

Trend and predictors of change of unmet need for family planning among reproductive age women in Ethiopia, based on Ethiopian demographic and health survey from 2005-2016: Multivariate decomposition analysis

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Abstract

Background: Family planning is a key method for reducing population growth and improving maternal and child health by spacing births and preventing unwanted pregnancies. have an unmet need for family planning is defined as women believed to be sexually involved but are not using some form of contraception, either do not want to have more children (Limiting) or want to delay their next birth for at least two years, (Spacing).

Methods: The data for this study arrived from the Ethiopia Demographic Health Surveys in 2005, 2011, and 2016 to investigate trends and Predictors of change of unmet need for family planning among reproductive age women in Ethiopia. A pooled weighted sample of 26,230 (7761 in 2005, 9136 in 2011 and 9,333 in 2016 Ethiopian demographic health surveys) reproductive-age women used for this study. For the overall trend (2005-2016) multivariate decomposition analysis for non-linear response outcome was calibrated to identify the factors contributed to the change of unmet need for family planning. The Logit based multivariate decomposition analysis utilizes the output from the logistic regression model to assign the observed change in in unmet need for family planning over time into two components. Stata version 16.0 was used to analysis the data.

Result: among reproductive age women in Ethiopia the magnitude of unmet need for family planning decreased from 39.6% in 2005 to 23.6% in 2016. From the decomposition analysis change of unmet need for family planning was due to change in characteristics and coefficients. About nine in ten changes in unmet need for family planning was attributable to the difference in coefficients. Factors that associated with the change of unmet need for family planning over the last 11 years were educational status, birth order, and desired number of children.

Conclusion: Remarkable change in unmet need for FP was observed between the period of 2005 and 2016. Both change in characteristics and coefficient were the contributing to observed change. Majority of the change in unmet need for FP was due to difference in coefficient over the study period. Mainly the change of unmet need for FP was due to change in women having birth order of five and above, having secondary education and women who desired number of children below five.

Introduction

Background

Family planning is a key method for reducing population growth and improving maternal and child health by spacing births and preventing unwanted pregnancies (1). Both fecund reproductive-age women who are married and in consensual marriage have an unmet need for family planning and believed to be sexually involved but are not using some form of contraception, either do not want to have more children (Limiting) or want to delay their next birth for at least two years, (Spacing)(2, 3).

In 2015, globally unmet need for family planning among married women were 12 percent(4). In a developing country approximately 225 million people had an unmet need for modern contraception. Of this number, 160 million were using no method and 65 million were using a traditional method and an estimated 74 million unintended pregnancies occur annually, 52 million of these premature births could be avoided, saving 70,000 women from pregnancy-related death in 2014.(5)

Unmet need for family planning among married or in union women of reproductive age in Sub-Saharan Africa was 25%, posing a major public health concern (6, 7). In Burkina Faso, Malawi, Cameroon, and Ghana the prevalence of unmet need for family planning among reproductive age group women was 18.3%, 21.0%, 46.6%, and 38.9% respectively (8-11). In Ethiopia according to an Ethiopian demographic and health survey, unmet FP needs fell from 37% in 2000 to 22% in 2016(12).

Respective researchers have examined at various factors that influence women's unmet need for family planning, such as age, parity, and religion (13), Discussions with partners and wellness extension staff, as well as awareness of contraceptive methods (14), A visit to a health center, media exposure, a husband and wife's educational status, and residence (15), Due to contraception-related factors like availability, accessibility, affordability, and side effects (16), early marriage, wealth index (17), Number of children alive, use of contraceptive methods(18), partner's attitude toward the use of family planning, current menstrual status, healthcare providers visit and discussion about family planning issues(19).

Unmet need for family planning can have serious consequences for women and their families, including unsafe abortion, physical violence, and a high fertility rate linked to poverty and poor maternal and child health (20, 21). Though, improving family planning (FP) access is fundamental for sustainable development goal (SDG) achievement. It is linked to human rights, gender equality and women's empowerment and has an impact on maternal, newborn, child and adolescent health.

Different researchers in Ethiopia have identified the prevalence and determinant factors of unmet family planning needs., as far as our deep literature reviews, studies concerning on the trend and identify the contributing factors for the change in unmet need for FP in Ethiopia over the studying period among reproductive age group women are limited.

Using multivariate decomposition analysis to identify what socio demographic predictors are strongly correlated with the change in unmet need for FP among reproductive age women(15-49 years) is important to target on factors that decrease/increase unmet need for family planning and to help policy and programs development that focus on reducing unmet need for family planning in Ethiopia. Therefore, this study is aimed to address the trends and contributing factors for change in unmet need for family planning over time by using multivariate decomposition analysis based on the 2005-2016 Ethiopian Demographic and Health Survey (EDHS).

Method And Materials

Study design and sampling procedures

The data for this study was from 2005, 2011, 2016 Ethiopian Demographic Health Surveys (EDHS) to investigate trends and Predictors of change of unmet need for family planning among reproductive age women in Ethiopia. In each of the surveys, a two-stage cluster sampling was employed. In the first stage, 540 Enumeration Areas (EAs) in EDHS 2005, 624 EAs for EDHS 2011, and 645 EAs in EDHS 2016 were randomly selected proportional to their EA size and, on average, 27 to 32 households per EAs were selected in the second stage. A pooled weighted sample of 26,230 (7,761 in EDHS 2005, 9,136 in EDHS 2011 and 9,333 in EDHS 2016) reproductive-age women was included for this study. The detailed information about sampling procedures was presented in the EDHS report(12, 22).

Study Variables

Outcome variable

The outcome variable was unmet need for FP, where it composed of unmet need for spacing and limiting. It refers to the proportion of women who desire to either delay the next pregnancy or limit future pregnancies but are not using any method of modern method of contraception(11). The outcome variable was categorized as “unmet need” if women had unmet need for spacing and limiting were and coded as 1, while those using FP methods for spacing or limiting or with no unmet need were “met need” coded as 0.

Independent variables

The independent variables included in this study were: respondent’s age, respondent’s educational status, religion, husband’s education status, marital status, place of residence, women working status, husband working status, wealth status, media exposure, termination of pregnancy, knowledge about family planning, visited health facility last 12 months, visited by field worker in the last 12 months, perceived distance to health facility, age at first marriage, birth order, sex of household head, region and desired number of children.

Statistical Analysis

Important variables were extracted from the Individual Record (IR) datasets. Data were weighted using “svyset” STATA command and it was applied for descriptive analysis. The variables required for the “svyset” is the weight variable (v005), primary sampling unit (v021), and strata (v023). Trend analysis of unmet need for family planning and decomposition of the change in the prevalence of unmet need for family planning over time was done. The trend analysis has been done by separating based on time period as (2005–20011), (2011–2016) and the overall trend (2005–2016).

For the overall trend (2005-2016) multivariate decomposition analysis for non-linear response outcome was calibrated to identify the factors contributed to the change of unmet need for family planning across the two surveys. For our study, Logit based decomposition analysis was employed. The Logit based multivariate decomposition analysis utilizes the output from the logistic regression model to assign the observed change in in unmet need for family planning over time into components.

For our study, the 2016 EDHS data was appended to the 2005 EDHS data using the “append” Stata command, and the Logit based multivariate decomposition analysis (using mvdcmp STATA command) was used to identify factors that contributed to the change in unmet need for family planning over the last 11 years. The change in unmet need for family planning can be explained by the compositional difference between surveys (i.e. differences in characteristics) and/or the difference in effects of explanatory variables (i.e. differences in the coefficients) between the surveys. Hence, the observed decrease in unmet need over time is additively decomposed into a compositional difference of respondents of each survey (endowments) component and a coefficient (or effects of characteristics) component.

For logistic regression, the Logit or log-odd of unmet need for family planning is taken as:

$$\text{Logit (2005)} - \text{Logit (2016)} = F(X_{2005}\beta_{2005}) - (F X_{2016}\beta_{2016})$$

=

$$\frac{[F(X_{2005}\beta_{2005}) - F(X_{2016}\beta_{2005})]}{E} + \frac{[F(X_{2016}\beta_{2005}) - F(X_{2016}\beta_{2016})]}{C} \quad (23)$$

X indicates independent variables (unmet need for FP in this study)

β denotes that, regression coefficient of each selected explanatory variables

The E component refers to the part of the differential owing to differences in endowments or characteristics. The C component refers to that part of the differential attributable to differences in coefficients or effects.

Ethical approval and consent

Authors have requested DHS Program through an online request by written letter of objective and significance of the study. Permission for data access was granted to download and use the data from <http://www.dhsprogram.com>. The EDHS programs permitted data access, and data were used for only the current study.

Result

Characteristics of the study population

Table 1 below illustrates Percentage distribution of selected characteristics of respondents in 2005, 2011 and 2016 Ethiopian Demographic and Health Surveys. It is apparent that women age group 25-34 years were the dominant percentage of women across the three successive surveys. Across the three successive surveys, there was a clear trend of decline in percentage of unmet need for spacing (from 25.5% to 14.34%) by 9.16 point percentage and for limiting (from 16.05% to 9.22%) by 6.83% point values.

Regarding educational status of the study participants, women with no education decreased by 17.2% in 11 years. However, the number of women with primary school and those with high school and above increased by 12.7 percent and 4.6 percent, respectively. Percentage of orthodox Christian declined by 1.4 % and 2.4% from 2005 to 2011 and 2011 to 2016 respectively. Over all the total drop of Christian orthodox was 3.8 point percentage. But, percentage of Protestants and Muslim follower increased by 2.7% and 2.2% from 2005 to 2016 surveys respectively.

With respect to wealth status of households scanty change was occurred in Ethiopia between the period of 2005 and 2016. Poorest, poorer, middle and richer shows little reduction ranging from 0.2% to 1.2% point values. But, household with the richest category shows relatively highest rise i.e. 2.5 point percentage over the three study periods. In addition, the proportion of male household head fell by 5.2 percent, while the percentage of female household head rose by 4.8% percent from 2005 to 2016.

Table 1. Percentage distribution of socio-demographic characteristics among respondents, 2005, 2011 and 2016 EDHS

Characteristics	2005 EDHS N =7,761	2011 EDHS N =9,136	2016 EDHS N =9,333	2011 - 2005	2016 - 2011	2016 - 2005
Unmet need of family planning						
Unmet need for spacing	23.5%	18.81%	14.34%	-4.69%	-4.47%	-9.16%
Unmet need for limiting	16.05%	10.18%	9.22%	-5.87%	-0.96%	-6.83%
Total unmet need	39.55%	29%	23.6%	-10.6%	-5.4%	-16%
Age of respondents						
15-24	28.9%	28.2%	26.0%	-0.7%	-2.2%	-2.9%
25-34	43.9%	45.2%	46.6%	1.3%	1.4%	2.7%
35+	27.2%	26.6%	27.4%	-0.6%	0.8%	0.2%
Region						
Tigray	6.5%	6.5%	6.8%	0.0%	0.3%	0.3%
Afar	1.1%	1.0%	0.9%	-0.1%	-0.1%	-0.2%
Amhara	25.2%	26.3%	24.7%	1.1%	-1.6%	-0.5%
Oromia	36.9%	38.2%	38.3%	1.3%	0.1%	1.4%
Somali	3.8%	2.2%	2.9%	-1.6%	0.7%	-0.9%
Benishangul-gumuz	1.0%	1.2%	1.1%	0.2%	-0.1%	0.1%
SNNP	22.0%	19.7%	20.5%	-2.3%	0.8%	-1.5%
Gambela	0.3%	0.5%	0.3%	0.2%	-0.2%	0.0%
Harari	0.3%	0.3%	0.2%	0.0%	-0.1%	-0.1%
Addis Ababa	2.7%	3.9%	3.9%	1.2%	0.0%	1.2%
Dire-Dawa	0.4%	0.4%	0.5%	0.0%	0.1%	0.1%
Partner's educational status						

No Education	56.7%	46.4%	44.4%	-10.3%	-2.0%	-12.3%
Primary	29.5%	41.0%	38.1%	11.5%	-2.9%	8.6%
Secondary& above	13.2%	11.8%	16.9%	-1.4%	5.1%	3.7%
Orthodox	45.9%	44.5%	42.1%	-1.4%	-2.4%	-3.8%
Religion						
Catholic	1.2%	1.0%	0.7%	-0.2%	-0.3%	-0.4%
Protestant	18.9%	22.3%	21.6%	3.4%	-0.7%	2.7%
Muslim	31.7%	30.4%	33.9%	-1.3%	3.5%	2.2%
Traditional	1.4%	0.9%	1.0%	-0.5%	0.2%	-0.4%
Other	1.0%	0.9%	0.7%	-0.1%	-0.2%	-0.3%
Respondent's educational status						
No Education	75.8%	61.8%	58.6%	-14.0%	-3.2%	-17.2%
Primary	17.0%	30.4%	29.7%	13.4%	-0.7%	12.7%
Secondary& above	7.2%	7.8%	11.8%	0.6%	4.0%	4.6%
Wealth status						
Poorest	19.3%	20.0%	19.1%	0.7%	-0.9%	-0.2%
Poorer	20.6%	20.1%	20.2%	-0.5%	0.1%	-0.4%
Middle	21.3%	19.6%	20.1%	-1.7%	0.5%	-1.2%
Richer	19.7%	18.7%	19.1%	-1.0%	0.4%	-0.6%
Richest	19.1%	21.6%	21.6%	2.5%	0.0%	2.5%
Place of residency						
Urban	11.1%	19.1%	17.0%	8.0%	-2.1%	5.9%
Rural	89.0%	80.9%	83.0%	-8.1%	2.1%	-6.0%
Sex of household head						
Male	90.7%	86.3%	85.5%	-4.4%	-0.8%	-5.2%
Female	9.7%	12.7%	14.5%	3.0%	1.8%	4.8%
Birth order						

1 st	14.76%	16.04%	16.67%	1.3%	0.6%	1.9%
2 nd	14.79%	17.15%	15.50%	2.4%	-1.7%	0.7%
3 rd	14.11%	14.21%	15.06%	0.1%	0.8%	1.0%
4 th	13.15%	12.82%	12.91%	-0.3%	0.1%	-0.2%
5 th & above	43.19%	39.78%	39.87%	-3.4%	0.1%	-3.3%
Age at first marriage						
<18 years	69.8%	64.4%	62%	-5.4%	-2.4%	-7.8%
>= 18 years	30.2%	35.6%	38%	5.4%	2.4%	7.8%
Working status						
Not working	68.8%	43.7%	49.25%	-25.1%	5.6%	-19.6%
Working	31.2%	56.3%	50.75%	25.1%	-5.6%	19.6%

Trend of unmet need

In the last three successive demographic health surveys, unmet need of family planning decline from 39.6% in 2005 to 23.6% in 2016 i.e. drop by 16 percent. The second Highest rate of decline was observed from 2005 (39.6%) to 2011 (29%) i.e. about 10.6 percent of change next to 2005 to 2016 time period. 5.4% point of fall was also noticed from 2011(29%) to 2016(23.6%) (Fig 1). Over all a significant change (non overlapping 95% confidence interval) was detected across the three period of study i.e. 2005 to 2011, 2011 to 2016 and 2005 to 2016 EDHS.

Regionally, Oromia showed largest amount of point decline in proportion of unmet need for family planning i.e. 5.6% fall. Next to Oromia region, SNNP (by 5%), followed by Amhara region (4.7%) showed reduction in unmet need for FP. Lowest decrease in unmet need was noticed from regions; Somali, Benishangul-Gumuz, Harari and Gambella region. But, Addis Ababa and Dire Dawa city administration shows slight increment in unmet need for family planning from 2005 to 2016. Even though, between 2005 and 2016 the amount of unmet need diminished by 16 percent, but there have been steady decrease of unmet need in urban areas i.e.by 0.1% point percentage. Regarding religion relatively considerable reduction in unmet need for family planning was shown among orthodox, protestant and Muslim followers from 2005 to 2016 by 9%, 4% and 2.2% respectively. (Table 2)

Table 2: Trends of unmet need for family planning among reproductive age from 2005, 2011 and 2016 EDHS.

Characteristics	2005 EDHS N =7,761	2011 EDHS N =9,136	2016 EDHS N =9,333	2011 - 2005	2016 - 2011	2016 - 2005
Age of respondents						
15-24	10.5%	7.2%	4.8%	-3.3%	-2.4%	-5.7%
25-34	16.8%	12.3%	10.3%	-4.5%	-2.0%	-6.5%
35+	12.3%	9.5%	8.4%	-2.9%	-1.1%	-3.9%
Region						
Tigray	1.77%	1.57%	1.21%	-0.20%	-0.36%	-0.56%
Afar	0.19%	0.18%	0.17%	-0.01%	-0.01%	-0.02%
Amhara	8.96%	6.81%	4.25%	-2.15%	-2.56%	-4.71%
Oromia	17.63%	13.14%	12.06%	-4.49%	-1.08%	-5.57%
Somali	0.55%	0.61%	0.37%	0.06%	-0.24%	-0.18%
Benishangul- Gumuz	0.36%	0.34%	0.24%	-0.02%	-0.10%	-0.12%
SNNP	9.60%	5.61%	4.60%	-3.99%	-1.01%	-5.00%
Gambella	0.10%	0.09%	0.07%	-0.01%	-0.02%	-0.03%
Harari	0.06%	0.08%	0.05%	0.01%	-0.02%	-0.01%
Addis Ababa	0.32%	0.47%	0.43%	0.15%	-0.04%	0.11%
Dire-Dawa	0.07%	0.10%	0.11%	0.02%	0.02%	0.04%
Partner's educational status						
No Education	22.9%	14.8%	12.1%	-8.14%	-2.64%	10.8%
Primary	13.0%	12.4%	9.1%	-0.64%	-3.25%	-3.9%
Secondary& above	3.9%	2.0%	2.8%	-1.9%	0.8%	-1.2%
Religion						
Orthodox	16.8%	11.1%	7.7%	-5.7%	-3.4%	-9.0%

Catholic	0.6%	0.4%	0.3%	-0.3%	-0.1%	-0.4%
Protestant	8.3%	6.5%	4.3%	-1.8%	-2.1%	-3.9%
Muslim	12.8%	10.6%	10.6%	-2.3%	0.1%	-2.2%
Traditional	0.6%	0.3%	0.4%	-0.3%	0.1%	-0.2%
Respondent's educational status						
No Education	31.6%	19.5%	15.4%	-12.1%	-4.1%	-16.2%
Primary	6.7%	8.7%	6.6%	2.0%	-2.0%	0.0%
Secondary & above	1.3%	0.9%	1.5%	-0.4%	0.7%	0.3%
Wealth status						
Poorest	7.5%	7.0%	5.3%	-0.5%	-1.7%	-2.2%
Poorer	9.2%	6.2%	5.7%	-3.0%	-0.5%	-3.5%
Middle	9.1%	6.5%	5.0%	-2.6%	-1.5%	-4.1%
Richer	8.5%	5.8%	4.3%	-2.7%	-1.5%	-4.2%
Richest	5.2%	3.6%	3.2%	-1.7%	-0.4%	-2.0%
Place of residency						
Urban	2.1%	3.2%	2.1%	1.0%	-1.1%	-0.1%
Rural	37.4%	25.9%	21.5%	-11.5%	-4.4%	-16.0%
Sex of household head						
Male	36.0%	25.2%	20.0%	-10.8%	-5.1%	-16.0%
Female	3.6%	3.8%	3.5%	0.3%	-0.3%	0.0%
Birth order						
1 st	4.8%	3.3%	2.4%	-1.5%	-0.9%	-2.4%
2 nd	4.5%	3.8%	2.6%	-0.7%	-1.2%	-2.0%
3 rd	5.7%	3.5%	2.9%	-2.2%	-0.6%	-2.8%
4 th	5.0%	3.5%	2.9%	-1.4%	-0.7%	-2.1%
5 th & above	20.4%	15.6%	13.8%	-4.8%	-1.7%	-6.6%
Age at first marriage						

<18 years	11.8%	8.9%	7.9%	-2.9%	-1.0%	-3.9%
>= 18 years	28.1%	20.2%	15.7%	-7.8%	-4.5%	-12.3%
Working status						
Not working	12.0%	15.8%	11.3%	3.8%	-4.5%	-0.7%
Working	27.6%	13.2%	12.3%	-14.4%	-0.9%	-15.3%

Additionally, there was decrease in composition of unmet need for family planning in women's who had no education from 2005 to 2016 at 16.2% point percentage drop. On the other hand, slight rise i.e. by 0.3% was observed among women who accomplished high school educational program during the period of 2005 to 2016. Women with primary school showed almost constant trend of unmet need for family planning over the periods of 11 years.

As birth order (parity) increases the proportion of unmet need for family planning also increases. In 2005 EDHS huge difference in unmet need was noticed between women having 1st birth order and having 5 and above birth, which was 4.8% to 20.4% respectively. Similar pattern of difference was also occurred in 2016 EDHS i.e. 2.4% in first birth order and 13.8% in women having five and above birth history. Also, there has been similar drop in the prevalence of unmet need over the last 11 years in every categories of wealth quintile group.

Decomposition analysis

Difference due to characteristics (Endowment)

Generally, there have been decrement in unmet need for family planning among reproductive age group women in Ethiopia from 2005 to 2016. The multivariate decomposition analysis result showed that about 9 % of change in unmet need for family planning among reproductive age group women was explained by differences in respondent's characteristics (endowment) the two surveys (table 3). Among the various important compositional factors, such as wealth index, birth order (parity), place of residence and perceived distance from health facility had a significant effect on change of unmet need for family planning among reproductive age group women.

The characteristics with largest effect among the individual characteristics affecting change in unmet need for FP between 2005 and 2016 was perceived distance from health facility. This means that the decline in women who perceives distance from health facility as not big problem accounts for 6.4 percent rise in unmet need for FP. Second largest characteristics effect on the observed change in unmet need was due to decrease of women who have higher number of children (five and above) i.e. explains about 5% increase in unmet need. Similarly, 2.5 percent increment in unmet need for family planning was due to decrease in the composition of women who reside in rural areas. (Table 4)

Table 3: summary of overall Decomposition Results of unmet need for family planning in Ethiopia 2005 to 2016 EDHS. High outcome group: year==1 --- Low outcome group: year==0

Unmet need for family planning	Coefficient	p-value	95% CI	Percent
E	-0.0147	0.000	(-0.022 , -0.008)	8.93
C	-0.1504	0.000	(-0.174 , -0.126)	91.06
R	-0.1652	0.000	(-0.188, -0.143)	
E = difference as a result of Endowment; C = difference as a result of coefficients; R = Residual				

Table 4: Decomposition of change in underweight among under five children in Ethiopia, 2005 to 2016.

Characteristics	Characteristics effect (E)		f coefficients effect (C)	
	Coefficient	Share (%)	Coefficient	Share (%)
Age of respondents				
15-24	0		0	
25-34	-0.00100	0.60637	0.01610	-9.75
35+	-0.00057	0.34577	0.01105	-6.69
Respondent's educational status				
None	0		0	
Primary	0.00457	-2.7682	0.00978	-5.91
Secondary	0.000139	-0.084	0.0091*	-5.50
Higher	0.00186	-1.127	.0018788	-1.14
Wealth status				
Poor	0		0	
Middle	0.00033	-0.19948	-0.0063	3.83
Rich	-0.00069*	0.41661	-0.01811	11.38
Age at marriage				
>=18 years	0		0	
<18 years	.001422	-.86062	.0013496	-.81681
Place of residency				
Urban	0		0	
Rural	-0.00010*	2.4612	-.039155	23.70
Birth order				
1 st	0		0	
2 nd	0.00008	-0.051711	0.00647	-3.92
3 rd	0.00070	-0.42806	-0.00056	0.34
4 th	-0.00074*	0.451	0.01124	-6.80
5 th & above	-0.0084***	5.101	0.045756**	-27.69
Desired no. of children				

5+	0		0	
<5	-0.00024	0.14378	-0.03290**	19.91
Perceived distance from health facility				
big problem			0	
Not big problem	-0.01059***	6.4108	-0.01289	7.80
Constant	---	-----	-0.1492	90.30
*: p-value <0.05 , **: p-value<0.01 & ***: p-value <0.001				

Difference due to effects of the coefficient

Holding the effect of change in compositional characteristics constant, about nine in ten changes in unmet need for family planning was attributable to the difference in coefficients (table 3). This means, change in unmet need for family planning among reproductive-age women was explained by differences in coefficient (effects of characteristics) across the two surveys. Factors that associated with the change of unmet need for family planning over the last 11 years were educational status, birth order, and desired number of children. Among these, high birth order made the largest contribution to the decrement of unmet need for family planning, accounting more than one fourth changes [Coefficient=0.04756, $P < 0.01$]. However, being a woman with less than five ideal number of desired children was the largest positive (increase) contributor through rising unmet need for family planning nearly by one fifth point percentage (20%). Other interesting finding was that Women who had secondary education showed a significant negative contribution to the observed percentage decrease in unmet need for family planning over the study period which contributed about 5.5 % with [Coefficient=0.0092, $P < 0.05$]. In other word being educated are increasingly displaying substantial influence in reduction of unmet need for family planning. (Table 4)

Discussion

The study demonstrated trend and explaining change of unmet need for family planning over the last 11 years (2005 to 2016 EDHS). Consequently, trend of unmet need was significantly decreased by 16 point percentage over the last 11 years among reproductive aged women in Ethiopia. Major change of the unmet need for family planning i.e.91% over the decade was due to change in effect of covariates (coefficient) and the remaining 9% overall change was attributable to change of population composition (characteristics) of the two surveys.

Socio-demographic and obstetric factors like respondent's educational level, wealth status, place of residency, birth order and perceived distance from health facility were the contributory factors for the overall change of unmet need for family planning between 2005 and 2016. This finding Are in agreement with previous study done in Ethiopia and Pakistan (24, 25). For the decrement of unmet need over the

last 11 years in Ethiopia, the expansion of health extension programs to all over the country take its lion's share, over the last decade Ethiopia showed improvement in accessibility and availability of health facilities and There is also documented evidence of improvement of women's autonomy in making decision for their own health(26, 27).

The results of this study suggest that rural residents (table2) have had superior decline in unmet need for family planning compared to urban residents. This may be due to government dedication to raising rural community awareness related to maternal and child health and provision of healthcare facilities over the last decades.

From the decomposition analysis decrease in composition of women who reported distance to health facility is not big problem, who had five and more children, being rural dweller and women from rich wealth status households contributes to compositional rise of unmet need for family planning. Decrease in composition of women of who perceived distance from health facility is not big problem shows significant effect on rise of unmet need for FP over the entire study periods (2005-2016). This may be attributed to Ethiopia's improvement in health facilities physical accessibility and affordability over the recent decades. In addition, specially trained community health workers (health extension workers) and accessibility of health post to nearby community had their own contribution in enhancement of maternal health services such as family planning (28).

Similarly, decreased composition of women who had five and above birth order results a significant impact on raise of unmet need for FP compared to women with only on birth order. Women with high number of children are more likely to face unmet need for FP Because of due to having too many children unlikely to fear of child death and they think of themselves as reached the planned level of fertility.

From 2005 to 2016 survey the compositional decrement of rural residence raised the unmet need for FP by 2.5% point percentage relative to urban resident. This can explained by speedy urbanization over the last decades (29). Urbanization was important in enhancing access to health facility and have a higher knowledge of maternal health service use than rural residents.

From change due to coefficient differences between the two surveys having secondary education, having many children (highest birth order) and ideal number of desired children were significantly associated with the change of unmet need for FP. About 28% decrease in unmet need for FP was attributable to women having 5 and above birth order. This finding is consistent with study done in Ethiopia (30).

Women who desired to have less than five number of children positively contributed to the rise of unmet need for family planning by 20% compared to women who desired greater than five number of children, a result that is consistent with other recent Ethiopian study (29). This can be explained by; women who desired to have less than five number of children more likely to face challenges related to unmet need for FP to limit their number of children below the desired number.

Other finding of this study was having secondary education contributed to decrease unmet need for FP by 5.5% point percentage, similar to what had been documented in other Ethiopian and Kenyan studies(31, 32). Women with a secondary education may have more access to knowledge about family planning, or formal education may have allowed them to better understanding of contraception (33). These educated women were also more likely to become independent decision maker to use of family planning (34). The findings of the study may inform maternal health programmers to strengthen home visit by health care workers to improve family planning uptake. Even though, the authors have compared three large data sets to show the trend over the time and associated differences in the women's characteristics, this analysis did not consider other significant predictors of unmet need for FP (cultural, clinical and other factors) which were not collected by EDHS program.

Conclusion

Remarkable change in unmet need for FP was observed between the period of 2005 and 2016. Both change in characteristics and coefficient were the contributing elements to the observed change in unmet need for FP. Majority of the change in unmet need for FP was due to difference in coefficient over the study period. Mainly the change of unmet need for FP was due to change in women having birth order of five and above, having secondary education and women who desired number of children below five. Empowering uneducated women about maternal health services specifically about family planning is required. The government and any concerned body could be better to focus on the enhancement of household economic status and health facility accessibility.

Abbreviations

EDHS, Ethiopian Demographic Health Surveys; EAs, enumeration areas; FP, family planning; SNNP, south nations and nationalities people.

Declarations

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References

1. Gebre G, Birhan N, Gebreslasie K. Prevalence and factors associated with unmet need for family planning among the currently married reproductive age women in Shire-Enda-Slassie, Northern West of Tigray, Ethiopia 2015: a community based cross-sectional study. *Pan African Medical Journal*. 2016;23(1).
2. Bongaarts J. The impact of family planning programs on unmet need and demand for contraception. *Studies in Family Planning*. 2014;45(2):247-62.
3. Westoff CF. The potential demand for family planning: a new measure of unmet need and estimates for five Latin American countries. *International Family Planning Perspectives*. 1988:45-53.
4. Alkema L, Kantorova V, Menozzi C, Biddlecom A. National, regional, and global rates and trends in contraceptive prevalence and unmet need for family planning between 1990 and 2015: a systematic and comprehensive analysis. *The Lancet*. 2013;381(9878):1642-52.
5. Ganatra B, Tuncalp O, Johnston HB, Johnson Jr BR, Gulmezoglu AM, Temmerman M. From concept to measurement: operationalizing WHO's definition of unsafe abortion. *SciELO Public Health*; 2014.
6. Sedgh G, Ashford LS, Hussain R. Unmet need for contraception in developing countries: examining women's reasons for not using a method. New York: Guttmacher Institute. 2016;2:2015-6.
7. Vahdaninia M. The unmet needs for modern family planning methods among postpartum women in Sub-Saharan Africa: a systematic review of the literature. 2021.
8. Wulifan JK, Jahn A, Hien H, Ilboudo PC, Meda N, Robyn PJ, et al. Determinants of unmet need for family planning in rural Burkina Faso: a multilevel logistic regression analysis. *BMC pregnancy and childbirth*. 2017;17(1):1-11.

9. Wemakor A, Garti H, Saeed N, Asumadu O, Anyoka B. Prevalence and determinants of unmet need for contraception in North Gonja District, Ghana. *BMC women's health*. 2020;20(1):1-9.
10. Nkoka O, Mphande WM, Ntenda PA, Milanzi EB, Kanje V, Guo SJ. Multilevel analysis of factors associated with unmet need for family planning among Malawian women. *BMC public health*. 2020;20:1-12.
11. Edietah EE, Njotang PN, Ajong AB, Essi MJ, Yakum MN, Mbu ER. Contraceptive use and determinants of unmet need for family planning; a cross sectional survey in the North West Region, Cameroon. *BMC women's health*. 2018;18(1):1-8.
12. Csa I. Central statistical agency (CSA)[Ethiopia] and ICF. Ethiopia demographic and health survey, Addis Ababa, Ethiopia and Calverton, Maryland, USA. 2016.
13. Austin A. Unmet contraceptive need among married Nigerian women: an examination of trends and drivers. *Contraception*. 2015;91(1):31-8.
14. Chafo K, Doyore F. Unmet need for family planning and associated factors among currently married women in Misha District, southern Ethiopia: a cross sectional study. *J Women's Health Care*. 2014;3(165):2167-0420.1000165.
15. Gebreselassie T, Govindasamy P. Levels and trends in unmet need for family planning among adolescents and young women in Ethiopia: further analysis of the 2000, 2005, and 2011 Demographic and Health Surveys. DHS Further Analysis Report. 2013(72).
16. Sulthana B, Shewade HD, Sunderamurthy B, Manoharan K, Subramanian M. Unmet need for contraception among married women in an urban area of Puducherry, India. *The Indian journal of medical research*. 2015;141(1):115.
17. MacQuarrie K. Unmet need for family planning among young women: levels and trends: ICF International; 2014.
18. Mihret N. Magnitude and associated factors of unmet need for contraceptive methods among currently married women in west Belessa District. North Western Ethiopia. 2015;4(10):164-9.
19. Dejen G, Ayichiluhm M, Abajobir AA. Prevalence and associated factors of unmet need for family planning among married women in Enemay District, Northwest Ethiopia: a comparative cross-sectional study. *Global J Med Res*. 2013;13(4).
20. Bankole A, Hussain R, Sedgh G, Rossier C, Kaboré I, Guiella G. Unintended pregnancy and induced abortion in Burkina Faso: Causes and consequences. New York: Guttmacher Institute. 2014.
21. Okonofua FE, Odimegwu C, Ajobor H, Daru PH, Johnson A. Assessing the prevalence and determinants of unwanted pregnancy and induced abortion in Nigeria. Wiley Online Library; 1999.
22. Demographic E. Health Survey: Addis Ababa, Ethiopia and Calverton. Maryland, USA: Central Statistical Agency and ORC Macro. 2006.
23. Powers DA, Yoshioka H, Yun M-S. mvdcmp: Multivariate decomposition for nonlinear response models. *The Stata Journal*. 2011;11(4):556-76.

24. Tadele A, Abebaw D, Ali R. Predictors of unmet need for family planning among all women of reproductive age in Ethiopia. *Contraception and reproductive medicine*. 2019;4(1):1-9.
25. Asif MF, Pervaiz Z. Socio-demographic determinants of unmet need for family planning among married women in Pakistan. *BMC public health*. 2019;19(1):1-8.
26. Woldemicael G, Tenkorang EY. Women's autonomy and maternal health-seeking behavior in Ethiopia. *Maternal and child health journal*. 2010;14(6):988-98.
27. Tesema GA, Yeshaw Y, Kasie A, Liyew AM, Teshale AB, Alem AZ. Spatial clusters distribution and modelling of health care autonomy among reproductive-age women in Ethiopia: spatial and mixed-effect logistic regression analysis. *BMC Health Services Research*. 2021;21(1):1-12.
28. Medhanyie A, Spigt M, Kifle Y, Schaay N, Sanders D, Blanco R, et al. The role of health extension workers in improving utilization of maternal health services in rural areas in Ethiopia: a cross sectional study. *BMC health services research*. 2012;12(1):1-9.
29. Tegenu T. *Urbanization in Ethiopia: Study on growth, patterns, functions and alternative policy strategy*. 2010.
30. Korra A. *Attitudes toward family planning and reasons for nonuse among women with unmet need for family planning in Ethiopia*: Citeseer; 2002.
31. Zenebe CB, Adefris M, Yenit MK, Gelaw YA. Factors associated with utilization of long-acting and permanent contraceptive methods among women who have decided not to have more children in Gondar city. *BMC women's health*. 2017;17(1):1-7.
32. Ontiri S, Ndirangu G, Kabue M, Biesma R, Stekelenburg J, Ouma C. Long-acting reversible contraception uptake and associated factors among women of reproductive age in rural Kenya. *International journal of environmental research and public health*. 2019;16(9):1543.
33. Radulović O, Šagrić Č, Višnjić A, Tasić A, Marković R. The influence of education level on family planning. *Med Biol*. 2006;13(1):58-64.
34. Acharya DR, Bell JS, Simkhada P, Van Teijlingen ER, Regmi PR. Women's autonomy in household decision-making: a demographic study in Nepal. *Reproductive health*. 2010;7(1):1-12.

Figures

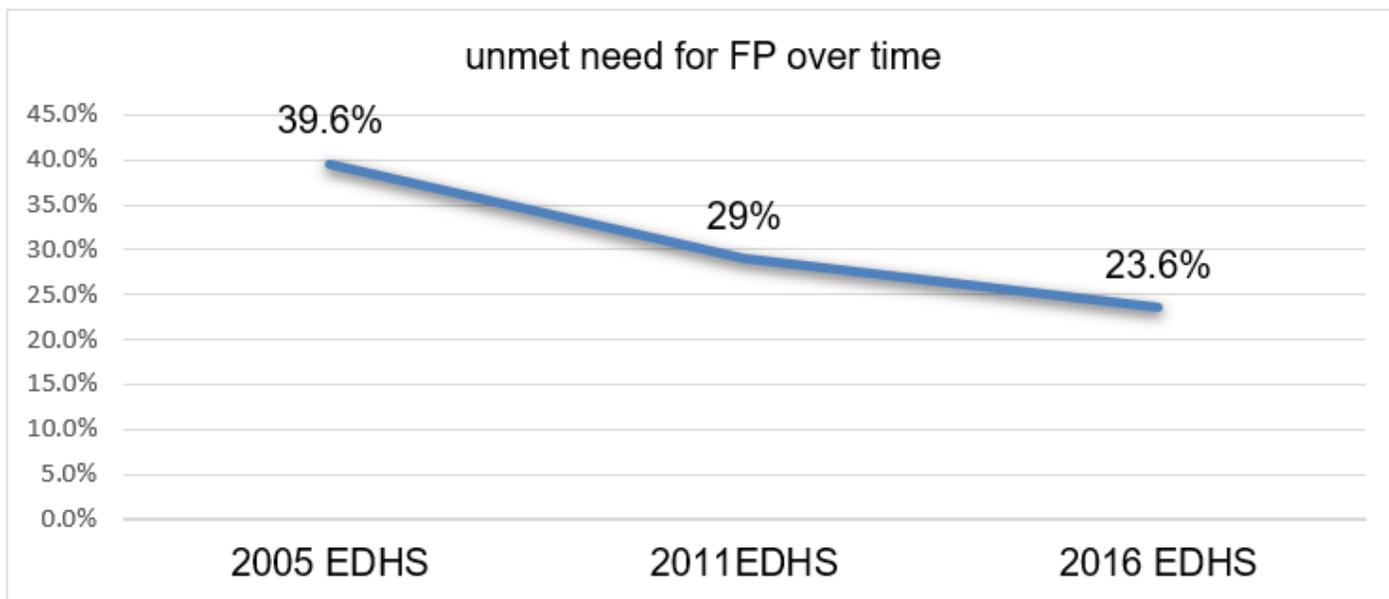


Figure 1

The trend in rate of unmet need for family planning among reproductive age women in Ethiopia in the past 11 years.