10-1.29]	0.042*	1.15 [1.02- 1.31]	0.018*	1.14 [1.10-1.29]	0.000*
Age of Women's (ref. 15-24)						
25-34	.96 [.85- 1.07]	0.477	.95 [.85- 1.06]	0.441	.95 [.85-1.06]	0.544
35-44	.88 [.68- 1.14]	0.348	.86 [.67-1.10]	0.254	.88 [.68-1.13]	0.069
45 and above	1.05 [.47-2.30]	0.902	.97 [.44-2.11]	0.951	1.04 [.47-2.30]	0.087
Women's education level (ref. No education)						
Primary	1.21 [1.08- 1.40]	0.001*	1.27 [1.12-1.43]	0.000*	1.23 [1.08- 1.40]	0.000*
Secondary	1.11 [.93- 1.45]	0.175	1.14 [.92-1.42]	0.206	1.16 [.93-1.45]	0.145
Higher	1.46 [1.04-1.89]	0.023*	1.31 [.99-1.73]	0.057	1.41 [1.04- 1.89]	0.001*
Wealth index of women's (ref. poorest)						
Poorer	1.20 [1.03-1.44]	0.021*	1.28 [1.09-1.50]	0.002*	1.22 [1.03-1.44]	0.000*
Middle	1.13 [.95- 1.36]	0.156	1.22 [1.03-1.44]	0.019*	1.14 [.95- 1.36]	0.000*
Richer	1.11 [.86- 1.24]	0.708	1.11 [.94-1.32]	0.200*	1.03 [.86- 1.24]	0.000*
Richest	1.21 [1.06- 1.50]	0.007*	1.24 [1.07-1.45]	0.004*	1.26 [1.06-1.50]	0.000*
Sex of child (ref. Male)						
Female	.96 [.82-1.02]	0.147	.99 [.85-1.56]	0.140	.92 [.82- 1.02]	0.178
Mothers' occupational status (ref. No)						
Yes	.61[.41-.94]	0.011*	1.81 [1.34-1.95]	0.043*	1.58 [1.26-1.71]	0.000*
Father educational level (ref. No education)						
Primary	1.28 [1.13-1.44]	0.000*	1.74 [1.03-2.17]	0.000*	1.20 [1.06- 1.36]	0.004*
Secondary	1.26 [1.05-1.51]	0.013*	1.65 [1.11-2.41]	0.000*	1.25 [1.03-1.51]	0.021*
Higher	1.30 [1.07- 1.58]	0.007*	1.79 [1.09-2.74]	0.000*	1.33 [1.08- 1.63]	0.006*
Place of residence (ref. urban)						
Rural	.72 [.42- .92]	0.003*	.61 [.17- .89]	.041*	.71 [.27-.96]	0.007*
Region (ref. (ref. Tigray)						
Afar	.88 [.69-1.12]	0.332	.29 [.22-.38]	0.000*	.87 [.68- 1.11]	0.283
Amhara	.71 [.56- .90]	0.006*	.42 [.32-.54]	0.000*	.71 [.56- .90]	0.006*
Oromia	1.33 [1.06-1.67]	0.013*	.67 [.53-.84]	0.001*	1.32 [1.05-1.65]	0.015*
Somali	.73 [.58- .92]	0.009*	.22 [.17-.29]	0.000*	.72 [.58- .90]	0.004*
Benishangul-gumuz	.68 [.53- .88]	0.003*	.86 [.66- 1.10]	0.244	.68 [.53- .87]	0.003*
SNNPR	1.13 [.90- 1.40]	0.269	1.04 [.83-1.29]	0.724	1.12 [.90-1.39]	0.292
Gambela	1.05 [.81-1.36]	0.686	2.05 [1.57-2.67]	0.000*	1.05 [.81-1.36]	0.698
Harari	1.19 [.88- 1.59]	0.241	1.65 [1.24-2.21]	0.001*	1.18 [.88-1.58]	0.258
Addis Ababa	.75 [.56- 1.01]	0.064	1.54 [1.05-2.14]	0.000*	.75 [.56-1.01]	0.063
Dire Dawa	.86 [.66-1.18]	0.280	.95 [.70- 1.29]	0.765	.83 [.62-1.13]	0.253
Media exposure (ref. No)						
Yes	.56 [.25-.88]	0.013*	1.32 [1.16-1.51]	0.000*	1.78 [1.42-1.96]	0.002*
Wanted pregnancy wanted (ref. No)						
Yes	1.12 [.99-1.25]	0.057*	1.17 [1.03-1.33]	0.014*	.67[.57-.89]	0.000*
Number of existing children (ref. <2)						
2-4	1.87 [1.31-2.61]	0.000*	.15 [.06-.37]	0.000*	.51 [.43-.90]	0.004*
>=4	.52 [.29-.71]	0.000*	.26 [.13-.62]	0.000*	.44 [.15-.76]	0.008*
Sex of HH head (ref. Male)						
Female	1.90 [1.59-2.03]	0.000*	1.67 [1.43-1.84]	0.000*	1.81 [1.60-2.36]	0.025*
Visited health professional (ref. No)						
Yes	.46 [.25-.76]	0.000*	1.23 [1.03-1.62]	0.000*	1.48 [1.19-1.89]	0.012*
Random Part						
	Estimate	[95% Conf. Interval]				
Variance of region-level	1.255	[1.06-2.78]				
ICC for regions	0.222	[.101-.166]				
Variance for community- level	1.11	[1.01-1.64]				
ICC for community-level	0.196	[.084-.23]				

Indicate a P-value&lt;0.05 (Significant)

The anticipated use of family planning methods was substantially greater among women who had 24 months or more prior to the birth interval than among those who had less than 24 months prior, according to the results of the multilevel

regression model displayed in Table 4. Compared to mothers who are illiterate, mothers with primary and higher education levels tend to employ family planning methods far more frequently. Both conventional and contemporary family

planning techniques are used much more frequently when women's wealth index rises. Nevertheless, women in the wealthiest wealth index had a much higher chance of not utilizing family planning than did women in the worst wealth index. As a result, it was determined that the intention to utilize family planning was strongly predicted by the wealthiest or poorest women (Table 4).

The chance of intentional family planning use tends to increase dramatically with a husband's higher level of education. The expected use of family planning was also significantly predicted by the mothers' work. When comparing women who used condoms to those who used pills, the odds ratio showed that the former were far more likely to intend to utilize family planning. Compared to moms having fewer than two children, the percentage of mothers with two to four children who do not use family planning has increased by 87%. However, compared to mothers of fewer than two children, women with two to four children are less likely to use modern and traditional family planning techniques. Additionally, mothers who have four or more children are less likely than mothers who have one kid to employ planned family planning (Table 4).

The odds of intending to use family planning methods was shown to be lower among working women, women exposed to mass media, women who desired a pregnancy at the time, women who learned about family planning through the media, and women residing in rural areas. In the Oromia region, the odds ratio of intended family planning use was rising, whereas it was substantially declining in the Amhara and Somali regions. Traditional family planning methods' odds ratios were noticeably rising in Gambela, Harari, and Addis Ababa. In the Benishangul-Gumuz region, the odds ratio between women who use modern family planning and those who do not is considerably declining (Table 4).

## 4. Discussion

Women's preceding birth interval, residence (rural/urban), their educational level, number of living children, wealth status, educational level of their husbands, currently wanted pregnancy, sex of household head, their employment status, regions and exposure to mass media have been identified as an important determinant of intended use of family planning among women of Ethiopia. They might have already attained their desired number of children and hence would like to use contraceptives for limiting. On the other hand, the demand for traditional family planning methods was higher among Gambela, Harari and Addis Ababa women who want to postpone their next pregnancy. Our results confirm the findings of the earlier studies [16, 17].

The higher likelihood of intended use of family planning in rural areas than that of urban areas is an indication of easy availability of family planning services in urban areas. Studies that have already been done in many nations and parts of the world indicate that there is a larger chance of planned family planning use in rural areas than in urban areas in case of Ethiopia [16], Zimbabwe [17], Tanzania [18], and

India [19].

Educated women are more likely to use family planning than uneducated women. The women with higher education have the lowest facility planning. This suggests that because educated women are more informed, they are more likely to use family planning services. In a similar vein, women who receive knowledge are better equipped to make decisions about using contraceptives. These outcomes validate the conclusions of earlier research [19, 20].

According to our results, the likelihood of women who used traditional method and modern family planning decreases with increasing in number of children. Such likelihood goes on to decreases till the birth of at least fourth child. Of the mothers with four children, it is the lowest. It suggests that as the number of children rises, women and other family members who may be involved in decisions about fertility may grow increasingly persuaded of the benefits of family planning techniques. Compared to women from the poorest homes, women from wealthier households are probably going to utilize family planning more frequently, both traditionally and modernly. The reason for this is that, in comparison to the poorest homes, wealthier households have better access to modern contraception [21].

Because reproductive decisions in any household can be decided jointly by women and their husbands, education levels of both spouses can likewise improve the chance of intended family planning use [22]. Educated individuals may be well informed and can have better access to family planning services. Employed women are expected to be more concerned regarding their family size. As a result, the likelihood of using traditional and modern family planning of employed women is higher than unemployed women.

Women's exposure to mass media can help to increase the likelihood on intended use of family planning. Such exposure can provide them information regarding the availability and usefulness of different family planning methods. Thus, an effective media campaign can be useful to increase family planning. It can help people to limit their family size according to their desire. The reported results are based upon the data of the respondent women aged 15–49. However, the socioeconomic traits, opinions, and beliefs of males regarding family planning services can have a significant impact on family planning decisions. This may be especially true in a society like Ethiopia where women predominate. Investigating the relevance of these variables on the prevalence of family planning may be useful in future studies. Investigating the reasons behind the regional variations in family planning is also necessary [23].

This study's primary strength was its use of survey data that is nationally representative and its concentration on Ethiopia's high fertility regions. In addition to the huge sample size and well-designed procedures, like training field enumerators and using tried-and-true methods for data collecting, the DHS employs validated instruments in its evaluations of datasets. However, because the surveys have a cross-sectional nature, it is impossible to determine if the results are causative. Furthermore, the EMDHS data

collection did not include crucial variables such husband perspective on family planning, attitude toward family planning methods, or socio-cultural aspects because secondary data was used. Therefore, it was not feasible to include these factors.

## 5. Conclusion

Ethiopia's government has been under constant pressure to slow down the country's population growth since the size and rate of population expansion can have a significant impact on economic growth and lower rates of illness and death among mothers and children. Therefore, investigating the factors that influence family planning use can be useful in addressing the problem by developing appropriate policy. Several significant factors influencing the use of family planning by married Ethiopian women have been found by this study. In the light of this empirical result, the investigators suggest that education and particularly female education can be used as an effective tool to increase awareness about family planning. Women's access to education must be ensured.

This would be beneficial for giving them more family empowerment as well as raising their knowledge of reproductive health and the usage of modern contraceptives. As a result, they will be more involved in decisions about fertility and will have more freedom to utilize contraceptives to reduce the size of their family. Moreover, an effective media operation needs to be launched to create awareness among people about the availability and usefulness of family planning methods for population control. Community leaders and religious intellectuals need to be engaged to convince people about the usefulness of family planning program. Hence, rural areas should be the particular focus of family planning program in the country.

The study suggests that reproductive health initiatives should step up their efforts to increase women's awareness of modern family planning techniques. In order to enhance the adoption of modern family planning, they should also promote positive partner interaction and communication. Additionally, in order to directly, actively, and successfully accommodate male partners, it is necessary to reevaluate the current integrated maternal-child health and family planning services. Additional investigation is suggested into the perspectives of male partners about family planning, the psychological and cultural factors that contribute to non-use, and the obstacles that prevent men and women from using modern contraceptive techniques.

## Abbreviations

AOR: Adjusted odds ratio  
AIC: Akaike information criteria  
BIC: Bayesian information criteria,  
CI: Confidence interval  
CSA: Central Statistical Agency,  
EMDHS: Ethiopia Mini Demographic and Health Survey

ICC: Intra cluster correlation,  
MQL: Marginal Quasi-Likelihood  
SNNPR: Southern Nations and Nationalities People's Regional State

## Authors' Contributions

SYG designed the study, performed the statistical analysis and participated in drafting the manuscript. KAK participated in the study design, implementation of the study, and drafted the manuscript. Both authors contributed to the data analysis, read and approved the final manuscript.

## Availability of Data and Materials

We have accessed the publically available data based on the available data access permission set by the agency under official web page ([www.dhsprogram.com](http://www.dhsprogram.com)).

## Ethics Approval and Consent to Participate

Our data source was the Ethiopia Mini Demographic and Health Survey, 2019, which was collected at national level with written consents and ethical consideration during data collection by Ethiopian statistical Agency (CSA, <https://www.statsethiopia.gov.et/>). All methods were carried out in accordance with relevant guidelines and regulations.

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## Conflicts of Interest

The authors declare no competing interests.

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