Modeling correlates of long-acting contraceptive use in North West Ethiopia: a community based cross-sectional study

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Abstract

The use of long acting contraceptive methods is a common practice among women seeking to prevent unintended pregnancies and plan their families. This study seeks to identify factors associated with the practice of long-acting contraceptive methods, particularly in a conflict-affected area in Awi zone, North West Ethiopia. A cross-sectional study was conducted on a multistage random sample of 1,334 women's. Bivariable and multivariable binary logistic regression has been applied to identify determinant factors. Among the 1,334 women surveyed, 25.49% reported using long-acting contraceptive methods. The analysis revealed that women's educational level, wealth index, being visited by health extension, marital status, use of children as a source of income, and occupational status of women were factors significantly hindering the use of long-acting contraceptive methods in the area. In conclusion, higher contraceptive use was observed among educated, married women, women who used children as a source of income, and women employed by the government. It is therefore recommended that government officials in Awi Zone and policy makers should implement programs to increase female education and employment, which could lead to greater use of contraceptive methods for effective family planning.

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Introduction

The rapid growth of the world population has become an urgent global concern. Most of this growth is occurring in developing countries where, the fertility rate is very high.[1] In most developing continents generally, and in sub-Sahara Africa particularly, the problem of population growth and reproductive health challenges like high maternal mortality, high population growth rate, total fertility rate and much unmet need for family planning is increased.[2,3] Ethiopia, like most countries in sub-Saharan Africa, is characterized by high fertility and rapid population growth. The country stands third next to Nigeria and Egypt in this respect.[4] According to 2016 Ethiopian Demographic and Health Survey (EDHS) reports, from sexually active unmarried women, 58% were currently using a contraceptive method where 55% are using a modern method and 3% are using a traditional method.

The higher fertility rate is associated with rapid population growth which directly associated with depletion of productive resources in the society, rising cost of commodity, poor nutrition and limited educational opportunities, and ultimately trapping women in a poverty cycle. High fertility increases health risks for children and mother, and also aggravates environmental threats.[5] Thus, family planning contributes to promote the health and welfare of the family. It is the means of social development of a country and the best way to control the rapidly and massively growing population which is also essential to the well-being of women, men, adolescents, and the community at large. Contraceptive offers the opportunity for women to plan and space pregnancies in order to achieve personal goals and self-sufficiency.[6]

Recently, women are desired to have more children in Awi Zone of North West Ethiopia which intends the population to increase time to time. In spite of the fact that family planning ser-

vice delivery facilities and other supplies have increased in number in the region particularly in Awi zone, the use of contraceptive methods are still low and as a result major portion of the population is still living in abject poverty.[7]

Most studies in developing countries, including Ethiopia, have put emphasis on the role of socio-economic, demographic and cultural factors in determining family planning. Thus, this study was intended to identify determinant factors of using long-acting family planning methods in a resource limited and conflict affected area in Awi zone, North West Ethiopia.

Materials and Methods

Study design

A cross-sectional study was carried out among 1,334 reproductive women between September 2022 and May 2023 in the Awi Zone, located in the Amhara region of North West Ethiopia. The area, characterized by its flat territory and fertile soil, has elevations ranging from 1,800 to 3,100 meters above sea level, with an average altitude of approximately 2,300 meters. The zone comprises 215,564 households, with an average household size of 7 people.

Sample size and sampling techniques

The sample size was determined using sample size for percentages or proportions formula(8). Using 95% Confidence Level (CL), 3% margin of error (d) and 50 % proportion (p) of using family planning, the sample size was estimated as

$$n = \frac{(1.96)2\ (0.5)\ (0.5)}{(0.03)2} = 1067$$

By considering 1.25 design effects the final sample size was 1,334. A multi-stage cluster sampling method with stratification was applied. In the first stage, two out of three administrative towns and five out of nine districts was selected through simple random sampling technique. In the second stage, two kebeles from Injibara town administration, two kebeles from Chagni town administration, three kebeles from Guagusa Shikudad district, three kebeles from Banja district, three kebeles from Ayehu Guagusa district, three kebeles from Dangla district and three kebeles from Jawi districts were selected randomly. In the third stage, a total of 1,334 households was selected using proportional allocation to each selected kebeles systematically and only one eligible mother was interviewed per household.

All fertile women in the reproductive age of the household were included in the study, and if there were more than two mothers in the household, only one mother was selected randomly.

Data collection tools and procedures

Administered structured questioners were used to collect data. The questions were prepared including socio demographic and maternal contraceptive related factors through reviewing different literatures. The questioners first prepared in English language, and translated to Amharic and Awigna. Each questionnaire was checked for completeness of the information by the principal investigator. About 30 health extension workers were recruited as data collectors.

Data quality control

A pre-test of the questionnaire was conducted with 5% of the sample women within the study area and we assesses that, the questionnaire's content adequately covers the concept it aims to measure. Based on the results of the pre-test, the questionnaire was revised and modified accordingly. Data collectors and supervisors underwent two days of training, facilitated by the investigators, prior to the actual data collection. The data's consistency and completeness were verified before any data entry or coding was attempted. Epi-Info version 7 was utilized to control and manage errors during the data entry process.

Data processing and analysis

The data were cleaned and entered into Epi-Info version 7, after which it was exported to STATA version 16 for analysis. Variables were recoded and computed as necessary for the analysis. We employed complete case analysis, which involves excluding any observations with missing values as a method for handling missing data. A bivariate and multivariable logistic regression model was applied to identify factors associated with the use of contraceptive methods. To account for potential confounding variables in the relationship between risk factors and long-acting contraceptive use among women, we applied a statistical control method. Initially, binary logistic regression was used, including key confounders as covariates in the model, such as women age, women education, current marital status, maternal education and women occupation. Model adequacy checking was done using Hosmer and Lemshow test statistics. All explanatory variables with a $p<0.25$ from the bivariate analysis were included in the multivariable analysis to control for potential confounding effects and associations were declared at 0.05 level of significance. The final model was selected using a backwards elimination approach, which started with a full model including all potential predictors and iteratively removed the least statistically significant variable, based on the Wald statistic, until all remaining variables were statistically significant at a p-value of < 0.05.

Results

Socio demographic and economic characteristics

As indicated in Table 1, among the 1,334 women sampled in Awi Zone, 25.49% reported using long-acting contraceptive methods, while 74.51% did not. The use of long-acting contraceptives varied across different age groups of reproductive women. The highest usage rate (77.5%) was observed in women aged 35-44, while the lowest rate (68.9%) was seen in the 15-24 women's age. A chi square test exhibited a significant association between women's age and the use of long-acting contraceptives methods (X^2: 7.208, p=0.027). Additionally, the highest proportion of women using long-acting contraceptives were those with no formal education (79.35%), followed by those who completed primary school (66.7%) and those who finished secondary school or higher (53.9%). A chi square test showed a significant association between women's educational level and the use of long-acting contraceptives methods (X^2: 41.288; p£0.001).

As shown in Table 1, the use of long-acting contraceptive methods varied between women who had received family planning information through media and those who had not. Among the total sample, 77.2% of women who had not heard family planning information on the radio in the past month used long-acting contracep-

tive methods, while 66.8% of those who had heard family planning information on the radio used these methods. A chi square test showed a significant association between hearing about family planning in radio and the use of long-acting contraceptives methods (X^2:25.018; p≤0.001).

The uses of long-acting contraceptive methods were also varied across marital status. Hence among single, married, divorced, and widwed women the usage rates were 86.7%, 71.9%, 98.6%, and 88.8%, respectively, with divorced women exhibiting the highest rate of contraceptive use. Because divorced women desire to avoid the stress of an unintended pregnancy. The chi square test revealed a significant association between women's marital status and the use of long-acting contraceptives methods (X^2: 35.937; p£0.001). Additionally, 68.3% of women who relied on their children as a source of income reported using long-acting contraceptives. Regarding women occupation, 70.8% of unemployed women, 75% of government-employed women, and 86.2% of housewives reported using contraceptive methods. Furthermore, the chi-square test of association showed that wealth index (X^2: 80.330; p≤0.001), being visited by health extension (X^2:17.233; p≤0.001), use of children as a source of income (X^2:16.012; p≤0.001) and occupation (X^2:17.074; p≤0.001) of women's were significantly associated with use of long-acting contraceptive methods in Awi zone, North West Ethiopia. The results of detailed descriptive statistics including the crosstab and chi-square test of association are depicted in Table 1.

Factors causing for usage of long-acting contraceptive methods

Bivariate logistic regression analysis was employed for all independent variables to identify possible covariates for the multivariable binary logistic regression. Age in 5-year Current marital status, heard family planning on radio, Women's education, Wealth Index, Use child as source of income, being visited by health extension and women's Occupation were found to be the candidate variables for the multivariable binary logistic regression analysis.

The final multivariable binary logistic regression analyses were done to look the effects of the selected explanatory variables on the use of long-acting contraceptive. As it is shown in Table 2, the variables women's educational level, wealth index, marital status, usage of children as source of income and women's occupation were found significant factors on use of log acting contraceptive methods.

The odds of women whose educational level was illiterate were 0.512 (AOR: 0.512, 95%CI: 0.298, 0.879, p=0.0015) times less likely to use long-acting contraceptive methods than women with secondary or higher. This indicates that, secondary and above education often leads to women pursuing careers and delaying marriage and childbearing. This naturally increases the need for effective contraception. Wealth index was also found to be a significant predictor of long-acting contraceptive usage and thus, the odds of a woman with a poor wealth index were 0.336 times (AOR 0.336; 95% CI: 0.243, 464) less likely to use long-acting contraceptive methods than women who were rich.

Based on the study, marital status was found a significant factor for long-acting contraceptive usage and, the odds of married women were 2.497 times (AOR 4.469; 95% CI: 2.144, 9.316, P-value=0.000) more likely to use long-acting contraceptive methods than women whose current marital status were divorced.

Occupation of women also found significant factor of long-act-

Table 1. Percentage distribution on use of long-acting contraceptive with covariates and chi- square test of association results.

Variables	Categories	Contraceptive use		Chi-square	df	p
		Use %	Not use %			
Age in 5-year	15-24	68.9	31.1			0.027*
	25-34	72.7	27.3	7.208	2	
	35-44	77.5	22.5			
Women's education	Illiterate	79.3	20.7			≤0.001*
	Primary	66.	33.3	41.288	2	
	≥Secondary	53.9	46.1			
Wealth index	Poor	85.5	14.5			≤0.001*
	Middle	69.3	30.7	80.330	2	
	Rich	62.7	37.3			
Heard family planning on radio	No	77.2	22.8	25.018		≤0.001*
	Yes	61.5	38.5		1	
Visited by health extension	No	77.7	22.3	17.223		≤0.001*
	Yes	66.8	33.2		1	
Told about side effects	No	75.8	24.2			
	Yes	72.7	27.3	1.571	1	0.210
Current marital status	Single	86.7	13.3			
	Married	71.9	28.1		3	
	Divorced	98.6	1.4	35.937		≤0.001*
	Widowed	88.8	11.3			
Use child as source of income	No	78.2	21.8			
	Yes	68.3	31.7	16.012	1	≤0.001*
Women's Occupation	No Job	70.8	29.2			
	Government employee	75.0	25.0	17.074	2	≤0.001*
	Housewife	86.2	13.8			

ing contraceptive usage. The odds of women with no occupation were 2.179 times (AOR: 2.179; 95% CI: 1.291, 3.678, p=0.004) more likely of using long-acting contraceptive methods than women who were housewife's and, government employed women's were 0.932 times (AOR: 1.932, 95% CI: 1.176, 3.174, p=0.009) more likely to use long-acting contraceptive methods as compared to housewife women's.

The Hosmer and Lemeshow test yielded an insignificant chi-square value (X^2=11.461; p=0.177), indicating that the model is a good fit for the data. Therefore, the logistic regression model is deemed adequate.

Discussion

This study was conducted to assess the prevalence and factors associated with use of long-acting contraceptive methods among Awi zone adolescent women who can give birth, northweast Ethiopia. The overall prevalence of contraceptive usage was found to be 25.4% and 74.6% of women was not use long-acting contraceptive. This prevalence was small as of studies conducted in Jordan (74.8%),[9] Malawi (77.9%),[10] Tiro Afeta District, South West Ethiopia (74.4%),[11] Debre Tabor town, Ethiopia (30.9%),[12] and Ghana (44.9%).[13] The possible reason for the difference might be variations in the study areas and women in Awi zone district use their child as source of income.

The result revealed that illiterate women were 0.512 times less likely to use long-acting contraceptive methods than women who have secondary and above education level controlling other variables in the model [*AOR*: 0.512; 95% *CI*: (0.298, 0.879); p£0.001)]. The finding is consistent with a study[11] that states that educational level has a statistical significant difference for use of contraceptive methods, respondents with primary and secondary education had about 2 times higher, the result is also consistant with Gafar *et al.*[14] which founds women who had completed secondary and above education had 2.8 times greater than the odds of women who had not completed any formal education for using long-acting contraceptive methods, and Dasa *et al.*[15] which revealed women who have no formal education were 0.59 times less likely to utilize long-acting family planning services as compared to women who had primary education and above.

Women's wealth index has found a significant effect on use of long-acting contraceptive methods. The odds of women with poor wealth index were 0.336 times less likely to use long-acting contraceptive methods than rich women controlling other variables in the model. The finding was similar with a study[14] that reveals women classified as the richest by the wealth index were 1.1 times more likely to use contraceptives than those classified as poorest, the study by Johnson,[16] which states that the odds of using modern contraceptives were also observed to progressively increase with wealth quintile, being 3.7 times higher among the richest compared to the poorest, and the study by Adebowale *et al.*[17] that states using multiple logistic regression on the data reveals that poorest married women were less likely to ever use modern contraceptive.

The model results also showed that visited by health extension workers has significant effect on long-acting contraceptive. The finding reveals that women who were not visited by health extension were 73.4% less likely to use long-acting contraceptive methods than women who were visited by health extension. This study was consistent with the finding which was done in Nigeria that states the problem of low access and utilization of modern contraceptive experienced by adolescent girls in Niger can be resolved to

Table 2. Parameter estimates of explanatory variables in logistic regression model.

Explanatory variables	Categories	Coefficients	SE	Wald	p	AOR	AOR 95% C.I. Lower	AOR 95% C.I. Upper
Age in 5-year groups	15-24	0.206	0.205	1.005	0.316	1.228	0.822	1.837
	25-34	0.057	0.162	0.124	0.724	1.059	0.771	1.455
	35-44 (Ref.)	-	-	-	-	-	-	-
Mother education	Illiterate	-0.670	0.276	5.898	0.0015	0.512	0.298	.879
	Primary	-0.461	0.274	2.826	0.093	0.631	0.369	1.079
	Secondary and above (Ref.)	-	-	-	-	-	-	-
Wealth index	Poor	-1.091	0.165	43.803	0.000	0.336	0.243	0.464
	Middle	-0.246	0.199	1.518	0.218	0.782	0.529	1.156
	Rich (Ref.)	-	-	-	-	-	-	-
Heard family planning on radio last few months	No	-0.216	0.176	1.505	0.220	0.805	0.570	1.138
	Yes (Ref.)	-	-	-	-	-	-	-
Visited by health extension	No	-0.309	0.144	4.588	0.032	0.734	0.553	0.974
	Yes (Ref.)	-	-	-	-	-	-	-
Current marital status	Single	0.029	0.872	0.001	0.973	1.030	0.187	5.683
	Married	1.497	0.375	15.95	0.000	4.469	2.144	9.316
	Widowed	-1.975	1.077	3.363	0.067	0.139	0.0017	1.146
	Divorced (Ref.)	-	-	-	-	-	-	-
Use child as source of income	No	-0.426	0.140	9.322	0.002	0.653	0.497	0.858
	Yes (Ref.)	-	-	-	-	-	-	-
Mother occupation	No Job	0.779	0.267	8.499	0.004	2.179	1.291	3.678
	Government Employee	0.659	0.253	6.761	0.009	1.932	1.176	3.174
	Housewife (Ref.)	-	-	-	-	-	-	-
Constant	Constant	-1.427	0.507	7.907	0.005	0.240		

AOR,Adjusted odds ratio; C.I, Confindence Interval; SE, Standard error; Ref., Reference category,

some degree by the introduction of Community Health Workers;[18] and with the study by Asresie *et al.*[19] that says contraceptive uptake was higher among women who visited by health workers at home 12 months prior to the survey.

In this study marital status of women has significant effect on use of long-acting contraceptive methods. Married women are 4.469 times more likely to use long-acting contraceptive methods than divorced women, which indicate that married women were more intended to more children than divorced controlling other covariates in the model. This finding is consistent with the study done in Ethiopia, which revealed that modern contraceptive use among married or in-union reproductive-age women was relatively high compared to other studies done in the region,[19] and Niger[18] that showed controlling for covariates, the odds of current use of modern contraceptive methods were higher in married adolescent youth. But this finding was contradict with the study done in Malawian,[10] which says that the demand for long acting contraceptive use was higher among sexually unmarried women compared to married women. This is comparable with a study in Malawian where the researcher use only two marital status category (married and un married) and unmarried women often face greater social stigma associated with unintended pregnancies, which can create a stronger motivation to use long acting contraceptive use to prevent such outcomes.

The study result portrayed that use of child as source of income is a significant variable for use of long-acting contraceptive methods. Mothers who were not used their child as source of income were 65.3% less to use long-acting contraceptive methods than women who used their child as source of income controlling other covariates in the model.

Occupation status of women has significant effect on the use of long-acting contraceptive methods. The result showed that women's whose occupation were no job is 2.179 times more likely to use long-acting contraceptive methods than house wife women and government employed women were 1.932 times more likely to use long-acting contraceptive methods than housewife's women. This finding was consistent with the study done in Debre Berhan town, Ethiopia.[12] Our study reveals that a respondent whose occupation is employed was found to be 13.992 times more likely to had long-acting family planning compared with self-employed. A study done in Bangladesh[20] was also consistent with this study and says that occupation had an emergent relation with contraceptive usage of employed woman had 26% higher chance of using contraception than an unemployed woman.

The factors "heard about side effects" and "family planning on the radio" were found to be non-significant determinants for long-acting contraceptive use. This may be due to the fact that awareness alone is not enough; individuals must also have access to family planning services. If barriers such as distance, lack of supplies, or high costs exist, increased awareness may not necessarily lead to higher usage.

Conclusions

This study, conducted in the Awi Zone of Northwest Ethiopia, examined the utilization of long-acting contraceptive methods among 1,334 women of reproductive age. The findings reveal a complex picture of contraceptive use, influenced by a range of demographic and socioeconomic factors. The study utilized bivariate and multivariable logistic regression to identify significant predictors of long-acting contraceptive method usage among women. The final multivariable analysis revealed that women's educational level, wealth index, marital status, occupation, and the use of children as a source of income were significant factors.

Future studies should employ qualitative methods to understand women's contraceptive perceptions and barriers, alongside longitudinal research to track intervention impacts. Investigating male partner and community leader influence is crucial. Comparative studies across Ethiopian regions, considering spatial analysis, cultural and infrastructural differences, will further refine intervention strategies. These research avenues will provide a more comprehensive understanding of contraceptive behavior and optimize public health efforts.

Limitations

Because of missing data all explanatory variables were not included and since this study was retrospective type recall bias might be introduced. While the study acknowledges the need for qualitative research, it primarily relies on quantitative methods. The absence of qualitative data limits the depth of understanding regarding women's perceptions and experiences. The study's cross-sectional design limits the ability to establish causal relationships between the identified factors and long-acting contraceptive use. It provides a snapshot in time, and therefore can not show cause and effect

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