# DETERMINANTS OF HIGH FERTILITY STATUS AMONG MARRIED WOMEN: A CASE CONTROL STUDY

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# DEDICATION

This work is dedicated to my lovely family, specially my wife Edilawet Amtataw and all their dedicated partnership for the success of my life**.**

## STATEMENT OF THE AUTHOR

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# ABBREVIATIONS

| | |
|---|---|
| CEB | Child Ever Born |
| CPR | Contraceptive Prevalence Rate |
| DHS | Demographic and Health Survey |
| EDHS | Ethiopian Demographic and Health Survey |
| HIV/AIDS | Human Immune –Deficiency Virus /Acquired Immune Deficiency Syndrome |
| KDS-HRC | Kersa Demographic Surveillance and Health Research Center |
| KDSS | Kersa Demographic Surveillance System |
| MMR | Maternal Mortality Rate |
| OR | Odds Ratio |
| PA | Peasant Association |
| PI | Principal Investigator |
| PPS | Probability Proportional to Size |
| SAS | Statistical Analysis System |
| SPSS | Statistical Package for Social Sciences |
| TFR | Total Fertility Rate |
| WFS | World Fertility Survey |

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# ABSTRACT

Fertility is an important component of population dynamics which plays a major role in the size and structure of a given population. Uncontrolled fertility has adversely influenced the socio-economic, demographic and environmental development of the country. Ethiopia is one of the most populous countries in Africa, which suffers from direct and indirect population problems. The TFR is 5.4 children per woman and under five mortality rates 123 per 1000 live births.

This study aimed at identifying the determinants of high fertility status among married woman in kersa district using un mach case control study design. Where the cases are women with number of children ever born alive greater or equal to five (high fertility) and controls are women with number of children ever born alive less than five (low fertility). This study was conducted in KDS_HRC field site. There were 127 and 508 women in the high and low fertile groups, respectively selected using simple random sampling method. Backward logistic regression techniques were used to analyze the data. The mean number of children per women in the high fertile group was 7.25 and while it was 2.83 in the low fertile group. Under-five mortality affected number of children ever born alive significantly (Adjusted OR= 634, 95% CI: (3.43,11.73). Age at first birth, Number of children desired before marriage and desire more additional children currently were the other variables that showed significant associations with the level of fertility. Measures taken to decrease under-five mortality are believed to decrease fertility status besides promoting child survival with expanding interventions to reduce the high under-five mortality rate through child health services, is recommended.

# 1. INTRODUCTION

## 1.1. Background

The demographic pattern of developing countries is characterized by the co-existence of high fertility and high infant, and child mortality (Yohannes *et al.,* 2004). Fertility is one of the elements in population dynamics that has significantly contributed to changing the population size and structure over time.

Over 60% of all women and girls in the world live in countries where their status is poor to extremely poor. These 1.4 billion women live under conditions that threaten their health. Their poor status compromises their health in many ways. In many cultures early marriage and child bearing are the norm. Early child bearing and high parity increase the woman's chance of complications in child bearing. Pregnancies are most dangerous for women who are too young (less than 18 years), have too many births (more than four) and do not want another pregnancy and may resort to unsafe abortion (John Hopkins University, 1988). Studies in a number of countries indicated that wherever fertility is high, maternal, and infant and child mortality rates are high. Fetal deaths, low birth weight at birth and related problems are also associated with unregulated fertility. High maternal and under five mortality are also associated with such reproductive practices as short birth intervals, pregnancies in women under age of 20 and above the age of 35 years. The fertility rate is the highest in sub-Saharan Africa than many parts of the world, mainly due to strong kinship networks and high economic and social values attached to children (Hinde and Mturi, 2000).

Ethiopia is one of the most populous countries in Africa next to Nigeria, which suffers from direct and indirect population problems (Aynalem, 2010). Uncontrolled fertility has adversely influenced the socio-economic, demographic and environmental development of the country. Poverty, war and famine, associated with low levels of education and health, a weak infrastructure, and low agricultural and industrial production have exacerbated the problem of overpopulation (Ezra, 2001).

The demographic significance of Ethiopian population growth on the African continent is substantial. The country is one of the largest and poorest that even in the midst of crisis, have maintained high levels of fertility (Short and Kiros, 2002). Its population has increased nearly seven times from 11.8 million at the beginning of the $20^{th}$ century to about 80 million in 2007.

The estimated annual rate of growth and doubling period was 2.7% and 26 years respectively (MOH, 2007).

The use of contraception in Ethiopia is tripled in the fifteen year period between 1990 and 2005 from five percent to 15 percent for currently married women. But more than half of currently married women who were not using any family planning method at the time of the survey say they intend to use a method in the future (CSA, 2006). The maternal mortality ratio (MMR) of the country was 871 and 673 per 100,000 live births in 2000 and 2005, respectively. Similarly the infant and under-five mortality rates were 77 and 123 per 1000 live births in 2005 (CSA, 2006).

The Oromia Regional State where the present study was undertaken is not an exception. Oromia represents the largest regional state of the country. The CSA estimate of 28,067,000 (35.4%) people for July 2008 indicates that its population size is also the largest and 353,690 (32%) square kilometers land area of a country (Aynalem, 2010). The high plateaus of the region have been tremendously affected by uncontrolled population growth throughout the ages. The potential health service coverage and utilization of the region is about 70.5% and 27% respectively. Around 3.7% of women deliver at health care facilities, while over 95% of them deliver at home. The infant, and under-five mortality rate is 76 and 122 per 1000 live births respectively (WHO EHA, 2007). According to 2005 EDHS, the total fertility rate and contraceptive prevalence rate of the region were 6.2 and 13.6 %, respectively (CSA, 2006).

The women in Kersa district were found to be at a disadvantaged position compared with the male counterparts mainly due to their low social status that results from a lack of access to family resources, education, occupation and decision-making power (FAO, 2004).

### 1.2. Statement of the problems

As high fertility is associated with increased obstetric and medical risks of mothers, in order to reduce fertility and control population growth of the country, the factors that influence fertility should be clearly identified (Zhang, 2007). Experience of fertility transition countries also emphasizes the role of its determinant in fertility change (Angeles, 2008). Human fertility is a function of a variety of factors. The factor varies from place to place, depending on the specific conditions of the given area (Lindstrom and Kiros, 2001; Yohannes et *al.,* 2004). Early marriage, especially in the peak fertility age 20-29 places many women at a high risk of pregnancy which translates into high fertility rates. Because in this age group breastfeeding duration and duration of postpartum amenorrhea shorter than older women and less effective in contraceptive use (Jimma university,et.al.,2003). Adolescent fertility also known as teenage fertility refers to women could have given more than two live births before the age of 20 years and who did not breastfeed, as well as did not use family planning. The earliest age reported at first birth was 12 years of age (Tewodros *et al.,* 2010).

A proper understanding of these factors are of paramount importance in tackling the problem of uncontrolled fertility, which paves the way for the improvement of the prevailing socio-economic problems of the country. Particularly, it would have a substantial contribution in the improvement of the health status of women and children. It is plausible that they may be related to each other.

### 1.3. Rationality and Implication of the Study

The fertility level of Ethiopia especially in the rural area is unacceptably high. The higher the fertility of women, the more the risk associated with each birth. The reproductive role on top of the productive role of woman put her in a poor social and economic status. In developing country like Ethiopia, pregnancy and child birth is 18 times more likely to end in the woman's death than in developed countries (John Hopkins University, 1999). Understanding the factors responsible for the fertility level would help in designing strategies to effectively implement any program to tackle uncontrolled fertility and in raising the status of women. Identifying, factors responsible for fertility levels in the *Kersa* district would imply identifying factors in other similar settings of the country and important in detecting relevant variables of interest for intervention. For the above point out reasons undertaking a study at the district level which try to cover as many differential factors as possible would be important.

**Research question**: Why do some married women having more children than others?

### 1.4. Objectives

***General objective:***

1. To identify the determinants of high fertility status among married woman in Kersa district

***Specific objective:***

1. Describe the level of fertility among the specific group of married women,
2. Identify factors that influence high fertility status of married women in the Kersa district.

# 2. LITERATURE REVIEW

## 2.1. Overview of Fertility Situation

The global population was about 5.4 billion in 2007 and 6.8 billion in 2009 with 5.6 billion (82% of the world total) living in the less developed regions (UN, 2009). The population of the more developed regions remained largely unchanged at 1.2 billion inhabitants. Three least developed countries including Bangladesh, Ethiopia and the Democratic Republic of the Congo were among the ten most populous countries in the world. Thus, whereas the population of more developed regions was rising at an annual rate of 0.34 per cent, that of the less developed regions was increasing four times as fast, 1.37 per cent annually, and the least developed countries as a group were experiencing even more rapid population growth, at 2.3 per cent per year (UN, 2009).

The average total fertility rate for sub-Saharan Africa as a whole is more than five children per women, which is almost twice the world average of 2.5 (PRB, 2011). More developed regions have fertility levels below replacement; whereas, least developing regions have five or above five children per women (UN, 2009).

Niger has the highest total fertility rate (TFR) in Africa and in the world. The total fertility rate was 7.4 children per woman. Girls who marry at a young age face the health risks that accompany adolescent childbearing. In Niger more than 70 percent of girls in their early 20s had married before 18, and in any single year, one in seven girls ages 15 to 19 has given birth (PRB, 2011). Under-five mortality had reached 82 deaths per 1,000 births in South-Central Asia, but it was still as high as 148 deaths per 1,000 births in sub-Saharan Africa (UN, 2009). In developing countries each year, an estimated 585,000 women die from complication of pregnancy, child birth and unsafe abortion. That comes to about one death every minute. Pregnancy related complications cause one quarter to one half of deaths among women of reproductive age in developing countries (John Hopkins University*,* 1999).

The Ethiopian Demographic and Health Surveys (EDHS) report reveals that the total fertility rates (TFRs) of 2000 and 2005 was 5.5 and 5.4 respectively. Overall, utilization of health services remains low for a number of reasons, including limitations in the services and delivery capacities available, as well as the affordability and quality of the services (WHO, 2009). As maternal deaths related to child-bearing is unacceptably very high in our country, knowing the factors affecting the fertility levels of women at the individual and community levels in the rural context of Ethiopia where the majority of women reside would help greatly in averting deaths related to high fertility and thereby raising the status of women at large.

## 2.2. Determinants of Fertility

There are two groups of factors that affect fertility. The first group consists of socio-economic and demographic factors, which are characterized as indirect determinants. The second direct factor known to be the intermediate determinants are the biological, reproductive and behavioral/attitude factors through which the indirect determinants must eat to affect fertility (Henry, 2006).

Fertility differences among populations and trends in fertility over time can always be traced to variations in one or more of the intermediate fertility variables. Educational attainment has, in general, a depressing effect on fertility through the adoption of small family norms, knowledge and use of contraceptives, and later ages at first union and birth.

It is generally believed that high infant and under-five mortality causes high fertility through the insurance and replacement effect. The "insurance effect" assumes that the couples adjust their fertility because they expect some of their children to die. "Child replacement effect" involves a deliberate decision of couples to make up for the lost children and is based on the fat their previous child bearing (Gyimah, 2001). Analysis using data from rural Ethiopia supports child/infant mortality had a significant positive effect on the number of children ever born. An increase in the number of children who have died raises the probability of attaining higher fertility (Yohannes *et al.,* 2004). Similar results in South Africa were also found in the study of Dust (2005), in which he illustrated that under-five mortality had a significant positive effect on fertility status. That is, an increase in the under-five mortality rate increases fertility significantly. As the number of children who died increased, women were exposed to a higher risk of uncontrolled fertility (Ramesh A., 2010)

The relationship between fertility and under-five mortality is complex. Bhalotra and Soest (2005) focus on the biological relation between fertility and child mortality in India. The neonatal death of a child shortens the interval unit to the next birth because parents want to quickly replace the lost child and /or because shortened post-partum amenorrhea. Women who experienced a child death were more likely to have shorter subsequent birth intervals comparing to those who did not have such experience (Hossain *et al*., 2005; LeGrand *et al*., 2005).

In investigating the impact of survival child on fertility, Doepke (2004) used the Barro-Becker Model and found that a decline in child mortality significantly reduced fertility. When the number of survival child increased, the fertility level correspondingly decreased (Getu A. and Alemayehu W.,2008).

The relationship between education attainment of parents and level of fertility generally noted in surveys of sub-Saharan African countries and other parts of the world has been an inverse one. Groups with high educational attainments (either husband or wife) have lower fertility than low educational groups (Dejene, 2000; Vilaysook, 2009**).** Education can affect birth rate through a number of channels including changes in the level of contraceptive knowledge, desire for children and economic productivity. Educated women are more likely to postpone marriage, have smaller families and use contraception more than uneducated women. The educational level of the parents (wife or husbands) influences access to modern knowledge and new ways of life. In addition, education tends to break down barriers to communication about family planning between spouse*s* (Derebssa, 2002). Similarly it has important implications in raising family planning discussion like the use of contraception, which ultimately reduces the fertility level and helps to reach the replacement level of fertility with their husbands. Woman's education, directly and indirectly influences contraceptive use (Azhar and Pasha, 2008).

The husband's desire for more children, a preference for the sex of the next child, and the women's poor education attainment remain the main barriers to contraceptive use in Pakistan (Saleem and Pasha, 2008). In a similar study in Awassa by Samson and Mulugeta (2009), educational status of women was mainly found to be associated with high fertility, even after adjustment for other basic socio-demographic variables. Mothers with educational status of above primary school had less risk of having 5 or more child ever born. Those mothers below primary school not showed a significant difference with illiterate mothers in their level of fertility.

It has been proposed that in the developing country, the negative relationship between women's employment and fertility level is only present when higher status occupations of the urban sectors are considered (Agadanian, 2000). The relationship between women's participation in the paid labor force and their fertility and contraceptive behavior is commonly conceptualized in two ways. The first main perspective emphasizes the opportunity cost of child bearing, focusing on how the prospect for career development and higher income may depress the women's fertility. The second perspective centers on the work child care conflict, postulating that the less flexible the women's work schedule and arrangements are the more difficult it is for her to provide adequate care for her children. Therefore she more likely tries to limit her fertility (Agadanian, 2000; Yohannes *et al.,* 2003). Beguy (2009) examined the impact of female employment on fertility in Dakar (Senegal) and Lome (Togo) and found that women in both places who were employed had a longer birth interval than those who were unemployed, especially those who worked outside their homes . Another study confirmed that unemployed women were more likely to have higher pregnant frequency than employed women (Banerjee , 2004).

Women who lived in the urban area were more likely to use contraceptives than those who lived in rural areas. The fertility levels in urban and rural areas tend to be different (Boupha *et al.,* 2005). A longitudinal study of Nepal's fertility trend based on the Demographic Health Survey in 1996 and 2001 illustrated that the estimates of TFR and fertility level of women in the urban area were lower than women who lived in the rural area, because of differences in contraceptive use (Retherford and Thapa, 2003).

Religion continues to be associated with variations in the intermediate variables contraceptive because large differences by religion remain in contraceptive choice (CSA, 2006). Traditionally one of the indisputable generalizations in demography has been that Orthodox Christians have higher fertility rates than the Muslim (Yohannes *et al.,* 2003).

Income affects fertility through its effect on child survival which in turn affects maternal mortality, environmental contamination, nutritional status, personal illness, and controlling the use of medical services .The 2005 EDHS showed that Ethiopian women in the lowest wealth quintile have twice as many children as those in the highest wealth quintile. The fact that "….84 percent of women in the lowest quintile have no education compared with 38 percent in the highest quintile" shows the obvious fact that wealth and education go hand-in-hand and, together, make the biggest fertility impact. It is no wonder, then that the wealthy countries of the world have low fertility while most African countries plagued by poverty and illiteracy have, as a group, the highest fertility in the world (CSA, 2006). The lower the income levels the higher the child mortality. Higher child mortality is followed by a higher fertility in individuals (Dust K., 2005).

Fertility is said to be affected by ethnicity. In various ethnic groups, the proximate and remote determinants of fertility do not operate by the same route. The observed difference in fertility and its determinants can be understood in the wider context of the inequalities and differences in socio cultural and economic position. Ethnicity as fertility differential acting through patterns of postpartum abstinence which intern is affected by education , urbanization ,changes in marriage and religions tradition ,they tend to have a lower rate of contraceptive use due to their limited knowledge of birth control (Vilaysook, 2009).

The age at first marriage has a major effect on child bearing because women who marry early have on average a longer period of exposure to pregnancy and a greater number of life time births (CSA, 2006)**.** In a study on differentials of fertility in Awassa, the age at first marriage was significantly associated with the level of fertility, the age at first sexual intercourse and the age at first birth (Samson and Mulugeta, 2009). Marriage is a leading social and demographic indicator of the exposure of women to the risk of pregnancy, especially in the case of low levels of contraceptive use, and, therefore, is important for an understanding of fertility. Women who marry early, for example at age fifteen, have roughly twice as many years of productivity as those marrying at age 30. But their productivity is more than twice that of those marrying age 30. This is because even though those marrying at 30 expose themselves to pregnancy half as many years as those marrying at age 15, their reproductive years are not as productive as the 15 years between age 15 and 30 due to reduced fecundity (biological potential to reproduce). In Ethiopia, the median age at marriage among women aged 25 – 49 was 16.1 years, and 79 percent of them were already married by age 20 and 49% were married at age 18 (CSA, 2006; Henry, 2006). Woman who live in urban areas and completed lower secondary school tended to have a higher age at first marriage than those who lived in the rural area and had lower education (Boupha *et al*., 2005).

In general, a woman's age is a significant factor involved with the probability for her to get pregnant. Increasing infertility with age is a well-documented and very apparent problem in modern society. The longer women wait to have children, the higher the chance is for them to have fertility problems due to the quality of the eggs and other related issues (Vilaysook, 2009).

Contraceptive use is another substantial proximate factor affecting fertility among countries. At the same time, culture and socio-economic condition have significant roles in the use of contraceptive method. By and large, it is found that an increase in contraceptive prevalence rates is consistent with an increase in the proportion of woman who needs to avoid pregnancy, which then leads to a decrease in fertility (Feyisetan, 2000). The prevalence of use of contraceptive methods increases with the increase in the number of living children as well as education level of the respondent (Sajid *et al.,* 2005; Azhar and Pasha, 2008). Similarly this association was also found in rural Tanzania where the number of living children and education were the main factors in use of contraception (Marchant *et al*., 2004). This was also found in Nepal where the sex preference was an important barrier to the increase of contraceptive use and the decline of fertility in the country (Tiziana *et al*., 2003)**.**

According to Kwame Boadu (2002) the fertility behavior in Ghana is influenced by a multitude of socio-demographic and economic, and cultural factors. These factors, in turn, affect contraceptive practice in a variety of ways. The outcome of the analysis appears to support the view that knowledge of, and contraceptive adoption is gradually making an impact on fertility behavior in Ghana. Every use and current use of contraceptives is not significantly associated with the level of fertility (Fantahun *et.al*, 2001; Getu A. and Alemayehu W., 2008; Samson and Mulugeta, 2009).

It is well known that breast-feeding is the major factor influencing the duration of postpartum infertility. The inhibitory mechanism by which breast-feeding acts to delay ovulation was not fully understood, but there is evidence that both the frequency and the duration of suckling play an important role (Hadia *et al.*, 2009). Similar studies conclude that the fertility-inhibiting effect of postpartum infecundity resulting from prolonged breast-feeding is by far the most important proximate determinant of fertility. The duration of breast-feeding showed a significant difference between the two fertility profiles .Those mothers with prolonged breast-feeding showed a lower fertility status (Yohannes *et al*., 2004).

The inhibiting effects of breast-feeding on fecundity, particularly during the first twelve months after a birth, are well established. In the absence of breast-feeding the postpartum amenorrhea period is about two months. Prolonged breast-feeding can extend the amenorrhea period for up to 19 months or more (Berhanu and Hogan, 1998). Even after the return of menstruation, breast-feeding can continue to depress a woman's fecundity. The death of breast-fed infant prematurely ends lactation that shortens the length of the postpartum amenorrhea period. In non-contraception populations, the early return of menstruation contributes to a higher risk of conception, and thus a shorter than normal birth interval. It is more pronounced in societies such as those of sub-Saharan Africa with prolonged breastfeeding practice and low contraceptive usage (Gyimah ,2001).

Abortion is a significant proximate determinant of fertility. Guillaume (2003) stated that abortion significantly attributes to fertility reduction in many countries, particularly where the contraceptive use remained low and women expressed their demand to control fertility. The study of Sogner (2003) found that abortion was a significant factor that influenced fertility decline. It affects the women's decision to use contraception. However, in societies where abortion is illegal, the information on abortion is very difficult to obtain. Therefore, the impact of abortion on fertility reduction may not be explicit.

A family size norm plays an important role in defining fertility behavior. In countries where family size preferences are below fertility levels, successful implementations of reproductive goals readily lead to fertility decline. It can be argued that the differential between the desired family size and actual family can be attributed to the socio-economic status. The desire to have lower children usually precedes the actual decline in fertility (Ramesh A., 2010). A strong preference of one sex can be a constraint on fertility decline if a couple that achieved their preferred family size continues to bear child until they achieve their desired number of sons or daughters. Reasons parents give for their son/daughters preferences include the continuity of the "house". Some of the reasons stated for desiring more children are that children are wealth, a source of help in old age, that they may or may not grow, and honors etc (Yohannes *et al*., 2003).

### Conceptual Framework on Determinants of High Fertility Status

The conceptual framework of the study that deals with the determinants of high fertility status is showed in figure1. The selected socio-economic and demographic factors in the model list the proximate determinant variables. These factors can also determine high fertility of married women. This conceptual framework is constructed based on the literature.

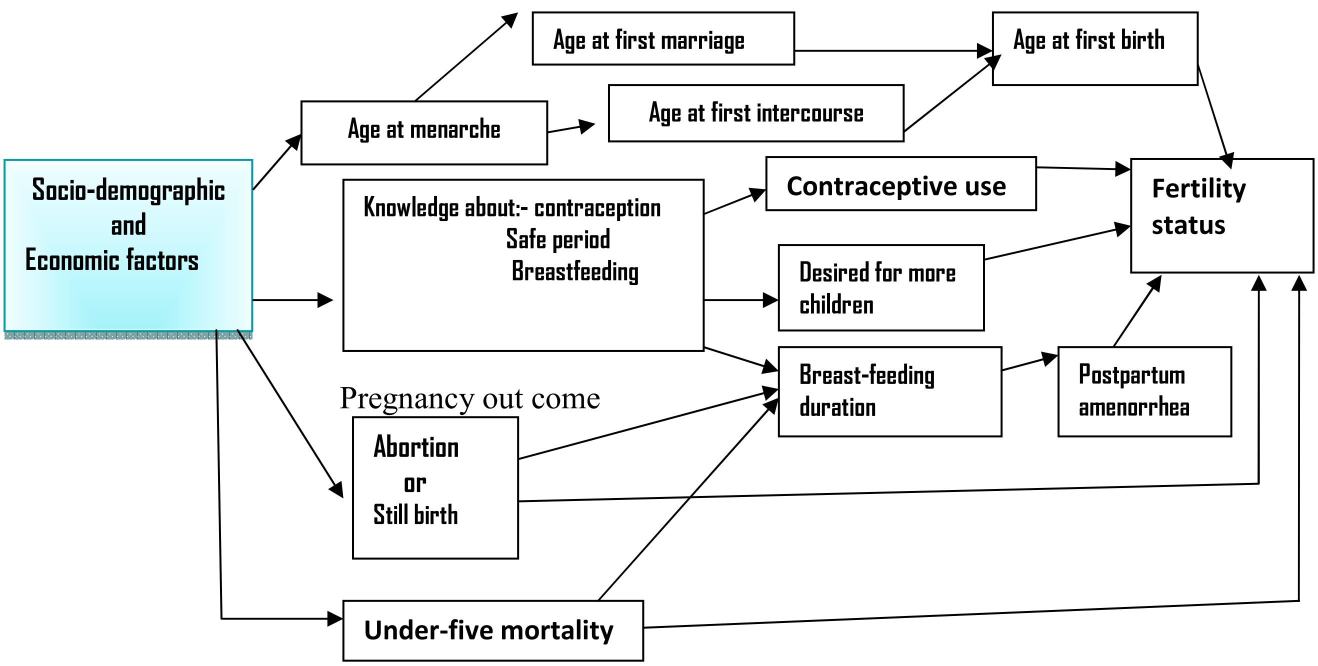



Figure 1: Conceptual framework on determinants of high fertility status.

# 3. METHODOLOGY

## 3.1. Study Area and Period

This study was conducted in the Kersa Demographic Surveillance and Health Research Center field site in 2011. The district is administratively located in, Kersa woreda, Eastern Hararge, Oromia Regional State, Eastern Ethiopia which is located 44 km from Harar and 482kms east of Addis Ababa. Based on figures published by the Central Statistical Agency in 2005 EDHS the total population of the Woreda is estimated to be 169,330 with 82,537 (48.7 %) males and 86,793 (51.3 %) females. From the total population, 7.21 percent are urban dwellers (CSA, 2006). The district is organized to in 38 Peasant Associations (PAs) and three of them are urban. The major ethnic group is Oromo. It has three climatic zones with the altitude ranging from 1400 to 3200 meters above sea level. The woreda has two health centers in Weter and Kersa town seven clinic/health posts and eight private pharmacies. Health coverage of the Woreda is 56% (KDS-HRC, 2007).

The surveillance site was established in September 2007 with the aim of tracking demographic changes as death, birth, migration and marital status change. The surveillance activities further extended by adding surveys in nutrition, reproductive health, environmental health, HIV/AIDS, morbidity/health seeking behavior and health care utilization during the month of January-March 2008. Surveillance activity was instituted in 12 Kebeles (the smallest administrative unit in Ethiopia with approximate population Size of 4-5 thousand) based on the population proportion to size, attitude (climatic zone) accessibility service and urban, and rural composition. Two of the Kebeles are urban and the remaining ten are rural Kebeles (KDS-HRC, 2007; Haramaya and Brown University, 2009).

According to the first census of KDS-HRC in September 2007, there were 10,256 households and 48,192 people in the study site with an average household size of 4.7(4.8 rural and 4.2 urban). The population structure of this study area is broad-based distribution that includes 15.6% of under-five children, 51.6% of active age group (15-64 years of age) while the dependent (<15 and>64 years of population) comprise 48.4%. The pre-reproductive age group (<15 years) is 46.5% indicting a potential of high fertility in the future. Females of child bearing age account for 26% (12,526) of the total population.

In the study area the crude birth and death rates were 29.1 and 11.9 per 1000 population. Infant and under five mortality rates were 44.9 and 108.2 per 1000 live births respectively (KDS-HRC, 2007**).**

### 3.2. Study Design

The study design is a case-control, where the cases are women with number of children ever born alive (CEB) greater or equal to 5 (high fertility). Controls are women with number of children ever born a live (CEB) less than 5 (low fertility).

### 3.3. Populations

#### 3.3.1. Source Population

All women who are married in Kersa Demographic Surveillance and Health Research Center field site.

#### 3.3.2. Study Population

The study populations are women who are married and aged from 20 to 49 years. The study subjects are selected from the KDSS data base. This group of women would be taken for this particular study by taking account of the fact that women in the Oromia region are married at an early age and could have more than four children before they celebrate their twenty-fifth birthday (CSA, 2006). The minimum age was therefore set at 20 to give an equal chance for both the high and low fertile groups.

**Inclusion criteria:** Women, aged 20-49 and who are married for 5 years and above.
**Exclusion criteria:** Women, mentally ill, or not hearing or not speaking.

### 3.4. Sample Size Determination

Sample size was calculated with the following assumption:

| Prevalenc | OR | α | β | $N_1$ | $N_2$ |
|---|---|---|---|---|---|
| **50%** | **2.0** | **0.05** | **0.1** | **121** | **484** |
| | 1.50 | >> | >> | 255 | 102<br>0 |
| | 1.85 | >> | >> | 116 | 464 |
| | 3.0 | >> | >> | 41 | 164 |

As the investigation was unmatched case –control study, different sample sizes were calculated by taking account of the major determinant factors and using the STATCALC program of the EPI INFO statistical package. In this regard, a minimum detectable OR (Odds Ratio) of 2, a 5% level of significance (two-sided), a power of 90% and a four to one allocation ratio of low fertile group to high fertile group (4:1) were assumed. An additional 5 percent was also added for non response. This was done to increase the precision by reducing the sampling error. The prevalence of important factors to be studied (proportion of married women who are experience of under-five mortality among the low fertile women) assumed 50%. Since there is no published study about the determinants of high fertility status among married women with the same age group. Based on the above assumptions, we took the total sample size of 635 with 127 for high and 508 for low fertility is logistically possible and reasonably large enough.

### 3.5. Sampling Technique

This study was comprised of 12 Kebeles in the research field site. The probability proportional to the size method was employed for determining the number of households to be included from each of the 12 Kebeles. Identified number of case and controls proportionally each kebele and also the sample size was distributed over the 12 Kebeles proportional to the size of the households existing in each Kebele. Study subject was proportionally allocated to each kebele and selected by using simple random sampling techniques until the required sample size is fulfilled after selecting the first study subject at random among case and control group using SAS program. Cases were included in the study up on fulfillment of the case definition criteria for high fertility group. Controls were also being obtained based on the fulfillment of the control definition criteria for low fertility group. Four controls were included for one case from the selected kebeles. Homogeneity of control with cases was stuck to during selection as much as possible to ensure representativeness of the population from which they would have been drawn. The initial interviewed household was randomly selected by lottery system from the kebele house number register, using number between 1 and the sampling interval. In case of more than one woman in a given house hold a lottery method was employed to identify the women to be interviewed.

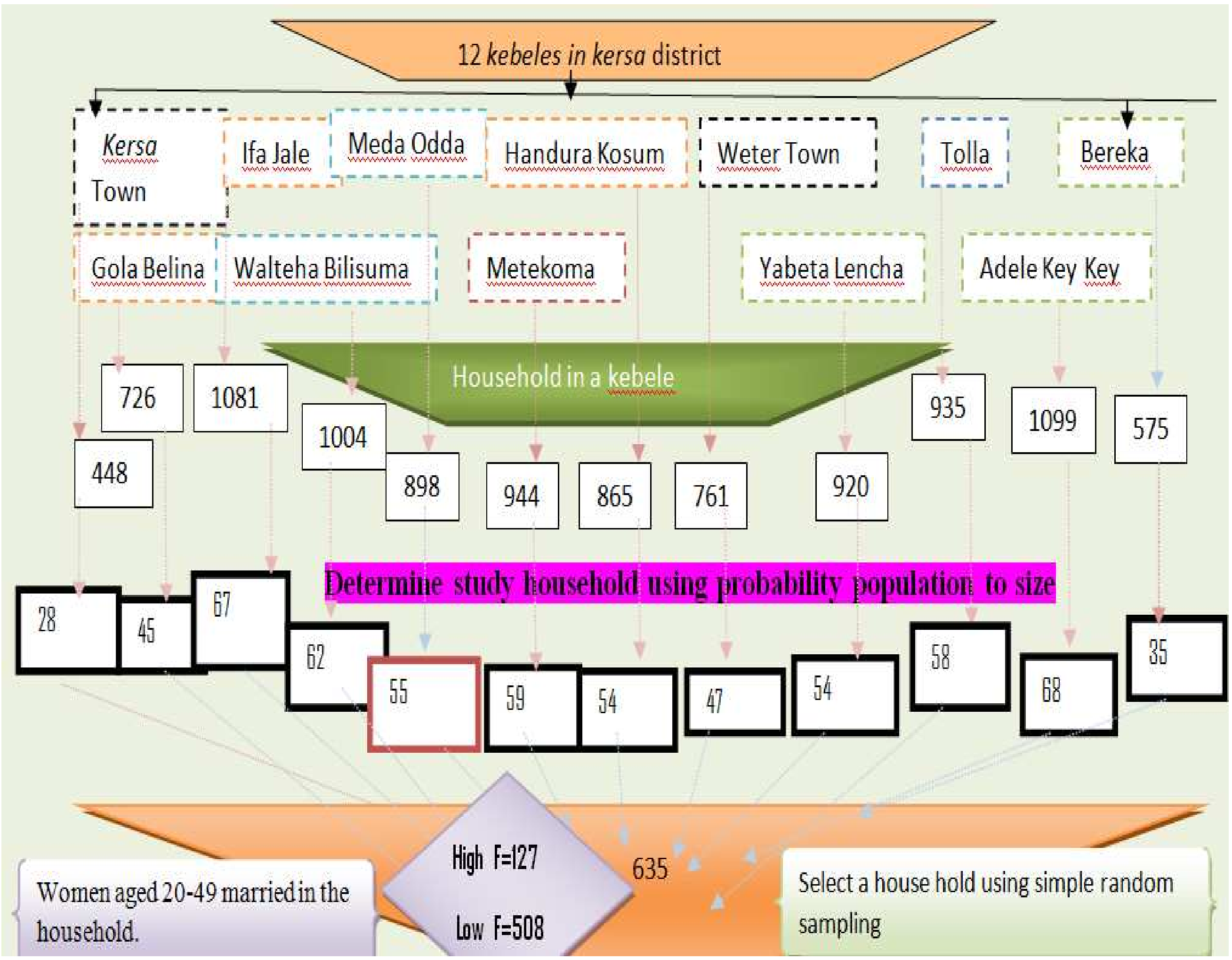



Fig 2: Schematic presentation of sampling technique

The study subjects who are women aged 20-49 were selected from the KDSS data base. Women in the specified age range and Kebeles were enrolled in to the study after cross checking their age.

### 3.6. Data Collection Procedures

#### 3.6.1. Data collection instrument

The questionnaire was adapted from Ethiopia Demographic Health Survey (EDHS) and World Fertility Survey (WFS), English version. The questionnaire was further developed by using peer reviewed published literatures to include determinants of high fertility status. The English version questionnaire translated into oromiffaa language. The oromiffaa language version again translated back in to English, and comparisons were made on the consistency of the two versions. Different domains were included in the questionnaire including the respondent's background, reproductive health and contraceptive information. The questionnaire was further modified after a pretest was conducted.

#### 3.6.2. Pretesting

A pretest was conducted in a rural village adjacent to the study area called Dengego. Each interviewer was administered 5 questionnaires and a total of 60 questionnaires were administered. On a number of questions additional response categories were added based on the pretest findings. Repetitive ideas and ambiguous questions were corrected.

#### 3.6.3. Data Collection

The data collectors were recruited from the KDS-HRC. The data collectors who are the employees of the study area had prior training on data collection and have worked in the study base for about four years. Training was given to the data collectors by the principal investigator on the methods of data collection with respect to the study for two days. There were 12 data collectors and three supervisors out of which 6 were females with reliability check of 1 in 50 households. Incomplete questionnaires were filled by callbacks while on the fieldwork. In fact, the data collectors were informed about the strict supervision and the cross-checking procedure that would take place during data collection. The principal investigator was supervising the overall activities.

### 3.7. Variable and Operational Definition

#### 3.7.1. Variables

Dependent Variable: Fertility status, which is categorized as low when CEB alive is less than 5 and high when CEB alive is greater or equal to 5.

Independent Variables:

- Socio-economic and demographic variables: income, education level, place of residency, religion, ethnicity and women occupation.
- Reproductive variables: Age at first marriage, age at first birth, age at last birth and contraceptive use.
- Biological variables: Duration of breast-feeding, duration of post-partum amenorrhea, history of still birth or abortion experience.
- Sexual variable: Age at first coitus.
- Knowledge /attitude variable: Knowledge about contraception (knowledge about the existence of services and where the service is given, knowledge about the safe period for coitus and desired number of children.
- Under-five mortality.

#### 3.7.2. Operational Definitions of Variables

Fertility status measured by a number of children ever born (CEB) alive: It is categorized as low fertility when CEB alive is< 5 and high fertility when CEB alive is ≥5. The cutoff point of 5 is taken because the medical and obstetric risk for mothers with a number of CEB greater or equal to 5 is significantly higher compared with those with less than 5 (Yohannes *et al.*, 2004). It is also based on the population policy of Ethiopia which aims to have less than five children per women a low fertility, and greater or equal to five children per women as high fertility (NPPE, 1993).

Under-five mortality: Deaths among children <5 years for any case of death (infant and child death include)

### 3.8. Data Quality Assurance

To assure the quality of data, different mechanisms were used. The following measures were undertaken including pre-testing of the questionnaire with 10% sample size of the households that are not included in the actual study population (not part of KDS-HRC) before the actual data collection takes place. Correction on the instrument was done accordingly. The final version of the questionnaire was translated into the local language of the respondents (oromiffaa language) and used for the data collection. A total of two days of intensive training on how to administer the data collection process was given for all data collectors during the process of data collection. Three field supervisors were assigned to four villages and the principal investigator performs the immediate supervision on a daily basis. They were checking each and every completed questionnaire and visiting a randomly selected 5% of households each day and ensure the reliability of the collected data. Incomplete questionnaires were filled by making re-visits while on fieldwork. The overall activity was monitored by the principal investigators. Using data entry software Epi Info version 3.51 was used for double data entry.

### 3.9. Data Processing

The data template format was prepared in EPI Info version 3.51 and the data were entered using double data entry clerks. The completeness of the data was checked. Errors related to inconsistency were verified using data cleansing method. The data were exported to SPSS version 16, and SAS version 9.2 using stat transfer software version 9 in recorded, categorized and sorted to facilitate its analysis.

### 3.10. Methods of Statistical Analysis

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 16 and Statistical Analysis System (SAS) version 9.2. Descriptive analysis was used to describe the percentages and number distributions of the respondents by socio-demographic characteristics. Furthermore, logistic regression, specifically bivariate and multivariable analysis, was used to identify factors that affect high fertility level through controlled factors and confounding. The unadjusted (crude) and adjusted odds ratios together with their corresponding 95% confidence intervals were computed. A P-value $\leq 0.05$ was considered statistically significant in this study. Efforts were made to assess whether the necessary assumptions for the application of multiple logistic regression were fulfilled. In this regard, the Hosmer and Lemeshow's goodness-of-fit test and Omnibus tests of model coefficients considered. This statistic is computed as the Pearson chi-square from the contingency table of observed frequencies and expected frequencies. A good fit as measured by Hosmer and Lemeshow's test will yield a large P-value. It should be checked the interaction effect. If interactions are included, then the significance of the interaction should be measured and reported. We believe that covariate is an effect modifier only when the interaction term added to the model is both clinically meaningful and statistically significant.

### Logistic Regression

Logistic regression is useful for situations in which you want to be able to predict the presence or absence of a characteristic or outcome based on values of a set of predictor variables. Logistic regression allows one to predict a discrete outcome, such as group membership, from a set of predictor variables that may be continuous, discrete, dichotomous, or a mix of any of these. Generally, the dependent or response variable is dichotomous (binary), such as presence or absence / success or failure/ binary logistic regression is used. There are two main uses of logistic regression: Firstly, to predict the group membership, since logistic regression calculates the probability of success over the probability of failure. Logistic regression coefficients can be used to estimate odds ratios for each of the independent variables in the model. Secondly, logistic regression also provides knowledge of the relationships and strengths among the variables.

### Model Description

The dependent variable in binary logistic regression is usually dichotomous, that is, the dependent variable can take the value 1 with probability of success Pi or the value 0 with probability of failure 1-Pi. The model for logistic regression analysis assumes that the outcome variable Y is categorical. The logistic model is defined as follows. Let $Y_{nx1}$ be a dichotomous outcome random variable with categories 0 (low fertility) and 1(high fertility). Let $X$ (k+1) $_{nx1}$ denote the collection of k-predicator variables of Y, where:

$$X = \begin{bmatrix} 1 & X_{11} & X_{12} & X_{13} . & . & . & X_{1k} \\ 1 & X_{21} & X_{22} & X_{23} . & . & . & X_{2k} \\ . & . & . & . & . & . & . \\ 1 & X_{n1} & X_{n2} & . & . & . & X_{nk} \end{bmatrix}$$

**X** is called regression matrix and without the loading column of $1^s$ is termed as predictor data matrix. Then, the conditional probability that a women fertility status is high fertility given **X** is denoted by Prob (Yi =1/Xi) =Pi. The expression Pi has the form:

$$\text{Pi} = \frac{e^{\beta 0+\beta 1Xi1+\cdots....+\beta kXik}}{1+e^{\beta 0+\beta 1Xi1+\cdots....+\beta kXik}} = \frac{e^{X\beta}}{1+e^{X\beta}} = \frac{1}{1+e^{-X\beta}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(1)$$

Pi = the probability of women fertility i being high fertile

$Y_i$ = the observed low fertility status of women i

$\beta'$ = ($\beta_0$, $\beta_1$,...., $\beta_\kappa$) is a vector of unknown coefficients. The model given in (1) is logistic regression modal. The relationship between the predictor and response variables is not a linear function; instead, the logarithmic transformation of equation yields the linear relationship between the predictor and response variables. The logit transformation of Pi given as follows:

$$\text{logit(Pi)} = \log\left(\frac{Pi}{1-Pi}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{i2} + \ldots\ldots + \beta_k X_{ik} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

**Assumptions in the Logistic Regression Model**

- 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 logit regression equation should have a linear relationship with the logit form of the dependent variable.

- Absence of multicollinearity. As with multiple regressions, multicolinearity is a potential source of confusing or misleading results and needs to be assessed. Multicolinearity occurs when there are high inter correlations among some set of predictor variables.
- Logistic regression requires large sample to guarantee higher level of accuracy.

**Selection of Predictor Variables**

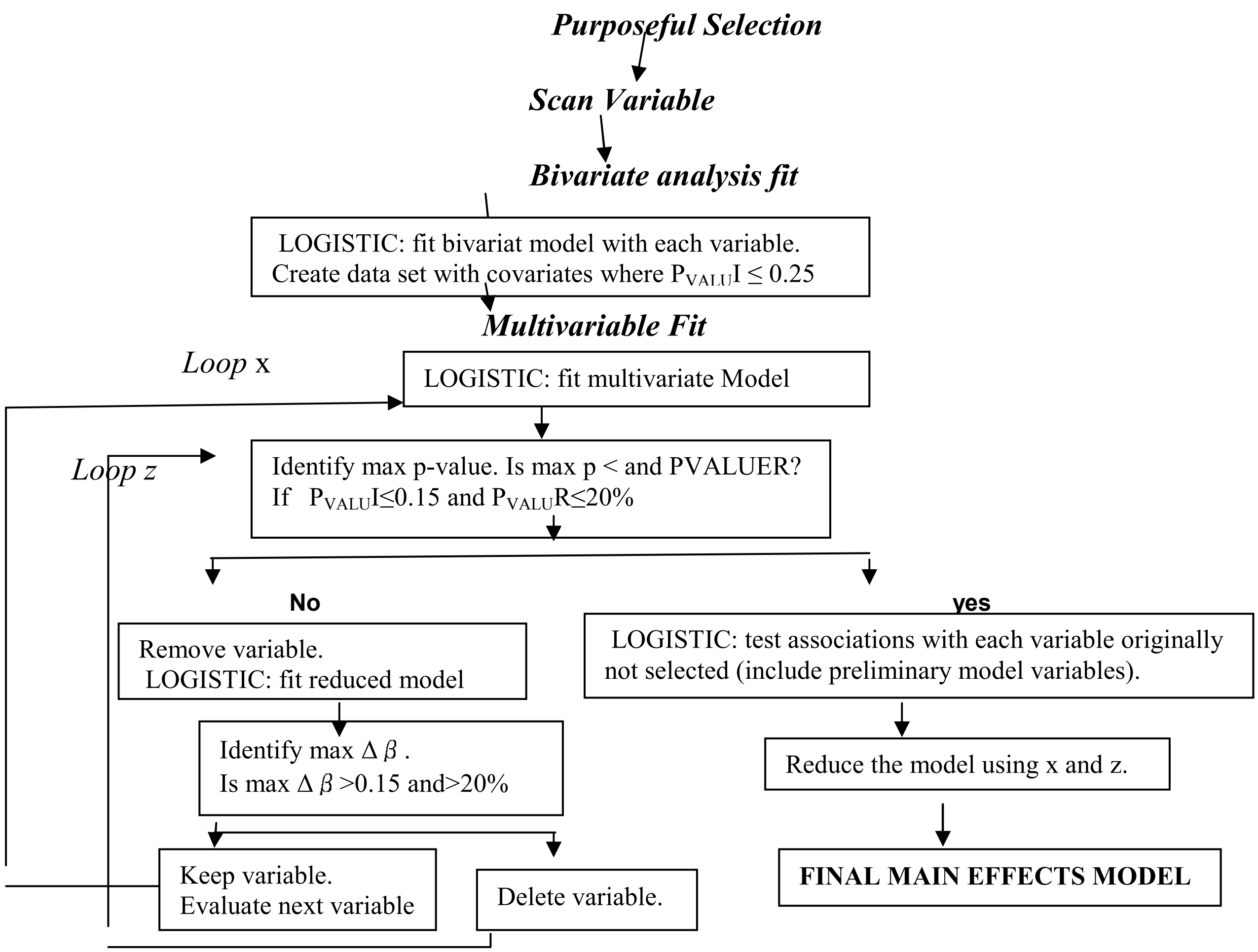
The criteria for including a variable in a model may vary from one problem to the next and from one scientific discipline to another. The traditional approach to statistical model building involves seeking the most parsimonious model that still explains the data. Epidemiological methodologies suggested regardless of their "statistical significant". The rational for this approach is to provide as complete control confounding as possible within the given data set. This is based on the fact that it is possible for individual variables not to exhibit strong confounding, but when taken collectively, considerable confounding can present in the data (Hosmer, D. and Lemeshow, S. 2001)

Upon the completion of the bivariate analysis, we select variables for the multivariable analysis. Any variable whose bivariate test has a p-value $\leq 0.25$ is a candidate for multivariable model along with all variables of known clinically importance .Once the variable have been identified, we begin with a model containing all of the selected variables. Our recommendation is that 0.25 levels be used as screening criterion for variable selection is based on the work Zoran B, Heath G., D. Keith W. and David H. (2007) on logistic regression. The authors showed that the use of more traditional level (such as 0.05) often fail to identify variables known to be important.

The multivariable logistic regression analysis which controls the undesirable effects of confounding factors using backward stepwise procedures for selection or deletion of variables from the model is based on a statistical algorithms that checks the "important" of variables, and either includes or excludes them on the basis of a fixed decision rule .The "importance" of a variable is defined in terms of a measure of the statistical significance of the coefficient of the variable. The crucial aspect of using stepwise logistic regression is the choice of an "alpha" level to judge the importance of variable in term of probability of entry and removal. The choice of probability of entry and remove to determines how many variables eventually are included in the model and were to minimal level continued contribution to the model remove respectively. Choosing the value of probability of entry and removal in the range 0.15 up to 0.2 is highly recommended and confounding at 20% change; these parameters can be directly controlled by the analyst, based on more recent result of Lee and Koval (1997) to examine the issue of significant level for forward stepwise logistic regression. They were eliminated one at a time because they were not significant in the multivariable model at the alpha level of 0.15 and when taken out, did not change any remaining parameter estimates by more than 20%.

**Fitting procedures**

The variable included in the model by automatic procedures (back ward logistic regressions)




**Fitting procedures flowchart (**Zoran B et.al, 2007)

## Assessment of the Fitting Logistic Regression Model

After estimating the coefficients, there are several steps involved in assessing the appropriateness, adequacy and usefulness of the model. First, the importance of each of the explanatory variables was assessed by carrying out statistical tests of the significance of the coefficients. Then the overall goodness of fit of the model was tested. Additionally, the ability of the model to discriminate between the two groups defined by the response variable was evaluated (Bewick and Jonathan, 2005).

### Likelihood-Ratio Test

Likelihood-ratio test is widely used approach to testing the significance of a number of explanatory variables. This is appropriate for a variety of types of statistical models. Agresti (1996) argues that the likelihood ratio test is better, particularly if the sample size is small or the parameters are many. The likelihood-ratio test uses the ratio of the maximized value of the likelihood function for the full model ($L_1$) over the maximized value of the likelihood function for the simpler model ($L_0$). The likelihood-ratio test Deviance statistic equals:

$$-2\log\left(\frac{L_0}{L_1}\right) = -2[\log(L_0 - L_1)] = -2(LL_0 - LL_1)$$

This log transformation of the likelihood functions yields a chi-squared statistic when n- (k+1) is large.

### Goodness of Fit of the Model

The goodness of fit of a model measures how well the model describes the response variable. Assessing goodness of fit involves investigating how close values predicted by the model with that of observed values (Bewick and Jonathan, 2005). The comparison of observed to predicted values using the likelihood function is based on the statistic called deviance.The purposes of assessing the significance of an independent variable, the values of D are compared with and without that particular independent variable in the equation: $X^2$=D (model without variable)-D (model with variable). The goodness-of-fit $X^2$ process evaluates predictors that are eliminated from the full model, or predictors (and their interactions) that are added to a smaller model. In general, the question in comparing models is whether the log-likelihood decreases or increases significantly with the addition or deletion of predictor(s).

### The Hosmer-Lemeshow Test

Another measure of model fit is the Hosmer-Lemeshow goodness-of-fit statistic, which measures the correspondence between the actual and predicted values of the dependent variable. The Hosmer-Lemeshow test is a commonly used test for assessing the goodness of fit of a model and allows for any number of explanatory variables, which may be continuous or categorical. The test is similar to a $X^2$ goodness of fit test and has the advantage of partitioning the observations into groups of approximately equal size, and therefore there are less likely to be groups with very low observed and expected frequencies. In this case, better model fit is indicated by a smaller difference in the observed and predicted classification or a large p-value (much larger than 0.05). (Hosmer and Lemeshow, 2001).

### $R^2$ -Statistic

A number of measures have been proposed in logistic regression as an analog to $R^2$ in multiple linear regressions. The Cox and Snell measure is based on log-likelihoods and considers sample size. The maximum value that the Cox and Snell $R^2$ attain is less than 1. The Nagelkerke $R^2$ is an adjusted version of the Cox and Snell $R^2$ and covers the full range from 0 to 1, and therefore it is often preferred. Therefore, in this study $R^2$ statistical test indicates how useful the explanatory variables in predicting the response variable were used (Bewick and Jonathan, 2005).

## 3.11. Ethical Considerations

The study protocol was approved by the College of Health Sciences School of Graduate Studies and by the Institutional Research Ethics Review Committee. Since we used the KDSS data base and Kersa Demographic Surveillance and Health Research Center field site, prior permission was also obtained from the program managers. Study subjects were told about the purpose of the study and verbally informed consent was secured. There was no potential hazard to the study subjects. The outcome of the study is expected to fill the gap on knowledge concerning differential of high fertility in Kersa District and in other similar settings and can serve as an entry point of intervention. In order to protect the confidentiality of the information, names and house numbers were not included the interviewer-administered questionnaire.

### 3.12. Strengths and Limitation of the Study

**Strengths**

- The study is done in the community, thus results can be generalizable to similar setting.
- To minimized selection bias, the study subjects selected from KDSS database.

**Limitations**

- Some of the events may be difficult to remember and hence the effect of recall bias may exist.
- Little overlap may occur between cases and controls in the distribution of the confounding variables and lead to bias estimation of odds ratio. As a result, unmatched case control study design was used.

### 3.13. Disseminations of the Result

The finding of this study will be disseminated to Haramaya University, KDSS office, Oromia Regional State Health Bureau in Kersa branch and NGO's working on a similar area with the copy of the research. Furthermore, the finding will be presented at appropriate seminars, conference and workshops, and also Publishing in a scientific journal will be considered.

# 4. RESULTS AND DISCUSSION

## 4.1. Results

### 4.1.1. Socio-Demographic and Economic Characteristics

A total of 127 women in the high fertile group (cases) and 508 women in low fertile group (controls) were included in this study. This study revealed the very fact that 17 (2.7%) of the responding women have (age 20 – 49years) had above secondary education. The mean number of children ever born (CEB) alive was 3.72 and for older women (40-49) who are nearing the end of their reproductive period to be 7.16 from parity of 0 to 12. It was learned from the present study that the mean number of children per woman in the high fertile group was 7.25 (median = 7.0) while it was 2.83 (median = 3.0) in the low fertile group. The corresponding standard deviations were also computed at 1.64 and 0.76 in the high and low fertile groups, respectively. The median age at first sex and marriage was 16.9 and 17.00 respectively.

Table1: Mean number of children ever born across basic Socio-demographic characteristics of respondents in kersa district eastern Ethiopia, 2011

| Exposure variables | Total (%) N=635 | Mean Child Ever Born<br>Pooled mean($\bar{X}_c$) | High fertile ($\bar{X}_H$) | Low fertile($\bar{X}_L$) |
|---|---|---|---|---|
| Educationalstatus(Husband | | | | |
| Cannot read and write | 340 (53.5%) | 3.93 | 7.32 | 2.87 |
| Read and write and above | 295 (46.5%) | 3.54 | 7.16 | 2.81 |
| Educational status(women) | | | | |
| Cannot read and write | 524(82.5%) | 3.82 | 7.18 | 2.89 |
| Read and write and above | 111(17.5%) | 3.42 | 8.00 | 2.61 |
| Place of residency | | | | |
| Urban | 62 (9.8%) | 3.56 | 7.58 | 2.60 |
| Rural | 573(90.2%) | 3.74 | 7.23 | 2.86 |
| Income /monthly | | | | |
| ≤280 | 115(18.1%) | 3.50 | 7.30 | 2.84 |
| 281-480 | 258(40.6%) | 3.59 | 7.33 | 2.79 |
| 481+ | 262(41.3%) | 3.95 | 7.20 | 2.88 |

Although religion, ethnicity and women's occupation are expected to have relation with the outcome variables children ever born alive, the situation in this study showed that the greater majority of respondent women aged 20-49 were Oromo (96.4%), their religion was Muslim (96.1%), their occupational status was housewives (97.5%). In such a case it does not make sense to include these three covariates in further analysis. Therefore, these covariates were discarded (exclude) from further analysis.

### 4.1.2. Determinant of high fertility status

As can be noted from the result of the bivariate analyses (Tables 2 and 3), six of the eighteen variables did not show a significant association with high fertility level at a 5% level of significance. In this regard, place of residence, amenorrhea period (last birth), duration of breast feeding (last birth), ever use of contraceptive and knowledge about contraceptive used were not significant at a 0.25 level of significance and were excluded from further analyses. In fact, the corresponding P-values for each of these variables were greater than 0.25. One predictor variable (knowledge about fertile period between menstrual cycles) which fulfilled the minimum requirement for further assessment were considered and removed the redundancy variables like age at first sex; Ethiopian women generally begin sexual intercourse at the time of their first marriage, and entered into the multivariable logistic regression model. Each of these predictor variables showed statistical significance at a 0.25 level of significance. Consequently, the multivariable logistic regression analysis which controls the adverse effects of confounding variables was used by taking all the twelve covariates (determinants of high fertility) into account simultaneously. The backward stepwise regression which controls the problem of multicollinearity was employed and only five of the most contributing factors remained to be significantly and independently associated with high fertility level and other two factors were weak associations for some covariates when controlling other variables (Table 4). The same findings were also obtained using the forward stepwise regression.

Table 2: Results of separately regressing fertility levels (high versus low) on each demographic and socio-economical and women's sexual behavior of explanatory variable in kersa district, Eastern Ethiopia, 2011

| Exposure variables | | Fertility level | | Bivariate analysis | |
|---|---|---|---|---|---|
| | | High n= 127 | Low n=508 | Crud OR with 95%CI | LR Sig. |
| Educational status(their husband) | | | | | |
| Cannot read and write [R] | | 82 | 258 | 1.00 | |
| Read and write and above | | 45 | 250 | 0.57 (0.38, 0.85) | 0.005* |
| Educational status(women) | | | | | |
| Cannot read and write [R] | | 114 | 410 | 1.00 | |
| Read and write and above | | 13 | 98 | 0.48 (0.26, 0.88) | 0.011* |
| Income /monthly | ≤280 [R] | 17 | 98 | 1.00 | |
| | 281-480 | 45 | 213 | 0.64 (0.42, 3.42) | 0.034* |
| | 481+ | 65 | 197 | 0.53 (0.29, 2.24) | |
| Place of residency | Urban [R] | 12 | 50 | 1.00 | |
| | Rural | 115 | 458 | 1.05 (0.54, 2.03) | 0.893 |
| Age at first marriage | <18 [R] | 97 | 323 | 1.00 | |
| | 18+ | 30 | 185 | 0.54 (0.35, 0.85) | 0.005* |
| Age at first coitus [r/s] | <18 [R] | 97 | 325 | 1.00 | |
| | 18+ | 30 | 183 | 0.55 (0.35, 0.86) | 0.007* |
| Age at first birth | <19 [R] | 95 | 284 | 1.00 | |
| | 19+ | 32 | 224 | 0.43 (0.28, 0.66) | 0.000* |
| Age at last birth | ≤30 [R] | 44 | 474 | 1.00 | |
| | 31+ | 83 | 34 | 26.30 (15.88, 43.56) | 0.000* |
| Post partum amenorrhea (last birth/m) | | | | | |
| | < 6 [R] | 13 | 59 | 1.00 | 0.884 |
| | 6-10 | 26 | 104 | 1.14 (0.54, 2.37) | |
| | 11-15 | 49 | 174 | 1.28 (0.65, 2.52) | |
| | 15+ | 31 | 141 | 0.99 (0.49, 2.04) | |
| | Don't know | 8 | 30 | 1.21 (0.45, 3.24) | |
| Duration of breast feeding (last birth/m) | 0-6 [R] | 4 | 24 | 1.00 | 0.880 |
| | 7-12 | 25 | 100 | 1.50 (0.48, 4.72) | |
| | 13-18 | 11 | 46 | 1.44 (0.41, 4.99) | |
| | 19+ | 87 | 336 | 1.55 (0.53, 4.59) | |
| | Don't know | 0 | 2 | - - - | |

**In bivariate analysis significant association (p≤0.25), R set as reference, -2 L $L_o$: 635.51, (Null model by intercept only), **r/s** redundancy variables.*

Table 3: Results of separately regressing fertility levels (high versus low) on each explanatory variables relating to women's reproductive knowledge/ attitude, use of contraceptives, pregnancy outcome and under-five mortality in kersa district, Eastern Ethiopia, 2011

| Exposure variables | Fertility level | | Bivariate analysis | |
|---|---|---|---|---|
| | High n=127 | Low n=508 | Crud OR with 95%CI | LR Sig. |
| Contraceptive use (ever) | | | | |
| No | 76 | 292 | 1.10 (0.74, 1.64) | 0.627 |
| Yes [R] | 51 | 216 | 1.00 | |
| Have you ever heard of Contraception | | | | |
| No | 8 | 20 | 1.64 (0.71,3.82) | 0.267 |
| Yes [R] | 119 | 488 | 1.00 | |
| Do you know fertile period(b/n cycle ) | | | | |
| No | 99 | 365 | 1.39 (0.87,2.20) | 0.159* |
| Yes [R] | 28 | 143 | 1.00 | |
| Desire more children (before marriage) | | | | |
| <5 [R] | 6 | 87 | 1.00 | 0.001* |
| ≥5 | 74 | 261 | 4.11 (1.73, 9.78) | |
| As God give | 34 | 109 | 4.52 (1.82, 11.26) | |
| Don't know | 13 | 51 | 3.70 (1.32,10.32) | |
| Do you want additional children (current | | | | |
| No [R] | 93 | 78 | 1.00 | |
| Yes | 34 | 430 | 0.07 (0.04,0.11) | 0.000* |
| Your husband need Additional children/current | | | | |
| No [R] | 89 | 94 | 1.00 | |
| Yes | 38 | 414 | 0.10 (0.06,0.15) | 0.000* |
| History of abortion or still birth experience | | | | |
| Yes | 17 | 32 | 2.30 (1.23, 4.29) | 0.012* |
| No [R] | 110 | 476 | 1.00 | |
| History of un-5 mortality | | | | |
| No [R] | 33 | 382 | 1.00 | |
| Yes | 94 | 126 | 8.64 (5.54,13.47) | 0.000* |

**In bivariate analysis significant association (p≤0.25), R set as reference. -2 L $L_o$: 635.51, (Null model by intercept only)*

The majority of the variables which showed significant associations with the level of fertility in the bivariate analyses could not persist in having such associations in the multivariable analyses. These variables were: age at first marriage, educational status of women, monthly income, history of abortion or still birth experience and knowledge of women about the fertile period between the menstrual cycles.

In multivariable analysis only five variables have over all significant effect on women fertility level at 5% level of significant. The other two selected variable have affected to fertility level at probability of removal $p<0.2$ form the model significantly. The simplest way to assess Wald test is to take the significance values and if less than 0.05 rejects the null hypothesis as the variable does make a significant contribution. In this case, we note that all selected variables contributed significantly to the prediction of p-value, which is less than level of significant at $\alpha=0.05$. Their husband educational status and desired more additional children turned out to be marginally significant $p=0.19$ and 0.074 in multi variable analysis respectively. There was some evidence at α-value of 0.2 (choice of removal variables from the mode). This multivariable analysis result indicates weak associations for some covariates when controlling other variables.

The level of statistical significance would dictate that their husband educational status and needs additional children suppose to be deleted from the model. On consultation with our colleagues we were advised that, their husband educational status and needs additional children are an important controlling variable of fertility status. Thus on the basis of subject matter considerations we keep their husband educational status and needs additional children in the model (Table, 4). We can interpret exp (bˆ) in terms of the change in odds to which raising the corresponding measure by one unit influences. If the value exceeds 1 then the odds of success occurring increase (high fertile group); if the value is less than 1, any increase in the predictor variables leads to a drop in the odds of the success occurring (high fertile group)

Accordingly, age at first and last birth was shown a significant association on the fertility status of women in the study area. Women who can give a child early(less than 19 years) 64% times more likely to have a high fertile as compared to mothers age at first give birth at or above 19 years with adjusted OR=0.36, 95% CI (0.18, 0.68). The difference in the number of children ever born alive between the women age at last birth less than or at 30 years and greater or equal to 31 years is significant with adjusted OR of 13.62 and 95% CI (7.02, 26.44).

The number of children desire before marriage showed a significant association in the number of children ever born alive. The women desires five and above children more likely to have high risk of uncontrolled fertility, with the adjusted odds of 6.22 (p=0.003). The desired for additional more children currently showed a significant difference in the number of children ever born alive with adjusted OR 0.23 and 95% CI (0.08, 0.61).

The history of under-five mortality was found to have a very high association with an increased number of children. As the number of under-five children who had died increased, there appeared in increasing trend in the number of children ever born alive ($X^2$ for trend=32.345, df=3, p=0.000). Mothers who had lost under-five children were about 6.34 times more likely have resulted in high fertility with 95% CI (3.43, 11.73).

Efforts were made to assess whether the necessary assumptions for the application of multiple logistic regression were fulfilled, which is derived from the likelihood of observing the actual data under the assumption of that the model has been fitted is accurate.

The difference between –2 log likelihood for the best-fitted model and –2 log likelihood for the null model (in which all the coefficient values are set to zero in block 0) is distributed like chi square, with degrees of freedom equal to the number of predictors; this difference is the model chi-square that SPSS refers to. The difference between -2 log likelihood values for models with successive terms added also has chi-squared distribution. In the -2 log likelihood value for the null model or the restricted model and final model are 635.511 and 305.431, respectively.

In our case model chi-square has 6 degrees of freedom, a value of 330.080 and a probability of $P < 0.000$. This shows that the model has a poor fit with the model containing only constant and also final model has a good fit which indicating that the predictor variables do have a significant effect. Also, the result of a chi-square value shows highly significant at level of significance, $\alpha=0.05$ and the independent variables predict the dependent variable well and model is good fit model

The model summary provides some approximations of $R^2$ statistic in logistic regression. Cox and Snell's $R^2$ attempts to imitate multiple $R^2$ based on 'likelihood'. These "pseudo" $R^2$ estimates (0.405 and 0.641) indicate that approximately 40.5% 0r 64.1% of the variation in the dependent variable-fertility level (high and low) can be predicted from the linear combination of the covariate variables.

An alternative to model chi-square is the Hosmer-Lemeshow test which divides subjects in to 10 ordered groups of subjects and then compares the actual observed number in each group to the number predicted by the logistic regression model. The 10 ordered groups were created based on their estimated probability; those with estimated probability below 0.1 form one group, and so on, up to those with probability 0.9 to 1.0 the tenth group. Each of these categories is further divided into two groups based on the actual observed outcome variable (high fertile, low fertile). The expected frequencies for each of the cells were obtained from the model. A probability value was computed from the chi-square distribution with 6 degrees of freedom to test the fit of the logistic model. If the Hosmer-Lemeshow goodness-of-fit test statistic is greater than 0 .05, as we want for well fitting models, that is, well-fitting models show non-significance on the Hosmer Lemeshow goodness-of-fit test.

The Hosmer-Lemeshow statistic has chi-square value of 11.735 and a significance of 0.163 which means that Hosmer-Lemeshow test is not statistically significant and therefore our model is quite a good fit. Because p-valve exceeds level of significance ($\alpha$=0.05), that shows, there is no significant difference between the observed and predicted model values and hence the model fits the data well.

Rather than using a goodness-of-fit statistic, the screening test shows us, how many of the observed values of the fertility level (high and low) has been correctly predicted and focuses on error rates in classification. The overall accuracy of the model to predict subject's women fertility level, out of 635 sampled households included in the model 90.1% were correctly predicted. The independent/covariate variables were better at helping us predict who would low fertile 95.9% correct (specificity) than at who would take it 66.9% correct (sensitivity). A false positive would be predicting that the event would occur when, in fact, it did not and a false negative would be predicting that the event would not occur when, in fact, it did occur. Our decision rule predicted a decision to high fertile group 106 times and low fertility 529 times. This prediction was wrong 21 times, for a false positive rate of 19.8% and wrong 42 times, for a false negative rate of 7.93%.

Our main effect model contains five covariates, there is only one interaction (age at first birth by age at last birth) to enter in the model using 15% level of significant and none were removed at the 20 % level of significant. To explore this further we fit a model contain this interaction terms: age at first birth*age at last birth. In this model the likelihood ratio test for exclusion of the age at first birth*age at last birth interaction term is not significant. Thus we feel that this interaction term should not be included in the model. We present in Table 4 the results of fitting the model containing the main effect.

Apart from identifying the important contributing variables that affect fertility either positively or negatively, this study had also explored the conceived reasons why some women were in favor of a large number of children. Slightly three fourth of the responding subjects approved the advantages of having five or more children and their main reason for such mind-set was economically benefits might be obtained from a large number of children and also children's may or may not grow. Furthermore, the type of preference they had towards the sex of the first child and their response for such preferences was also examined. In this regard about 51.7% and 47.4% of the women were in favor of male and female children, respectively.

Table 4: Results from the multivariable analysis. Adjusted for significant variables (p≤0.25) in bivariate analysis in Kersa District, Eastern Ethiopia, 2011

| Exposure variables | Fertility level | | Multivariable Analysis | |
|---|---|---|---|---|
| | High n=127 | Low n=508 | Adjusted OR with 95% CI | LR Sig. |
| Educational status(their husband) | | | | |
| Cannot read and write R | 82 | 258 | 1.00 | 0.190 |
| Read and write and above | 45 | 250 | 0.66 (0.36,1.23) | |
| Age at first birth <19 R | 95 | 284 | 1.00 | |
| 19+ | 32 | 224 | 0.36 (0.18, 0.68) | <0.002* |
| Age at last birth | | | | |
| ≤30 R | 44 | 474 | 1.00 | |
| 31+ | 83 | 34 | 13.62(7.02, 26.44) | <0.000* |
| Desire more children (befo. marriage) | | | | |
| <5 R | 6 | 87 | 1.00 | <0.014** |
| ≥5 | 74 | 261 | 6.22 (1.86, 20.87) | 0.003 |
| As God give | 34 | 109 | 4.24 (1.18, 15.26) | 0.027 |
| Don't know | 13 | 51 | 2.44 (0.56, 10.68) | 0.238 |
| you want additional children (current | | | | |
| No R | 93 | 78 | 1.00 | |
| Yes | 34 | 430 | 0.23 (0.08, 0.61) | <0.003* |
| Your husband need Additional children/current | | | | |
| No R | 89 | 94 | 0.41 (0.16,1.09) | 0.074 |
| Yes | 38 | 414 | | |
| History of un-5 mortality | | | | |
| No R | 33 | 382 | 1.00 | <0.000* |
| Yes | 94 | 126 | 6.34 (3.43,11.73) | |
| No of under five mortality | | | | |
| 1 | 41 | 89 | | $X^2$_ trend= 32.345 P=0.000 |
| 2 | 27 | 26 | | |
| 3 | 9 | 5 | | |
| 4+ | 17 | 6 | | |

*R set as reference. -2 $LL_f$ : 305.431, p=0.000, * significant association only one category ** For variables having more than two categories, the overall significance is given by their corresponding P – values* ***N.B****. The combined contribution of the rest 5 variables was very minimal (P > 0.20). This justifies the dropping of these variables so as to have a more parsimonious model that works just as the full model.*

## 4.2. Discussion

In order to effectively tackle the unrestrained population growth and its associated problems in Ethiopia in general and in the present study areas in particular, there appears a need to investigate the contribution of a number of factors influencing high fertility. Accordingly, this study has attempted to look into differentials of fertility in a typical rural and urban set ups by incorporating as many risk factors as possible. By international standards the median age at marriage for those married women age 20-49 years of 17.0 in kersa is relatively young. This is earlier than that of the legal age at first marriage in Ethiopia. However, compared to Ethiopia as whole, women in kersa district tend to marry at slightly older ages and slightly similar to the region. The median age at first marriage for all of Ethiopia and oromia region is 16.5 and 17.1 respectively (Jimma university, *et.al*., 2003; CSA, 2006;Aynalem,2010). Marriage is also nearly universal among women in kersa district with only 0.2 percent or less of women age 30 and above never married.

The educational status of women and their husbands has showed a significantly negative effect on the number of children ever born alive. This was not true when the data were reanalyzed by adjusting for many other covariate variables. A similar finding was also reported in Rural Butajira, Ethiopia (Yohannes *et.al,* 2003). Other study showed that education has been considered as an index of socio-economic development and modernization used to convey new ideas in innovation-diffusion theory: an indicator of women's status (Derebessa, 2002). Those educated women's have lower fertility compared with those uneducated women (Dejene, 2000; Vilaysook, 2009).

Girls who resign schooling at the primary level would swiftly be overburdened by the existing rural cultures and get married. For example, in kersa wareda girl usually stop attending school at the primary level (FAO, 2004). This requires the development of an enabling condition that would reduce the number of female students who fail to continue their education due to one or another reason. In this regard, the Ethiopian education policy should encourage female students to continue at least the first cycle of their high school education besides improving the quality of the current primary education. It is to be noted that education is helpful not only to reduce uncontrolled fertility, but also to enhance many other developmental activities. Educated women's are more likely postpone marriage and breakdown barrier to communication about family planning between spouse (Boupha et.al, 2005; Saleem A. and G.R.pasha, 2008).

In those mothers who experienced under–five deaths the risk of having high fertility is increased. As the number of infant/ childe died increased women were exposed to high risk of having more and more uncontrolled fertility. This requires a determined effort in reducing under-five mortality by putting in place strong measures, such as, vaccination, provision of safe water, maternal education, practice and perception of mothers on severity of common illness etc. Reducing infant and child mortality, apart from giving mothers (parents) confidence to limit the number of children they would like to have, will also increase the life expectancies of women to a greater extent. Moreover, women will have the opportunity to be occupied in many other activities that would eventually lead them to gain a greater empowerment. A similar finding was obtained in the Butajira study of Central Ethiopia and South and North Gonder (Yohannes *et al*., 2004; Getu A and Alemayehu W., 2008).

Other similar studies were those mothers who had experienced infant /child death more likely to have exposed to a high risk of uncontrolled fertility like South Africa (Dust, 2005), India (Bhalotra and Soest, 2005) and Nepal (Ramesh A., 2010). In India, the fear of under-five mortality and their own experience of the child /infant death tend to be increased the size of family, which the mothers considered to be replace the lost child. A study done in six rural Thana's of Bangladesh, Women who experienced childhood mortality was more likely to have shorter subsequent birth intervals comparing to those who did not have such experience. The death of an infant in an index birth interval and the death of a child immediately prior to the index interval elevate subsequent fertility (Hossain *et al*., 2005). High rate of under-five mortality is a contributing factor to a couple's decision to have more children.

Age at first birth has significant bearing on the number of children ever born alive. Age at first give birth is an important factor influencing fertility in countries like Ethiopia where level of contraception is very low. Those women who get married at early age exposed to an early sexual intercourse and early first give birth, which in turn leads to too many teen age pregnancies. A study undertaken in Ethiopia revealed a situation in which mothers with an earlier age at first birth are likely to end up in having many children (Tewdros *et al*., 2010). Apart from the negative impact it poses on women's health, this culture of early marriage has a greater likelihood of having a lot of children eventually.

Age at first marriage has significant effect of on the number of children ever born alive. This difference is not persisted after controlling the confounding factors. This is also contrary to other findings where age at first marriage highly a significant effect on fertility (Boupha *et al*., 2005; Henory, 2006). In the present study areas in particular, marriage is the hope of nearly all people. But age at first marriage has an important factor to control age at first birth. Since early marriage has a major effect of early child bearing, they tend to have a lower rate of contraceptive use due to their limited knowledge of birth control. Women who marry early have on average a longer period of exposure to pregnancy and a greater number of lifetime births.

In the present study, ever use of contraceptives did not appear to have a significant effect on fertility level. There was no enough evidence at 5% level of significance to reject the null hypothesis of no significant association between ever use of contraceptive and fertility level.
It could be that women adopt contraception when they reach or exceed the target number of children they would like to have. The majority of respondent are living in rural area and poor educational status. Since women's who live rural area and low education status directly or indirectly influence contraceptive use. Similar findings were documented in the Gondar (Fantahun *et.al*, 2001; Getu A and Alemayehu W., 2008), Butajira (Yohannes *et al*., 2004) and Awassa (Samson and Mulugeta, 2009). In contrary studies where the use of contraception is significantly higher like Tanzania (Marchant, 2004), Pakistan (Sajid, 2005; Azhar and G.H, 2008), the fertility declining effect of contraception is significant.

The number of children desire before marriage and more children currently showed a significant association in the number of children ever born alive. This is analogous to other studies where the desire to have lower children usually precedes the actual decline in fertility (Ramesh A., 2010). This finding is in disagreement with other similar study in Butajira (Yohannes *et al*., 2003). A case control study, differentials of Fertility in rural Butajira, Ethiopia, where desired number of children before marriage and need additional more children insignificant effect on fertility level. The insignificant association observed in butajira may be due to the fact that the study was done in old age (30-49 years) women were desire additional child is relatively more common and also difficult to remember desired children before marriage at this age group (recall bias). In our study those respondents age 20-49 need additional children is young age group, childhood mortality experienced, less income, uneducated and less attitude about use family planning and her occupation was house wife. This is similar to other study (Short E.S *et.al*, 2002; Yohannes D., 2009).

# 5. SUMMARY AND CONCLUSIONS

## 5.1. Summary

The study was conducted with the overall objective: to identify determinants of high fertility status among married woman in Kersa district. Therefore, this study attempts to identify the fertility levels among married women by experience of under-five death and selected socio-economic and demographic factors as well as investigative factors that affect fertility either directly or indirectly and explored the conceived reasons why do some married women having more number of children ever born alive than other women?. Socio-demographic and economic , reproductive and other data deem to be important were collected, organized, analyzed and interpreted to come with feasible results using a case control study designs. The cases are high fertile women and controls are low fertile women.

The analysis employed both descriptive statistics and logistic regression methods. Descriptive analysis would be used to describe the percentages and number distributions of the respondents by socio-demographic characteristics with fertility level. Both the classical bivariate and multivariable analyses were considered to access the determinants of fertility status through controlled variables and control confounding factors. The unadjusted (crude) and adjusted Odds ratios together with their corresponding 95% confidence intervals were computed. In this regard, the Hosmer and Lemeshow's goodness-of-fit test was considered.

The descriptive statistics showed the median number of children per women in high fertile group was 7.0 and 3.0 in low fertile group. The mean and median of age at first marriage and sex for those married women were 16.9 and 17.0 years respectively. Results of separately regressing fertility levels (high versus low) on each explanatory variables in binary logistic regression model was employed to estimate the grasp the differential level of child rearing according to women's characteristics among sampled households of Kersa district. Five out of eighteen variables did not show significant association with the outcome variables at 0.25 level of significant in bivariat analysis. The majority of the variables which showed significant associations with the level of fertility in the bivariate analyses could not persist in having such associations in the multivariable analyses. The backward stepwise regression which controls the problem of multicollinearity was employed and only five of the most contributing factors remained to be significantly and independently associated with the level of fertility. Such variables were: history of under-five mortality, desired children before marriage and the desired more additional children currently, age at first and last birth.

### 5.2. Conclusions

In Kersa, the number of children ever born alive is high. This study has attempted to come up with the result of conclusion; many factors contribute to this phenomenon. Among these factors, reduction of under-five mortality, delay age at first birth, correct awareness (knowledge) on the desired number of children before marriage and need additional children were the most contributing factors in reducing high fertility. Among the factors considered in this childhood mortality by far stands as a powerful predictor of fertility. Measures taken to decrease childhood mortality will indirectly help in reducing fertility. Such measures would give impulse to fertility controlling programmes and hence should be further strengthened.

### 5.3. Recommendations

Based on the findings of the study, the following recommendations are made:

- Curbing the high under-five mortality by putting in place strong measures, such as, better vaccination and impregnated bed nets (ITN) access. All responsible body including health extension workers should exert maximum efforts should be trained to practice those mothers, the key child survival interventions like antenatal care follow-up, skilled-based delivery, use of oral rehydration salt and homemade fluids.
- Interfere to delay age at first birth through an organized women and man activity like education in primary schools, ritual group, health extension workers and family planning counseling could also be considered. In the present study areas in particular, marriage is the hope of nearly all people. The legal age at first marriage in Ethiopia is 18 years. However, this minimum age at first marriage is not practiced particularly in the present study areas. Hence, all responsible bodies including the remotest Kebele administrations and community and religious' leaders should be in a position to ensure the practicability of this marriage law.
- Thus to community conversation, women affair, health extension workers and social ritual groups to give emphasis of couple's knowledge, approval and use to family planning. Low fertility women's should encourage and about small desired children's.

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# 7. APPENDICES

## 7.1. **Appendix I**: **Informed consent form**

**Research team**:

Before starting any questioning, please remember the following

1. Introduce your self
2. Take time to explain the following for both the wife and husband
3. Give clarification at all time
4. Seek for their willingness to be enrolled in this study.
5. If they are willing to be part of the study, request them to sign on the form and write the date.

### 1. Participant information sheet

Good Morning/Good Afternoon.

My name is ____________________________and I am working in the graduate school of Haramaya University .Today I come to visit your house related to the work the school launched in kersa woreda on the cases of high and low fertility of married women in the community. I am very much appreciating your participation in this study.

- Title of the study: Determinants of high fertility status among married women in Kersa district.

### Purpose of the study

This research is part of MPH Work; in the main time it will identify the determinants of high fertility status among ever married woman in Kersa district. After the results of the study the researchers will inform the health policy makers on the leading causes of high and low fertility. The study will provide statistics on fertility and the determinants of high fertility status that are reliable and useful in guiding priority interventions in the locality as well as in the nation.

### Procedures

Today I will be asking you same information on determinants of high fertility status in the community. Again I am very much appreciating your participation in this effort. I want to ask you about the circumstances leading to high and low fertility status. Whatever information you provide will be kept strictly confidential.

Only the interviewer and researcher will have access to the questionnaires and the information that you provide. The interview will take about 30 to 45 minute. The interviewer will take notes. The notes taken during the interview will not have any information that names you.

### Risks of Participation

There is no anticipated risk involved with this interview. Some questions may make you feel uneasy. You may not be familiar with some of the questions or issues. You can ask for elaborations on questions you think you do not properly understand. You don't have to answer any question(s), if you don't want to.

### Benefits and compensation of Participation

Your participation in this study and answers you give will be beneficial to the community as a whole, especially women in the reproductive age group. The information collected will help the government to identify the relevant variables of interest for interventions and to improve the health status of women and children. It should improve access to health services accordingly. You will not receive monetary compensation for this interview.

### Privacy

What I talk about will be kept private. Your name will not be attached to any written notes from this interview. All written materials will be locked in a cabinet. Only researchers will see this information during the study. Your name or other facts that might point to you will not appear when I present this study or publish its results. During the interview notes will be taken to be sure that the information is correct. There will be no way to identify you from the notes of the interview.

### Voluntary Participation, Refusal and Withdrawal

This interview is completely voluntary. You can discuss as much as you like or as little as you like. You do not have to answer any questions that you do not feel comfortable with. You can stop the interview at any time without giving any reason. The decision not to participate or to withdraw will not affect any aspects of your community life and your relationship with the university or any stakeholders associated with this study. If there is anything that is unclear or you need further information about the investigator will be happy to provide.

**For further information concerning the research work contact one of the following addresses:**

- Bekele Belayihun (PI): call phone:+251-912-055980, e-mail:bekalubel@gmail.com
- Negga Baraki(chair person) College of health science, Haramaya University ,institutional research ethics review committee (IRERC): 0912-47 97 52/025 666 1899
- Haramaya University , Faculty of Health Science, P.O.Box: 235

If you are willing to be part of the discussion we will be continuing. Otherwise we can stop.

**1. Declaration of voluntary consent form**

**Wife agreement**: are you willing to be part of the study?

1. Yes ( proceed to check to get permission from the husband)
2. No (stop)

I have understood the explanation given to me. I have agreed that I shall be enrolled in the study.

Make sign: ----------------------------- Date: ---------------------

**Husband agreement**: have you understood the explanation given to your wife? If there is unclarity you can ask questions.

Are you willing that your wife will be enrolled in the study?

1. Yes (proceed the interview)
2. No (stop)

I have understood the explanation given to me. I have agreed that my wife enrolled in the study.

Make sign: -------------------------Date: -----------------------

I would like to thank both of you for your willingness to be enrolled in the study.

## 7.2. Appendix II: Questionnaire

Questionnaire prepared for married women aged 20-49

**Title**: D**eterminants of high fertility status among married women in Kersa district.**

This study is conducted to identify the determinants of high fertility status among married women in the Kersa district. All information in the interview was confidential. Thank you for your responses to the questions.

| **Part 1: Interviewer Contact Result** | | |
|---|---|---|
| Name of interviewer: _________________<br>Interviewer signature : ___________________ | | Kebele name ________<br>Keble code ______<br>Gote ____________ |
| Name of supervisors: ___________________<br>Supervisors signatur_____________________ | | |
| Sex of head of the household; 1.Male 2.Female | | |
| Date of interview (ETC):<br>Day/Month/Year | ______/______/________ | Record the time at start of interview<br>----- |

**Part II: Socio-demographic and economic information**

| No | Questions and filters | Coding categories | Skip |
|---|---|---|---|
| 101 | How old are you? (completed years) | ……………..Years | |
| 102 | For most of the time until now, did you live in a city, in a town, or in the countryside? | 1. City/town<br>2. Countryside | |
| 103 | What is head of the house hold religion? | 1. Muslim<br>2. Orthodox<br>3. Protestant<br>99. Other (specify)……… | |
| 104 | What is head of the house hold ethnicity? | 1. Oromo<br>2. Amhara<br>3. Somali<br>4. Gurage<br>99. Other (specify)…… | |

| | | | |
|---|---|---|---|
| 105 | What is the highest grade you completed? | 1. Cannot read and Write<br>2. Read and write/adult literacy<br>3. Primary<br>4. Secondary<br>5. Above secondary | |
| 106 | What is the highest grade your husband completed? | 1. Cannot read and Write<br>2. Read and write/adult literacy<br>3. Primary<br>4. Secondary<br>5. Above secondary | |
| 107 | What is your occupational status? | 1. House wife<br>2. Employ Farmer<br>3. Merchant<br>4.. Private employee<br>5. Daily laborer<br>99. Others (specify)……… | |
| 108 | What is your husband occupational status? | 1. Employ Farmer<br>2. Merchant<br>3. Private employee<br>4. Daily laborer<br>99. Others (specify)……… | |
| 109 | What do you think of your socio-economic status relative to others in the neighborhood? | 1. Rich<br>2. Medium<br>3. Poor | |
| 110 | What is your monthly income? farming, livestock, trading, salary/pension, support and others(ETB) | …………….in birr | |
| 111 | How much was your monthly expenditure last month? (ETB) | ……………..in birr | |
| **Part III:-Reproductive health information** | | | |
| 201 | What is your marital status now? | 1. Widowed<br>2. Married<br>3. Divorced<br>4. Single | |
| 202 | In what age were you married first? | ……..Years | |
| 203 | Are you living with your first husband currently? | 1. Yes<br>2. No | |
| 204 | How long have you been married? | ……..Years | |

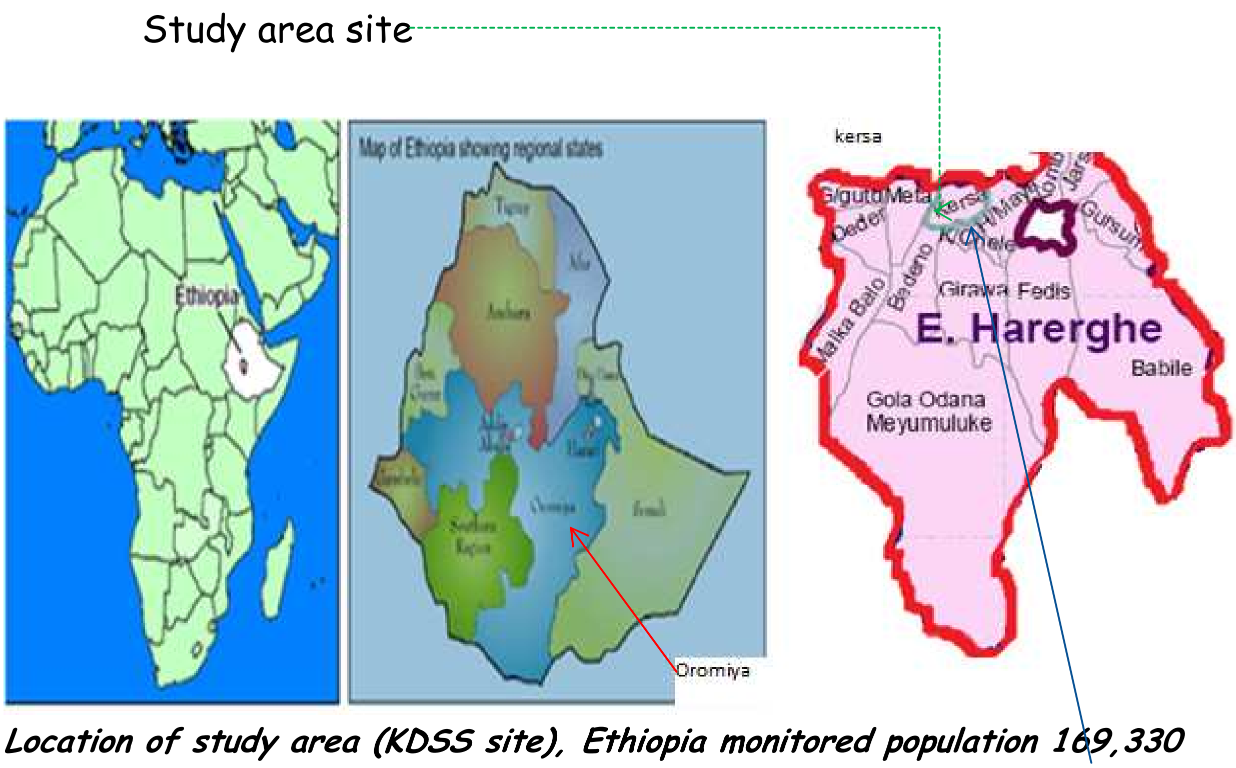
| | | | |
|---|---|---|---|
| 205 | What was the duration of your previous marriages? | ……..Years | |
| 206 | At what age did you start sexual relations? | ………Years | |
| 207 | Let me ask you about all the children you have given birth to throughout your life. Have you ever given birth? | 1. Yes<br>2. No → | Q216 |
| 208 | How old were you when you first gave birth? | ………..Years | |
| 209 | How old were you when you last gave birth? | …………..Years | |
| 210 | How many male and female children did you deliver alive? | Male…..<br>Female…… | |
| 211 | What is the sex of your first child? | 1. Male<br>2. Female | |
| 212 | Which type of sex would you want for your first child? | 1. Male<br>2. Female | |
| 213 | Have you ever given birth to a child who was born alive but later, died? | 1. Yes<br>2. No → | Q216 |
| 214 | If yes, How many? | ………………. | |
| 215 | How old was your child, when he/she died?<br>Probe: if less than 1 month; record days<br>if 'less than 1 year; record months | …………… Days<br>…………… Months<br>…………… Years | |
| 216 | Have you ever had a pregnancy that miscarried, or was aborted? | 1. Yes<br>2. No | |
| 217 | Have you ever had a pregnancy that miscarried and ended in a still birth? | 1. Yes<br>2. No | |
| 218 | If you were able to go back to the time when you didn't have any children and decide the number of children you wanted to have then How many children would you prefer? | Child number…………..<br>Male ……………….<br>Female ………….<br>As God give…….<br>Don't know……..88 | |
| 219 | Do you want more children? | 1. Yes<br>2. No → | Q221 |

| | | | |
|---|---|---|---|
| 220 | Why do you want to have more children? | 1. Children's are wealth<br>2. They can support in old age<br>3. Children's may/may not grow<br>4. Children's are honor<br>5. To maintain posterity | |
| 221 | Does your husband want to more children? | 1. Yes<br>2. No → | Q223 |
| 222 | Why does your husband want to have more children? | 1. Children's are wealth<br>2. They can support in old age<br>3. Children's may/may not grow<br>4. Children's are honor<br>5. To maintain posterity | |
| 223 | Do you know the fertile period between your menstrual cycles? | 1. Yes<br>2. No | |
| 224 | After the birth of your last child, for how long were you been amenorrhea? | …………….Day<br>…………….Month<br>88. …………. Don't know | |
| 225 | Did you ever breastfeed your children? | 1. Yes<br>2. No → | Q301 |
| 226 | For how long did the last child breastfeed? | ……………Months<br>……………Year<br>88……………Don't know | |
| **Part IV: Contraceptive Information** | | | |
| 301 | Have you ever heard of contraceptive? | 1. Yes<br>2. No | |
| 302 | Have you ever used contraceptive methods? | 1.Yes<br>2. No | |
| 303 | Are you or your husband currently using contraceptive? | 1. Yes<br>2. No | |
| 304 | For how long have you used the current a contraceptive you are using? | …………….Months<br>………………Year<br>88………………Don't know | |

**THANK YOU**

**Map of Study Area**

*DETERMINANTS OF HIGH FERTILITY STATUS AMONG MARRIED WOMEN IN KERSA DISTRICT*




***Location of study area (KDSS site), Ethiopia monitored population 169,330***