



WOLKITE UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

DEPARTEMENT OF STATISTICS

**DETERMINANTS OF FAMILY PLANING PRACTICE AMONG WOMEN OF
REPRODUCTIVE AGE IN ETHIOPIA**

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Declaration

We, the undersigned, declare that this paper is our original work and has not been presented for a degree in any other university, and that all sources of materials used for the paper have been appositely acknowledged.

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ABSTRACT

Family planning is the practice to prevent or avoid unwanted birth and control the spacing between child birth to help create a small and planned family. It is the best way to control the rapidly and massively growing population. This study aimed to identify factors that affect women's family planning practice in Ethiopia. In this study the data source is EDHS 2016 with a total of 5937 women of age 15-49 years. In this study 5929 all women of reproductive age are considered. Descriptive statistics and binary logistic regression are used for statistical analysis. The descriptive result revealed that about 34.9% of the women practiced family planning while 65.1 % did not practice family planning. The logistic regression analysis revealed age of a women, marital status, place of residence, region, religion group, number of living children, women's health facility told FP, and women's heard FP on TV were found to be significant predictors for women's family planning practice. Finally, this study recommended that since women exposed to FP information in any way were more likely to practice FP the government and non-government organization involved with FP should enhance information and communication activities regarding family planning services using mass media, family planning workers and health centers and government should give more emphasis to improve the FP service delivery in rural areas.

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List of Abbreviations

CPR-Contraceptive Prevalence Rate

CSA-Central Statistical Agency

DHS- Demographic and Health Survey

FGA -Family Guidance Association

FP-Family Planning

MDG- Millennium Development Goal

SNNP- South Nations, Nationality and People

SPSS-Statistical Package for Social Science

STD- Sexually Transmitted Diseases

SSA -Sub-Saharan Africa

TFR- Total Fertility Rate

UNICEF-United Nations International Children Fund

UNPF -United Nations Population Fund

US- United State

USAID-United States Agency for International Development

WHO- World Health Organization

CHAPTER ONE

Introduction

1. Background of the Study

Family planning is the practice to prevent or avoid unwanted birth and control the spacing between child birth to help create a small and planned family. It is the best way to control the rapidly and massively growing population. So, family planning contributes to promote the health and welfare of the family and thus contribute effectively to the social development of a country (WHO, 2013). The health of mothers is not only affected by nutrition status but also by early marriage, frequent pregnancies, early motherhood, abortion etc. Moreover, the health of a child is also affected by the mother's health status (WHO, 2013).

Family planning helps people have the desired number of children, which as a result improves the health of mothers and contributes to the nation's social and economic development. In most developing countries, including SSA countries, it is a common practice for women to have too many children to close to one another. As a consequence, the population size of those countries has grown dramatically but economic growth has not kept in parallel with it. Such an unbalanced population size will inevitable have a negative impact on the wellbeing of the nation. Family planning is one of the strategies which are proving to be effective in tackling these problems (UNICEF, 2015).

The factors that influence family planning practice are multifaceted and challenging. Several studies evident that most women's knowledge and practice of FP is associated with socio-demographic, socio-cultural, socio economic, source of information and family planning factors. For instance, according to different study findings socio-demographic and economic and media exposure related factors were found to contribute on the practice of FP (Mekonnen et al., 2011; Ibnouf et al., 2007; Mostafa et al., 2010).

Family planning(FP) use across Sub-Saharan Africa (SSA)is fundamental in advancing maternal health (Annan, 2010; UNICEF & WHO, 2012). Maternal and reproductive services use in SSA is low across all ages, especially among economically impoverished groups and least educated women in the society (Darroch & Singh, 2011; WHO, 2010, 2011). Additionally, more

than one-third of all pregnancies in developing countries are considered unintended, with an estimated 19% of these needing abortion care (Guttmacher Institute, 2012). Those seeking abortion care, unsafe abortions account for 13% of all maternal deaths globally (Guttmacher Institute, 2012). Despite evidence that worldwide fertility rates have been declining and family planning use increasing for the past two decades, many women who desire to stop having children or delay child bearing are not meeting their demands for contraception (Population Reference Bureau, 2009; WHO & UNICEF, 2012). This is particularly the case in West Africa where recent indices for maternal and reproductive health is worst among countries in SSA (Bearinger, Sieving, Ferguson, & Sharma, 2007; UNICEF & WHO, 2012).

It has been estimated that two-thirds of all unintended pregnancies in developing countries occur among women and adolescents who do not use contraceptives (Mbizvo & Zaidi, 2010). In 2014, it was reported that two hundred and twenty-five million women in developing regions had an unmet need for modern contraception (Singh, Darroch and Ashford, 2014). This total, 160 million were using no method and 65 million were using a traditional method.

Ethiopia is one of three countries (along with Malawi and Rwanda) in SSA that have achieved a much more rapid increase in the contraceptive prevalence rate (CPR) than any other countries in the region, according to an analysis of modern contraceptive prevalence in Demographic and Health Surveys (DHS, USAID/Africa Bureau 2011). Modern family planning service in Ethiopia was pioneered by the Family Guidance Association (FGA), established in 1966 (FMOH 2011). After 1980, the Ministry of Health expanded its family planning services with country support programs by United Nations Population Fund (UNPF) and other stakeholders.

Ethiopian women of childbearing age (15–49) use any method of family planning. This is a dramatic increase from 2005 when only 15 percent of married women of childbearing age were using any form of contraception. However, 25 percent of married women do not want any more children or want to wait for two or more years before having another child but are not currently using any form of contraception. Family planning efforts need to expand to address this “unmet need” for family planning—particularly among young women ages 15–19 who have the highest unmet need 33% (USAID, 2015).

Investing in family planning improves maternal and child health and also has benefits for Ethiopia across several sectors. For example, fulfilling unmet need for family planning would generate significant cost savings in meeting five of the MDGs-achieve universal primary education; reduce child mortality; improve maternal health; ensure environmental sustainability and combat HIV/AIDS, malaria, and other diseases. The savings would be more than two times greater than the increased costs of family planning. Satisfying unmet need for family planning by 2015 would meet the desires of women and men for their families and save the lives of nearly 13,000 mothers and more than 1 million children. In addition, meeting unmet need would generate \$23 million in savings in the education sector and \$26 million in the water and sanitation sector. Addressing the high unmet need for family planning will help Ethiopia fulfill its national vision of reducing poverty and becoming a middle-income country (USAID, 2012).

The vastly growing population is an issue all around the world especially in developing countries like Ethiopia. Ethiopia is the second most populous nation in Africa with estimated population of 110.14 million. More over Ethiopia is one among the six countries that contribute to about 50% of the maternal deaths (Hogan et al., 2008). Thus practicing family planning is a viable and cost effective solution for such growing population and decreasing this high maternal mortality (Black et al., 2003).

Additionally the inclusion of FP in the Target 5b of the Millennium Development Goal (MDG) in 2005 reflects the international consensus on its benefits, both for mother and child at individual level and for family income, national economy and environment at collective level (Bongaarts & Sinding 2009; Cates 2010; Potts et al.2013).

1.2. Statement of the problem

Family planning in Ethiopia like the rest of the world cannot be viewed in isolation but in a broader picture of reproductive health and specifically in safe motherhood. This is because it affects safe motherhood in many ways. For example, family planning helps to save women's and children's lives and preserves their life by preventing untimely and unwanted pregnancies (UNFPA, 2004). Women are looking beyond a domestic and reproductive role, into playing other productive roles in their societies, roles which have been helped by socio - economic progress and change. Governments and the international community realized that enabling women to control their fertility and to decrease the number of births is critical for checking rapid population growth and for speeding up the stabilization of world population, and are providing the necessary information and services.

The goal of family planning is to reduce unwanted births, teen pregnancy, spread of STDs and HIV, and improve the overall health of mother, child, and, ultimately, the family unit. Family planning improves health, reduces poverty and empowers women (Bongaarts et al., 2012).

This study tried to answer the following questions

1. What factors affect the FP among women of reproduction age?
2. Is there deference between FP of women among Ethiopia regions?
3. Is there relation between FP practice and its factors among women of the reproduction age in Ethiopia?

1.3. Objectives of the study

1.3.1. General objective

The general objective of this study is to identify determinants of family planning practice among women of reproductive age in Ethiopia

1.3.2. Specific objectives

The specific objectives of this study are;

- To identify factors that affect FP practice of women of reproductive age in Ethiopia.
- To examine the extent of FP practice between regions of Ethiopia
- To identify the association between the factors of FP and status of FP practice among women of reproductive age in Ethiopia.

1.4. Significance of the study

Population growth in enormous rate is major challenge worldwide. The problem worse mostly developing country. These problems are the major obstacles which lag countries to achieve their goals. This study is therefore; aims to assess the utilization and determinants of family planning in Ethiopia.

CHAPTER TWO

2. LECTRATURE REVIEW

Family planning has been cited as essential to the achievement of Millennium Development Goals (MDG) and is an important indicator for tracking progress on improving maternal health (Eliason et al., 2013 and Cates et al., 2010). Family planning is one of four pillars with antenatal care, safe delivery, and postnatal care that was introduced by the safe Motherhood Initiative in 1987 to reduce maternal mortality in developing countries, where 99% of all maternal deaths occur (Ahmed et al., 2012).

Alemayehu (2012) studied that religion was one of the determinants of family planning. Religion has been documented to be the most controversial factor influencing use of FP methods. Degree of one's adherence to the norms of a given religion may exert an influence on ones "mode of life including reproductive behavior. In addition, a qualitative study in the Afar region of Ethiopia reported that women in the rural areas have some concerns about religious sayings and the implications that these sayings have about family planning use. Similarly a study conducted to assess Socio-economic and demographic determinants of unmet need for family planning in India and its consequences revealed that a significant association between religion and FP for both spacing and limiting (Barman, 2013)

Assefa and Fikrewold (2011) and Black, et al. (2010) conducted the number of living children is a factor influencing the practice of FP. An analysis of the 2005 Ethiopia Demographic Health Survey (EDHS) data for Southern Nations and Nationalities Peoples Region (SNNP) revealed that women with higher number of living children (5 or more) were significantly more likely to have an unmet need for limiting births than women with medium (less than five) living children for both limiting and spacing births than women with no living children.

Among the demographic factors that affect the use of FP is age. A research performed in Tanzania revealed use of modern FP methods was highest among women in the age 35 years and above. This could be attributed to the fact that the younger ones, though highly sexually active, desire to bear children and are not yet ready to use contraceptives. Comparable observations have been made with a start up of acceptance of modern contraceptive methods being more in women of thirty years and above. However this finding doesn't imply that

the age of the woman alone can predict the trend of use of FP methods among particular age groups (Anna and Nassoro, 2006).

Residence is the one of Socioeconomic Factors that has effect on women's family planning practice. A study performed in Luck now revealed that overall residential area had influence on use of family planning methods which correspondence with research made in India (NFHS-III, 2007) which showed that more urban than rural women used family planning methods. Moreover a research made in Southern Nations, Nationalities and Peoples Region in Ethiopia revealed that women residing in rural areas were significantly less likely to practice family planning compared to women in urban areas (Assefa and Fikrewold, 2011).The explanation for these urban rural differences no doubt includes the easier accessibility of family planning services in cities, the desire for more children in rural areas, and the greater education in urban areas to verify this a study conducted in northern Ethiopia (Kebede, 2006) found that urban women had more access to health services than rural women.

According to Dejene Edosa, et al. (2016) number of a live births, family size, decision maker on the number of births and type of method shift are statistically significant predictors of utilization of long acting and permanent family planning methods.

Abebaw Gebeyehu, et al. (august 2014) conducted accessing family planning can reduce a significant proportion of maternal, infant, and childhood deaths. In Ethiopia, use of modern contraceptive methods is low but is increasing. This study aimed to analyze the levels, trends, and determinants of modern contraceptive use and changes over time among young married women in Ethiopia. The study used data from the three Demographic Health Surveys (DHS) conducted in Ethiopia, in 2000, 2005, and 2011. Non-pregnant, young married women age 15-24 were included in the final samples, for sample sizes of 2,157 in 2000, 1,904 in 2005, and 2,146 in 2011. The major statistical techniques used were logistic regression for analysis of determinants of current contraceptive use and logit-based decomposition analysis of factors contributing to the recent changes.

Many unintended pregnancies and illegal abortions contributes significantly to the high mortality rate in Nigeria, which signifies the unmet needs for family planning among women of reproductive age, which could be affected by myriads of factors. Hence, this

study assesses factors influencing the utilization of family planning methods among women attending selected health centers in Ile Ife Osun State, Nigeria. Findings showed that more than two-thirds (68.6%) had ever used a family planning method. Meanwhile, about two-thirds (60.4%) were currently using a family planning method, while 39.6% were not using any method. Majority (26.3%) rated condom as the most effective method of contraception (International Journal Dec 2017)

Laya (2012) conducted exposure to mass media (television, radio, etc) is an effective way towards family planning. Family planning programs can use effective communication channels to address barriers affecting FP practice and to bring about a behavioral change. In most developing countries, especially in Sub-Saharan Africa, promoting family planning through radio and television is an important means of raising awareness, improving knowledge, and motivating use of modern contraceptive methods (ETR, 2007)

CHAPTER THREE

3. METHEDOLOGIES

3.1. Data Source

The dataset used in this study was taken from the Ethiopia Demographic and Health Survey (EDHS) conducted by central statistics agency (CSA) in 2016.

3.2. Variables of the Study

3.2.1. The Response Variable

The response variable of this study is;

- Status of FP practice(0=women used method,1=women not used any method)

3.2.2. Explanatory Variables

No	Variables name	Categories
1	Age of a woman	(0)=15-25,(1)=26-336,(2)=Above 36
2	Place of Residence	(0)= Urban,(1)= Rural
3	Region	0=Tigray,1=Affar,2=Amahra,3=Oromiya,4=Somali,5=BenGumuz,6=SNNP,7=Harari,8=Gambela,9=Dire Dawa,10= Addis Ababa,
4	Women heard radio on FP	0=yes,1=no
5	Religion group of a women	1=Orthodox,2=Protestant,3=catholic,4=Muslim,5=Others
6	Women heard TV on FP	0=yes, 1=no
7	Women health facility told to FP	0=yes, 1=n0
8	Number of living Children	0= No children, 1= medium(1-5), 1=large(>5)
9	Marital status	0=Never in a union,1=Married,2=Living together,3=No longer living together,4=windowed

3.3. Method of data processing and analysis

Both descriptive and inferential statistics was used. The study use descriptive statistics and inferential statistics, the study was used chi-square test of independence and binary logistic regression. Data involves many steps like tabulation and analyzing of the study in both descriptive and inferential statistics

3.3.1. Descriptive statistics

Descriptive statistics were being used during the calculation of the frequency, percentage, cumulative percentage. This describe by tables, graphs, chart, and cumulative percentage. It is also very help full in drawing conclusion or decision making.

3.3.1.1. Chi-square test

Chi-square(X^2) is a statistical measure with the help of which it is possible to access of the significance of the different between the observed frequencies and expected frequencies obtained from some hypothetical universe. It is a measure of the different between the observed and expected counts.

In addition it helps us to determine whether two variables are associated or not. In order to that chi-square test may be applicable both the frequencies must be grouped in the same way and theoretical distribution must adjust to give the same total frequency, which is equal to that of observed frequency. Chi-square test enables us to test whether more than two population proportion, can be considered equal.

A chi-square test is used to:-

- a. Checking of goodness of fit
- b. Test of independency
- c. Test of homogeneity
- d. Test of association

Chi-square test of goodness of fit: - enables used to see how well the distribution of observed data fit to assumed theoretical distribution. It tests if the sample outcomes result a known discrete probability model.

Chi-square test of independence: - enables us to explain whether or not two attributes are associated or simply it is a technique of judging significance of the two associations or relationship between two attributes. The chi-square test for independency use when we have two descriptive variables is associated. The objective of chi-square test of independency is to test whether there is association between two categorical variables

Chi-square test of homogeneity: - it helps us to stating whether different samples come from the same universe.

From these our study was being the chi-square test of independence.

Test of hypothesis

Ho: There is association between dependent and independent variable.

H₁: There is no association between dependent and independent variable.

$$X^2_{cal} = \frac{\sum_{i=1}^r \sum_{j=1}^c (O_{ij} - E_{ij})^2}{E_{ij}} \quad X^2 (c-1), (r-1) (i=1, 2, \dots, r, j=1, 2, 3 \dots c)$$

Where, C= total number of column, R=total number of row

χ^2 is the value of random variable whose sampling distribution approximately very closes to the chi-square distribution with (r-1) (c-1) degree of freedom.

O_{ij}- observed frequency of ith row and jth column.

E_{ij}- expected frequency of ith row and jth column.

Assumption of Chi-square

- Each cell and every individual object is independent of each other
- Each number qualify for one and only one cell in the table
- It is required sufficiently large.
- All individuals' observation in the sample should be independent.
- The sample must draw from the population investigated.
- The data should be expressed in original unit rather than in percentage or ratio.
- Each data entry will be containing at least five individual observations.
- The data are assumed to be a random sample.
- The expected frequencies for each category should be at least one.
- No more than 20% of the categories.

3.3.2. Inferential statistics

Inferential statistics is the statistical method deals with making inference or conclusion about population based on data obtained from limited number of observations that came from the population. Inferential statistics consist of estimation and hypothesis testing; we were being use in this study chi-square test for the purpose of association checking between variables and logistic regression model under consideration.

3.3.2.1. Logistic Regression Model

One of the statistical techniques for this study was used to the logistic regression model. Logistic regression is a variation of ordinary regression which is used when the dependent (response) variable is dichotomous variable (i.e. it takes only two values, which usually represent the occurrence and non- occurrence, or success or failure, or satisfy or not satisfy of some outcome events usually coded as 0 or 1) and the independent (input) variables are continuous, categorical or both. The model for p-explanatory variables (i.e. $x_1, x_2 \dots x_p$) is given by

$$\text{logit}(\pi(x)) = \log\left(\frac{\pi}{1 - \pi}\right) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p \dots\dots\dots (3.2)$$

Where π is the probability of success and $1-\pi$ is the probability of failure;

Where $\pi(x)$ is the conditional probability of success and is given by

$$\pi(x) = \frac{\exp(\beta_0 + \beta_1 x_1 + \dots + \beta_p x_p)}{1 + \exp(\beta_0 + \beta_1 x_1 + \dots + \beta_p x_p)} \dots\dots\dots(3.3)$$

Logistic regression also produces odds ratio (O.R) associated with each predictor values of a variable. The odds of an event are defined as the probability of an outcome event occurring divide by the probability of the event not occurring. In general the odds ratio is one set of odds divide by another.

3.3.2.1.1. Assumptions of Logistic Regression

- Logistic regression assumes meaningful coding of the variables. A logistic coefficient was difficult to interpret if not coded meaningfully. The convention for binomial logistic regression is to code the dependent class of greatest interest as 1 and the other class as 0.
- Logistic regression does not assume a linear relationship between the dependent and independent variables. The dependent variable must be categorical.
- The independent variables need not be interval, nor normally distributed, nor linearly related, nor of equal variance within each group.
- The groups must be mutually exclusive and exhaustive; a case can only be in one group and every case must be a member of one of the groups.
- Linearity in the logistic regression equation should have a linear relationship with the logit form of the dependent variable.
- The dependent variable need to be normally distributed.
- Normally distributed error terms are assumed.

3.3.2.2. Binary logistic regression model

Binary logistic regression is the form of regression which is used when the dependent variable is dichotomous and the independent variables are of any type

(continuous or categorical). It can be used to predict a dependent variable on the basis of continuous and (categorical independent variables) and to determine the percent of variance in the dependent variable explained by the independents; to rank the relative importance of independent variables; to assess the interaction effect and to understand the impact of covariate control variables. But in logistic regression our objective is to find the probability of something happening (probability of success)

$$\text{Model: -Logit } [p(x)] = \log \left[\frac{\pi(x)}{1-\pi(x)} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k \dots \dots \dots (3.4)$$

Where: π - the probability of success

$1-\pi$ -the probability of failure

β_0 - is constant term

X_i - independent (explanatory) variables

β_i - Coefficients of independent variables

3.3.4. Model Building Using Logistic Regression

3.3.4.1. Odds Ratio

Logistic regressions work with odds so it is necessary to define both odds and odds ratio. The odds are simply the ratio of the probabilities for the two possible outcomes. If p is the probability that the event was occurring, then $1-p$ is the probability that the event was not occurring:

$$odd = \frac{p}{1-p} \dots \dots \dots (3.5)$$

In 2×2 contingency tables, within row 1 the odds of success are $Odds_1 = p_1/1-p_1$, and within row 2 the odds of success equal $Odds_2 = \frac{p_2}{1-p_2}$.

The ratio of the odds from the two rows,

$$P_i = \frac{\text{odds}_1}{\text{odds}_2} = \frac{\frac{p_1}{1-p_1}}{\frac{p_2}{1-p_2}} \dots\dots\dots (3.6)$$

Is called odds ratio. Whereas the relative risk is a ratio of two probabilities, the odds ratio p_i is a ratio of two odds.

Note: When a logistic regression is calculated, the regression coefficient (b_1) is the estimated increase in the log odds of the outcome per unit increase in the value of the exposure. In other words, the exponential function of the regression coefficient (e^{b_1}) is the odds ratio associated with a one-unit increase in the exposure.

When is it used?

Odds ratios are used to compare the relative odds of the occurrence of the outcome of interest (e.g. disease or disorder), given exposure to the variable of interest (e.g. health characteristic, aspect of medical history). The odds ratio can also be used to determine whether a particular exposure is a risk factor for a particular outcome, and to compare the magnitude of various risk factors for that outcome.

- OR=1 Exposure does not affect odds of outcome
- OR>1 Exposure associated with higher odds of outcome
- OR<1 Exposure associated with lower odds of outcome

3.3.4.2. Parameter estimation

The maximum likelihood and non-iterative weighted least square the two meet computing. Estimation methods used in fitting logistic regression model (Hosmer&Lemeshow, 1989)

When the assumption of normality of the predictors does not hold, the non-iterative weighted least square method is less efficient. In contrast the maximum likelihood estimation method is appropriate for estimating the logistic model

parameters due to this less restrictive nature of underlying assumption (Hosmer & Lemeshow, 1989) hence in this study the maximum likelihood estimation technique will be applied to estimate parameters of the model consider the logistic model.

- ✓ For estimation of coefficient in logistic we will use (MLE) maximum Likelihood estimation.
- ✓ $L(\beta) = \prod_{i=1}^n p(x)^y(1 - p(x))^{1-y}$
- ✓ Where $p(x)$ probability of success for the different value of x .
- ✓ y -is the response variable.
- ✓ To estimate the parameter we differentiate the likelihood function with respect to each parameters and equation to zero as follows.
- ✓ For constant we find $\frac{\partial L(\beta)}{\partial(\beta_0)}=0$ and
- ✓ For the slopes we find the partial derivative of the likelihood function with respect to the parameters and equal to zero $\frac{\partial L(\beta)}{\partial(\beta_j)}=0$.

3.3.5. Model adequacy checking

3.3.5.1. The Wald test statistic

The Wald test is a way of testing the significance of particular explanatory variables in a statistical model. In logistic regression we have a binary outcome variable and one or more explanatory variables. For each explanatory variable in the model there were associated parameters. If for a particular explanatory variable, or group of explanatory variables, the Wald test is significant, then we were conclude that the parameters associated with these variables are not zero, so that the variables should be included in the model. If the Wald test is not significant then the explanatory variables can be omitted from the model.

To test statically significance of each coefficient (β) in the model.

- ✓ $Z = \frac{\beta}{Se(\beta)}$ Where β = coefficient of regression.
- ✓ $Se(\beta)$ = standard error of the coefficient.

- ✓ Z = normal distribution.
- ✓ This z value is the squared yielding Wald statistics with a chi-square distribution of 95% CI

3.3.5.2. Likelihood-ratio test

An alternative and widely used approach to testing the significance of a number of explanatory variables is to use the likelihood ratio test. This is appropriate for a variety of types of statistical models. The likelihood ratio test is better, if the sample size is small or the parameters are large. The likelihood ratio test uses the ratio of the maximized value of the likelihood function for the model (L_1) over the maximized value of the likelihood function for the simpler model (L_0). It is compared with the chi-square distribution with one degree of freedom. This log transformation of the likelihood function yields a chi-square statistic.

The likelihood-ratio test statistic is:

$$G^2 = -2 \log(L_0/L_1) = -2[\log(L_0) - \log(L_1)] = -2 \log(L_0/L_1).$$

3.3.6. Goodness Test of the Model

A **goodness-of-fit test**, in general, refers to measuring how well do the observed data correspond to the fitted (assumed) model. We were using this concept throughout the course as a way of checking the model fit. Like in a linear regression, in essence, the goodness-of-fit test compares the observed values to the expected (fitted or predicted) values.

Most often the observed data represent the fit of the *saturated model*, the most complex model possible with the given data. Thus, most often the alternative hypothesis (H_A) was represent the saturated model M_A which fits perfectly because each observation has a separate parameter.

The goodness of fit or calibration of a model measures how well the π model describes (explains) the dependent variable. Assessing the goodness of fit involves

examining how close values predicted by the model with that of the observed value.

After fitting the logistic regression model, there are several techniques used in examining the goodness, adequacy and usefulness of the model.

3.3.6.1. Omnibus Test

The omnibus test is the method of testing the coefficients and the significance of the model. Which means the overall model is significant if all variables are included in the model.

3.3.6.3. The Hosmer - Lemeshow Test

The final measure of model fit is the Hosmer-Lemeshow goodness of fit statics, which measure the correspondence between the actual and the predicted value of the dependent variables. The Homers -Lemeshow test is commonly used test for assessing the goodness of fit model and allows for any number of explanatory variables, which may be continuous or categorical. In this case better model fit is indicated by smaller difference in observed and predicted statistic. The logistic model of Hosmer-Lemeshow Statistic (G^2_{HL}) is given by;

$$G^2_{HL} = \sum \left\{ \frac{(O_j - E_j)^2}{E_j(1 - E_j/n_j)} \right\} \sim X^2$$

Where, n_j = Number of observations in the j^{th} group

CHAPTER FOUR

4. DATA ANALYSIS AND DISCUSSION

4.1. Descriptive Statistics

Table 4.1. Summary of descriptive statistics

variables	categories	Status of FP practice		Total frequency
		Women not used method	Women used method	
Age of a woman	15-25	1363(23%)	795(13.4%)	2158(36.4%)
	26-36	1573(26.5%)	848(14.3%)	2421(40.8%)
	Above 36	929(15.7%)	425(7.2%)	1354(22.8%)
Place of Residence	Urban	697(11.7%)	1805(30.4%)	2502(42.1%)
	Rural	3169(53.4%)	266(4.5%)	3435(57.9%)
Region	Tigray	221(3.7%)	260(4.4%)	481(8.1%)
	Affar	590(9.9%)	216(3.6%)	806(13.6%)
	Amahra	333(5.6%)	76(1.3%)	409(6.9%)
	Oromiya	548(9.2%)	105(1.8%)	653(11.0%)
	Somali	496(8.4%)	115(1.9%)	611(10.3%)
	Benshangul	401(6.8%)	51(0.9%)	452(7.6%)
	SNNP	401(6.8%)	51(0.9%)	452(7.6%)
	Harari	317(5.3%)	119(2.0%)	436(7.3%)
	Gambela	490(8.3%)	77(1.3%)	567(9.6%)
	Dire Dawa	176(3.0%)	784(13.2%)	960(16.2%)
	Addis Ababa	102(1.7%)	240(4.0%)	342(5.8%)
Women's heard FP on radio	Yes	1978(33.3%)	3697(62.3%)	5675(95.6%)
	No	169(2.8%)	93(1.6%)	262(4.4%)
Religion group of a woman	Orthodox	1559(26.3%)	1332(22.4%)	2891(48.7%)
	Catholic	25(.4%)	11(.2%)	36(.6%)
	Protestant	712(12.0%)	232(3.9%)	944(15.9%)
	Muslim	1532(25.8%)	489(8.2%)	2021(34.0%)
	Traditional	22(.4%)	3(.1%)	25(0.4%)
	Others	16(.3%)	4(.1%)	20(0.3%)
Women's heard FP on TV	Yes	662(11.2%)	1326(22.3%)	1988(33.5%)
	No	3204(54.0%)	745(12.5%)	3949(66.5%)
Number of living Children	No children	1853(31.2%)	1630(27.5%)	3483(58.7%)
	medium	1219(20.5%)	373(6.3%)	1592(26.8%)
	large	794(13.4%)	68(1.1%)	862(14.5%)

Women's health facility told FP	Yes	2591(43.7%)	1320(22.2%)	3911(65.9%)
	no	1271(21.4%)	751(12.7%)	2022(34.1%)
Marital status	Never in union	453(7.6%)	634(10.7%)	1087(18.3%)
	Married	3030(51.1%)	1151(19.4%)	4181(70.4%)
	Living with partner	42(.7%)	64(1.1%)	106(1.8%)
	Widowed	73(1.2%)	47(.8%)	120(2.0%)
	Divorced	218(3.7%)	121(2.0%)	339(5.7%)
	No longer living together/separated	50(.8%)	52(.9%)	102(1.7%)

The highest percentage (14.3%) of women used method of FP was observed in the age group 26-36 followed by the age group 15-25(13.4%) and the lowest percentage (7.2%) of women used method of FP was observed in the age group Above 36.

The proportion of FP practice among women differed by place of residence. Among the women who resided in urban areas, 30.4 % used FP method. Among rural women, 4.5 percent practiced FP method and 53.4 percent did not use any method of FP. Thus the practice of FP was much higher among women who were residing in urban areas as compared to Women in rural area.

Moreover, women who lived in different regions had different status of FP practice. The highest proportion (13.2%) of women who practice FP was observed in Dire Dawa followed by Tigray 4.4 percent and the least proportion (0.5%) of women's who practice FP was observed in Benshangul-Gumuz region, followed by SNNP region (0.9%). There appeared to be some region wise variation in the proportion of women's FP practice.

The percentage of women who practiced used method FP methods was higher among those women who were followers of Orthodox (26.3%) followed by Muslim (25.8%). The lowest percentage (0.3%) of FP practice was observed among women who were followers of others religion.

With regard to the number of living children, the highest percentage (27.5 percent) of FP was practiced among those women who had no children followed by those women who had medium (less or equal to five) number of living children (6.3%). Moreover, the least proportion

(1.1%) of women's FP practice were women who had large (greater than five) number of children.

Women who were heard radio, 62.3 percent practiced FP and 33.3 percent did not practice FP. The other type of mass media which women were exposed was TV. Women who heard TV, 22.3% used FP and 11.2%) did not use any FP methods.

The highest proportion of marital status 70.4 percent women used FP were married followed by 18.3 percent never in union and the lowest 1.7 percent were no longer living together/separated followed by 1.8 percent of Living with partner.

Table 4.2. Chi-square test of independency

Variable	Chi-square	df	P-value
Age of a woman	14.673	4	0.005
Place of Residence	2.643E3	1	0.000
Women's heard FP on TV	1.332E3	1	0.000
Women heard FP on radio	0.045	1	0.831
Region	1.715	10	0.000
Religion group of a woman	3.132E2	5	0.000
Number of living children	5.862E2	2	0.000
Women's health facility told FP	6.743	1	0.009
Marital status	4.057E2	5	0.000

Hypothesis test:

H₀: There is no significant association between response and explanatory variables.

H₁: There is a significant association between response and explanatory variables.

From table 4.2 variables which had p-value of Pearson chi-square less than $\alpha=0.05$ were considered to have significant association with status of FP practice, where as variables which had p-value of Pearson chi-square greater than a value of $\alpha=0.05$ had no significant association with Status of FP practice. Accordingly, women heard FP on radio had not significant association with status of FP practice.

The rest variables such as age of a women, marital status, place of residence, region, religion group, number of living children, women’s health facility told FP, and women’s heard FP on TV had a significant association with status of FP practice.

4.2. Inferential statistics

Table 4.3. Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step 1 Step	3943.438	28	.000
Block	3943.438	28	.000
Model	3943.438	28	.000

$H_0: \beta_j=0$ (the independent variables could not predict status of FP practice)

$H_1: \beta_j \neq 0$ (at least one independent variable can predict status of FP practice)

The results show that the model with explanatory variables does better at predicting the response variable, and is statistically significant at $p = 0.00 < .05$. The Omnibus Test gives a Chi-Square of 3943.438 with 28 df, significant beyond 0.05. This is a test of the null hypothesis that adding explanatory variables to the model has not significantly increased our ability to predict the decisions made by our subjects. Since the omnibus test is significant we can conclude that adding the explanatory variables to the model has significantly increased our ability to predict the women status of FP made by our subject.

Table 4.4. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	3725.094	0.486	0.669

From table 4.4 we had seen that in model summary we see that the value of -2 Log Likelihood statistics is 3725.094. Nagelkerke R Square .669(66.9%) give a rough estimate of the variance that can be predicted from the combination of the independent variables. From this Nagelkerke R Square is greater than 50% it is enough to say large. This shows how better the model predicts the response variable. The value of Cox & Snell R square and Nagelkerke R square are good enough.

Table 4.5. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	14.343	8	0.073

Since the p-value (0.073) is greater than $\alpha=0.05$ the statistical level of significance and it implies that fail to reject the null hypothesis (Ho). So we conclude that the model is a good fitted model.

Table 4.6. Classification Table

Observed		Predicted		
		Status of family planning	percentage	
		Women not used any method	Women used method	
Status of family planning	Women not used any method	3471	390	89.9
	Women used method	435	1633	79.0
Overall percentage				86.1

The above table 4.6 is a classification table for the response variable based on how well the model does with only the constant-only model, the predictive power of the logistic regression is perfect for those respondents who are “Women not used any method “with 3471 subjects correctly classified, but not good for those “Women used method”. For those 1633 subjects, the constant-only logistic regression correctly classified 79.0% of them. The overall classification for the model is equal to $1633/3471=47.04\%$. What this means is that the model doesn’t do a good job at classifying subjects, which actually is expected at this stage of the analysis since we only have the constant term included in the model. That is, we have yet to use more predictors to aid in classification and to sharpen our predictive power.

Table 4.7. Estimates, standard errors, Wald, degree of freedom, p-values, estimated odds-ratio

		B	SE.	Wald	D f	Sig.	Exp(β)	95% C.I. Exp(β)	
								lower	upper
Region	Afar(ref)								
	Amhara	-.301	.190	2.520	1	.112	.740	.510	1.073
	Oromia	.018	.219	.007	1	.934	1.018	.663	1.564
	Somali	-.791	.207	14.647	1	.000	.453	.302	.680
	Benshg1	-.533	.204	6.857	1	.009	.587	.394	.874
	SNNPR	1.033	.277	13.907	1	.000	.356	.207	.613
	Gambela	1.207	.245	24.210	1	.000	.299	.185	.484
	Harari	-.934	.225	17.206	1	.000	.393	.253	.611
	Addis Ababa	-.514	.206	6.238	1	.013	.598	.400	.895
	Dire Dawa	1.590	.227	48.864	1	.000	4.902	3.139	7.655
	Tigray	.160	.164	.949	1	.330	1.174	.850	1.619
Place of residence	Rural(ref)								
	Urban	2.914	.110	696.690	1	.000	18.426	14.841	22.876
religion	Orthodox(ref)								
	Catholic	.918	3.273	3.273	1	.070	5.262	.871	31.799
	Protestant	1.077	1.083	1.083	1	.298	3.065	.372	25.283
	Muslim	.921	2.262	2.262	1	.133	3.993	.657	24.259
	Traditional	.921	1.347	1.347	1	.246	2.912	.479	17.703
Other	1.282	2.037	2.037	1	.153	6.233	.505	76.902	
Heard radio(1)	Yes(ref)								
	No	-.082	.201	.166	1	.684	.921	.621	1.367
Women heard TV	Yes (ref)								
	No	-2.16	.095	516.073	1	.000	.115	.096	.139
Planned at health facility	No(ref)								
	Yes	-1.45	.095	2.314	1	.128	.128	.718	1.043
Marital status	Never in union(ref)								
	Married	.709	.340	4.364	1	.037	1.045	1.045	3.954

	Living with partner	.469	.330	2.017	1	.156	1.598	.837	3.051
	Widowed	.787	.433	3.307	1	.069	2.196	.941	5.125
	Divorced	.647	.429	2.283	1	.131	1.911	.825	4.425
	separated	.125	.363	.119	1	.730	1.133	.557	2.308
Women age	15-25(ref)								
	26-36	-.320	.152	4.419	1	.036	.726	.539	.979
	>36	-.110	.128	.733	1	.392	.896	.697	1.152
no. children	No children (ref)								
	medium	1.07	.198	28.054	1	.000	2.850	1.934	4.199
	large	.509	.186	7.449	1	.006	1.664	1.154	2.398
Constant		-2.99	1.014	8.739	1	.003	.050		

Table 4.7 contains the estimated coefficients (under the column heading β) and estimated values of the logistic regression model that predict FP practice. The standard error of the estimates (under the column heading S.E) will help in computing the Wald Statistics. The Wald statistic, which is the square of the ratio of the coefficient to its Standard error, has a chi-square distribution with one degree of freedom.

Women who resided in the Somali region were 0.453 times less likely to practice family planning when compared with those residing in Afar controlling for other variables in the model (OR=.453). Women who lived in Benshgul-Gumuz, SNNP, Gambela, Harar, and Addis Ababa regions were 0.587, 0.356, 0.299, 0.393, 0.598 times less likely to practice family planning compared to women in Afar controlling for other variables in the model (OR=0.59, 0.34, 0.3, 0.4, and 0.6) respectively. Conversely women who lived in Dire Dawa and Tigray region were 4.902 and 1.174 times more likely to practice family planning when compared with those residing in Afar region controlling for other variables in the model (OR=4.9 and 1.2) respectively.

Women who resided in urban area were 18.426 times more likely to practice family planning when compared with those residing in rural area controlling for other variables in the model (OR=18.4).

Women who not heard TV on family planning practice were 0.115 times less likely to practice FP compared who were heard controlling for other variables in the model (OR=0.12).

Women who were married were 1.045 times more likely to practice FP when compared with those Never in union controlling for other variables in the model(OR=1.05).

The model revealed that women in the age group of 26-36 were 0.726 times less likely to practice FP when we compare with the age group of 15-25 controlling for other variables in the model(OR=0.73).

The women who had medium and large number of children were 2.850 and 1.664 times more likely to practice FP when we compare with women who had no children controlling for other variables in the model(OR=2.9 and 1.7) respectively.

Discussion

This study is an attempt to identify some determinants of women's family planning practice based on Ethiopian Demographic and Health Survey (EDHS 2016) data. A total of 5937 women aged above 15 years were chosen from the main sample in the EDHS. Accordingly descriptive analysis, chi-square test of independency and binary logistic regression finding of results, this study made a few comparative discussions as follows.

The model revealed that women in the age group of 26-36 were 0.726 times less likely to practice FP when we compare with the age group of 15-25 controlling for other variables in the model(OR=0.73). The prominent reason for this finding might be women at the older age of reproduction and they might have perceived not to be at risk of pregnancy (Anna and Nassoro, 2006).

Marital status is one of the factors that had significant association with FP in this study. Women who were married are 1.045 times more likely to practice FP when compared with those never in union controlling for other variables in the model(OR=1.05).

The study also revealed that FP practice and number of living children are significantly associated. Women who had medium and large were more likely to practice family planning to women who had no children (OR=2.850& 1.664) respectively. This finding is in line with study results by Assefa and Fikrewold (2011) for the SNNP which identified that Women with living children are significantly more likely to practice FP than women with no living

children. Similar findings were obtained in Barman, 2013; Kumar& Singh, 2013 and Laya, 2012.

Similarly, place of residence is a significant factor contributing to practicing family planning. Women who resided in the urban areas were more likely to practice family planning as compared with those from the rural areas (OR=18.426). The explanation for this could be easier accessibility of family planning services in cities, the desire for more children in rural areas, and the greater education in urban areas. Studies elsewhere revealed a similar pattern of relationship between residence and FP practice (Kebede, 2006).

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The descriptive results showed that 65.1% of the respondents (women) in the study did not practice family planning methods and the rest 34.9% used FP method.

Among the factors that affect the FP on reproductive age women the predictors region, place of residence, Women heard TV before selected survey, marital status, age, and numbers of children were found to have significant association with family planning practice of women in Ethiopia.

5.2. Recommendation

Based on the findings the following are recommended in order to increase women's FP practice:

- The government should give more attention to improve the practice of FP to those regions with low rates of practice like SNNP and Benshangul-Gumuz regions.
- Since women not exposed to FP information in any way were less likely to practice FP the government and non-government organization involved with FP should enhance information and communication activities regarding family planning services using mass media, family planning workers and health centers.
- Since there are variations in women's family planning practice based on residence the government should give more emphasis to improve the FP service delivery in rural areas.

5.3. Limitation of the study

The data used here being secondary may have a number of limitations on the outcome of the study but the major limitation of this study was important variables such as economic status of women, educational level, quality of service delivered etc are not included in the analysis of this study because of missing values and non responses.

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