Determinants of Modern Contraceptive Methods among Reproductive Age Women in Ayssaita District, Afar National Regional State, Ethiopia

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ABSTRACT

The fertility rate in Ethiopia is very high. According to the 2000 Ethiopian Demographic and Health Survey (EDHS) an Ethiopian woman gives birth on average to 5.9 children. Problems posed by high fertility rates and population growth have sparked studies of the factors determining contraceptive usage since contraceptive is used for birth control. The major objective of this study is to determine the factors that affect the use of contraceptive methods for women in Ayssaita district. The study is based on data a total of 323 women in the age group 15-49 years. Binary logistic regression and descriptive statistical measures are used for the analysis. The binary logistic regression analysis is applied to identify factors of contraceptive usage women's socio-economic characteristics. Binary logistic regression analysis revealed that place of residence, religion, partner's education level, woman's education, region and monthly income were the most important variables that explained the variability in contraceptive usage. Women who had higher education, high monthly income and higher partner's education were likely to use contraceptive methods. The regional government should also invest heavily on women and their partner schooling beyond primary school.

Key word: Contraceptive method, binary logistic, Ayssaita

1. Introduction

1.1 Background of the study

The world population is increasing from time to time at unprecedented speed. From day to day it is becoming a global concern as many countries in many parts of the world face the difficulty of sustaining their population. In most developing countries in general, and in Sub-Saharan Africa in particular, the problem of population growth and reproductive health challenges include: high maternal mortality, high population growth rate, total fertility rate and much unmet need for family planning in the world. The situation in Ethiopia is still much worse than most African countries (ETR, 2007).

Ethiopia is one of the developing countries with high growth rate of population, high level of maternal and child mortality. The population growth rate of the country is among the highest in Sub-Saharan Africa (CSA, 1999). Women in the reproductive age group (15-49), constitute a substantial percent of the total female population. Furthermore the country has a youth age structure in which 40% of the population is under age 15. This indicates that there is considerable momentum for population growth. This, together with the high level of fertility and a low level of contraceptive use, suggests that the population will continue to grow at a faster pace for at least another generation.

Rapid population growth, which in many instances far outstrips economic growth and environmental sustainability, is the reality in most developing countries of Sub-Saharan Africa. In Ethiopia the overall contraception prevalence rate among women of childbearing age (15 to 49 years) is less than 2%, and the crude birth rate is estimated to be 49 per 1000 population. Most women in Ethiopia marry by the age of 15, and less than 6% remain single by the age of 24.4 on average Ethiopian wives experience seven pregnancies during their lifetime, each pregnancy carrying about a 1% risk of death (Haile, 1990 and UNCF, 1989). These figures are associated with an annual rate of population growth of approximately 3% (World Bank, 1993).

As all other areas of Africa, maternal mortality remains persistently high in Ethiopia 676 deaths per 100,000 live births higher as compared Global average (EDHS, 2012). In Ethiopia modern contraceptive usage were satisfied, maternal mortality would drop by almost one-third from current levels, and unplanned births and unsafe abortions would decline by 89–92% (Roy, 2013). Therefore, promotion of family planning in countries with high birth rates has the potential to reduce poverty and hunger and avert 32% of all maternal deaths and nearly 10% of childhood deaths (Tesfaye, 2015).

As the three rounds of EDHS explained that, the modern family planning was estimated as 35.8%, 33.8 and 25.3% in 2000, 2005 and 2011 respectively with varies across regional states in Ethiopia. There was statistically significant difference between rural and urban areas modern family planning usage. On the other hand, the contraceptive prevalence for all women use was 29% (CSA, 2011). Similarly, the National and Afar regional state of contraceptive methods of family planning was 25.3% and 16% respectively.

However, the National contraceptive prevalence among the currently married women has increased five –fold from 8% in 2000 to 42 % in 2014 mini EDHS. Likewise, 40.4% and 8.4% of married women were using a modern method nationally and in Afar region respectively. In addition Afar women no education level accounts 73.3% and TFR is 5.7/ life time of women (CSA, 2014)**.** Generally, except by CSA over the entire region there was not conducted specifically in the target area. Therefore, even if, the regional government has made substantial effort, the Afar modern contraceptive use showed too low as compared with other region of Ethiopia.

1.2 Statement of the problem

In the developing world, deaths and poor health among women and newborns have remained far too high for too long (Mariska, 2014). Family planning have undergone a paradigm shift and emerged as one of the interventions to reduce maternal and infant mortalities and morbidities. Family planning can thus help mitigate the impact of high population growth by helping women achieve desired family size and avoid unintended and mistimed pregnancies.

 Unintended or mistimed pregnancy, threatens the lives and wellbeing of women and their families globally may end with abortion this may reveals significant associations between medical professionals' willingness to provide abortion services and their personal attitudes, qualities, and experience and most of these unintended pregnancies are aborted often in unhygienic and unskilled   condition.

Ethiopia is the second most populous country in Africa and the fourteenth largest in the world. If this trends hold, it will become the world's tenth most populous country by 2050, with a population reaching 167 million. As well as, it has the fifth highest number of maternal deaths in the world: One in 27 women die from complications of pregnancy or childbirth annually (Sarah, 2015).

Modern contraceptive is crucial but, the use of modern it differs significantly among regions, urban and rural areas (Yihunie, 2013). Women who married at younger age were significantly less likely to show unmet need for spacing and limiting. Afar region revealed calendar and abstinence methods are the commonly accepted community practices in the tradition of the Afar region. Men believed that the population in Afar was low compared to other regions and that was a reason to have more children.

The regional maternal health is too low as compared with the National maternal health services like antenatal care, institutional delivery, post natal care, and modern family planning services which account 32.3%, 6.8 %, 6% and 9.1%, respectively from EDHS 2011. In addition, the region has dispersed population settlement livelihoods, low trained health professionals, high turnover staffs, harsh environment, most of the pastoralist are mobile and low or no education of the Afar women Misperception, inappropriate cultural beliefs in modern contraceptive needs and practices of family planning services (CSA, 2011).

The objective of this study is to confirm the previous study by assessing the magnitude and factors associated with modern contraceptive method among the reproductive age in Ayssaita District zone one administration Afar National regional state, Ethiopia.

 Finally, the finding of this research could help addressing the critical points to increase the contraceptive prevalence rate, decrease the TFR and improve maternal and child health. Alongside, this study it would provide important information to family planning providers, policy makers, and program managers to meet the modern contraceptive methods in the future.

1.3. Objective of the study

The general objective of this study is to investigate factors associated with modern contraceptive usage among reproductive age women in Ayssaita district.

The specific objectives of this study are:

- To assess the overall determinant of modern contraceptive family planning among reproductive age women.

- To identify the factors associated with modern contraceptive family planning   among reproductive age women.

2. Methods

2.1. Description of the study area
The study area is Ayssaita is part of zone one administrative which is 649 KM distance from Addis Ababa and 65 KM away from the regional capital city Samara. It is located in northern part of the region sharing international boundary with Republic of Djibouti and bordered by neighboring districts: Elidar in the north, Dubti in the west, Afambo and Dire Dawa council in the south. Ayssaita has 2 urban and 11 rural kebele among the rural, five are agro-postural and six are postural kebele. The total area is 138,800 hectares and the temperature ranges from $30c^0$-$45c^0$ altitudinal. It extends from 350-500 meter above sea level (Rabia *et at*., 2013). According 2015 CSA report indicated the district population was estimated 56,187 of who 29,935 are men and 26,252 women. Among them 12,827 is reproductive age group. According to the Ayssaita district health office current report, where there is one district hospital, one health center, five clinics and three health posts.

2.2. Sampling techniques and sample size determination

2.2.1. Target population
All women in the reproductive age group who are in Ayssaita District.

2.2.2. Sampling techniques
Sampling technique is a systematic or a system of taking small ratio of observation from large population with the aim of getting information of this large population from the small observation by using some statistical techniques. A random technique is the probability, which involves every possible sample of specific size has an equal chance of being selected. In this study random sampling was used to select the entire sample.

2.2.3. Sample size determination
Even if there are a number of sample size determination formula approaches (like personal judgments and budgetary approach), the one in which the investigator interesting is based on precision with some confidence level. An appropriate sample is one of the means of gaining high precision and greater accuracy with minimum cost. That is in addition to the purpose of the study and population size, three criteria usually will need to be specified to determine the appropriate sample size: the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured (Cochran, 1963).

The Level of Precision
The level of precision, sometimes called sampling error, is the range in which the true value of the population is estimated to be

Degree of Variability
The degree of variability in the attributes being measured refers to the distribution of attributes in the population. The more heterogeneous a population, the larger the sample size required to obtain a given level of precision. The less variable (more homogeneous) a population is, the smaller the sample size will be.

Confidence level
There is always a chance that the sample you obtain does not represent the true population value. This risk is reduced for 99% confidence levels and increased for 90% (or lower) confidence levels. The total numbers of reproductive age women are 4442. Therefore, the appropriate sample size can be determined by taking a pilot survey from one urban kebele and year four rural kebele of women in Ayssaita district.

The study uses random sampling technique and accordingly the sample size determination formula adopted is given by:

$$n = \frac{(Z_{a/2})^2 \ p(1-p)}{d^2} - - - - - - - - - - - - - - - -[1]$$

Where n is the sample size, $Z\alpha/2$ is the value of standard normal distribution that gives an area of $\alpha/2$ to the right of it and d is the margin of error. Thus using $\alpha = 5\%$ (95% confidence level), $d = 4\%$ and $N = 4442$.
The sample size for this particular study is computed as

$n = \frac{(1.96)^2 \ 0.16(1-0.16)}{(0.04)^2} = 323$

The study used data a total of 323 women in the age group 15-49 years.

2.3. Method of data collection
The study used primary data that were collected using structural self administer questionnaire would be used as instrumental tool of gathering the information from the respondents. The questionnaires was translated to suit the local language Afargna and then retranslated back into English. The questionnaire involves both closed and open

ended question. 36 female high school students and two nurses for supervisor were participated in collecting the data. The data from questionnaires were entered into SPSS and cleaned to eliminate errors and then analyzed.

2.4. Variables in the Study
The response variable considered in this study was contraceptive use of women which is categorized as 1= using and 0= otherwise. The independent variable that determine the use of contraceptive method in Ayssaita district were place of residence, religion, ethnic group, level of education, partner level of education, occupation and monthly income of women.

2.5. Method of data analysis
After data collection is over, the collected data was carefully edited, coded, tabulated and organized depending on the type of questions and the nature of the data before analysis. The data gathered from the sample was analyzed by using both descriptive statistical methods and inferential statistical methods.

2.5.1 Descriptive statistics: - it is statistical methods that helps us to summarize a given sets of data using tables, diagrams, graphs and summary measures such as mean, median and standard deviation. For this particular study mainly frequency distribution table was used to summarize the most important features of the sample data.

2.5.2 Inferential statistics: - it is statistical method that helps us to make inference about the population parameters depending on the results obtained from sample data. Making statistical estimation and conducting statistical hypothesis testing are methods through which inferences are made. This study has used the binary logistic regression models to identify the most significant predictors of modern family planning usage of reproductive women in Ayssaita district.

Logistic regression model:- The dependent variable in logistic regression was usually dichotomous that was the dependent variable can take the value 1 with a probability of success π, or the value 0 with probability of failure $1 - \pi$. This type of variable is called a Bernoulli (or binary) variable.

The independent or predictor variable in logistic regression can take any form. The relationship between the predictor and response variable is not a linear function logistic regression; instead, the logistic regression function, which is the Logit transformation of π, is used. Consider a collection of P explanatory variable denoted by the vector $x^{'}=(x_1, x_2, \ldots, x_p)$. Let the conditional probability that the outcome is present be denoted by $p(y = 1/x) = \pi$.

$$\pi = \frac{\exp(\beta_0 + \beta_1 + \cdots + \beta_p)}{1 + \exp(\beta_0 + \beta_1 + \cdots + \beta_p)}$$

Then the Logit or log-odds of having Y=1modeled as a linear function of the explanatory variable as

$$ln\left(\frac{\pi}{1-\pi}\right) = \beta_O + \beta_1 X_1 + \ldots + \beta_P X_P; 0 \leq \pi \leq 1$$

where β_0 is the constant and $\beta_1, \ldots, \beta_p$ are the coefficients of the predictor variable. The above equation is known as the logistic function.

Odds ratio: The odds of an event happening (e.g. the event that Y=1) is defined as the ratio of the probability that the event will occur divided by the probability that the event will not occur. That is, the odd of the event E is given by

$$\text{Odds (E)} = \frac{P(E)}{P(notE)} = \frac{P(E)}{1 - P(E)}$$

It does this by examining the relationship between one or more independent variable and the log odds of the dichotomous outcome by calculating changes in the log odds of the dependent as opposed to the dependent variable itself. The log odds ratio is the ratio of two odds and it is a summary measure of the relationship between two variable The use of the log odds ratio in logistic regression provides a more simplistic description of the probabilistic relationship of the variable and the outcome in comparison to a linear regression by which linear relationship and more rich information can be drawn.

Parameter estimation: The maximum likelihood estimation method is appropriate for estimating multiple logistic models due to this less restrictive nature of underlying assumption (Hosmer and Lemeshow, 2000). Hence in this study, the maximum likelihood estimation technique could be applied to estimate parameter model.

Goodness of fit of the model: The goodness of fit or calibration of model measures how well the model describe the response variable assessing goodness of fit involves investigating how close value predicted by the model with that of bother value.

The Hosmer-Lemeshow Test

In order to find the overall goodness of fit Hosmer and Lemeshow proposed grouping based on the value of the estimated probability. Hosmer-Lemeshow goodness of fit test divides subjects in to deciles based on predicted probabilities and compute a chi-square from observed and expected frequencies. Using this grouping strategy, the Hosmer-Lemeshow goodness of fit statistic $\hat{c}$ is obtained by calculating the Pearson chi-square statistic form the $g * 2$ table of observed and estimated expected frequencies. A formula defining the calculation of $\hat{c}$ as follows:

$$\hat{c} = \sum_{k=1}^{g} \frac{(D_k - n_k \bar{\pi}_k)^2}{n_k \bar{\pi}_k (1 - \bar{\pi}_k)}$$

Ho: model holds good fit (no evidence of lack fit)

H1: model holds not good fit (evidence of lack fit)

If the p-value is larger than of α value we have evidence that the model is good fit.

Likelihood ratio test

Alternative approach to test the significance of number of explanatory variable are use the likelihood ratio test. Likelihood test use the ratio of maximizes value of likelihood function for the full model function for the simple model (Lo). The likelihood ratio test statistic equals

$$G^2 = -2\log\left(\frac{lo}{l1}\right) = -2[\log(l_o) - \log(l_1)]$$

Hypothesis test

Where l_o the likelihood of the null is model and l_1 is the likelihood of the saturated model. Under the null hypothesis, Ho: $\beta_{1=}\beta_{2=,\dots,=}0$

The statistic G^2 follows a chi-square distribution with P degree of freedom.

3. Results and Discussion

The purpose of this study is to analysis the effect of different socio-economic and demographic determinants of modern contraceptive methods in Ayssaita district. Descriptive and binary logistic regression methods are used to measure the effect of the determinant of contraceptive methods among reproductive age women in Ayssaita. The descriptive part provides percentages of modern contraceptive status of women. The binary logistic analysis is employed to determine modern contraceptive methods of women and to predict the odds of contraceptive method in Ayssaita. The data are analyzed using the Statistical Package for Social Sciences (SPSS) version 20.

Table 1. Descriptive statistics of contraceptive usage status of women in Ayssaita.

Variable	Categories of the variables	Currently use contraceptive method					
		Using		Not Using		Total	
		Count	Row N %	Count	Row N %	Count	Row N %
Place of residence	Urban	80	63%	47	37%	127	100%
	Rural	4	2%	192	98%	196	100%
Religion	Orthodox	38	73%	14	27%	52	100%
	Muslim	40	15.2%	224	84.8%	264	100%
	Others	6	100%	0	0%	6	100%
Ethnic Group	Afar	12	5.7%	197	94.3%	209	100%
	Amhara	60	69.8%	26	30.2%	86	100%
	Oromo	5	25%	15	75%	20	100%
	Others	7	87.5%	1	12.5%	8	100%
Educational Status	No Education	15	10.1%	134	89.9%	149	100%
	Primary	12	15.4%	66	84.6%	78	100%
	Secondary	32	47.8%	35	52.3%	67	100%
	Above Secondary education	25	86.2%	4	13.8%	29	100%
Partner Education	No Education	4	3.2%	121	96.8%	125	100%
	Primary	18	22%	64	78%	82	100%
	Secondary	31	53.4%	27	46.6%	58	100%
	Above Secondary education	31	53.4%	27	46.6%	58	100%
Occupation	Pastoralist	3	7.5%	37	92.5%	40	100%
	Agro-pastoralist	0	0%	18	100%	18	100%
	Housewife	49	25.8%	141	74.2%	190	100%
	Daily worker	9	25%	27	75%	36	100%
	Student	5	33.3%	10	66.7%	15	100%
	Gov't worker	18	78.3%	5	21.7%	23	100%
Income per month	Less than 1,000 birr	51	20.4%	199	79.6%	250	100%
	Between 2,000-3,000 birr	28	51.9%	26	48.1%	54	100%
	Above 3,000	5	26.3%	14	73.7%	19	100%

The proportion of contraceptive usage differs by place of residence. The contraceptive usage statuses of women (current users) who reside in urban areas were 63% the remaining 27% are non users. Among rural women 2% are currently contraceptive users and 98% are non users. The prevalence rate of contraceptive usage is higher among women who reside in urban areas (63%) as compared to rural area (2%).

With regards to religion, contraceptive usage of women is highest for Muslim (47.6%) followed by 45.2% of Orthodox. The lowest contraceptive usage (7.2%) of women was recorded for followers of other religions.

The above table 3.1 reveals that currently contraceptive usage differs by women's educational status. For instance, almost 90% of no educated women are not using contraceptive methods and the remaining 10% are using contraceptive methods. On the other hand women who have above secondary educational status are better on contraceptive usage (that is 86.2% of them are using and 13.8% of them are not using contraceptive methods).

The result shows that women who are different ethnic group also have different status on the usage of contraceptive methods. The highest proportion of contraceptive usage were Amhara (71.4%) followed by Afar (14.3%) and the least one is observed in Oromo (6%).

Analysis of Binary Logistic Regression

Table 2: results of binary logistic regression model

Variables		Coefficient	S.E.	Wald	d.f	Sig.	Exp(B) OR
Step 1ᵃ	Place of Residence (urban)	3.697	.557	44.088	1	.000	40.335
	Religion (ref)			.938	1	.333	
	Orthodox	.202	.250	.651	1	.420	1.224
	Muslim	-.224	.291	.592	1	.442	.799
	Ethnic (ref)			.162	1	.687	
	Afar	-1.227	.411	8.927	1	.003	.293
	Amhara	-.895	.272	10.813	1	.001	.408
	Oromo	.044	.249	.031	1	.860	1.045
	Education status mothers (ref)			.253	1	.000	
	No Education	2.077	1.708	1.479	1	.000	7.980
	Primary Education	-.763	.618	1.525	1	.000	.466
	Secondary Education	2.326	4.750	.240	1	.001	10.234
	Partner education status (ref)			44.088	1	.005	
	No Education	-.407	.421	.938	1	.003	.665
	Primary Education	-.202	.250	.651	1	.000	1.224
	Secondary Education	-.206	.159	2.139	1	0.139	.814
	Occupation (ref)			25.274	5	.000	
	Pastoralist	1.210	.606	3.982	1	.046	3.352
	Agro-pastoralist	1.231	.673	3.345	1	.067	3.425
	Housewife	.765	.609	1.580	1	.209	2.149
	Daily worker	.979	.607	2.597	1	.107	2.662
	Student	.410	.738	.308	1	.579	1.506
	Income (ref)			101.397	2	.000	
	Less than 1,000 birr	-1.067	.106	100.919	1	.000	.344
	Between 2,000-3,000 birr	-.309	0101	9.381	1	.002	.734
	Constant	-1.854	.667	7.726	1	.005	.157

The result of the binary logistic regression model is presented table 4.1. Currently use of contraceptive was assigned a value of 1 if the respondents reported use and 0 otherwise. The reference category of each dichotomously measured independent variable has a value of one and the values for other categories are compared to that of the reference category.

INTERPRITATION

- ❖ Women who live in urban area is $e^{3.697}$ = 40.335 times more likely to use modern contraceptive method than women who live in rural area in Ayssaita district.
- ❖ Women who have no education is $e^{2.077}$ = 7.980 time and learnt secondary education is $e^{2.326}$ =10.234 times more likely to use modern contraceptive method than those women that learnt above secondary school. But women learnt primary education is $e^{-0.763}$ = 0.466 times less likely to use modern contraceptive method than women who learnt above secondary school.
- ❖ Women getting monthly income is less than 1000 Ethiopian birr is $e^{-1.067}$ =0.344 time and between 2,000 and 3,000 birr is $e^{-0.309}$ =0.734 less likely to use modern contraceptive method than women their monthly income is above 3000 Ethiopian birr.

Over all goodness of fit of the logistic regression model

The most common assessment of overall model fit in logistic regression is the likelihood ratio test, which is simply the chi-square difference between the null models.

Table 3 Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	261.071[a]	.456	.655

a.   Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

 Under model summary we see that the -2log likelihood statistic is 261.07. This statistic measures how poorly the model predicts the use of modern contraceptive method; the smaller are statistic the better the model. The non-significant value of Cox & Snell space R^2 indicates that the model good enough.

The Homer- Lemeshow test used to test the overall goodness of fit of the fitted model. A large p-value indicates good fit to the data. Since the p-value is 0.47 which is insignificant at 5% level of significant, indicating that the fitted logistic regression model is good fit.

Table 4 Hosmer and Lemeshow Test

Step	Chi-square	D.f	Sig.
1	20.935	8	0.47

4   Discussion and Conclusions

High fertility rates could be one of the major deterrents to sustained economic growth. The findings in chapter four show that female education is a key determinant of contraceptive use. The result shows that women's educational attainment is a significant variable. Better educated women have more knowledge of contraceptive methods. This supports the study done by Bertrand *et al*. (1993) who found that education affects the distribution of authority within households, whereby women may increase their authority with husbands, and affect fertility and use of family planning.

The results of our study also show that there is difference in women's contraceptive usage status among rural and urban dwellers. Urbanization significantly impacts contraceptive usage. That is, an urban-based woman is more likely to use contraceptive than the rural-based woman. This also suggests that urban women may be more likely to use contraceptive (especially modern contraceptive methods) than rural women because of greater access to modern methods and medical care as well as other social amenities in urban areas. This supports the study by Bertrand *et al*. (1993) who found that modern contraceptive use is higher in urban than in the rural areas.

5 Recommendation

- ❖ This study suggests that investment in women's education should be a practical priority. Also, husband's education has a great impact on women's contraceptive usage. Therefore, the regional government should also invest heavily on women and their partner schooling beyond primary school.
- ❖ Awareness should be created about contraceptive usage to women in rural areas by increasing health facilities and family planning workers.

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