ADDIS ABABA UNIVERSITY
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SOCIOECONOMIC AND DEMOGRAPHIC DETERMINANTS OF UNMET NEED FOR CONTRACEPTIVES AMONG MARRIED WOMEN IN RURAL ETHIOPIA

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DEPARTMENT OF STATISTICS
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List of Acronym and Abbreviations

CSA	Central Statistical Authority
FP	Family Planning
MOH	Ministry Of Health
NFFS	National Family and Fertility Survey
NOP	National Office of Population
PRB	Population Reference Bureau
TGEOP	Transitional Government of Ethiopia, Office of the Prime Minster
UNFPA	United Nation Population Fund
ORC	Opinion Research Corporation

Abstract

This study attempted to assess some of the socioeconomic, demographic and proximate variables that affect unmet need for contraceptives among married women living in rural areas in Ethiopia. Logistic regression analysis is used in conjunction with descriptive statistical measures and Pearson's chi-square test of association. The study recognized the following factors, level of literacy, discussion with partner, respondent's approval of family planning methods, exposure to family planning methods on the radio, whether or not visited by family planning worker, whether or not visited a health facility as the main determinants of total unmet need. The study remarks that a woman with a higher level of literacy, exposed to family planning messages on the radio, was visited by family planning worker, had visited a health facility, discussed family planning methods with partner, who approves family planning methods is more likely to satisfy her contraceptive needs.

Chapter one

1.1 Introduction

Although there are few nations in sub-Saharan countries on the brink of demographic transition, the bulk of the continent still has high fertility and population growth rate (Caldwell and Caldwell, 2002). For instance, in Malawi, use of modern contraceptive methods has dramatically increased from 7 percent in 1992 to 26 percent in 2000, while the fertility level has slightly decreased from 6.7 children per woman to 6.3 during the same period. However, nearly one in three currently married women has an unmet need for family planning and the demand for family planning is satisfied for only half of these women (CSA and ORC Macro, 2001). Ethiopia has also experienced a fairly slow decline in fertility over the past decade. The reported total fertility rate (TFR) was 6.4 children per woman in 1990 (CSA, 1993), and by the year 2000, it had decreased to 5.9 children per woman (CSA and ORC Macro, 2001). The experiences based on Malawi and Ethiopia indicate that the prospects for further fertility decline is crucial for the development of sub-Saharan African countries.

Ethiopia is one of the developing countries with high growth rate of population, high level of maternal and child mortality. According to the medium variant projection of the Central Statistical Authority, the population size of the country was estimated at about 71.1 million for the year 2004.The population growth rate of the country is among the highest in sub-Saharan Africa, with 2.7 percent per annum projected for the year 2000-2005 (CSA, 1999). Women in the reproductive age group (15-49), constitute a substantial percent of the total female population. Furthermore the country has a youth age structure in which 40 percent of the population is below age 15.This indicates that there is considerable momentum for population growth. This, together with the high level of fertility and a low level of contraceptive use, suggests that the population will continue to grow at a faster pace for at least another generation.

The high population growth creates a hindrance to economic development of the country. Urbanization in the country is at very low stage with 15 percent of the population residing in urban areas and the rest living in rural areas. A substantial segment of the population is under

poverty line. The population living on less than$1/day accounts for 31 percent of the population (MOH, 2001).

Agriculture is the major economic sector of the country; more than 95 percent of the rural population is involved in agriculture. Rural women are engaged in agricultural and domestic activities on an average of 15 to 18 hours daily (NOP, 1999). There is a recurrent drought for most of the farming depends on the infrequent rain and infertile soil due to continuous plowing. In spite of frequent drought and poor cultivation practices, the agricultural sector plays a major role in the economy. It accounts for a substantial part of the gross domestic product and employs about 80 percent of the population and accounts for about 90 percent of the exports (CSA, 2000).

The population growth rate often outstrips the gains made in economic development. This suggests that policies with the objective of increasing economic development have to be formulated in relation to population growth. Thus, population issues should be a major concern for the country. Many people believe that addressing the population problem may pave the road for economic development and even it is considered as prerequisite for future development.

Ethiopian women have very limited access to modern health facilities. There is also uneven distribution of health facilities. Most of the health facilities are concentrated in urban areas, mainly in the capital and in the large cities of the country and regions. Only about 51 percent of the population has access to basic health services (MOH, 2001). Particularly for most rural parts of Ethiopia, access to health services is limited by distance since clients have to travel long distances to seek medical help. Access to professional maternity care during pregnancy is very low in the country. According to 2000 Ethiopian Demographic and Health Survey findings, only 27 percent of mothers who gave birth received antenatal care from a health professional during the 5 years preceding the survey. Urban women are three times more likely than rural women to receive antenatal care from a health professional. Furthermore, the rate of postnatal care is extremely low in Ethiopia. Ninety percent of mothers who gave birth during the 5 years preceding the survey received no postnatal care at all.

No matter how contraceptive use levels have increased from 10 percent in the 1960s to more than 50 percent in the 1990s in developing countries (Robey et al., 1994), including some sub-Saharan countries today, more than 100 million married women throughout the developing world are estimated to have an unmet need for contraception (Robey et al., 1996; Bhushan, 1997). Robey et al. (1996) estimated that the level of unmet need is highest in sub-Saharan Africa, ranging from 15 percent in Zimbabwe to 32 percent in Rwanda. Their findings show that in most of these countries, more married women have unmet demand than met demand for family planning.

According to the key findings of the 2000 Ethiopian Demographic and Health Survey, knowledge of contraceptive methods is relatively high in Ethiopia, with 86 percent of currently married women age 15-49. However, the contraceptive prevalence rate among currently married women is low (8 percent). Six percent of currently married women use modern methods; 2 percent use traditional methods. There is a marked difference in the current use of contraception by residence. Use of a modern method is nine times higher among currently married women living in urban than rural areas. Among women who are not currently using contraception, some indicate that they want to space births, while others indicate that they do not want to have any more children. These groups of women are classified as having an "unmet need for family planning". The DHS survey reveals that among currently married women, the unmet need for spacing is 22 percent, while the unmet need for limiting is 14 percent. Thus, the total unmet need is 36 percent.

Most women with unmet need reside in rural areas, a large area of the countryside is inaccessible, most men and women are illiterate, and women have little decision making power on family matters, meeting the unmet need for family planning is a serious problem. So, studying the various characteristics of women with unmet needs and reasons for nonuse of contraceptive might give some solution in alleviating the problem of high population growth in the country. In addition it is seems logical to see rural women as a distinct group to study the demand for their family planning according to their socioeconomic and demographic set up.

1.2 Statement of the problem

Sub Saharan Africa will constitute the most important family planning frontier of the twenty first century because fertility is still high in all its sub regions except South Africa, home to less than one thirteenth its population. Contraceptive prevalence rate is far lower than that of any other region in the world, partly because of low levels of socioeconomic development but also partly because of strong cultural resistance to family planning (Caldwell and Caldwell, 2002). On the other hand, many married women and women living in a union in developing countries have unmet need for spacing or limiting (Robey et al., 1996). On average, the level of total unmet need for contraception in sub-Saharan Africa is more than 20 percent. In some countries this is even higher with one in three women having an unmet need (30 percent in Malawi and 37 percent in Rwanda).

Ethiopia is at a high-fertility stage. According to the 2000 DHS, an Ethiopian woman will give birth on average to 5.9 children. Fertility in rural areas is even greater which is 6.4 and it is nearly twice as high as in urban areas with 3.3.

Besides, in this country use of contraceptive methods is low and the size of the unmet need group is high. According to the 2000 Ethiopia Demographic and Health Survey (DHS), the unmet need for family planning among currently married Ethiopian women is 36 percent, with 22 percent having a need for spacing and 14 percent having a need for limiting (CSA and ORC Macro, 2001). In contrast, the met need for family planning is only 8 percent. The unmet and met need together constitute the total demand for family planning, which is 44 percent at the national level. Because of the low level of contraceptive use, the proportion of demand that is satisfied is only 18 percent (15 percent for spacing and 24 percent for limiting).

Moreover, there is a remarkable difference seen in unmet need between rural and urban women (Antenane Korra, 2002). The author estimated that unmet need for family planning is 90 percent among rural women as compared to 41 percent among urban women. However, met need is almost six times higher among urban women than rural women. Low level of contraceptive use and high urban rural variation in contraceptive use implies the needs for effective family

planning program to reach the disadvantaged regions and rural areas in the country in order to ensure further fertility reduction (CSA and Macro, 2000).

It is apparent that rapid population growth, with existing low fertility control in the country is an obstacle in providing adequate social services related to education, health, housing and food in the country. Unless promotion of family planning programs and hence, increasing the current contraceptive prevalence rate is duely emphasized; reducing high fertility rate that contributes to rapid population growth is not attainable. Hence, the prospect for harmonizing slow economic development with high population growth will be in question. Moreover, problems related to high fertility rates will continue to deteriorate the health of women and children. Thus, addressing the problem of unmet need for contraceptive should be the first step in overcoming the incidence of high fertility rate.

With regard to reducing fertility rate and in response to the concern about the adverse effect of rapid population growth on socioeconomic development, the government launched a national population policy in 1993. The policy has one of its specific objectives as lowering the total fertility rate of 4 children per woman and raising the contraceptive prevalence rate from the existing 4 % to 44 percent by the year 2015 (TGEOP, 1993). The policy also identified that, reproductive health and reproductive rights are vital to empower women and improve their health status. Family planning is a major component of reproductive health, and appropriate attention should be given to improving the service. Indeed, the policy appeals to the government to ensure women's right to have access to basic health care facilities and information about family planning method. However, the large extent urban rural variation in contraceptive use and low level of contraception for the country is not promising to achieve these objectives. So, it is important to identify possible factors associated with couple's use of contraceptives and program should be designed and implemented accordingly.

Hence, an analysis of unmet need and a critical assessment of the underlying factors should be given priority to circumvent the problem. An understanding of the underlying causes of unmet need is important for designing effective programs to reduce the prevailing high level of unmet need. It has also important implications for future population growth. The magnitude of unmet

need and information on the characteristics of the unmet need population provide a more comprehensive measure of the expanded future demand for contraception (Ross, 1994). Unmet need also allows the estimation of the impact on fertility if this additional demand is met (Sinding et al., 1994).

Moreover, development researches should take into account not only the theoretical formulation but also the socioeconomic context of the given locality under study. This is also true for any reproductive health related research. The pitfall of this kind of research on some of the contemporary periods particularly among least developed countries including Ethiopia is not only because of poor and lack of theoretical formulation but also the failure to place reproductive health and related issues within its socio cultural and economic context.

Therefore, a major concern is which factors are contributing to the observed high level of unmet need for family planning in rural Ethiopia and hence, identifying strategies within the context of the rural society, which can bring about changes to the current situation. Several factors may contribute to the observed variation in unmet need and met need. However, this study focuses on demographic, socioeconomic and family planning related factors.

High fertility rate not only poses a problem on the provision of social services but also it has some negative implication on the health of mothers, children and the community at large. In general, the main victims of unregulated fertility are women and children. Too many and too close pregnancies are a major causes of maternal, infant, and childhood mortality and morbidity (UNFPA, 1997). However, the health problems of mothers and children in relation to fertility behavior could be reduced through the practice and intervention of family planning programs especially by using modern contraceptives. Hence, widespread use of effective contraception would protect women from health risk of unwanted pregnancies, unsafe abortion and child mortality. It will also ensure the reduction of fertility rate.

In Ethiopia, as in many underdeveloped countries, pregnancy and childbirth-related complications are believed to be one of the leading causes of death of women of reproductive age. The maternal mortality rate of the country is among the highest in sub-Saharan Africa. For

every 100,000 live births, there are 875 deaths during pregnancy or within four months of birth (CSA and Macro, 2001).

In addition, the fact that childbearing in Ethiopia begins at an early age subjects young women to pregnancy complications because of their physiological immaturity. Among all teenage women, 13 percent have given birth to at least one child, and among all women in their early twenties, more than one-third have two or more children (CSA and ORC Macro, 2001). Teenage pregnancy is higher among rural women than among urban women. A sizeable proportion of births to young women are reported to be unintended. This may in turn lead to unsafe abortion. In addition, their inexperience with childcare practices influences maternal and child health. Early childbearing contributes to high fertility and increases competition among siblings for food and other economic resources, thus contributing to malnutrition and other childhood illnesses. Frequent childbearing at a young age drains maternal strength and contributes to maternal malnutrition. Early childbearing also greatly reduces young mothers' educational and employment opportunities.

Moreover, studies have indicated that the incidence of unsafe abortion is high and constitutes a major cause of maternal morbidity and mortality, and that it is more common among young women. Indeed a substantial number of births in the developing world are unwanted; the number of unwanted pregnancies is even greater due to abortion. According to (MOH, 2002), abortion was one of the leading causes of hospital admission and the second most frequent causes of death next to tuberclosis in the country. Besides, a study conducted in five hospitals in Addis Ababa revealed that abortion-related maternal deaths contributed to 52 percent of all maternal deaths in the study hospitals (Seyoum Yoseph , et al., 1993). A similar study conducted in Jimma Hospital showed that 31 percent of admissions to obstetric and gynecology wards result from complications of unsafe abortions (Ahmed, 1996). However, if a woman uses contraception she is likely to avoid unsafe abortion to end unintended pregnancies (Upadhyay and Robey, 1999). Therefore, the incidence of unsafe abortions would be significantly small if safe and effective means of contraception were freely available.

Studies have indicated that higher proportion of maternal deaths each year results from lack or failure of contraceptive services. Indeed, unmet need results in unwanted births and remains a more serious problem in many developing countries. According to the 2000 DHS findings, for over three-quarters of women with an unmet need for contraception, it would be a big problem if they became pregnant. These women are at a risk of being pregnant because they are married but are not using any family planning method. Some of these women may seek an abortion as a means of avoiding an unwanted pregnancy. As mentioned above, abortion is one of the major causes of maternal mortality in Ethiopia. Thus, addressing the problem of unmet need will save women's lives by avoiding unwanted pregnancies and unsafe abortion.

Infant and child mortality rates in Ethiopia are very high. It is attributed to high morbidity leading to death from potentially preventable or treatable childhood illness. According to 2000DHS, nearly one out of 10 babies born in Ethiopia does not survive to celebrate its first birthday. Under-5 mortality is also high: one out of every six children dies before the fifth birthday. However, studies have shown that use of contraception helps improve children's health by spacing women's pregnancies. Children born after an interval of 18 to 23 months are more likely to die than children born after 24 to 47 months after the preceding child. It also helps to delay pregnancy, which is favorable condition for women to continue breastfeeding (Setty-Venugopal and Upadhyay, 2002). The demographic and health surveys in many countries have indicated that breastfeeding has beneficial effect on the nutritional status of children and lower morbidity and mortality among young children.

To put the above things in a nutshell, the current contraceptive prevalence in Ethiopia especially in rural areas does not seem in a position to substantially affect fertility rate. However, unmet demand is high in the country particularly in rural areas. If possible factors affecting unmet demand in rural areas are identified. It will help policy makers for designing and implementing appropriate family planning programs. Generally, it is true that improving access to family planning services and meeting the unmet need of women for family planning will improve both the health of mothers and children as well as welfare of the family (PRB, 1995). Besides effective family planning programs make the rapid spread of voluntary modern family planning methods possible in any country. Such programs help people achieve their personal reproductive

goals (Robey et al., 1994). In addition, family planning has so many advantages for women. For many women, using effective family planning can open the door to education, employment and community involvement (Upadhyay and Robey, 1999). The resulting widespread use of contraceptives and improved maternal and child health will be an integral component in the course of harmonization of socioeconomic development with that of population growth. Indeed this is one of the main objectives on the population policy of Ethiopia.

1.3 Significance of the study

In order to reduce the adverse consequences of rapid population growth, many developing countries including Ethiopia have developed population policies. Indeed, Ethiopia has a national population policy aiming to reduce population growth by increasing contraceptive prevalence rate. Besides, married women with unmet need in Ethiopia form a substantial proportion of married women in the reproductive age. In addition, most women with unmet need live in rural areas. Therefore, meeting the unmet needs of these women in the country and in particular in rural areas should be the primary goal of family planning programs.

Studies indicate that meeting the unmet needs of women will meet by far objectives of many government's population policy targets. To achieve these policy targets effectively, family planning program administrators should see the problem of unmet need from different angles. Indeed, studies at different administrative levels have to be conducted in order to implement effective family planning programs that consider the peculiar aspects of a given society. Therefore, identifying the socioeconomic, demographic and family planning related determinants of unmet need and reasons of women with unmet need for not using contraceptive in rural areas should be an integral part of a study for monitoring, assessing and administering programs in the implementation of the policy.

Apart from the demographic significance of meeting the unmet needs of women in reducing fertility, it has also a vital role in keeping the health of mothers and infants. Thus, the results of the study might help health planners and personnel because of its relation with infant, child and maternal mortality.

In general, the researcher hope that the results of the study will be indispensable to various disciplines and institutions whose work is related with reproductive health and population issues in Ethiopia specifically in rural areas. Particularly the results of the study will benefit family planning program administrators for designing effective programs to reduce the prevailing high level of unmet need.

Some research has been conducted by scholars on use of contraceptives and unmet need in Ethiopia, the regions and sub regions. However, studies targeting the rural society are limited in the country. Therefore, this study will complement the current understanding in the area with the context of rural areas in Ethiopia.

1.4 Literature review

In this section review of the literature related to unmet need and use of contraceptive is presented. In addition, the literature is reviewed in different sections thematically.

1.4.1 Concept of unmet need

Comparative studies done among DHS-surveyed countries during 1986-1989 has shown that despite the relatively high fertility rate in Africa, women's statements about desired future fertility indicate that in several countries a decline in fertility could possibly happen. Indeed, in some African countries (e.g. Kenya, Mali, Togo and Uganda) the projected declines equal or exceed those in lower fertility areas in which family planning services and information are already much better established, such as North Africa and Latin America (Sinding et al., 1994). This finding indicates that high population growth may not be an on going phenomenon in the world.

Furthermore, the implementation of voluntary family planning programs has been the principal policy initiative pursued by governments in the developing world that wish to reduce population growth. The main justification for this programmatic approach is an unfulfilled demand for contraception that presumably exists in many populations (Bongaarts, 1991).

The presence of unmet need for contraception was verified first during 1960s and 1970s when KAP-surveys (women's Knowledge, Attitude toward, and Practice of contraceptives) were conducted. The survey inquired about women's knowledge, attitudes toward and practice of contraception as well as about their family size preferences. Analysis of the survey data sets has shown that in most cases a substantial proportion of women who wanted to stop child bearing were not practicing contraception. This discrepancy between reproductive preferences and contraception practices is referred to as the "KAP-gap" or the "unmet need" for contraception. The World Fertility Survey also studied this situation in detail during the period (1972-1984). The Contraceptive Prevalence Surveys (mid 1970-1984) refined the concept by adding questions about women's interest in postponing or spacing next births, thus making it possible to measure those who want to space their births and those who want to limit them. The Demographic and Health Surveys further refined the concept by using additional information that referred to pregnant women on whether their current pregnancies were intentional, mistimed, or unwanted, and also on whether they were using contraception at the time of conception. This approach made it possible to classify some pregnant women according to whether or not they had an unmet need for family planning (Robey et al., 1996).

Nowadays the unmet need which is primarily accredited to the work of Charles Westoff and colleagues (Westoff and Pebley, 1981; Westoff and Ochoa, 1991) for its concept, is used as a measure for demand for family planning. Moreover, several measures of unmet need have been devised by scholars, but the main idea is that many women in union wish to delay or avoid future pregnancies, yet they have not obtained contraceptive protection. To mention some of the measurements for discrepancy between fertility preference and contraceptive behavior with order of increasing accuracy, conventional KAP-gap, instantaneous KAP-gap and total unmet need. Indeed, these measures have resulted from refining and revising basically the KAP-gap.

The focus on potential demand has also stimulated research into explaining the apparent discrepancy between the high proportion of couples in developing countries who say they want no more children and the relatively low proportion practicing contraception. The focus of the following section will be to review some of the research works conducted to examine the factors

underlying unmet need in some countries. Understanding of these underlying factors is also the aim of this research.

1.4.2 Demographic factors

Several studies have indicated that there is variation of unmet need among different age groups. In general the unmet need for spacing tends to be greater among women in their early 20s and to decline thereafter, while the unmet need for limiting gradually increases and reaches its highest levels in the oldest age-groups (Klistch, 1992). A study in Ghana based on data gathered in Ghana DHS conducted in 1988, 1993, and1998 indicated that the unmet need for spacing declines with age, while the unmet need for limiting increases up to age 44 and then declines. Unmet need is highest among young women age 15- 19. Unmet need is lowest among women age 45-49, the oldest age group. (Govindasamy and Boadi, 2000).

Studies in Ethiopia based on 2000 EDHS data indicated that the level of total unmet need for family planning does not show a strong variation by age of women. However, studies also indicated the presence of a remarkable variation of unmet need by age when distinction is made between unmet need for spacing and unmet need for limiting. Unmet need for spacing is higher among younger women, while unmet need for limiting is higher among older women (Jelaludin and Genet Mengistu, 2002; Antenane Korra, 2002). In fact, women aged 20-49 are significantly less likely to have an unmet need for spacing as women age 15-19. However, this difference though significant for each of the different age groups becomes less prominent with age. In contrast, young women (15-19) are much less likely to have an unmet need for limiting than older women (25+). Indeed, women of age 35 and over are almost five times as likely to have an unmet need for limiting as women age 15-19 (Antenane Korra, 2002).

Besides, there is a variation of unmet need depending on the age of women at first marriage. A study by Antenane Korra (2002) based on 2000 EDHS indicated that women who married for the first time before the age of 18 exhibited a lower demand for spacing than women who have been married for the first time after the age of 18. In contrast, the former group had a higher demand for limiting the number of children. More than 80 percent who have been first married before the age of 25 could not satisfy their need for both spacing and limiting. However, about one in two

women first married at age 25 or after have satisfied their demand for contraception (Antenane Korra, 2002).

Unmet need varies also with number of children women have but the pattern of variation for unmet need for spacing and unmet need for limiting are quite distinct. Indeed, a study by Daniel Sahelyesus (1995) based on 1990 NFFS (National Family and Fertility Survey) data; number of children was one of the most important determinants of unmet need for family planning in urban Ethiopia. Besides, Antenane Korra (2002) find that women with living children are about twice likely to have an unmet need for family planning than women with no living children.

In genral, unmet need for spacing decreases with the number of living children, while the unmet need for limiting increases as the number of living children increases.(Jelaludin and Genet Mengistu, 2002; Antenane Korra, 2002). Antennae Korra (2002) found that women with five or more children are half as likely to have a need for spacing as women with no children. On the other hand, women with 3-4 children and five or more children are twice as likely and nearly four times as likely, respectively, to have a need for limiting, as women with no living children.

Unmet need also varies with women's fertility preference particularly with ideal number of children women want to have. In fact, Daniel Sahelyesus (1995) identified that ideal family size is one of the most important determinants of unmet need for family planning among married women in urban Ethiopia. Besides, the unmet need for spacing increases with the ideal number of children, while the unmet need for limiting decreases as the ideal number rises (Antenane Korra, 2002). It is quite apparent from the above points that the pattern of variation of unmet need for spacing and for limiting with respect to ideal number of children and number of children are quite opposite.

1.4.3 Socioeconomic factors

The magnitude of the demand for family planning services also varies across various socioeconomic characteristics such as residence, education, employment status, etc. This section

presents a review of some relevant literature on the impact of socioeconomic factors on unmet need and contraceptive use.

Most often rural women have higher unmet need than urban women. A study by Klitsch (1992) based on data from 25 DHS-surveyed countries between the period 1985 and 1989 indicated that in North Africa, Asia, and Latin America, rural women consistently experience higher levels of unmet need (both for spacing and for limiting) than do urban women. However, in sub-Saharan Africa, unmet need is generally similar in urban and rural areas.

On the contrary, a comparative study by Govindasamy and Boadi (2000) based on data gathered in Ghana DHS conducted in 1988, 1993, and 1998 shows that although there was little difference in unmet need between rural and urban women in 1988, the gap between urban and rural women became wider and wider in 1993 and 1998. In 1993, unmet need among rural women was 14 percent greater than among urban women, and in 1998, the rural-urban gap nearly doubled to 26 percent. Further more, they identified that much of the difference is due to the increasing gap in unmet need for spacing between rural and urban women.

In Ethiopia also unmet need is substantially higher umong rural women than urban women (Jelaludin and Genet Mengistu, 2002; Antenane Korra, 2002). Rural women have a higher prevalence of demand not satisfied compared with urban women may be, because of the limited availability, accessibility, and acceptability of contraception in the rural community (Antenane Korra, 2002).

Several studies have revealed that women's education is closely related to contraceptive use. Usually education is most likely to increase women's access to information and interest to new technologies, including awareness and use of contraception.

In general in many parts of the world, better-educated women have less unmet need than women with little or no education. However, a comparative study by Klitsch (1992) indicated that in sub-Saharan Africa women with some primary education often have a greater unmet need than those with no education, particularly for spacing births. In addition, he noticed that literacy is

associated with both a greater awareness of the possibility of controlling fertility and a more developed preference for regulating fertility.

A similar study in Ghana indicated that women with a primary education have twice the unmet need of women with at least a secondary education, with little difference in unmet need among those with less than a secondary education (Govindasamy and Boadi, 2000). With regard to Ethiopia, a study based on 2000 EDHS indicated a little variation of total unmet need by educational level of women. Indeed, 35 percent of women with no education, 42 percent of women with primary education, and 29 percent with secondary education and above have unmet need (Jelaludin and Genet Mengistu, 2002). On the other hand, the usual pattern of variation is quite apparent when distinction is made between unmet need for spacing and unmet need for limiting. The percentage of women with an unmet need for spacing decreases from 53 percent among uneducated women to 27 percent among women with at least secondary education, with the unmet need for limiting falling from 36 percent to 12 percent (Antenane Korra, 2002).

Religion is also one of the factors that has an influence on practice of contraception. Studies in developing countries indicated that social, cultural and religious unacceptability of contraception frequently emerged as key impediment to use a method. For instance, a study based on data in 1990-1991 Pakistan DHS reveals that religious conservatism is a strong negative correlates of contraceptive use (Casterline, 2001). With regard to Ethiopia differences in total unmet need are not that obvious by religion although some variation exists in the demand for spacing methods (Antenane Korra, 2002).

Occupational status of women is often recognized as one of the economic factors that associated with their fertility behavior and contraceptive use. Usually women's employment is empowering so that they have control over economic resources and enables them to have a mandate over decision making in the family, including decisions in fertility and use of contraceptives. A study by Shapiro (1994) on the impact of employment and education on use of contraception in Kinshasa (Democratic Republic of Congo) revealed that employed women used contraceptive more likely than those women who were not working.

A study by Antenane Korra (2002) in Ethiopia based on 2000 EDHS data indicated little difference in total unmet need by employment status. However, he found that unmet need for spacing is lowest among women who are currently employed, while the unmet need for limiting is lowest among unemployed women.

Disseminating information through the mass media increases individual's awareness to new technologies, ideas on specific things and so on. Indeed, broadcast through the radio and television, and printed materials such newspapers, leaflets may bring change in individual's attitude to wards accepting modern life style. In particular they can serve to disseminate information on family planning.

In most developing countries, specifically in sub-Saharan Africa, promoting family planning through the radio and television is an important means of raising awareness, improving knowledge, and motivating use of modern contraceptive methods. In most countries regular exposure to mass media has a positive effect on use of contraceptive.

For instance a study by Westoff and Roderiguez based on 1989 Kenya DHS reveals that women's exposure to family planning messages in the mass media, their use of contraceptive and their desire for smaller families were closely associated. Indeed, women who were more exposed to family planning messages wanted smaller families and used contraception more than other women (Gupta, et al., 2003 ; Robey, et. al. 1996).

In relation to Ethiopia, a study by Antenane Korra (2002) reveals that media exposure has a profound effect on unmet need. He estimated that women who are exposed to the broadcast or the news paper have a lower unmet need for family planning (57 percent) compared with women who have had no media exposure at all (88 percent). Moreover, he found that women with media exposure are about four times as likely to use a method of family planning as women with no media exposure.

1.4.4 Family planning and other related factors

Spousal communication is one of the important factors that is given due attention in family planning programs and research. Indeed, several studies reveal that the amount of spousal communication is positively associated with contraceptive use. Moreover, a report on review of literature on male attitudes and behaviors concerning family planning and male initiatives in Africa remarked that spousal communication was positively associated with family planning method use (Toure, 1996).

However, spousal communication concerning contraception, specifically in developing countries, remains uncommon (Sharan and Valente, 2002). In Kenya, for instance, lack of communication between spouses proved to be a more common obstacle to contraceptive use than male opposition. Similarly a study by Jelaludin and Genet Mengistu (2002) based on 2000 EDHS reveals that communication between husband and wife is low. Besides, they estimated that sixty-five percent of women have never discussed family planning with their husband during the last year, while 20 percent discussed family planning once or twice, and only 16 percent discussed family planning more often.

A major debate in the recent literature is that a major justification for the less than ideal family planning performance in sub-Saharan Africa is the neglect of men in that endeavor. Almaz Terefe and Larsen (1993) have shown that modern contraceptive use improved significantly when husbands were involved in family planning interventions in Ethiopia. In fact, in many cultures men often have more power than women in decision making with regard to use of contraceptives and the number of children that the couple will have (McCauley et al., 1994). Thus, it seems reasonable to incorporate husband's attitude towards contraception in a study and this may illuminates possible barriers to the fulfillment of women's needs and give some insight into the problem of unmet need.

Indeed, husband's approval of family planning is an influential factor to women's contraceptive use behavior. Many women do not use contraception since their husbands disapprove of using contraceptive. In seven sub-Saharan countries, contraceptive use among women whose husbands

disapprove of family planning averaged only one third as much as among women whose husbands approve of it (Robey et al., 1996).

1.5 Objectives

The goal of this study is to distinguish (assess) major factors which affect unmet need for contraceptives among married women residing in rural Ethiopia; specifically the study has the following objectives:

- Describe women with unmet need.
- Identify the major socioeconomic, demographic and other related factors affecting unmet need.
- Fitting a statistical model to the data.
- Suggest some relevant points for family planning program administrators.

Chapter two

Data and methodology

2.1 Source of data and coverage

The target population of this study is married women living in rural areas in Ethiopia who have contraceptive demand. The 2000 Ethiopia Health and Demographic Survey (2000 EDHS) is used as a source of data for this research. The Ethiopia DHS collected information from respondents on fertility, family planning behavior, background characteristics of respondents and other variables. Respondents for the survey were a nationally representative sample of women and men in the reproductive age groups 15-49 and 15-59, respectively. The survey was intended to provide estimates of key population and health indicators, including fertility and mortality rate for the country as a whole and for urban and rural areas separately.

The survey (DHS-survey) used the sampling frame provided by the list of census Enumeration Areas (EAs) with population and household information from the 1994 census. Proportional sample allocation was not used as this would lead to uneven allocation of sample among regions. To tackle the problem of uneven sample allocation among regions, the sample was allocated to regions in proportion to the square root of the regions population size.

A two-stage stratified sampling scheme was used in the survey, which selects nationally representative sample of households. At the first stage of sampling, 540 EAs, 139 in the urban areas and 401 in the rural areas were selected using systematic sampling with probabilities proportional to size. At the second stage of sampling, a systematic sample of 27 households per EA was selected in all the regions using a complete listing of all households in the selected enumeration areas. Women in the age group 15-49 in all selected households, whether usual residents or visitors were interviewed. In the survey completed interviews were obtained for 14,072 households and 15,367 women. From all married women 7190 of them are usual (de jure) residents of rural areas. Among married women in rural areas the number of women with met or

unmet need is 2605 excluding a few observations with missing values and non-response. This study used all observations from these women.

2.2. Definitions and description of variables considered in the study

Response (dependent) variable is whether a woman has unmet need or met need. The diagram below depicts women who satisfy the definition of unmet need. It is this definition, which is adopted from the literature of unmet need for the study.

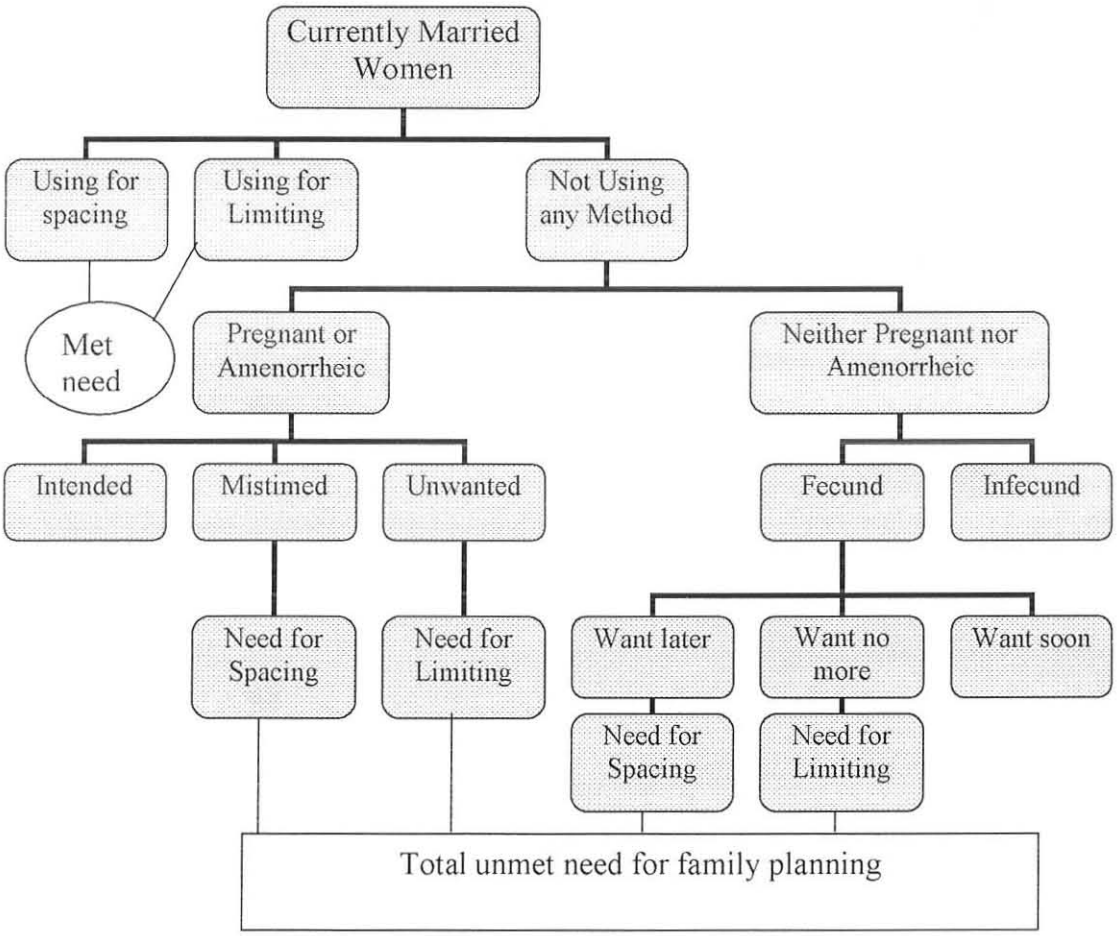

Figure 2.1 Diagram showing groups of women satisfying the definition of unmet need.

Socioeconomic factors

Factor	Factor Categories
Literacy	Cannot read at all, Able to read only parts of sentence, Able to read whole sentence
Religion groups	Moslem, Orthodox, Protestant, traditional and others
Respondent current employment status	Employed, Unemployed
Partner's education level	No education, Primary, Secondary and higher
Exposure to the radio	Yes, No
Visited by family planning worker last 12 months	Yes, No
Visited health facility last 12 months	Yes, No

Demographic factors

Factor	Factor Categories
Age	15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49
Age at first marriage	14 or less, 15-17, 18-20,21or more
Number of unions (number of marriage)	Once, More than once
Number of living children	0,1-2,3-4,5 or more

Proximate factors

Factor	Factor Categories
Knowledge of any method	No method, Knows a method
Discussed family planning (FP) with partner	Never, Once or twice, More often
Respondent approves FP	Disapproves, Approves, Don't know
Husband approves FP	Disapproves, Approves, Don't know

2.3 Methodology

In this section the statistical tools (procedures) used in the study are discussed. Specifically some of the methods appropriate for the analysis of binary (dichotomous) data will be reviewed. Indeed logistic regression which is often used for modeling binary data is used to model the relationship between the binary response variable which is defined in section (2.2) of this chapter and explanatory variables such as demographic, socioeconomic and proximate variables. In addition, it would be a good idea if related concepts are reviewed in different subsections. Therefore, the main objective of the following subsections is to discuss some of the related concepts used in logistic regression in brief and others.

2.3.1 Overview of alternative methods to the logistic regression

There might be several possible statistical methods for undertaking this research. So a brief discussion of these methods perhaps may reveal the advantages and disadvantages of using the logistic regression over the others. Some of the alternative methods are classical linear regression models, factor analysis, and log-linear models.

Available statistical literature reveals that the ease of fitting linear models to data in the form of observed proportions arising from binary response by the widely available softwares encourages use of these models for binary or grouped binary data. However, such models are not appropriate due to the following reasons: the assumption of constant variance under classical linear model does not hold as the variance depends on unknown parameters which vary from observation to observation. In addition, the assumption of normality which is important for inference regarding model parameters is no longer valid as these proportions are a function of binomial random variable. One other very important remark on fitting linear models to proportion is that fitted values obtained through applying classical linear models may lie outside the interval (0,1) since the estimates can assume any value such that a linear combination of this parameter estimates may lie in the interval $(-\infty,\infty)$.Therefore, fitting linear models for such data may be awkward or erroneous. On the other hand logistic regression can be used to tackle some of the above difficulties by first transforming proportions in such a way that the transformed proportion can

lie anywhere on the real line. Moreover, logistic regression enables one to overcome many of the restrictive assumptions of OLS regression.

Other possible methods for analyzing these data are factor analysis and log-linear models. However, such methods have some drawbacks. In factor analysis the data should arise from a continuous population, which is not the case for the data in this study because the response and most of the factors are categorical variables. On the other hand, Magidson and Vermut (2001) have recently proposed a method of factor analysis which is suitable for categorical and count data. Nevertheless this method poses a problem on interpreting parameters which is not easy like the typical factor analysis. It seems a good idea to mention here an important advantage of factor analysis: this method leads to a reduction in the dimensionality of the data by identifying underlying factors that accounts for the association between variables. In log-linear analysis there is no distinction between response (dependent) and explanatory variables. Moreover, this method cannot involve continuous variables.

In contrast logistic regression can involve data arising from continuous as well as categorical variables. Moreover, the distinction between response variable and explanatory variables in this method of analysis is well defined.

Finally, there are quite similar methods to logistic regression such as the probit and complementary log-log, which differ by the transformation used for the probability of success. However, for reasons of interpretation and ease of computation the logistic transformation is more convenient than the others.

2.3.2 Odds ratio

Before going to the detail about logistic regression analysis it is advisable to revise some of the concepts related to the model such as odds and the odds ratio.

Usually it is convenient to describe the chance that a binary response variable leads to a success relative to failure. The odds of a success is defined to be the ratio of the probability of a success to the probability of a failure. Hence if P is the true success probability the odds of a success is P/(1-P).

When two sets (groups) of binary data are to be compared, a relative measure of the odds of a success in one set relative to that in the other is the odds ratio. Let P_1 and P_2 are the success probabilities in these two sets, so that the odds of a success in the i^{th} set is $P_i/(1- P_i)$, i=1,2.The ratio of the odds of a success in one set of binary data relative to the other usually denoted by

$$\psi = \frac{P_1/(1-P_1)}{P_2/(1-P_2)}$$

is the odds ratio. When the odds of a success in each of the two sets of binary data are identical, Ψ is equal to one. This will happen when the two success probabilities are equal. Values of Ψ less than one suggest that the odds of a success are less in the first set of data than in the second, while an odds ratio greater than one indicates that the odds of a success are greater in the first set of data. The odds ratio is a measure of the difference between two success probabilities, which can take any positive value.

2.3.3 Review of the Logistic regression

Logistic regression is a popular statistical tool to model the probability of a certain event as a function of continuous and / or categorical variables. The logistic regression model is used when the response variable of interest takes on two values. Possible situations include studies where subjects are alive or dead have or do not have a particular characteristic and so on. The two possible forms are commonly called success and failure.

Suppose the response variable is represented for the i^{th} subject (individual) by a random variable Y_i. Further the two possible values can be coded by 1 and 0 such that

$E(Y_i) = P_i = P(Y_i=1)$

It is a common practice to represent $Y_i = 1$ as a success and $Y_i = 0$ as a failure. Furthermore, let's say there are k explanatory variables (X_{1i}, X_{2i},.....,X_{ki}) observed or measured on the individuals(subjects). In logistic regression analysis, it is assumed that explanatory variables affect the response through a suitable transform of the probability of success. This transformation which is a suitable function of P_i is called the logit link which is defined as

$$\log it(P_i) = \log \frac{P_i}{1-P_i}$$

This transformation maps the domain of P_i,(0,1) to the real line. It is this transformed variable which is related to the explanatory variables as follows:

$$\text{Logit}(P_i) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots\ldots\ldots + \beta_k X_{ki} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.1)$$

where β_0 , β_1, β_2,....., β_k are the model parameters. Using some rearrangement, the above relation can be written as

$$P_i = P(Y_i = 1 / x_1, x_2, \ldots, x_K) = \frac{e^{\eta_i}}{1+e^{\eta_i}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.2)$$

where $\eta_i = \sum_{j=1}^{k} \beta_j x_j \quad and \quad x_0 = 1$

Further rearrangement of equation (1) gives

$$Odds(Y_i = 1) = \frac{P_i}{1-P_i} = e^{\eta_i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.3)$$

The above three equations (2.1), (2.2) and (2.3) give suitable representations of log odds, the success probability, and the odds, respectively. Indeed, these representations facilitate interpretation of parameter estimates.

2.3.3.1 Parameter estimation

In order to fit the model to the data, the parameters of the model have to be estimated. In fact, the model fitting process could be facilitated by the widely available statistical softwares such as SAS, SPSS, GLIM. In this study, SPSS is used for analyzing the data. However, it is important to outline the main concepts underlying the model fitting process.

Suppose that Y_i's are independently distributed random variables with binomial probability distribution, p_i is the probability of success and n_i is the number of trial. i=1,2,..n. In short notation:

$$Y_i \sim B(n_i, p_i) \qquad i=1,2,\ldots n$$

Further, consider that binomial data of the form y_i successes out of n_i trials, i=1,.....,n are available, where the logistic transform of the corresponding success probability P_i, is to be modeled as a linear combination of the k explanatory variables $(x_{1i}, x_{2i}, \ldots\ldots, x_{ki})$, so that

$$\text{logit}(P_i) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots\ldots + \beta_k x_{ki}$$

There may be several methods for estimating the model parameters but the widely used method of estimation in logistic regression is the maximum likelihood method. In least square estimation, the error terms are bases for making a criteria for parameter estimation while in maximum likelihood estimation, the joint distribution of the Y_i's that is important for model fitting.

The main concept underlying maximum likelihood estimation is that finding values of parameters that maximize the likelihood function under the observed data. In mathematical language, this is simply optimizing the likelihood function with respect to the model parameters. The likelihood function is given by

$$L(\beta) = \prod_{i=1}^{n} \binom{n_i}{y_i} p_i^{y_i} (1-p_i)^{n_i - y_i}$$

This likelihood depends on the success probabilities p_i, which in turn depend on the βs through equation (2.2), and so the likelihood function can be regarded as a function of β. The problem now is to obtain those values $\hat{\beta}_0, \hat{\beta}_1, \ldots\ldots, \hat{\beta}_k$ which maximize L(β),or equivalently log L(β).The logarithm of the likelihood function is

$$\log L(\beta) = \sum \{\log \binom{n_i}{y_i} + y_i \log p_i + (n_i - y_i)\log(1 - p_i)\}$$

By rearranging terms, the log-likelihood function can be written as:

$$\log L(\beta) = \sum \{\log \binom{n_i}{y_i} + y_i \eta_i - n_i \log(1 + e^{\eta_i})\}$$

where $\eta_i = \sum_{j=0}^{k} \beta_j x_{ji} \quad and \quad x_{0i} = 1$ for all values of i

The derivatives of this log-likelihood function with respect to the k+1 unknown parameters β's are

$$\frac{\partial \log L(\beta)}{\partial \beta_j} = \sum y_i x_{ji} + \sum n_i x_{ji} e^{\eta_i} (1 + e^{\eta_i})^{-1} \qquad j = 0,1,\ldots\ldots,k$$

where β is the parameter vector.

Equating these derivatives to zero, we get a set of k+1 non-linear equations in the unknown values $\hat{\beta}_j$ that can only be solved numerically. The solution to this non-linear equation can be obtained by using an algorithm known as Fisher's method of scoring. This procedure is equivalent to using an iteratively weighted least squares procedure in which values of an adjusted dependent variable are regressed on the k explanatory variables $X_{1i}, X_{2i}, \ldots\ldots\ldots, X_{ki}$, using appropriate weights.

After the model parameters are estimated, the estimated value of the linear systematic component of the model is

$\hat{\eta}_i = \sum_{j=0}^{k} \hat{\beta}_j x_{ji}$ *and* $x_0 = 1 \quad \forall i$ which is known as the linear predictor. From this, the fitted values for the probability of success is given by

$$\hat{p}_i = \frac{\exp(\hat{\eta}_i)}{1+\exp(\hat{\eta}_i)}$$

2.3.3.2 Checking model adequacy

Once a model has been fitted to a given data, it is a good statistical practice to check the adequacy of the model, which is essentially checking the agreement between the observed and fitted values under the model. If the agreement between the observations and the corresponding fitted values is good, the model may be acceptable. If not, the current form of the model will certainly not be acceptable and the model will need to be revised. This aspect of the adequacy of a model is widely referred to as goodness of fit. An ill-fitting model is said to display lack of fit.

There are several statistical measures by which the discrepancy between observed data and fitted values under an assumed model can be assessed. Of these, the most widely used is based on the likelihood function for the assumed model. The basic concept underlying this procedure is to compare the maximum likelihood under an assumed model with that of a baseline model. Let $\hat{L}_c$ be the maximized likelihood under the current model. This statistic cannot be used on its own to assess the lack of fit of the current model unless compared with a corresponding statistic of an alternative baseline model for the same data. This latter model is taken to be a model that fits the data perfectly. Such a model will have the same number of unknown parameters as there are observations. The model is termed the full or saturated model and the maximized likelihood under it is denoted by $\hat{L}_f$. The saturated model does not condense the information in the bulk of data into a simple summary, as it is not parsimonious. However, the maximum likelihood under this model is an intuitively appealing reference by which a corresponding value of a given model can be compared to assess the adequacy of the given model.

Let the statistic D, be defined as

$$D = -2\log(\hat{L}_c/\hat{L}_f) = -2[\log\hat{L}_c - \log\hat{L}_f]$$

Large values of D are encountered when $\hat{L}_c$ is small relative to $\hat{L}_f$, indicating that the current model is a poor one. On the other hand, small values of D are obtained when $\hat{L}_c$ is similar to $\hat{L}_f$, indicating that the current model is a good one. The statistic D therefore measures the extent to which the current model deviates from the full model and is termed the deviance.

This statistic is a useful measure for detecting lack of fit of a given logistic regression model for grouped binary data. However, it proves to be uninformative for assessing lack of fit of a model for individual binary data (Collet, 1991), indeed this is the case for the data in this study. An alternative method for checking goodness of fit for individual binary data has been proposed by Hosmer and Lemeshow (2000). The outline of this procedure is briefly described in the following subsection.

The Hosmer-Lemeshow Test Procedure

The test statistic for this test procedure is formulated under the null hypotheses that the model fits the data, and the alternative is that the model does not fit. The test statistic is constructed by grouping the data set into roughly 10 (g) groups. The groups are formed by ordering the existing data by the level of their predicted probabilities. So the data are first ordered from least likely to have the event to most likely for the event. Then g (often 10) roughly equal sized groups are formed. From each group the observed and expected number of events are computed for each group. The test statistic is

$$\hat{C} = \sum_{k=1}^{g} \frac{(O_k - E_k)^2}{v_k}$$

where O_k and E_k are the observed and expected number of events in the k^{th} group, and v_k is a variance correction factor for the k^{th} group. If the observed number of events differs from what is

expected by the model, the statistic $\hat{C}$ will be large and there will be evidence against the null hypothesis. This statistic has an approximate chi-squared distribution with (g – 2) degrees of freedom.

2.3.3.3 Testing the significance of model parameters and the effect of adding terms

In order to test concerning the model parameters we need to know the distribution of the estimates. Under certain regularity conditions the maximum likelihood estimates have an asymptotic multivariate normal distribution with expected value equal to the true parameters. A test procedure that uses this general result is the Wald test, which can be used to test individual as well as several parameters at a time. The test procedure is as follows.

Suppose it is desired to test the significance of the j^{th} parameter, so that the null hypothesis can be stated as:

H_0: $\beta_j = 0$

The Wald test statistic for this hypothesis is

$$Z = \frac{\hat{\beta}_j}{\sqrt{\hat{Var}(\hat{\beta}_j)}}$$

This statistic has approximately a standard normal distribution in large samples. Equivalently, the square of this statistic has an approximate chi-squared distribution with one d.f. and this is the usual formulation of this statistical procedure.

In addition this test statistic can be used to construct a confidence interval for β_j. An approximate $100(1 - \alpha)$ % confidence interval for the true parameter is

$$\hat{\beta}_j \pm Z_{\alpha/2} \sqrt{\hat{Var}(\hat{\beta}_j)}$$

where $Z_{\alpha/2}$ is the normal critical value for a two-sided test of size α. Confidence intervals for effects in the logit scale can be translated into confidence intervals for odds ratios by exponentiation of the boundaries.

Now consider a more general situation where it is desired to assess the importance of adding explanatory variables in a given model.

In the previous section, the deviance has not been considered as a good measure of lack of fit of a model for individual binary data. However, this statistic can be used to compare two nested models for grouped as well as ungrouped binary data. When one model contains terms that are additional to those in another, the two models are said to be nested. The difference in the deviances of two nested models measures the extent to which the additional terms improve the fit of the model to the observed response variable.

Consider comparing two nested models say , model (1) and model (2), where the two models are as follows:

Model (1): $\text{logit}(p) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_h X_h$

Model (2) $\text{logit}(P) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_h X_h + \beta_{h+1} X_{h+1} + \ldots\ldots\ldots + \beta_k X_k$

Let the deviance under each model be D_1 and D_2, so that D_1 and D_2 have (n-h-1) and (n-k-1) degrees of freedom, respectively, where n is the number of binomial observations. Model (1) is nested within model (2) because model (2) contains more terms in addition to those in model (1). Hence model (2) is expected to fit the data better, and D_2 will be smaller than D_1. The difference in deviance $D_1 - D_2$ will reflect the combined effect of the variables $X_{h+1}, \ldots, X_k$ after $X_1, X_2, \ldots\ldots\ldots, X_h$ have already been included in the model. This difference in deviance is described as the deviance of fitting $X_{h+1}, \ldots, X_k$ adjusted for, or eliminating, $X_1, X_2, \ldots\ldots\ldots, X_h$.

To compare two nested models for binomial data, the usual large sample approximate distribution of the ratio of likelihoods is central as there is no exact distribution theory available

for this statistical problem. Since the deviance for each model has an approximate χ^2-distribution, the difference between two deviances will also be approximately distributed as χ^2.

Let the deviance for model (1) be D_1 on ν_1 degrees of freedom and that for model (2) be D_2 on ν_2 degrees of freedom. Denoting the maximized likelihood under model (1) and model (2) by $\hat{L}_{c1}$ and $\hat{L}_{c2}$, respectively, the two deviances are

$$D_1 = -2[\log \hat{L}_{c1} - \log \hat{L}_f] \qquad D_2 = -2[\log \hat{L}_{c2} - \log \hat{L}_f]$$

where $\hat{L}_f$ is the maximized likelihood under the saturated model. Moreover, D_1 has an approximate χ^2-distribution on ν_1 degrees of freedom and D_2 has an approximate χ^2-distribution on ν_2 degree of freedom, hence the difference in deviance D_1- D_2 will have an approximate χ^2-distribution on ν_1- ν_2 degree of freedom. However, the deviance for individual binary data cannot be approximated by χ^2-distribution. Essentially, this is because of the inclusion of the likelihood under the full model in the expression for the deviance. But when comparing two deviances, the term involving $\hat{L}_f$ disappears and

$$D_1 - D_2 = -2[\log \hat{L}_{c1} - \log \hat{L}_{c2}]$$

Indeed, this is the usual likelihood ratio test for comparing two models. The chi-squared approximation to the difference between two deviances can therefore be used to compare nested models for binary as well as for binomial data. In other situations where the distribution of the deviance cannot be reliably approximated by a χ^2-distribution, such as when the data are sparse, the χ^2-distribution is still a good approximation to the distribution of the difference between two deviances.

2.3.3.4 Model Selection Procedures

In situation where there are many explanatory variables, it would be convenient to use some automatic procedures which can be used routinely to select subsets of the explanatory variables for fitting an adequate model using certain statistical criterion. There are some procedures in the

statistical literature to accomplish such tasks such as the backward and stepwise selection procedures. However, in the statistical literature it is also remarked that this procedures should be used in caution. A good approach is to use this procedure in conjunction with some subjective approaches based on some knowledge of the underlying explanatory variables.

In this study an attempt has been undertaken to combine these automatic procedures with a subjective approach to select subsets of explanatory variables for fitting a model. Before leaving this section it would be wise to outline the basic steps underlying these automatic subset selection procedures.

In backward elimination, first all the explanatory variables are included in the model. After that the next step is to remove the non-significant term with the largest p-value. This step will proceed until a subset that consists of entirely statistically significant terms is achieved. This procedure usually returns useful models, or at least gives a good starting place.

Another alternative for selecting terms is to start with a model with no explanatory variables and select variables turn by turn from most significant term to least significant term. In short, the procedure begins by selecting the explanatory variable with the smallest p-value. In the next step, the procedure adds the next most significant term and checks to see if any previous terms are now non-significant and removes them if they are not significant. This procedure proceeds till there are no more significant terms to add. This technique is known as stepwise selection procedure. This procedure unlike backward elimination is basically built by successively adding terms.

Chapter three

Results and Discussions

In this chapter, the results of statistical analysis of the data used in this study and discussion of the results obtained are presented. In order to substantiate the logistic regression analysis the summary of the data is given by employing proportions (in percentages). In addition, tests of association based on Pearson's chi-square test between the dependent variable and explanatory variables are used to assess significance. A model is fitted to the data using the method/procedures mentioned in Chapter 2. Moreover, in the analysis, it is attempted to see total unmet need, unmet need for spacing, and unmet need for limiting separately. Decision regarding tests of association, significance of parameters, and adding explanatory variables is made simply by describing the amount of information against the null that is obtained through the p-values.

In order to make variable names handy, the following simple representation of variables is used to reduce space consumption.

Literacy = Level of literacy

Religion = Religion groups

Employ = Employment status

Partedu = Level of partner's education

Radio = Exposure to family planning messages on the radio

Visitedby = Visited by FP worker in the last 12 months

Visitedh = Visited a health facility in the last 12 months

Age = Age of woman

Agefm = Age at first marriage

Numu = Number of unions

Numch = Number of living children

Know = Knowledge of any method of contraceptives

Dissp = Discussion of family planning with partner

Resa = Woman's approval of family planning methods

Husa = Husband's approval of family planning methods

3.1 Summary statistics and associations of unmet need with explanatory variables

In the following subsections summary of the data and tests of association between unmet need and explanatory variables are presented and discussed. The presentation and discussion of the results are organized based on the nature of the explanatory variables.

3.1.1 Socioeconomic characteristics of women and unmet need

The association of socioeconomic characteristics with unmet need and the variation of unmet need of women will be assessed in the next paragraphs. The discussions are based on Table 3.1 and Table 3.2. In table 3.1 the proportion of total unmet need, unmet need for spacing and unmet need for limiting are presented for each categories of socioeconomic variables. Table 3.2 shows the results of Pearson's chi-square tests of independence between socioeconomic variables and total unmet need, unmet need for spacing and unmet need for limiting.

From Table 3.1, it seems that total unmet need varies with level of literacy of women. Women with better level of literacy have lower proportion of unmet need. Indeed, the chi-square test of independence from Table 3.2 indicates a significant evidence of association between level of literacy and total unmet need. On the contrary, the association between level of literacy and unmet need for spacing is not significant as can be seen from Table 3.2. On the other hand, unmet need for limiting and level of literacy are significantly associated, in which women who are able to read whole sentences are with lowest proportion of unmet need for limiting.

As can be seen from the chi-square tests of associations from Table 3.2, total unmet need and religion are not significantly related. However, unmet need for spacing and limiting have a significant relation with religion groups. Women who belong to the Orthodox Church are with lowest proportion of unmet need for spacing and with the highest proportion of unmet need for limiting. Others have more or less similar proportions of unmet need.

Table 3.1 : Proportions of unmet need across socioeconomic characteristics of women.

Socioeconomic variables		Unmet need		
		Unmet need to space	Unmet need to limit	Total unmet need
Literacy				
	Cannot read at all	55.6%	36.0%	91.60%
	Able to read only parts of sentence	49.2%	38.5%	87.70%
	Able to read whole sentence	57.1%	20.7%	77.80%
Religion				
	Orthodox	49.1%	40.7%	89.80%
	Protestant	64.3%	26.3%	90.60%
	Moslem	60.4%	29.2%	89.60%
	Traditional	64.2%	24.7%	88.90%
	Other	70.3%	16.6%	86.90%
Employ				
	No	59.5%	33.6%	93.10%
	Yes	52.7%	35.0%	87.70%
Partedu				
	No education	50.6%	40.1%	90.70%
	Primary	65.0%	24.9%	89.90%
	Secondary and higher	62.8%	18.4%	81.20%
Radio				
	No	55.7%	35.2%	90.90%
	Yes	52.4%	28.0%	80.40%
Visitedby				
	No	55.9%	34.4%	90.30%
	Yes	37.8%	37.3%	75.10%
Visitedh				
	No	56.2%	36.7%	92.90%
	Yes	54.4%	31.7%	86.10%

Table 3.2 : Associations of unmet need with socioeconomic variables.

		Total unmet need		Unmet need for spacing		Unmet need for limiting	
Factor	df	χ^2	P-value	χ^2	p-value	χ^2	p-value
Literacy	2	82.268	.000	2.50	.286	24.42	.000
Religion	4	1.961	.743	41.14	.000	39.51	.000
Employ	1	3.562	.059	5.23	.022	1.23	.266
Partedu	2	25.173	.000	33.08	.000	56.53	.000
Radio	1	62.747	.000	9.42	.002	4.95	.026
Visitedby	1	22.368	.000	5.29	.021	.69	.404
Visitedh	1	56.491	.000	5.94	.015	6.82	.009

There is a weak evidence of relationship between total unmet need and employment status of a woman, in which 93.1 % of unemployed women having unmet need as compared to 87.70% of employed women having an unmet need. On the other hand, there is a better evidence of association between unmet need for spacing and employment status, in which 59.5% of unemployed women having unmet need for spacing while 52.7% employed women having unmet need for spacing. On the contrary, employment status of a woman does not have a relation with contraceptive demand for limiting.

Partner's level of education of a woman and total unmet need have a significant association. Women whose husband's level of education is secondary and higher having the lowest level of total unmet need. There is little difference in unmet needs of women whose partners have primary level education and those without education. Moreover, there is also a significant relationship between partner's education with both unmet need for spacing and limiting.

Women whose partners' education are secondary or higher have the lowest proportion of unmet need for limiting. On the other hand, women whose partners' have no education have the highest proportion of unmet need for limiting. On the contrary, 50.6% of women whose husband's have no education have unmet need for spacing in comparison to 65.0% and 62.8 % of women

whose husband's have primary education and women whose husband's have secondary /higher education, respectively.

The Level of total unmet need has a significant relation with woman's exposure to family planning messages on the radio. About 90.90% of women who did not hear family planning messages on the radio in the last months before the survey have unmet need while 80.40% of woman who heard family planning messages on the radio have an unmet need. There is also a similar relationship between both unmet need for spacing and limiting with exposure of woman for family planning messages on the radio.

There is a significant association between total unmet need and whether a woman has been visited by family planning worker or not, in which 90.30% of women who were not visited by family planning worker in the last 12 months before the survey have unmet need while 75.10% of women who were visited by family planning worker have unmet need. There is also a significant relationship between unmet need for spacing and whether a woman was visited by family planning worker, in which 55.9% of woman who were not visited by FP worker have unmet need for spacing in contrast to 37.8% of women who were visited by FP workers have unmet need for spacing. On the other hand, there is no significant association between unmet need for limiting and whether or not a woman was visited by a FP worker in the last 12 months before the survey.

There is also a significant association between total unmet need and whether a woman visited a health facility or not. Women who visited a health facility in the last 12 months before the survey have lower proportion of unmet need than women who did not visit. Similarly both unmet need for spacing and limiting have a significant association with whether a woman has visited a health facility or not. Women who visited a health facility have lower proportion of unmet need for both spacing and limiting needs.

3.1.2 Unmet need and demographic factors

The following discussions are based on Table 3.3 and Table 3.4. From Table 3.3, it can be inferred that there is no significant association between total unmet need and age. However, there is a highly significant association between age and unmet need for both spacing and limiting. From Table 3.4, it seems that level of unmet need for spacing declines with age while level of unmet need for limiting increases with age. In particular, women in the younger age groups have higher proportion of unmet need for spacing. In contrast, women in the older age group have higher unmet need for limiting.

There is little evidence of association between age at first marriage and total unmet need. However, there is a highly significant association between age at first marriage with both unmet need for spacing and limiting. Unmet need for spacing increases with age while unmet need for limiting declines with age.

Total unmet need and the number of marriages a woman made are not significantly associated. However, there is a significant association between number of unions and unmet need for both spacing and limiting. Women who married once have higher proportion of unmet need for spacing while women who married more than once have a higher proportion of unmet need for limiting.

Table 3.3 : Associations of unmet need with demographic variables.

		Total unmet need		Unmet need for spacing		Unmet need for limiting	
Factor	df	χ^2	P-value	χ^2	p-value	χ^2	p-value
Age	6	7.699	.261	423.85	.000	437.79	.000
Agefm	3	6.477	.091	47.90	.000	40.13	.000
Numu	1	1.845	.174	32.83	.000	26.11	.000
Numch	3	.708	.871	350.45	.000	371.93	.000

Table 3.4 : Proportions of unmet need across demographic characteristics of woman.

		Unmet need		
		Unmet need to space	Unmet need to limit	Total unmet need
Age				
	15-19	83.0%	11.4%	94.40%
	20-24	80.7%	13.4%	94.10%
	25-29	67.1%	19.9%	87.00%
	30-34	51.3%	38.5%	89.80%
	35-39	34.9%	53.6%	88.50%
	40-44	24.9%	64.1%	89.00%
	45-49	16.0%	68.8%	84.80%
Agefm				
	≤ 14	48.7%	40.6%	89.30%
	15-17	54.4%	35.0%	89.40%
	18-20	63.8%	28.5%	92.30%
	≥ 21	67.3%	19.7%	87.00%
Numu				
	Once	59.1%	30.9%	90.00%
	More than once	46.8%	42.6%	89.40%
Numch				
	0	80.6%	15.2%	95.80%
	1-2	77.9%	14.2%	92.10%
	3-4	57.8%	30.4%	88.20%
	≥ 5	30.9%	57.3%	88.20%

As can be seen from Table 3.3 total unmet need is not related with number of living children a woman has. In contrast, there is a highly significant association between number of living

children a woman has and both unmet need for spacing and limiting. From Table 3.4, it can be easily seen that unmet need for spacing declines with number of living children a woman has while unmet need for limiting increases with number of living children a woman has.

3.1.3 Unmet need and proximate variables

The following discussions in relation to proximate factors and unmet need are based on Table 3.5 and Table 3.6.

Knowledge of a woman about any method of contraceptive has a highly significant association with total unmet need. Knowledge and both unmet need for spacing and limiting are also significantly associated. However, the evidence for association of unmet need for limiting and knowledge is relatively weak as compared to that of total unmet need or unmet need for spacing with knowledge. Almost, all women with no knowledge of contraceptive method have unmet need in contrast to 88.60% of women with a knowledge of a method have unmet need.

Though the association between both total unmet need and unmet need for spacing with amount of discussions about family planning a woman had with her husband are highly significant. The association between unmet need for limiting and the amount of discussion a woman had with her husband is not significant. A larger proportion (96.60%) of women who have never discussed FP with their husband have unmet need.

Though a woman's approval of family planning methods has a highly significant association with total unmet need and unmet need for spacing, the association of unmet need for limiting with woman's approval of family planning methods is not significant. About 99.90% of women who disapprove family planning methods have unmet need in comparison to 86.80% of women who approve have unmet need.

There is a highly significant association between woman's perception about husband's approval of family planning methods with both total unmet need and unmet need for spacing. On the other hand, there is a weak evidence between relation of perceived husband's approval of family planning method and unmet need for limiting. About 94.90% of women who perceived their

husband disapproval of family planning have unmet need as compared to 82.10% of women who perceived their husband approval of FP methods have unmet need.

Table 3.5 : Proportions of unmet need across proximate variables.

		Unmet need		
		Unmet need to space	Unmet need to limit	Total unmet need
Know				
	don't know any method	71.6%	28.4%	100.00%
	knows a method	53.5%	35.1%	88.60%
Dissp				
	Never	62.5%	34.1%	96.60%
	Once or twice	49.3%	32.1%	81.40%
	More often	37.0%	38.7%	75.70%
Resa				
	Disapproves	68.5%	31.4%	99.90%
	Approves	51.1%	35.7%	86.80%
	Don't know	67.4%	29.3%	96.70%
Husa				
	Disapproves	64.5%	30.4%	94.90%
	Approves	45.4%	36.7%	82.10%
	Don't know	60.5%	34.8%	95.30%

Table 3.6 : Associations of unmet need with proximate variables.

		Total unmet need		Unmet need for spacing		Unmet need for limiting	
Factor	df	χ^2	P-value	χ^2	p-value	χ^2	p-value
know	1	54.868	.000	48.23	.000	4.92	.027
DissP	2	232.174	.000	108.96	.000	2.40	.300
ResA	2	100.038	.000	63.82	.000	2.36	.307
HusA	2	131.325	.000	76.35	.000	4.99	.082

3.2 Logistic regression analysis

For convenience of interpretation the coding used for the dependent variable is as follows. A response of unmet need is coded as one and met need is coded as zero for the dependent variable (total unmet need).

3.2.1 Stages of model selection

At the first stage of the analysis the dependent variable is regressed on each explanatory variables separately. These models with single explanatory variables are used for screening purpose, that is, to identify those explanatory variables that affect the response significantly.

Table 3.7: Significance of change in deviance due to entering a single variable in a model with a constant only.

Factor	Change in deviance	Degree of freedom	P-value
Literacy	66.541	2	.000
Religion	2.031	4	.730
Employ	3.610	1	.057
Partner's	21.351	2	.000
Radio	51.147	1	.000
Visitedby	17.099	1	.000
Vistedh	57.585	1	.000
Age	7.655	6	.264
Agefm	6.906	3	.075
Numu	1.811	1	.178
Numch	.715	3	.870
Dissp	221.751	2	.000
Resa	134.668	2	.000
Husa	129.786	2	.000

It can be inferred from Table 3.7 that the change in deviance for literacy, partner's level of education, exposure to FP messages from the radio, visited by FP worker and visiting a health facility have highly significant contribution in explaining the variation in the response variable. On the other hand, religion does not significantly account for variation in total unmet need. There is also a weak evidence that employment status of a woman significantly affect total unmet need.

In general, the change in deviance due to entering any of the demographic factors is not significant except the change in deviance due to adding the variable age at first marriage where the contribution of this factor is significant in explaining the variation in total unmet need.

Finally, all proximate variables namely, discussion on family planning issues with partner, respondent's approval of FP and husband's approval of FP have highly significant contribution in explaining the variation in total unmet need.

One remark here is that though knowledge has highly significant association with total unmet need, the effect of knowledge on total unmet need cannot be assessed using logistic regression analysis as the iterative method of estimation cannot converge to a solution.

From the above models with single explanatory variables those variables with significant change in deviance are further considered for model selection. Furthermore, the effect of adding partner's education in a model after eliminating the effect of level of literacy of a woman does not improve the model significantly. Indeed, the change in deviance due to adding partner's education in a model when only level of literacy is already in a model is 2.613 with p-value 0.271, which is not significant at any reasonable level of significance. Therefore, level of partner's education is excluded from further model selection.

Finally, the following explanatory variables which passed the above procedures are considered for final model selection by forward selection procedure.

- Age at first marriage
- Husband's approval of family planning
- Level of literacy of a woman
- Discussion of FP with partner
- Respondent's approval of FP
- Employment status of a woman
- Exposure to FP messages on the radio
- Visited by FP worker in the last 12 months before the survey
- Visited a health facility in the last 12 months before the survey

The likelihood ratio test criterion is used to select and remove variables on each step of the procedure. The 0.05 level of significance is set for entry of variables and 0.1 level of significance for removal from the model. The reference category is the first category for all explanatory variables. Using these criteria, the forward selection procedure results the following model.

$$\text{Logit}(P_i) = 5.126 - 0.219\, x_{1i} - 0.757\, x_{2i} - 1.377\, x_{3i} - 1.455\, x_{4i} - 2.011\, x_{5i} - 1.212\, x_{6i} - 0.384 x_{7i} - 0.845\, x_{8i} - 0.614\, x_{9i}$$

where, the following variables with indicator (dummy variables) are in the model.

- `Level of literacy

  $x_1 = 1$, If woman able to read only parts of sentence

  $= 0$, otherwise

  $x_2 = 1$, If woman is able to read whole sentence

  $= 0$, otherwise

- Discussion with partner about FP methods

  $x_3 = 1$, If a woman discussed FP with her partner once or twice

  $= 0$, otherwise

  $x_4 = 1$, If a woman discussed FP with her partner More often

  $= 0$, otherwise

- Woman's approval of FP methods

  x_5 = 1, If a woman approves FP methods

  = 0, otherwise

  x_6 = 1, If a woman does not know whether to approve or disapprove

  = 0, otherwise

- Exposure to FP messages on the radio

  x_7 = 1, If a woman heard FP messages on the radio

  = 0, otherwise

- Visited by FP worker in the last 12 months

  x_8 = 1, If a woman is visited by FP worker

  = 0, otherwise

- Visited a health facility in the last 12 months

  x_9 = 1, If a woman visited a health facility

  = 0, otherwise

Statistical inference for the model parameters and summary of the steps by which the variables are entered in the model and their corresponding inference are shown below in Table 3.8 and Table 3.9.

Table 3.8: Summary of the steps in the forward selection procedure.

Step	-2 Log likelihood (deviance)	Improvement			Model			Variable
		Chi-square	df	Sig.	Chi-square	df	Sig.	
1	1695.500	221.751	2	.000	221.751	2	.000	IN: Dissp
2	1640.680	54.821	2	.000	276.571	4	.000	IN: Resa
3	1610.389	30.290	2	.000	306.862	6	.000	IN: Literacy
4	1585.672	24.718	1	.000	331.579	7	.000	IN: Visitedh
5	1577.502	8.170	1	.004	339.749	8	.000	IN: Visitedby
6	1572.434	5.067	1	.024	344.817	9	.000	IN: Radio

Table 3.9: Summary statistics and inference for parameters in the model fitted for total unmet need.

	$\hat{\beta}_j$	S.E.($\hat{\beta}_j$)	Wald	df	Sig.	Exp($\hat{\beta}_j$)
Literacy			20.140	2	.000	
Able to read only parts of a sentence	-.219	.243	.806	1	.369	.804
Able to read a whole a sentence	-.757	.169	20.089	1	.000	.469
Discussion with partner			97.346	2	.000	
Once or twice	-1.377	.161	73.302	1	.000	.252
More often	-1.455	.167	75.858	1	.000	.233
Respondent's approval			27.028	2	.000	
Approves	-2.011	.423	22.627	1	.000	.134
Don't know	-1.212	.530	5.229	1	.022	.298
Heard FP on the radio	-.384	.168	5.226	1	.022	.681
Visited by FP worker	-.845	.284	8.861	1	.003	.430
Visited health facility	-.614	.138	19.836	1	.000	.541
Constant	5.126	.424	146.343	1	.000	168.261

Model adequacy for final model the adequacy of the final model is assessed by the Hosmer and Lemeshow Test for goodness of fit. The computed test statistic is 8.016 with p-value .432 indicating that there is no lack of fit. In short, the model seems to fit the data very well.

0utlier: Detecting outliers that might affect the results would have been important. However, as the sample size is so large that graphical techniques of detecting outliers is not possible. Therefore, the study assumes this as part of a limitation.

3.2.2 Discussion of the results

The following discussions are based on Table 3.9. To make interpretation of odds ratios easily understandable, Exp($\hat{\beta}_j$) is inverted. One remark here that the odds ratios pertaining to a given

categorical variable are obtained while other variables are in the model, hence the odds ratio is the adjusted odds ratio obtained while the effect of other variables in the model are eliminated.

Level of literacy of a woman is found to be an important determining factor of unmet need. The odds of unmet need of a woman who is able to read only parts of a sentence relative to those who cannot read at all is not significant. However, the odds of unmet need of a woman who is able to read whole sentence relative to those who cannot read at all is significant. The odds of unmet need for a woman who cannot read at all is 2.13 times that of a woman who able to read a whole sentence. Hence, higher level of literacy has a positive relation with use of contraception. The chance of satisfying contraceptive need for a woman with a higher level of literacy is greater than a woman with no literacy.

Exposure to family planning messages on the radio has a significant impact on unmet need. The odds of unmet need for a woman who did not hear messages about family planning on the radio is 1.5 times that of a woman who is exposed to family planning messages on the radio last months before the survey. The implication here is that exposure to family planning messages on the radio has a positive impact on satisfying contraceptive needs. A woman who has exposure to family planning messages on the radio is likely to have better chance of satisfying her contraceptive needs than a woman who is not exposed to family planning messages on the radio. A woman who was visited by a family planning worker have a better chance of fulfilling her contraceptive needs as compared to those who was not visited by family planning worker. In fact, the odds of unmet need for a woman who was not visited by family planning worker is 2.33 times that of a woman who was visited by family planning worker in the last 12 months before the survey.

Visiting a health facility is also an important variable affecting unmet need. Women who visited a health facility have a better chance of satisfying her demand for contraceptives. Indeed, the odds of unmet need of a woman who did not visit a health facility in the last 12 months before the survey was found to be 1.85 times that of a woman who visited a health facility.

Spousal communication about family planning is another important variable influencing unmet need. In fact, the odds of unmet need for a woman who never discussed family planning methods with her partner is about four times that of a woman who discussed family planning methods once or twice and more often. Hence, we note that those couples who discuss family planning methods have better chance of satisfying their contraceptive demand than those who never did that.

Woman's approval of family planning methods is an important variable determining unmet need. The odds of unmet need of a woman who disapproves family planning methods is 7.5 times that of a woman who approves family planning methods. This implies that a woman who approves family planning methods is more likely to satisfy her contraceptive needs than a woman who disapproves family planning methods.

Chapter Four
Conclusion and Recommendation

4.1 Summary and conclusion

In this study, it is attempted to assess some of the factors that affect unmet need for contraceptives among married women residing in rural areas in Ethiopia. Descriptive measure and association tests are used to complement logistic regression analysis. The study identified the following factors as the main determinants of total unmet need.

- ✓ Level of literacy
- ✓ Discussion with partner
- ✓ Respondent's approval of family planning methods
- ✓ Exposure to family planning methods on the radio
- ✓ Visited by family planning worker or not in the last 12 months before the survey
- ✓ Visited a health facility in the last 12 months before the survey.

The effect of these factors is summarized in brief in this paragraph. The chance of satisfying the contraceptive need of a woman with a higher level of literacy is greater than a woman with no literacy. A woman who is exposed to family planning messages on the radio is more likely to satisfy her contraceptive needs than otherwise. Women who were visited by family planning worker have a better chance of fulfilling their contraceptive needs as compared to those who were not visited. A woman who visited a health facility have a better chance of satisfying her demand for contraceptives. Women who discussed family planning methods with their partners are more likely to satisfy their contraceptive demand than those who never discussed family planning with their partners. A woman who approves family planning methods is more likely to satisfy her contraceptive needs than a woman who disapproves family planning methods. In short, a woman with a higher level of literacy, exposed to family planning messages on the radio, was visited by family planning worker, had visited a health facility, discussed family planning methods with partner, who approves family planning methods is more likely to satisfy her contraceptive needs.

Though some factors such as religion and many of demographic variables considered, in general, are not significant in affecting total unmet need, their association with unmet need are found to be significant when distinction is made between unmet need for spacing and limiting.

Knowledge of family planning method and perceived husband's approval of family planning methods are associated with total unmet need, unmet need for spacing and unmet need for limiting. On the other hand discussion with partner about Family planning methods and respondent's approval of these methods are associated with total unmet need and unmet need for spacing.

From the tests of associations between unmet need and the explanatory variables, it can be concluded that some factors may influence unmet need for spacing and limiting differently. To mention one situation as an illustration it was noted that level of literacy is significantly associated with unmet need to limit but it is not associated with unmet need for spacing.

4.2 Recommendations

Based on this study, the researcher believes that promoting family planning messages through the radio and increasing the awareness of family planning methods have to be given due attention to alleviate the problem of high level of unmet need. Family planning programs should encourage a woman to discuss family planning methods with her partner and promote family planning methods to reduce the higher level of unmet need. In addition a closer relation between family planning workers and woman may also contribute in alleviating the problem of unmet need.

Besides, increasing the level literacy of women and improving access to health facilities may also contribute in reducing the higher level of unmet need indirectly. Therefore, promoting involvement of women in literacy campaign and increasing women's access to health facilities should be given attention.

Finally, if the problem of unmet need is further studied in depth, there will be a better understanding of the problem.

4.3 Limitation

It is worthwhile to mention some of the constraints the researcher faced while undertaking this study. The constraints were:

- ✓ Shortage of time.
- ✓ Unavailability of softwares particularly suitable for logistic regression analysis.
- ✓ Shortage of money and relevant materials such as stationary.
- ✓ Data problem
  - Unavailability of the variables ethnic groups and ideal number of children in a suitable form that might be worth including in the study.
  - Presence of missing values and non-response.

It is the belief of the researcher that the study would have been better accomplished if most or all limitations had not been there.

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Declaration

I, the undersigned, declare that the thesis is my original work, has not been presented for a degree in any other university and all sources of material used for the thesis have been duly acknowledged.

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This thesis has been submitted for examination with my approval as a University advisor.

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