ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

INSTITUTE OF POPULATION STUDIES

THE EXPERIENCE OF CHILD LOSS AND CHILDBEARING IN ETHIOPIA

By
Mesrach Hailu Demissie

A THESIS SUBMITTED TO:
THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF SCIENCE IN POPULATION STUDIES

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Table of Contents

page

List of Tables

List of Figures

ANNEXES

ACRONYMS/ABREVATIONS

AFM--------Age at first marriage

AFB---------Age at first birth

ASFR---------Age specific fertility rate

ACEB-------Average number of children ever born

CB-----------Children born in the last five year

CEB----------Children ever born

CSA----------Central Statistics Agency

EDHS--------Ethiopian demographic and health survey

ECWA-------Economic Commission for Western Asia

ESCAP-- ----Economic and Social Commission for Asia and the Pacific

IMR----------Infant mortality rate

LDCs--------Least developed Countries

MDCs-------Most developed Countries

MOFED-----Ministry of Finance and Economic Development

NGO---------Non-governmental organizations

GFR----------General fertility rate

GO-----------Governmental organizations

NFFS--------National Family and Fertility Survey

SNNPR------Southern Nation's Nationality and Peoples Region

TFR----------Total fertility rate

UN-----------United Nation

UNFPA------United Nations Population Fund

UNICEF----United Nations Children's Fund

WFS---------World Fertility Survey

ABSTRACT: *Child mortality aggravate burden on mothers in different ways. Among this the study focused on its effect on increasing their life time pregnancy to replace their lost child and some of them might fear in losing the one that was replaced and decide in giving large number of births to be secured. To examine this effect of child loss experience on fertility, ever married females of reproductive age with at least one childbearing experience were selected from EDHS 2005. First chi-square was used to test the association of demographic, behavioral and socioeconomic variables with fertility measured by CB or CEB. Methods like Brass P/F ratio and different Bi-variates were implemented to compare the fertility of mothers with child loss experience and with no experience. In addition to this binary logistic and count data model Poisson regression were implemented to examine the socioeconomic, behavioral and demographic determinants of child loss and fertility in Ethiopia. More over the study clearly showed the differential in child loss and fertility by urban and rural residences with respect to the determinants. The study used two statistical software's SPSS and STATA for analysis.*

A 2.7 increase in TFR for mothers with the experience was obtained by using Brass P/F ratio. This implies that child loss experience had a big share in increasing the TFR of mothers. The result of the bivariate analysis showed that an increase in the level of child mortality had impact in increasing the level of fertility which was measured by CEB. The poison regression model indicated that child loss experience, religion, age of mother, marital duration, place of residence, AFM, AFB, duration of breastfeeding, mother's education and type of contraceptive method are important determinants of fertility of mothers. Similarly multivariate-logistic regression model revealed that exposure to media, place of residence, region of residence, sex of child with ($P<0.05$), marital duration, AFM, age of mother, duration of breastfeeding, work status and education of mothers with ($P<0.001$) found to have a significant effect on mothers experience of under five child loss.

The result clearly indicates child mortality affects the fertility of mothers, and the effort to reduce fertility and child mortality in Ethiopia will be fruitful if greater emphasis is given to their socioeconomic, behavioral and demographic determinants. More over it indicates that much effort is needed to reduce fertility in rural Ethiopia.

CHAPTER ONE

Introduction

1.1. Background

The experience of child loss and childbearing are the most important areas of population research. Even though the questions of child mortality and fertility are major areas for demographers, not much study has been done on the effect of child loss experience on fertility in Ethiopia. The link between child mortality and fertility was observed by many researchers, for instance based on the experience of Bangladesh mothers, the death of an index child was associated with shorter than expected birth interval and a higher probability of conception or birth (Park et al., 1998).

According to Notestein theory(1945), the demographic transition theory that was drown from the experience of eighteenth and nineteenth century Western European countries, hypothesized a steady fertility decline following the process of socioeconomic development or 'Modernization', the argument was that processes that are part of 'modernization' are responsible for precipitating a secular decline first in adult and child mortality, and then in infant mortality, and also accounts for conditions favoring a secular fertility decline as cited by (Palloni and Rafalimanana,1997). The theory describes that fertility decline did not begin until mortality drops primarily child mortality to a very low level.

One frequent response of women worldwide to infant death is the renewed pregnancy-an attempt to replace relatively that which was lost (Choudhury et al., 1976).This effect of child mortality on fertility by deliberate attempts to replace any child who dies at an early age in order to attain a desired number of surviving offspring at the end of reproductive life is ***replacement effect***. This behavior of replacement in which actual fertility will decline with reduced child mortality resulting in a new level of actual family size (Palloni and Rafalimanana, 1997)

Connection between child mortality and fertility are at the root of many explanations of the demographic transition and are important for population policy in less developed countries like Ethiopia (Wolpin, 1984). The net effect of child mortality experience on fertility of mothers with the experience could be substantial. The ***insurance effect*** which operates in anticipation of high child mortality, evidence from Goa, India showed that women with personal experience of child

loss and pessimistic opinion about the level of mortality produced on an average about two children more than similar women who never experienced a child loss and optimistic about the level. In terms of the preferred family size, this effect could bring about as high a difference as 3.6 children (Syamala, 2001).

The death of an infant leads to sudden termination of breastfeeding and this initiates the continuation of ovulation and increases the chance of conception. This ***physiological effect*** of infant mortality on fertility works through the effect of lactation on post-partum amenorrhea, and this mechanism should be more powerful in societies where the practice of breastfeeding is widespread and where contraception is not universally used (Assefa, 1992; Palloni and Rafalimanana, 1997).

Research findings about the relationship indicate that child mortality experience is an important determinant of fertility and that reduction of child mortality is a pre-condition for successful population control programs (Lindstrom and Gebre-Egziabher, 2001, Pebley et al., 1979, Alam , 1995,Dust,2005).Following this research finding, resources directed towards achieving some of the Millennium Development Goals would have high cost effectiveness if invested in child mortality control programs using utilization and quality of health care, particularly care for under five children and initiating NGO's working on Pediatrics.

Studies by several investigators have reported that lower regional death rates are correlated with lower levels of fertility or that a decline in the death rate; when lagged several years, has substantial negative effects on the birth rate (Mark and Schultz, 1983).In this study, only child mortality, which can have more influence on fertility than over all death rates is considered. A study in Guatemalan using information from ever married women of reproductive age shows high fertility among women who had lost children compared with those with no child loss experience (Pebley et al., 1979).

This study presents findings of an empirical analysis of the effects of child mortality on fertility in Ethiopia, a country with moderately high levels of child mortality. Using the data, an effort was made to explain the contribution of child mortality in increasing the fertility of mothers who experienced child mortality in the population. In this study, the effect is observed using two different approaches: the first is under five child mortality with births in the last five years and

the second is life time child loss with total children ever born. In addition to this, child mortality and fertility differential with respect to the socio-economic, behavioral and demographic factors between those women living in urban and rural area of the country were considered.

1.2. Statement of the Problem

Nearly 90% of all the births in the world occur in developing countries-115million births per year. These 115 million births are the outcome of about 180million pregnancies. Almost 600,000 women each year die from pregnancy related causes and 99% of them in developing countries. About 1 in 48 women in developing countries die from pregnancy related causes, compared with only 1 in 1800 women in developed countries (Tsui et al., 1997). High fertility is responsible for population growth and women reproductive health problem. It is essential to deal with reducing fertility to come up with a solution for its consequence.

Sub-Saharan Africa is by far the highest with rate of child mortality – on average, one in every six children dies before age five – the region as a whole has shown the least progress in child mortality reduction since 1990, and managed to reduce the burden of child mortality by only 14 percent between 1990 and 2006. A number of countries in the region are still registering increases in under-five mortality rates. In 2006, 49 percent of all deaths of children under age five occurred in sub-Saharan Africa, despite the fact that only 22 percent of the world's children are born there (UNICEF, 2008).

If fertility were to be held constant at its current level for every country, the world population would reach a total of 11.7 billion persons by the year 2050, almost doubling its present size. Three least developed countries—Bangladesh, the Democratic Republic of the Congo and Ethiopia—will be among the ten most populous countries (United Nations Department of Economic and Social Affairs, 2004).

On average, a mother in Ethiopia had 5.2 children over her life time. However, around 1 in every 8 new born children dies before their fifth birth day (CSA and ORC Macro, 2006).In the area population is presently growing at a rate of 2.62% adding approximately 2 million persons per year. With this rate of annual growth, it will only take about 25 years for the present population to double itself (MOFED, 2007).According to the UN population projection, Surprisingly

Ethiopia will be one among the first five countries in the world that are contributing most to the world population growth next to Nigeria with additional 80 million people over the next three decades.

In Ethiopia under-five mortality rates have steadily declined to 123 out of every 1,000 live births, down from peak levels in 1990 when 204 out of every 1,000 children died before the age of five. However "with close to 400,000 still dying from preventable causes each year, the country continues to have one of the highest child mortality rates in the world" said UNICEF Executive Director Ann Veneman. (Accessed on Aug 26 2008 www.unicef.org/media/media_38456.html).

Even though a number of studies have been made on the relationship between mortality and fertility, they were based on group mortality at the country level using NFS. It is difficult to distinguish the impact of country level rate of mortality on fertility using only the trends since there are different characteristics which are unobservable behind the trend. Much was not done at individual level experience of child loss and fertility that can more clearly shows their link.

Longer duration of breastfeeding extends birth interval. Curtailment of breastfeeding upon the death of an infant may lead to conception if not followed by other contraceptive methods. But females who lost their infant forced to stop breastfeeding and are susceptible to pregnancy. In the absence of breastfeeding the postpartum amenhoerric period is about two months (Lioyd and Ivanov, 1988) as cited by Lindstrom (2001). The high rates of infant death represent, in addition to other problems, gross reproductive waste, exhausting the physical, economic and psychological resources of women who bring such vulnerable offspring (Bhuyan, 2000).

The reduction of child mortality is one of the most strongly and universally supported development goals. In high mortality settings, a large proportion of all deaths occur before age five. Despite considerable progress in reducing child mortality, there remains a large gap between Industrialized and least developed countries in the risks of dying before age five; for instance, in 2006, under five mortality stood at six per 1000 in the industrialized regions but at 142 per 1000 in least developed countries (UNICEF, 2008).

This study shows some factors which are responsible in changing child mortality and fertility levels. This may help programs that have been designed on both child mortality and fertility. As we can see the situation in Ethiopia, a little improvement is arising on the socio-economic performance of women, like education, participating in economic sectors and different programs on health services. But the question is how many of them and how much they are responsible for all changes on these two events child mortality and fertility? Even though some improvements have been made on women's empowerment, In terms of women's status, it is not possible to say "it is complete", men's dominance and women's dependency on men still exists in Ethiopia, particularly in the rural parts. This situation may affect the effect of women's status on child mortality and fertility in rural Ethiopia.

A fair allocation of funds between alternative health and family planning programs by the government require empirical information about the child mortality and fertility experience of different areas with in the country. This study is expected to show the target area to solve problem of unfair allocation of funds to the programs, that is to say, the question of identifying where the problem is found and needs more work will be answered. IMR is known to be one of the most sensitive and commonly used indicators of the social and economic development of a population, It is only natural that factors that affect human development in a country also affect infant mortality rates, and vice versa (Zakir and Wunnava, 1997).As the social and economic development of a country increases the IMR decreases. Here IMR is with in child in our case so that it is very important and current issue to deal with the problem.

In Ethiopia there does not exist more number of well documented investigations on this issue of child mortality and fertility. In addition to this fertility research is relevant whether a country has a pro or anti-natalist policy. Moreover this knowledge about fertility is required for the design of policies that are likely to have direct or indirect effects on fertility. This study will fill the gap in knowledge of the issue.

1.4. Literature Review

1.4.1. Theoretical Background

The theoretical link between child mortality and fertility can be explained in three approaches such as the replacement, the insurance, and the biological or physiological effect (Assefa, 1992; Palloni and Rafalimanana, 1997; UN, 1985).These effects were explained as follow. The **replacement effect** may involve replacement of a child who has died and it is a deliberate decision of couples to make up for the dead children. **The insurance effect** can be seen by forcing parents to give birth to as many children as possible in order to secure the survival of a sufficient number to match or exceed the desired number of children. And the third **biological or physiological effect** works through the effect of lactation on post-partum amenorrhea and its effect is strong in population where breastfeeding is widespread (Assefa, 1992; Palloni and Rafalimanana, 1997).

The increase in child survival chances facilitate a corresponding decline in the propensity to "hoard" or " replace" ; known mechanisms used by couples to ensure that they obtain desired family size(Makinwa, 2001). In all the cases mothers might give large number of births in order to secure the survival of their interest or overcompensate in order to replace and secure.

Biological effects of decreased child mortality may reduce fertility as a result of increased pregnancy intervals. Because the death of a breastfed child cuts short lactation and may thus reduce the length of the postpartum anovulatory period, improved infant survival should prolong lactation and increase average length of pregnancy interval (Pebley et al., 1979). Birth interval tends to be shorter following the death of a child than when the child survives (Preston, 1978) as cited by Assefa (1992).

In this study considering the last five years child mortality and childbearing experience the link between child mortality and fertility was observed. In addition to this considering the life time child mortality and childbearing experience the effect further observed.

The demographic transition theory postulates that the reduction of the mortality of under five children is followed by the reduction of fertility with delay (Raivio, 1990). The safety first model as applied to reproductive decisions suggests that parents define minimum requirements for old-

age security in terms of a certain number of surviving children. The fertility level that is consistent with this goal will depend primarily on the probability of child survival. The higher the level of child mortality, the greater the fertility necessary to achieve the goal. On the other hand, in the safety first model an improvement in infant and child mortality would, other things being equal, reduce the number of births needed to achieve the security target. Unless this number exceeded the level of natural fertility, one would expect an improvement in mortality to have a negative effect on fertility (Cain, 1984).

Notestein (1945) proposes that fertility reduction is the rational response to the realization that with lower infant and early child mortality fewer births are needed to secure a desired number of surviving children cited by (Palloni and Rafalimanana, 1997).

1.4.2. Demographic Factors

Using the 1920-1990 data from Latin America Countries, Palloni and Rafalimanana (1997) showed Mexico was a country with rapid mortality decline beginning immediately during the Post World War II period but with a fertility decline that begins only in the late sixties and early seventies. The study showed the decline in mortality came before the beginning of fertility decline. This study focuses on individual level child mortality experience, not on macro level or over all mortality, and its effect on fertility can be clearly investigated.

Much has been observed about the influence of fertility on child mortality. The risk of dying, particularly during the second year of life, was higher if the mother had an additional birth within a short period that is poorly spaced births tending to increase risks of dying for children (Hobcraft et al., 1985).This study focused on the reverse effect that is the influence of child loss experience on fertility of mothers. Using a discrete-time, discrete-outcome dynamic stochastic fertility model and based on 188 Malay women, child survival effects were found to be greater: a reduction by 0.05 percentage points reduced the number of children ever born by ¼, as the survival probability fell down, there was also a tendency to have children earlier (Wolpin, 1984).

Parents who expect to have children with a high risk of mortality (for example, low birth weight) might seek prenatal care earlier in their pregnancies and plan to have more children than parents who expect to have children who are to be born in less risky environments (Mark and Schultz,

1983).In Ethiopia, where more than 75 % women in the reproductive age live in rural part and give birth usually under high risk than those live in urban areas, the problem is expected to be massive. Women who do desire additional children are likely to be more experienced with child loss (Pebley et al., 1979). A child probability to survival influences the number of births (Choudhury et al., 1976). A study in rural Butajera revealed that child mortality affected number of children ever born alive significantly (OR= 7.39, 95% CI: 4.62, 9.08) (Yohannis et al., 2003).

In addition to allocating public resources to improve child health, reduce child mortality and to help people avert unwanted births, it should be useful to understand the forces initiating women to give large number of births. Variation in child death rates across families may be due to the healthiness of residential area as well as to differences in investments in children by parents (Mark and Schultz, 1983) if so studying the differential of child mortality experience and fertility of mothers who live in urban and rural area of the country is reasonable. Women with personal experience of child loss and having pessimistic opinion about the level of mortality, produced on an average about two children more than similar women who never experienced a child loss and optimistic about the level (Syamala , 2001).

There is no question that the continued lowering of child mortality must continue to be a priority concern of policy makers, along with other goals related to fostering economic development and decreasing population growth (Pebley et al., 1979).Reduction of child mortality is an important factor in reducing fertility in countries such as Nepal, Bangladesh and Pakistan. The direct experience of losing a child tended to make women, especially low parity women, more pronatalist. While the measurable effects of child mortality on fertility were small, the findings about attitudes were highly suggestive (UN, 1985).

The risk of death increased by 1.085 times for every increase in parity of children (Mturi and Hinde, 1994). On the other hand when child mortality is high, parents raise their fertility to ensure that some will survive to adulthood (Brass, 1978).

AFM is the age at which first marriage takes place.AFM and proportion of women that marry are important determinants of fertility. In Ethiopia, particularly in rural Ethiopia, where more than 80% of the country women in the reproductive age are living ,AFM is not yet rise up ,and hence childbearing expected to start early in the area. The chances of infant deaths are expected to be

higher at younger and older ages while lower for mothers at middle ages, there is a U-shape relationship between infant deaths and maternal age (Teshome and Chaudhury,1991). Age at first marriage is expected to have major effect on fertility of women since women who marry early have on average a longer period of exposure to pregnancy and a greater potential to give large number of lifetime births. The main events or phenomenon associated with fertility are age at menarche, age at marriage and age at menopause (Dabral and Malik, 2004).

In Ethiopia the median age at first marriage among women age 20-49 was 16.5 years. There was a wide variation in AFM among regions in Ethiopia (excluding Addis Ababa). The lowest median AFM was in Amara 14.4 and higher in Harari 18.9(CSA and ORC Macro, 2006).

Mean age at attained parity is lower for women experiencing child loss. for example, In Costa Rica the mean age of women at the birth of their first child whose first child had died before the birth of the second was 19.5years compared to 20.15with the child survived, similarly the mean age of women at the birth of the second child where both children died, was 19.41 as against 22.15 where both survived. Women at any parity seem to exhibit higher subsequent fertility when they have experienced child loss (Balakrishnan, 1978).

Mothers age under 20years had lower IMR (Alam, 1995).A study made by Bouvier Rao based on Rhode Island data indicates there is an inverse relation between AFM and CEB. An analysis of the social and demographic correlates of fertility shows that infant and child mortality, level of education and AFM among the factors which significantly influence fertility in Tanzania (Mturi and Hinde, 1994).Based on 18 countries DHS data, the average excess mortality risks for children under 18 was 51% across all the countries compared with mothers of age group 20-34, and concluded that prematurity was the possible factor for the risk of child motality (Hobcraft, 1992)

It is a common experience in many of countries in the world that males have higher mortality than females at all ages. According to Rutstein based on WFS data show excess male infant mortality in 27 of 29 countries. He also find out that for all countries together, male mortality is 1% below that of females for toddlers and 4% below for children between two to five years of age(Rutstein, 1983). Infanticide has been practiced to avoid having too many children, to select the sex of children, incase of deformities or twins. In many societies there is still an acceptance of

high rates of infant mortality and a lack of the need to take desperate measures to save an infant life (Scrimshaw, 1981).

1.4.3. Socio-Economic, Behavioral Factors and Fertility

It is much conclusive that education improves the quality of life for individuals and societies by strengthening their potential, more over it enables the society to a better use of resources. Education is a powerful instrument to change the woman's opportunity to get information, to communicate with other people and the external environment. It is to mean that education is an important tool for social and economic change. Using a discrete-time, discrete-outcome dynamic stochastic fertility model Wolpin (1984) showed that each additional year of schooling reduced the expected number of children by 0.35.

Educationally developed societies are characterized by having around replacement level fertility and very small child mortality. A number of studies on the determinants of fertility find out that the inverse relationship between education and fertility is one of the most consistent finding in the literature. For instance (Caldwell, 1980) has shown the importance of women's education to fertility decline in developing countries. Similarly (Caldwell, 1979) find out that women's education have a role to lower infant mortality. By using Cox hazard model a study in Bangladesh showed that the risk of child birth rose sharply among the educated if their children died, although the main effect of education itself was to reduce the risk (Park et al., 1998).

Using path analysis on the determinants of fertility among different social variables in India, among the social variables, female education is found to be an important predictor variable for explaining variation in fertility levels (Soni et al., undated).Psychological Fear of mortality is primarily related to lack of information; couples particularly male expressing a fear of mortality give large number of births and have lower education levels and less exposure to mass media (Mathews and Sear, 2008). Improvements in women's education raise child survival ages (Ware, 1977), since education raise women's skill and self confidence, increases their exposure to information, and alters the way in which others respond to them. Thus women's education has a significant negative impact on child mortality (Das Gupta, 1990).

Duration of breastfeeding is an important indicator of fertility behavior for females. Prolonged breastfeeding usually resulted in longer postpartum amenorrhea. This longer postpartum amenorrhea obviously increases birth interval. The effect of breastfeeding on survival declines as the age of the child increases i.e. breastfeeding was important to survival only in the first six months of life (Francis, 1988).On the other hand (Aguirre, 2007) told us stopping breastfeeding early during infancy considerably increases the likelihood of dying.

Breastfeeding was found to have a significant effect on both child mortality and fertility by many researchers. According to (Eshetu and Markos, 2002) short birth intervals are not crucial problems in populations that typically breastfeed for more than two years. Short duration of breastfeeding increase the risk of death during the first two years of life. Children or infants who did not breastfeed or breastfed for short period less than 18months are about 12 times more likely to die before their second birth day than infants who breastfed for more than 24months, more over infants who breastfed between 12 and 18months are also less likely to die before their second birth day than infants who did not breastfeed or breastfed for less than 12 months, after controlling other covariates in the model (Aguirre, 2007). Breast-feeding duration of more than 6 months showed association with less number of children ever born alive (OR= 1.92, 95 % CI: 1.30,2.80)(Yohannis et al.,2003) .

Religion which refers to a system of attitudes, beliefs and practices that individuals share is one of the institutions that affect fertility (Eshetu and Habtamu, 1998). In India fertility was the highest among Muslim and illiterate (Trypathy and Sarangi, 2004). Multiple classification analysis of census data on Shewa province in Ethiopia revealed differences in fertility by religious affiliation. Muslims had lower fertility than a combination of Catholics, Protestants, or Orthodox Christians in rural Shewa and total Shewa (Berhanu, 1994)

The fertility reducing impact of marriage and contraception was greater among urban than rural women, where as the fertility reducing impact of breastfeeding weakened with increases in the degree of urbanity. The effect of residence in urban areas tends to reduce fertility more through postponed marriage than through use of contraception in marriage (Cleland et al., 1985)

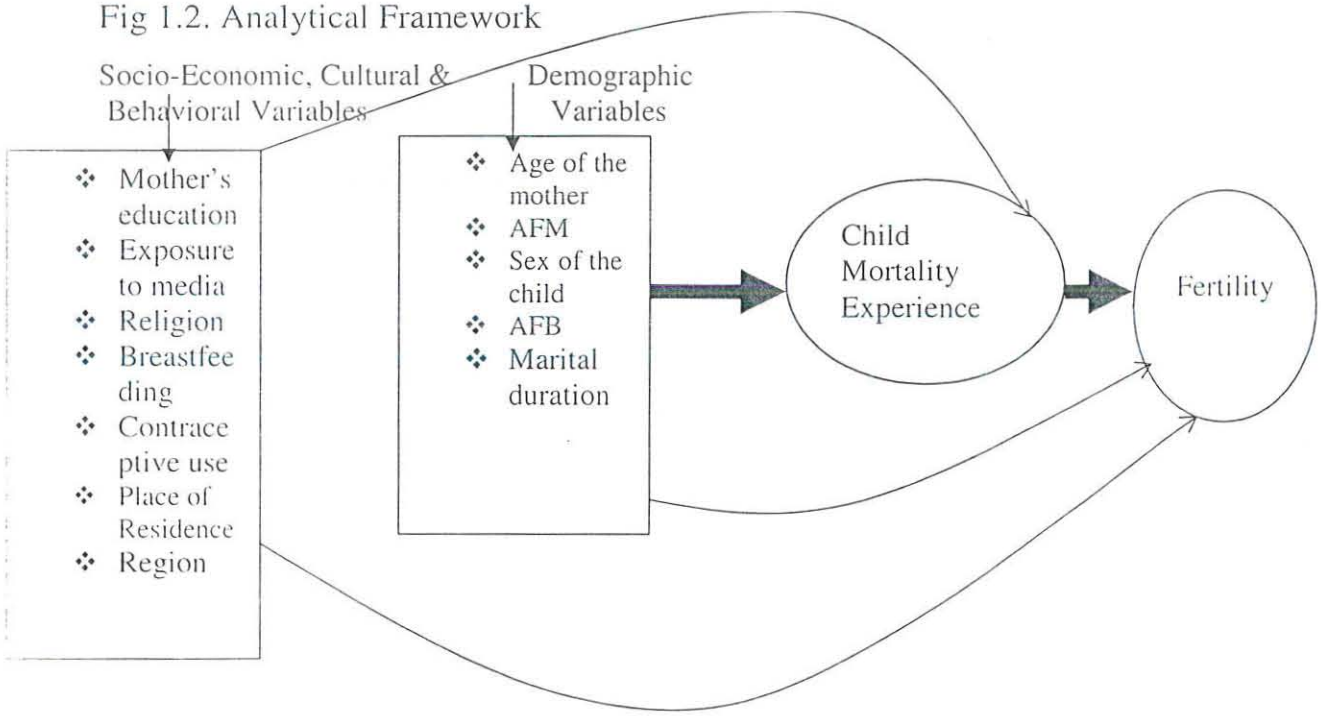
Generally the evidences of different studies in the literature supports demographic, behavioral and socio-economic factors are playing an important role in both child mortality and fertility. In

addition to this some studies clearly showed child mortality in affecting level of fertility by adding to the assumed effect of the demographic, behavioral and socio-economic factors using different models.

1.5. Analytical Framework

The analytic frame work Fig1.2 indicates how the investigation was done. The determinants of both child loss experience and fertility among the socio-economic, behavioral and demographic factors are expected to be clearly shown in the study. In this research process the effect of other determinants were controlled to get the only effect of child loss experience on fertility. In this study the major objective is to see the influence of child loss experience on fertility of mothers with the experience controlling place of residence. The socio-economic, behavioral and demographic variables may increase or decrease the magnitude or strength of relationship between child mortality and fertility in either positive or negative ways. In some cases, they may help in reducing fertility, there by adding to the assumed effect of child mortality on fertility. When you closely study this relationship, the change in fertility is a function of child mortality and the other variables mentioned.

Fig 1.2. Analytical Framework



Sources. The Researcher's own after reviewing the available literature.

1.6. Objective of the Study

1.6.1 General Objective

The general objective of the study is to examine the influence of child mortality experience on the level of fertility.

1.6.2 Specific Objective

1. To Identify important socio-economic, behavioral and demographic factors affecting child mortality and fertility in the country.
2. To assess the variation in children ever born between urban and rural residents with regard to the explanatory variables.
3. To assess how much child mortality experience increases the life time birth of mothers.
4. To check its consistency by comparing the results of this study with the findings of the study made at other areas and by other investigators.

1.7. Hypothesis.

The study has the following hypothesis.

1. There is significant difference in mean number of children ever born between those who have the experience in child loss and those who have not the experience.
2. There is significant difference in both child mortality and fertility among females following different religion.
3. AFM and AFB of the mother are negatively associated with both child mortality and fertility.
4. There is significant difference in child mortality experience and fertility by mothers who fed breast milk for different duration.
5. There is a significance difference in the influence of child mortality on fertility between mothers who live in urban and rural areas.

Even though EDHS was undertaken based on questionnaires designed for the households, the woman's and man's. This study considered only data obtained using woman's questionnaire. The EDHS 2005 survey woman's questionnaire contains information classified in different sections to collect woman's fertility history, childhood mortality, demographic and socio-economic backgrounds. For further information you can read the EDHS 2005 report, it gives detailed information about the methods and sampling procedures.

2.2.1. Variables

Independent variables-under five Child loss experience, Infant loss, educational status of women, Age of the mother, AFM, AFB, Exposure to media, Duration of breastfeeding, Place of residences, sex of the child, Religion, Work status, Contraceptive type, Region, Marital duration .

Dependent variable-Fertility measured by Children ever born per mother to relate with life time child loss experience and children born per mother in the last five year to relate with under five child loss experience.

2.2.2. Operational Definition of Variables

Under five Child loss experiences-The mothers experience in losing child under age five in the last five years preceding the survey. It was categorized as follow.

Mothers with the Experience---1 Mothers with no Experience----0

Infant loss experience- The mothers experience in losing child under age one in the last five years preceding the survey. Similar categorization like the under five.

Life time Child loss experience - This is the mothers experience in losing child in their reproductive age.

This variable is used in addition to the above to see the insurance or hoarding effect as it cannot be observed efficiently using the last five year experience of child mortality. Similar categorization was made like the above.

CB-The sum of children mothers born including those not alive in the last five year.

CEB- The sum of children ever born including those not alive. This variable is used to the above to see the insurance effect efficiently as it cannot be observed using the last five year

experience of child birth.

Note that. During the analysis total children ever born less than 13 were considered since total children ever born more than 12 is found to be extreme(outliers),even less than 9 were used to satisfy the assumption of Poisson regression model. On doing this equality of mean and variance is achieved with a tolerable gap (mean=3.9 and variance 4.1).

Educational status of women-This is a variable providing women's education with response rate of 100%. Categorized as:

1-No education 2-incomplete primary 3-complete primary

4-incomplete secondary 5-complete secondary and above.

Those mothers having complete secondary and higher educational level was merged due to small number of women with higher level education.

Exposure to media-Those females who have the exposure to either radio or television with 99% response rate and categorized as:

1- Who have either radio or television. 0-who have neither radio nor television.

AFM-The number of completed years at first marriage of mother, with response rate of 99.5% and categorized as:

1. < 18 2. 18 and above.

Age of mother-The age of mother in completed years with 100% response rate and this variable is categorized in five years interval to avoid the problem of age heaping.

AFB- The age of mother at the birth of first child categorized as:

1. ≤19 2. >19

Duration of breastfeeding-For how long in terms of months the mother fed her child. The Variable has a response rate of 99.2%.It was categorized as

1. ≤6 months 2. 7-12 3. 13-24 4. 25-36 5. 37 and more months

Place of Residence-It is the woman place of residence which is categorized as urban or rural with 100% response rate.

Sex of child-male or female with 100% response rate.

Religion-The religion that the woman was following. It was categorized as follow

Orthodox, Protestant, Muslim and Others with 99.9% response rate.

Region-It is the woman's region of residence.

Note: Different categorization might be used for some of the variables during analysis in different models.

2.3. Data Management and Statistical Analysis

The study selected the independent, dependent and other variables included in the analysis from the source. In addition to this, variables that could not be used readily were computed from the available variables and recoded as required. More over, the quality of the data was assessed before going into analysis using different ways as presented in the data quality section. All the descriptive part of the analysis was made by using sample weight given to EDHS 2005 data though the study have got no difference without giving weight. During the process of analysis the out liers and leverages were removed out. In the analysis, the effect of socio-economic and demographic independent variables was checked with both child mortality experience and fertility. To assess the effect of other independent variables with child mortality, the study considered child mortality experience of mothers as dependent variable and this experience was taken as independent variable to check its influence on main dependent variable fertility (measured by CEB and CB in the last five year).

The study used indirect techniques and descriptive statistics to explain the observations and to clean the data obtained and more. In addition to this Bi-variate analysis like χ^2 was implemented to check the association of fertility with the explanatory variables.

In addition to bi-variate analysis, a count data model from the multivariate was implemented to further approve the decision made i.e. poison regression model was used to determine the influence of the socioeconomic and demographic variables on fertility with particular attention given to child loss experience. As CEB is a count data dependent variable, poison regression model is found to be adequate (Berk and Mackdonald, 2007; Bavel, 2002). To implement this count data model only those mothers who satisfy the condition with mean and variance almost equal (CEB less than 9) were taken. In this paper the usual count data models Poisson regression and Negative binomial models were considered. Both based on the Poisson distribution. This study used the later model only to test over dispersion. If there was significance over dispersion, the negative binomial regression model would be used. The study used binary logistic regression for determinants of child mortality experience.

When we come to negative binomial regression model

$P(y/x) = \frac{\Gamma\left(y+\alpha^{-1}\right)}{y!\Gamma\left(\alpha^{-1}\right)}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\partial^{-1}}\left(\frac{\mu}{\alpha^{-1}+\mu}\right)^{y}$ Here alpha (α) represents the extent of over or under dispersion. If $\partial = 0$ the model reduces to Poisson regression, if not Poisson regression is inadequate.

In our case testing the hypotheses Ho: $\alpha = 0$. Fail to reject this hypotheses since P-value>0.05 in all the model. It means that no need to use negative binomial regression model as Poisson regression model is obtained to be adequate.

2.4. Data Quality Assessment:

To derive true and accurate demographic indicators such as TFR, GFR, CDR, CBR. IMR and the like- the quality of the data is expected to be good. If demographic data are defective, these indicators will not be accurate. Hence, it is necessary to do quality assessment.

Usually problems like incompleteness of reporting CEB and age heaping in DHS may arise particularly children dead in developing countries due to the sorrow following discussion about the death or the mothers are living in a culture that discourages discussion about dead (CSA and Macro, 2006) so that before going in to the analysis, the quality of the data should be assessed. An attempt was made to check the quality of the data by using techniques like mean parity for women in single year, proportion dead to check omission of live births, sex ratio by women's age in single year and women's single years age evaluation to assess age heaping (i.e. digit preference).

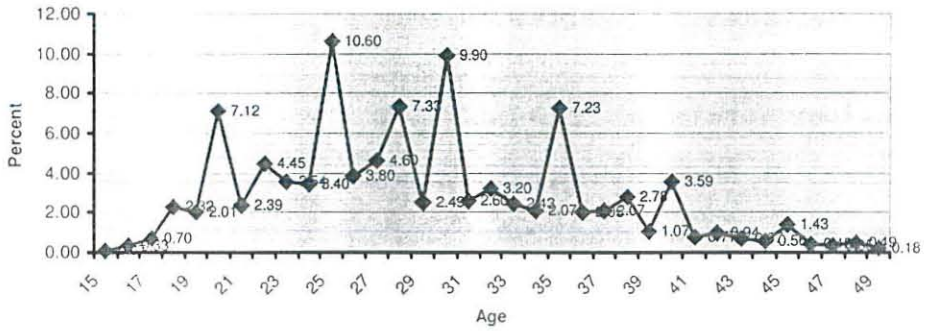
2.4.1. Age Data Evaluation

Several rates depend on ages and dates—especially recent levels of fertility and infant/child mortality. The overall quality of a survey's data is probably indicated by the quality of the age and date reporting (Pullum, 2005). Age is an essential demographic variable in any demographic study. Here in this study, to assess the quality of age data for mothers who have at least one childbearing experience in their life time, Myers Blended summary index was used as a tool to observe heaping (digit preference). The result of Myers Blended index (Table 3 annex) shows, a 24.07% of extent of concentration on or avoidance of a particular digit a, and it gives the

summary index for each terminal digit. The theoretical range of Myer's index is 0, representing no heaping, and 90 which would result if all ages were reported at a single digit (Shryock and Siegel, 1976). The index obtained for single age data reveals heaping or age preference for digit ending with 0 and 5.

Fig 2.1 given below indicates the percentage distribution of women in single year of age and it shows that the age report has formed grouping at digit ending in 0 and 5 more.

Fig 2.1. Percentage Distribution of Women's Age in Single Year, EDHS 2005.



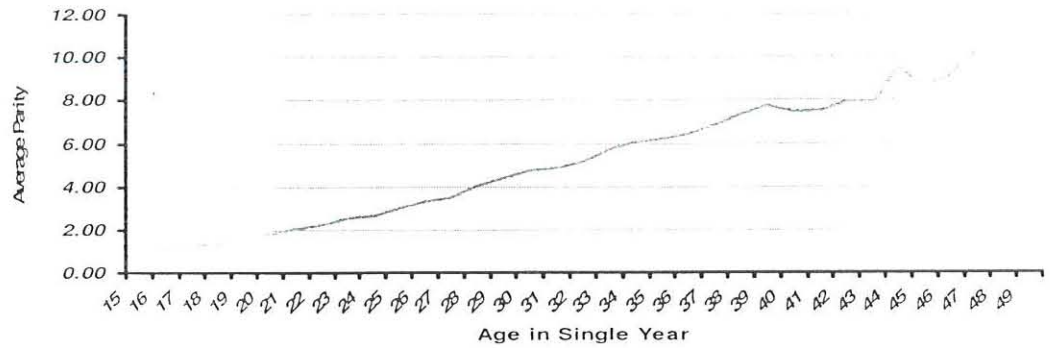
Data source. EDHS 2005 and computed by the author.

Errors might remain in age data even when the data are grouped in 5-year intervals, but the percentage distribution indicate an improvement in concentration and used grouped data for the analysis (Fig 4 in Annex).

2.4.2. Average Parity

One way of assessing the quality of the data on children ever born is examining the behavior of the average parities reported by women's age. The average parity in the 5-year age groups of women reveals an increasing trend. As the age of the women increases parity is expected to increase unless fertility increases at some time in the past. Fig 2.2 indicates that the data is not much affected by omission of children ever born but when older age groups of women were considered between age groups 40 and 49 a little omission of children is observed.

Fig 2.2 Average Parity by Single year Age of Mothers, EDHS 2005



Data Source: EDHS 2005 Computed by the Author.

2.4.3. Sex Ratio

To check consistency and quality of sex data, sex ratio for the number of children ever born and children born in the last five year by mother's age group was computed and it reveals variation by age group of mother .Sex ratio expected to fall within the range 1.02 to 1.07 with little variation by age group of mother to be acceptable. Even though the figures show a variation across age group of mother, the variation is not that much high to the age group lower than 40. But the sex ratios in the older age groups show a high variation from the others and far from the acceptable region. The sex ratio for age groups 15-19, 25-29 and 30-34 are in acceptable region. But mothers in age group 20-24 and 35-39 shows a little under reporting of male children (Table 2.1). Similarly older age groups of 40-44 and 45-49 reveals under reporting of male children. This under reporting of children born may affect the quality of the data. But the over all sex ratio 1.04 for all births indicate good quality of sex data.

Table 2.1. Children Born and Sex Ratio by Women's Age in 5-year Intervals, EDHS 2005.

Women's Age in 5-year intervals	Children born in last five year			Sex ratio
	Male	Female	Total	
15-19	375	364	739	1.03
20-24	1881	1717	3598	1.10
25-29	2640	2579	5219	1.02
30-34	1875	1791	3666	1.05
35-39	1386	1263	2649	1.10
40-44	466	548	1014	0.85
45-49	197	235	432	0.84
Total	8820	8497	17317	1.04

Data source. EDHS 2005 and computed by the author.

CHAPTER THREE

Background Characteristics of the Study Population

3.1 The Study Area

This study is conducted in Ethiopia which is one among the Sub-Saharan and East African countries. The country has an area of about1.1million square kilometers and bordered by Djibouti, Eritrea, Sudan, Kenya, and Somalia. The country constitutes of nine regional administrative areas called 'Regions' classified as Tigrai, Afar, Amhara, Oromia, Somali, Ben-Gumz, SNNP, Gambella, Harari and two city administrations Addis Ababa and Dire Dawa . The country had a population of about 73,918,505, in 2007 of which 37,296,657 male and 36.621.848 were female population. Among these only about 16 percent live in urban and the other 84 percent lived in rural areas. In addition to this more than 80 percent of the total population was in three regions naming Amhara (23.3%), Oromia (36.7%) and SNNPR (20.45) (CSA, 2008).

The age structure of the population is characterized by large number of children under 15 (around45%) while those in the age group 15-64 and above 64 accounts for 51.9 and 3.2 percent respectively (CSA, 2008) which indicates high dependency burden and high population momentum in the years to come. Surprisingly the estimated number of births in the country per year is about 3,201,000(UNICEF et al,2008) .The overall dependency ratio of the country is around 93%. i.e. for each 100 persons in the productive age group there are about 93 dependents to be supported. Out of the total female population of the country, women in the reproductive age (15-49) account for about 15,475,269 i.e.47.2 percent of the total female population of the country. Out of these, only 20.5 percent live in urban areas while the other 79.5 percent reside in rural areas of the country. The increase in the number of women in the reproductive age group 15-49 challenges the health services working on reproductive health and in Ethiopia the burden is expected to be high as the majority of women in the reproductive age are in rural Ethiopia where access to health service is limited.

The country comprises of different religious groups. Among these the following three are the major religious groups in declining order of percentage share Orthodox (43.5%), Muslim(33.9%),Protestant(18.6%)(CSA,2008).

The country is one of those with uneven distribution of population; its population density was about 68 persons per square kilometers (MOFED, 2006). The GFR and TFR of the country was 179 and 5.4 respectively, these figures were 200 and 6 for rural women and, 77 and 2.4 for urban. The country is experiencing one of the highest Infant Mortality Rate (77 per 1000 live births), under five mortality of 123 for both sexes (CSA and ORC Macro, 2006).Lack of good antenatal care and delivery, poor postpartum care, malnutrition, anemia, high fertility and the like contributed to the high mortality rates. Moreover, sexually transmitted diseases are among the major health concern of the country. Currently, the HIV cases are increasing very alarmingly with estimated adult prevalence rate of 2.1% and estimated number of HIV pregnant women is 66000 (UNICEF et al,2008), which is threatening the health status of the people, and if it continue unabated it is expected to have a serious adverse socioeconomic consequences in the country.

3.2. Levels and Trends of Fertility and Child Mortality in Ethiopia.

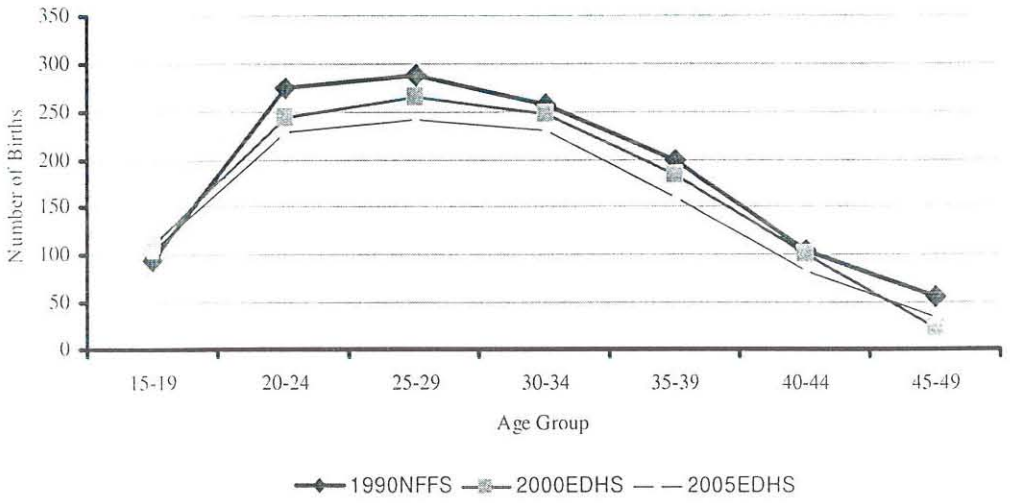
In the last 50 years, the average fertility in MDCs has declined from 2.8 to 1.6 children per woman. Although there are considerable regional variations, average fertility in LDCS has declined from 6.2 to slightly less than 3 children per woman; a decline of 3. Fertility has declined most quickly in Latin America and Asia from 5.9 to 2.6; and less rapidly in North Africa and Western Asia, from 6.6 to 3.5 children per woman. The transition was slowest in sub-Saharan Africa in which fertility declined by 1 only from 6.5 to 5.5 children per woman (UNFPA, 1999). Different factors might be responsible for the decline of TFR, among these, reductions in under five mortality rates, increased contraception especially the use of modern methods, increase in AFM, and improvement in the status of women are among the leading causes for the decline in TFR(Makinwa, 2001).

Ethiopia is one among countries in sub-Saharan Africa in which fertility levels appear to decline but the change is not appreciable. Fertility trends using estimates obtained in earlier surveys 1990 NFFS, the 2000 EDHS, and the 2005 EDHS shows a decline in fertility from 6.4 births per woman in the 1990 NFFS to 5.4 births in the 2005 EDHS, a one-child drop in the past 15 years. The decline in fertility was more pronounced in the 10 years between 1990 and 2000 than in the five years between 2000 and 2005(CSA and ORC Macro, 2006). The trend in ASFR shown in the Fig 3.1 reveals that the level of ASFR at the beginning and end of childbearing age have not

shown a marked difference in the 15 years period. This indicates that In Ethiopia even though there is a reduction in fertility, early childbearing has not shown a significant change. This might affect all the efforts made to reduce fertility as the lower age groups have more exposure to increase the fertility of the country.

Similarly trend in under five mortality rates has shown a decline by 44.8 in the 10 years between 1990 and 2000, the decline in the five year interval between 2000 and 2005 was about 43.2 Which reveals a marked reduction like fertility with in five years interval and it shows a little clue to think about the relationship between child mortality and fertility.

Fig 3.1.Trend in ASFR, EDHS 2005

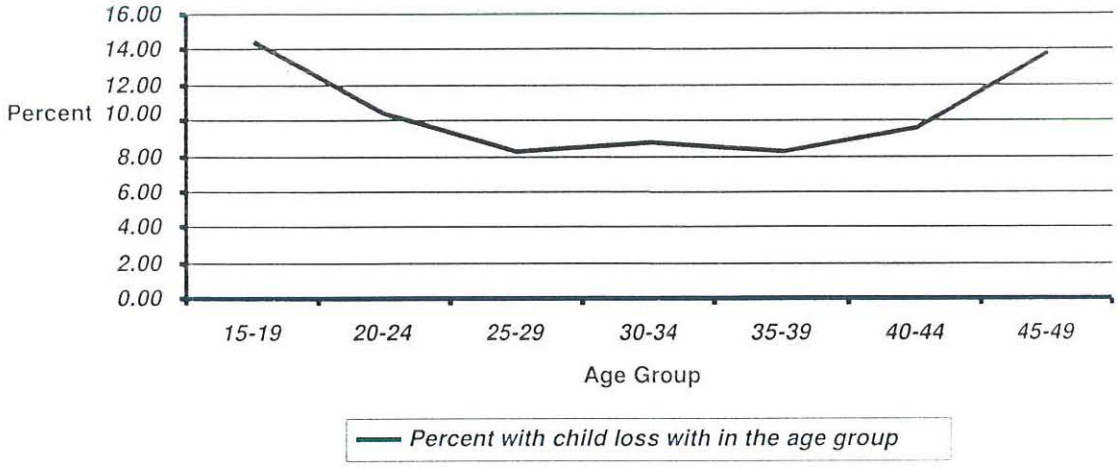


Data source: 1990 NFFS, 2000EDHS and 2005 EDHS computed by the author.

3.3. Women in the Reproductive Age and Their Child Mortality and Fertility Behavior.

Fig 3.2 reveals that, the shape of child mortality experience among mothers in the reproductive age considering their five year age groups was almost a U-shape. That is mothers who give birth early and lately take the highest share in child loss experience. According to the figure, it indicates that under five mortality was high at the extremes of reproductive age range and lower in the middle of the age groups. It is highest for mothers in their teen and begin to decline and reaches low level in the age group 25-29, again begins to increase until the end of reproductive age.

Fig 3.2. Percent Child lost with in the Age Group of Mothers, EDHS 2005.

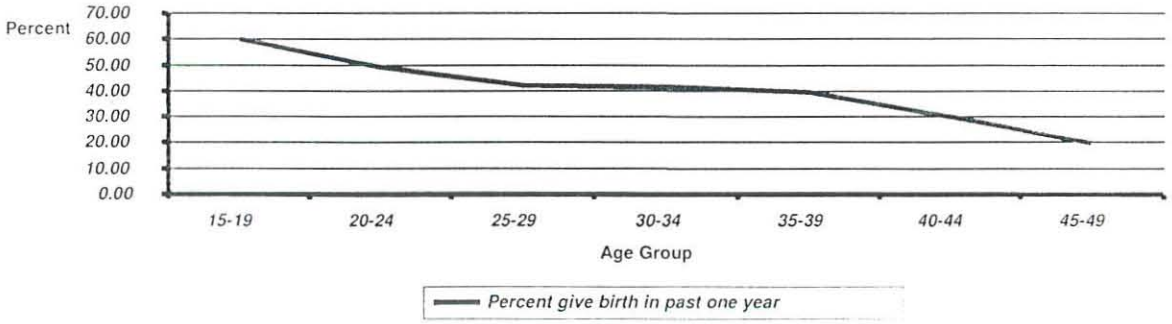


Data Source. EDHS 2005 and computed by the investigator.

Similarly Fig 3.3 reveals that the youngest age groups of women 15-19 took the highest in percentage of birth in the last 12 months and similarly they took high percentage in child loss next to the oldest age group. It reveals in different ways of the ASFR since the percentage indicated in Fig 3.3 reveals percent of mothers with the experience in giving birth in the last one year with respect to that age group number of mothers who had at least a one childbearing experience. But the ASFR consider all women in that age group.

When we observe the percentage of mothers who are giving birth in past one year, younger mothers of age group 15-19 took the highest share; this implies that for mothers of reproductive age childbearing starts early in Ethiopia be which lead women to reproductive health problems, increases the risk of child to death and increases their duration of childbearing potential. In addition to this a question on the oldest age group might be raised, why their share is in the reverse direction. That is, their share in child mortality experience is great but their share in last 12 months birth is the smallest of all. This might be explained in different ways. among these reasons the most fundamental is their potential to give birth. Mothers in old age may arrive at menopause earlier than the average age 49. In addition to this, even if old age mothers have the potential to give birth to replace the lost child, they ignore to respond due to achieving the desired number of births and fear of old age pregnancy complication.

Fig 3.3. Percent of Mothers with in Age Group Who Give Birth in Past One Year, EDHS 2005.



Data Source. EDHS (2005) and computed by the investigator.

3.4. Childhood Mortality and Fertility Differentials by Mothers' Socio-Economic, Behavioral and Demographic Characteristics.

There is a differential in the fertility behavior of women of different social, behavioral and demographic backgrounds, usually in rural areas the value of children is higher, and the costs of children are relatively low and the benefits high. On the other hand in urban areas, the value of children is low, since the costs of children become high. Children may present to the family not only direct costs, but also lose income for the mother who gives up work to care for children (Derebssa, undated).

It is not only variation in fertility of mothers in reproductive age groups among regions in Ethiopia but also there is a variation in child mortality experience. As we can see from the Fig 1 in annex, it tells us that percentage of child mortality experience in Amhara region is the top from all the regions followed by SNNPR and AFAR respectively. In Amhara from all mothers of reproductive age group about 11.72 percent of mothers have the experience in losing at least one child under five in the last five year. This high child loss experience in Amhara, SNNPR and Afar regions might be due to the high prevalence of early age at first birth, age at first marriage and traditional practices. In a similar fashion life time child loss experience in Amhara and SNNPR took the leading percent and the possible reason mentioned for under five can work here again.

According to Table 7 (in annex), AFB and AFM found to have a difference in mean number of life time child loss experience. In addition to this AFM is found to have a difference on average under five child loss experiences. So that the high child loss experience in Amhara region might be attributable to AFM and AFB. It is not as such surprise to get variation in child mortality experience between the urban and rural residences of women, due to different factors responsible to increase the experience in the rural part like shortage of access in schooling, shortage of access in quality health facilities, environmental sanitation relatively and the like.

In Ethiopia the infant mortality rate in the five years preceding the survey was 77 and under-five mortality was 123 deaths per 1,000 live births for the same period 2005. This means that one in every thirteen Ethiopian children dies before reaching age one, while one in every eight does not survive to the fifth birth day. These figures have great variation between urban and rural residences, the IMR was 81 and 66 per 1000 live births and under five ($_5q_0$) was 135 and 98 for rural and urban residences respectively (CSA and ORC Macro, 2006).

3.4.1. Socio-Economic Characteristics of Mothers

The result of Table 3.1 reveals number of women in the reproductive age and their experience in under five child loss and childbearing by their socio-economic factors. Childbearing was obtained to have an association with almost all socio-economic factors mentioned in the Table 3.1. The result shows the variables considered during analysis and their categorization. The percent child loss experience in rural Ethiopia was almost twice as urban; on the other hand there was a big gap in ACB and ACEB between rural and urban women.

In this study the experience of about 9259 mothers was taken, among these 1261 are from urban and the remaining from rural residences. The percent experience in under five child loss by religion was almost the same but the average children born in the last five year and CEB were found to be higher for Muslims. About 16158 children born in the last five year and the share by each category is shown in the Table 3.1. Similarly the fertility in terms of ACB and ACEB shows a reduction by exposure to media, work, and education.

Table 3.1. Child Mortality and Childbearing by Socio-economic Background of Mothers, EDHS 2005.

Variables	Women 15-49 age group	%Experience in under five child loss	Child born five year before survey	ACB 5-year before survey	χ^2 value (life time CEB)	χ^2 value (CB five year before survey)	ACEB
	15-49	Yes(with in the category)					
Religion					112.75***	229.7***	
Orthodox	3672	6.42	5950	1.62			4.1
Protestant	1659	6.26	2952	1.78			4.42
Muslim	3610	6.27	6702	1.85			4.56
Others	314	5.06	546	1.73			4.55
Place of Residence					432.1***	230.6***	
Urban	1261	3.41	1905	1.51			3.13
Rural	7998	6.74	14253	1.78			4.55
Region					586.85***	375.5***	
Tigrai	948	5.38	1581	1.67			4.38
Afar	534	6.93	956	1.79			4.66
Amhara	1387	8.72	2239	1.61			4.28
Oromiya	1780	6.04	3325	1.86			4.69
Somali	606	5.28	1178	1.94			4.82
Ben-Gumz	656	6.08	1163	1.77			4.22
SNNP	1644	6.98	2920	1.77			4.65
Gambela	477	5.45	736	1.54			3.60
Harari	493	4.04	875	1.77			3.68
Addis Ababa	335	2.09	459	1.37			2.58
Dire dawa	399	6.52	726	1.82			4.1
Work status					14.5	55.6***	
Not working	7134	6.08	12595	1.76			4.38
Working	2123	7.00	3561	1.67			4.26
Exp to media					109.54***	36.8***	
Have not the exposure	5916	7.09	10458	1.76			4.52
Have the exposure	3253	4.94	5564	1.71			4.09
Education					452.2***	112.2***	
No-education	7171	7.0	12800	1.78			4.67
Incomplete-primary	1296	4.3	2223	1.72			3.82
Complete-primary	138	5.1	216	1.57			3.15
Incomplete-secondary	434	2.8	638	1.47			2.62
Complete-secondary and above	220	1.4	281	1.28			2.25

* Significance P-value<0.05 **significance p-Value<0.01 *** significance P-value<0.001

%experience is with in the category

Data Source. EDHS 2005 Computed by the Author

3.4.2. Behavioral and Demographic Characteristics of Mothers.

Similar to Table 3.1 the result of Table 3.2 reveals number of women in the reproductive age and their experience in under five child loss and childbearing by their behavioral and demographic factors. Excepting with sex of child, childbearing was obtained to have an association with all the other factors mentioned in the Table 3.2. The result shows the variables considered during analysis and their categorization.

When we consider mothers who have different duration of breastfeeding behavior in terms of months to their child, it reveals an inverse relationship with CB in the last five year. There are different factors which may reverse the relationship that will be observed in the multivariate section, the result shows only its association with childbearing not the only strength of breastfeeding behavior in affecting the fertility of mothers.

The result reveals that women in the oldest age group 45-49 and youngest 15-19 have the highest experience in child loss. More over ACEB has an increasing trend along age groups but ACB has almost parabolic shape with age group of women. The result shows variation along age groups, CEB is influenced by time exposure among mothers of different age groups. It is to say that older mothers have long time exposure to give large number of births where as younger have short. When we come to CB in the last five year, it is not much affected by time exposure.

In addition to this AFM and AFB shows an association with fertility. Mothers who marry and give birth early had higher percent share in under five child loss, but there was no big gap in ACB for AFB and AFM. Though AFM and AFB fails to show their effect with fertility measured by ACB, both show their association with fertility measured by CEB as shown on Table 3.2.

The result cannot tell us the author's interest, since the observed ACB and ACEB are the result of both groups (mothers with the experience and those without the experience of child loss).Further method was used to observe the difference in number of CB and CEB by the two groups; the next chapter includes these methods and the multivariate result.

Table 3.2. Child Mortality and Childbearing by Behavioral and Demographic Background Of Mothers, EDHS 2005.

Variables	Women 15-49 age group	%Experience in under five child loss	Child born five year before survey	Average CB 5-year before survey	χ^2 value (life time CEB)	χ^2 value (CB five year before survey)	ACEB
	15-49	Yes(with in the category)					
Marital duration					11584***	647.5***	
0-4	1283	5.61	1795	1.40			1.43
5-9	2461	6.62	4655	1.89			2.68
10-14	2244	5.17	4063	1.81			4.28
15-19	1614	6.87	2900	1.79			5.92
20-24	1029	6.80	1792	1.74			7.20
25-29	455	7.39	691	1.49			8.17
30+	173	9.24	262	1.40			9.24
Age group					8703.56***	330.3***	
15-19	493	8.92	690	1.4			1.42
20-24	1922	6.35	3345	1.74			2.18
25-29	2698	5.23	4879	1.81			3.51
30-34	1860	6.67	3382	1.82			5.11
35-39	1428	6.15	2521	1.76			6.65
40-44	604	5.58	951	1.55			7.73
45-49	254	11.32	390	1.46			8.93
Sex of child					10.56	2.1	
Male	4707	6.94	8221	1.74			4.31
Female	4552	5.61	7937	1.74			4.39
Age at first birth					177.3***	11.7*	
<=19	6040	6.6	10537	1.74			4.57
>19	3219	5.7	5621	1.73			3.79
Age at marriage					193.1***	18.9***	
<18	6370	6.90	11134	1.75			4.52
>=18	2889	4.90	5024	1.73			3.76
Duration breast feed					116.1***	842.5***	
<6	1834	21	3484	1.90			4.10
7-12	1890	5.90	3675	1.94			4.49
13-24	3655	1.91	6347	1.73			4.39
25-36	1532	0.85	2220	1.44			4.40
37-59	348	0.57	432	1.24			4.87
Total	9259		16158				

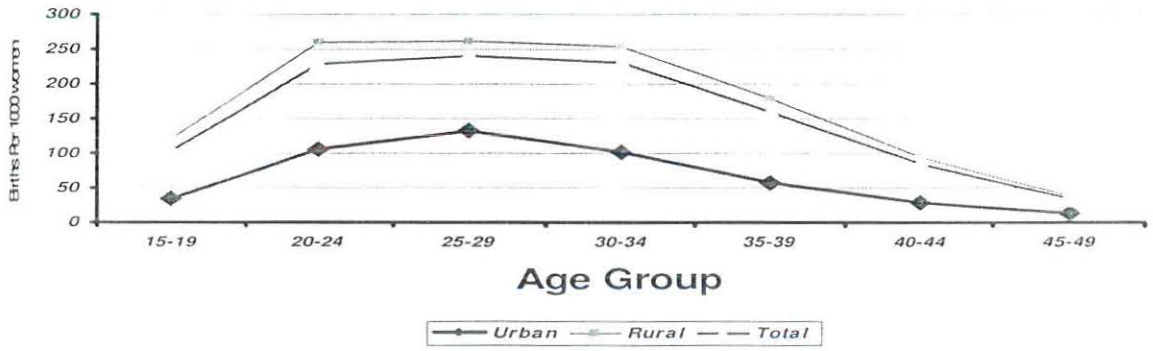
* Significance P-value<0.05 **significance p-Value<0.01 *** significance P-value<0.001

%experience is with in the category

Data Source. EDHS 2005 Computed by the Author

Almost all the cohorts in rural Ethiopia had more than 2.5 times greater ASFR than corresponding cohorts in urban. ASFR expressed as the number of births per thousand women in a specified age group, are calculated by dividing the number of live births to women in a specific age group by the number of woman-years lived in that age group (CSA and ORC Macro, 2006). This helps the researcher to investigate the problem separately for urban and rural Ethiopia.

Fig 3.4. Age Specific Fertility Rate by Urban and Rural Residence for the Three Years Preceding the Survey, EDHS 2005.



Source: EDHS 2005

As one can see from Fig 4.1 given above, it reveals that the ratio of average parity for mothers with life time child loss experience and mothers with no life time child loss experience was above the line R=1. which means that mothers with the experience in child loss in all the cohorts gave large number of births than mothers without the experience. The figure reveals that the ratio was higher for younger age groups; this might be attributable to their difference in potential to respond for child loss.

4.2. Results of Bivariate Analysis

Mothers in the study area are divided into 8 categories based on their level of fertility. For each level of child mortality, the percentage distribution of mothers by their level of fertility is presented in Table 4.2.1. Similarly in Table 4.2.2; the mortality level per mother for each level of fertility is shown using percentage distribution separately.

One can see how the life time child mortality experience related with level of fertility. As can be seen from Tables 4.2.1 and 4.2.2, those mothers who had the experience in child mortality had the experience of giving large number of births. The result reveals that those mothers having more number of child mortality experience increases their number of births than those with lower level of child mortality experience. Table 4.2.2 indicates from all women with one childbearing experience only 7.29% of them missed their child and from all women with two CEB 21.62% of them had the experience in losing at least one child. Those mothers who had eight and above CEB about 86.18% of them had the experience of losing at least one child.

The variation in level of fertility among mothers with different level of child mortality reveals, those mothers who lost two children have more number of births than those who lost one child. For instance table 4.2.1 reveals 37.87% of mothers with the experience of exactly two children loss had more than 7 CEB but only 17.88% of those with the experience of one child mortality have more than 7 CEB. Comparing those with two and three children loss experience, 45.35% of those mothers with the experience of three children mortality had more than 7 CEB. Similarly comparing those mothers with the experience of four and more than four children mortality, 75% of mothers with the experience of more than four children mortality had more than 7 CEB but only about 58% of those with the experience of four children mortality had more than 7 CEB. A unit increase in level of child mortality increases on average to more than 20 percent of mothers

with high level of fertility (more than 7CEB). From this we might guess that an increase in the level of mortality has its own impact on increasing the level of fertility and life time pregnancy. But these tables cannot show the direction of leading factor to influence one another.

Table 4.2.1.Percent Distribution of Mother's level of Fertility by Level of child mortality, EDHS 2005.

Note. Cells show row percentage.

No. of Child Lost(x)	Children Ever Born(y)								
	1	2	3	4	5	6	7	7+	Total
	Women with y number of CEB experience and their %share from women of x child lost experience.								
1	4.24	11.21	13.94	14.55	14.85	11.82	11.52	17.88	100
2		1.78	2.96	10.65	10.65	18.93	17.16	37.87	100
3			1.16	0	13.95	18.6	20.93	45.35	100
4				2	12	8	20	58	100
4+					3.57	10.71	10.71	75	100
Total	192	185	174	163	163	142	142	249	

Data Source: EDHS 2005 computed by the author.

Table 4.2.2 .Percent Distribution of Mother's level of child mortality by Level of Fertility, EDHS 2005.

Note. Cells show Column Percentage

No. of Child Lost(x)	Children Ever Born(y)								
	1	2	3	4	5	6	7	7+	%Lost
	% of women with x child lost experience from women with y number of CEB experience								
1	7.29	20.00	26.44	29.45	30.06	25.32	26.76	23.98	
2		1.62	2.87	11.04	11.04	20.78	20.42	26.02	
3			0.57	0.00	7.36	10.39	12.68	15.85	
4				0.61	3.68	2.60	7.04	11.79	
4+					0.61	1.95	2.11	8.54	
% total	7.29	21.62	29.88	41.1	52.75	61.04	69.01	86.18	
Total count	192	185	174	163	163	154	142	249	

Data Source: EDHS 2005 computed by the author

The relationship between child loss experience and childbearing further investigated controlling the categories of both residential place and mother's education. The mean number of children ever born according to the level of education and the experience in life time child loss by mother's place of residence is presented in Table 4.2.3. The mean children ever born for various groups presented in Table 4.2.3 suggests the presence of the effects of both education and child loss experience on level of fertility. Controlling the effects of education and child loss experience there is no big gap in mean number of children ever born by place of residence.

In urban Ethiopia controlling the categories of education, there is almost a difference of 2.2 children on average by mother's experience in life time child loss. Similarly controlling the categories of education in rural Ethiopia, there is a difference of 2.41 children on average. Even if the result in this section was not statistically tested, the study further uses multivariate analysis to approve the result. The next section will present the detail.

Table 4.2.3: Mean Number of Children Ever born Controlling Place of Residence and Women's Education by Child loss Experience, EDHS 2005.

Child loss Experience	Urban			Rural	
	Illiterate	Primary	Secondary and above	Illiterate	Primary and Above
No	3.43	2.53	2.19	3.65	3.19
Yes	6.05	4.52	4.05	6.16	5.50

Data Source: EDHS 2005 Author's own computation.

To understand the effect of child loss experience on childbearing more clearly, the investigation was further extended by controlling the duration of breastfeeding and place of residence. Both child loss experience and breastfeeding were obtained to show influence on childbearing in both urban and rural mothers. As we can see in Table 4.2.4. Greater mean number of children born in each categories of breastfeeding duration by experienced mothers in child loss was observed.

Table 4.2.4: Mean Number of Children born Controlling Place of Residence and Women's Duration of Breastfeeding to Their Child by Child loss Experience.

Child loss Experience	Urban				Rural				
	0-6	7-12	13-24	25-36	0-6	7-12	13-24	25-36	37-59
No	1.58	1.78	1.42	1.29	1.90	1.96	1.78	1.47	1.24
Yes	1.66	1.90	1.67	2.00	2.13	2.08	1.94	1.58	1.50

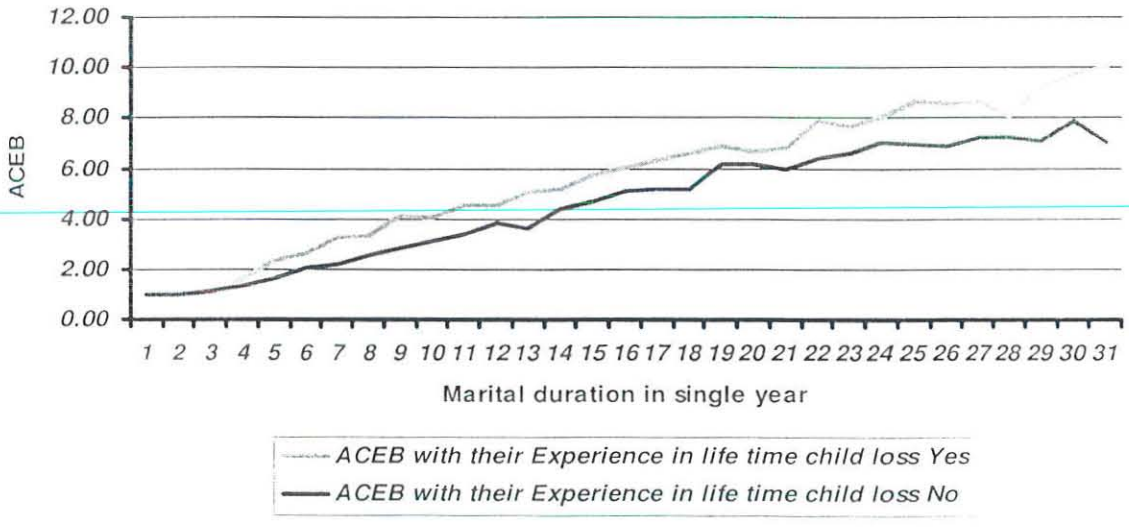
Data Source: EDHS 2005 Author's own computation.

The study reveals child mortality aggravate burden on mothers in different ways. Among this the one and the first is increasing their life time pregnancy to replace their lost child and some of them who were psychologically not confident in the survival of their child might fear in losing the one that was replaced and decide in giving large number of births to be secured.

Much of the early childbearing that occurs in developing countries involves women who are in a union or marriage (Singh, 1998). Number of children ever born to a woman depends on the total amount of time she has been exposed to childbearing, as measured by the duration since her first marriage. Controlling marital duration, the difference in children ever born between experienced mothers and non experienced mothers in child loss (see Fig 4.2)

Fig 4.2 indicates that mothers who had the experience in child loss gave two more birth on average than those mothers who had no experience in child loss during their life time. Both the grouped (see Fig 3 in annex) and single year period of exposure to childbearing reveals similar result. Controlling the mother's years of exposure to childbearing in single year marital duration, the gap in average children ever born starts early with in 3 years of exposure and ends with a difference of two children on average. The single year period of exposure was made taking those mothers who had a maximum of 30 years marital duration.

Fig 4.2. Child Loss Experience and Childbearing by Marital Duration, EDHS 2005.



Data Source. EDHS 2005 Authors Own Calculation.

4.3. Results of Multivariate Analysis

4.3.1. Multicollinearity

After collecting the variables that are supposed to affect child loss experience, multicollinearity among the explanatory variables was checked. To detect the multicollinearity, first their correlation or contingency coefficient was observed and those variables which have got greater relationship was selected and their combined effect was checked by including in the model and found to have significant effect. If we take the result with the existence of multicollinearity, the coefficients that we interpret will be exaggerated and the interpretation will not represent the real effect of the independent variables considered.

One option to avoid the problem of multicollinearity is to ignore either of the variables since it affects the result. Among the explanatory variables, AFM and AFB, place of residence and region, marital duration and Age of mother are obtained to have multicollinearity.what the author did to avoid the problem of multicollinearity during analysis is that, one of the variable dropped and the other considered, again the one which was dropped will be included in the second model by dropping previously included. On doing this the effect of all the variables displayed without the existence of multicollinearity.

4.3.2. Goodness of fit test

To check the goodness of fit for the models in appropriately used for the data under investigation, the Hosmer and Lemeshow test of model fitting is used for the binary logistic regression. It reveals that the p-value for the models are greater than 0.05 which is insignificant, indicating multivariate binary logistic regression is appropriately used.

To check for the goodness of fit test for Poisson regression model, the researcher implemented negative binomial regression model to test the hypotheses Ho: $\partial = 0$(existence of dispersion) and failed to reject this hypotheses since P-value>0.05 in all the models. It means that no need to use negative binomial regression model as Poisson regression model was adequately fit the data.

4.3.3. Child Mortality Determinants by Place of Residence.

The study considered some socio-economic, behavioral and demographic factors which are supposed to bring differences in child loss experience. All these variables brought here to further

investigate their effect using multivariate models on both child loss and fertility of mothers after getting their relationship using chi-square statistics. Among these factors on the country level, multivariate-logistic regression model (Tables 4.3.1 and 4.3.2 Total model1 and 2) revealed that exposure to media, place of residence, region of residence, child sex ($P<0.05$), marital duration, AFM, age of mother, duration of breastfeeding, work status and education of mothers ($P<0.001$) found to have a significant effect on mothers experience in under five child loss. These variables show differential in child loss experience among their category.

The models that are displayed by place of residence used 1125 sample size from Urban and 7915 from rural residences. Since some categories in urban and rural have small cases, which prone to increase standard error, during analysis these categories either ignored not to be included in the model or merged with the other category if possible. Hence the sum total of the stratum sample sizes will not give total sample size.

4.3.3.1. Socio-Economic Determinants of Child Mortality.

The result in table 4.3.1 states, mothers with the exposure to media had lower chance to come across child loss experience. Mothers with no exposure to media had at least 22% higher experience in child loss under five. Similarly the result reveals that exposure to media has a significant effect on mothers life time child loss experience (see table 12 in annex). Mothers with the exposure to media had at least a 14% reduction in the risks of child loss in their life time. This exposure to media was found to have a significant effect in only rural resident mothers and it was found to reduce chance of child loss experience by 23% for under five and about 20% for life time child loss.

Women's place of residence was obtained to vary their child loss experience for both under five and life time child loss. A woman who was living in rural area had a 1.6 times more risk to have under five child loss than a woman in urban. Similarly a mother who was living in rural had 1.9 times more risk to loss their child in her life time controlling the effect of all the other factors. This result might not surprise any one since mothers who live in rural Ethiopia are not in a condition which helps mothers to keep their child in a good health. Among many leading factors the existence of good health facility may take the responsibility to this variation.

Region of residence influences child survival due to different reasons. Variation in child death rates across families may be due to the healthiness of residential area as well as to differences in investments in children by parents (Mark and Schultz, 1983). There might be differences in cultural practices and difference in the allocation of essential resources to keep children's health that have great role for the variation of child survival.

The study took Tigrai region as reference to compare with the other categories. Under five child loss in Amhara region was obtained to be significantly different from the reference region. Mothers in Amhara region had a 1.48 times higher experience in under five child loss than Tigrai, but there was not any significant difference between the other regions and the reference category. There was no difference in under five child loss taking only urban part of the regions. The difference in under five child loss experience by region was massive in rural Amhara comparing with reference category rural Tigrai. In addition to this, life time child loss experience among the regions in over all the country and by place of residence was obtained to be significantly different from the life time child loss experience of the reference category.

Mother's working status was expected to influence child loss. Even though the researcher was expecting at the beginning of this research to get mothers who had work to have less chance of under five child loss, the study find out unexpected result. Mothers who had work obtained to loss their child more than those who had not any work ($P<0.05$). Mothers who were working have a 1.6 times higher under five child loss experience than who were not working. This working status was obtained to have significant effect on under five child loss in country level, urban mothers and rural mothers as a whole.

The multivariate logistic regression analysis provides evidence on impacts of maternal education on under five child loss and life time child loss. The study find out that education of mothers has a significant effect on child survival in over all the country and rural Ethiopia ($P<0.05$), it also has a significant effect on life time child survival in over all the country, urban and rural mothers ($P<0.001$). Mothers with different level of education show differences in child loss. In Ethiopia mothers with incomplete secondary education had a 0.6 times under five child loss experience than mothers with no-education. Similarly mothers with complete secondary and above had a 0.2 times under five child loss experience than mothers with no education. By dividing education in

to two categories in rural Ethiopia, this study find out that mothers with primary and above educational level had lower chance of losing their under five child, that is a 0.65 times that of mothers with no education.

Table 4.3.1. Parameter estimates of Multivariate Logistic Regression model of under five child loss for Rural and Urban Mothers in Reproductive Age by Socio-economic factors in Ethiopia. EDHS 2005.

Experience In child loss Under five	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.
	Total Model1		Total Model2		Urban Model1		Urban Model2		Rural Model1		Rural Model2	
Exposure to media												
Have the exposure	.77**	.106	.78**	.107	1.129	.423	1.067	.425	.77**	.113	.77**	.113
No exposure(reference)	1.000		1.000		1.000		1.000		1.000		1.000	
Religion												
Orthodox(reference)	1.000		1.000		1.000		1.000		1.000		1.000	
Protestant	.856	.133	.897	.170	1.398	.620	1.397	.622	.823	.179	.830	.180
Muslim	.781	.105	.969	.145	.805	.519	.841	.517	.941	.156	.937	.155
Others	.610	.284	.718	.301	S		S		.680	.304	.630	.306
Type of place of residence												
Rural	1.6**	.194			X	X	X	X	X	X	X	X
Urban(reference)	1.000											
Region												
Tigrai(reference)			1.000		1.000		1.000		1.000		1.000	
Afar			1.116	.277	.642	1.018	.817	1.025	1.190	.290	1.149	.290
Amhara			1.48**	.188	.218	1.009	.265	1.011	1.565**	.193	1.541**	.192
Oromiya			.954	.212	.589	.828	.707	.817	1.005	.221	.972	.221
Somali			.797	.283	.854	.898	1.046	.901	.764	.311	.724	.310
Ben-Gumz			1.009	.250	.170	1.245	.198	1.231	1.124	.259	1.073	.259
SNNP			1.259	.218	.550	.868	.641	.866	1.365	.227	1.339	.227
Gambela			1.034	.293	S		S		1.379	.302	1.289	.303
Harari			.651	.315	.231	.936	.303	.933	.737	.342	.713	.341
Addis Ababa			.484	.471	.152	.840	.206	.843	S		S	
Dire dawa			.952	.297	.441	.832	.525	.835	1.174	.339	1.153	.340
Work-status												
Working	1.6***	.108	1.621***	.110	2.683**	.361	2.730**	.362	1.549***	.117	1.557***	.117
Not working(reference)	1.000		1.000		1.000		1.000		1.000		1.000	
Educational status												
No-education(ref)	1.000		1.000		1.000		1.000		1.000		1.000	
Incomplete-primary	.630	.155	.614	.155	.419	.532	.400	.528	.66**	.154	.65**	.154
Complete-primary	.689	.444	.721	.445	M		M		M		M	
Incomplete-secondary	.6**	.335	.6**	.320	.409	.493	.424	.486	M		M	
Complete-secondary and above	.2**	.619	.2***	.614	M		M		M		M	
Constant	.013***	.236	.015***	.239	.020***	.411	.02***	.438	.024***	.198	.022***	.199
N	9277		9277		1125		1125		7915		7915	
Hosmer & Lemeshow test of Model-Fitting	P-Val=0.464>0.05		P-Val=0.474>0.05		P-Val=0.699>0.05		P-Val=0.129>0.05		P-Val=0.849>0.05		P-Val=0.320>0.05	

M-Merged with the above category S-small number of cases **P-value<0.05 ***P-Value<0.001 X-Not applicable Note-The shaded region indicate the variable is dropped due to multicollinearity
Data Source. EDHS 2005 Computed by the Author

4.3.3.2. Behavioral and Demographic Determinants of Child Mortality.

According to this paper, age of mother is found to have a significance effect on child survival. The multivariate logistic regression (Table 4.3.2) reveals that mothers in oldest age group had a greater under five child loss than the youngest age group in over all the country (total model1) and rural Ethiopia (rural model2) that is mothers in age group 45-49 had a 2.8 times higher risk in under five child loss than mothers in age group 15-19. But the other age groups did not show significance variation. Similarly marital duration is obtained to affect child loss experience in the country level and rural residences. Mothers who were in marital union for more than 15 years showed a greater chance for the risk in under five child loss experience comparing with mothers who were in marital union for less than five years.

There are people who give care for male children more than that of females. This differential has its own impact on child health but surprisingly the result indicates in different way of expected treatment variation by sex of child. Mothers with female children had lower chance of losing their children than mothers with male children with in five years. This under five child loss by sex of child was obtained to be significant in over all the country (Total model1 and model2) but it was not significant by urban-rural residence. The life time child loss experience was not significant by sex of child in all of the models.

It is much conclusive that breastfeeding is essential for child survival. But here the study raises a question of duration of exposure to breastfeeding. A consistent finding was obtained on the existence of effect on child survival. In addition to this, Mothers who fed their child for about more than six months have got higher child survival than those who fed less than six months. The result reveals that for longer time you fed breast milk for your child the more you increase the chance of child survival. Duration of breastfeeding was obtained to affect under five child loss experience in over all the country as well as by urban and rural residences. For instance: Mothers who fed their child for more than three years have a 0.016 times smaller chance of losing their child compared with mothers who fed for less than six months. The result of table 4.3.2 further explains the finding. Duration of breastfeeding was further investigated to affect mother' child loss experience in their life time (see Table 13 in annex).

In Ethiopia, particularly in rural area, where more than 80% of the country women in the reproductive age are living, AFM is not yet rise up. For most women in rural Ethiopia sexual activity starts with marriage (Derebessa, undated) and hence childbearing expected to start early in the area. This study find out that controlling the effect of all the other explanatory variables AFM significantly affect mother's under five child loss in over all the country and rural Ethiopia. Mothers whose AFM greater than and equal to 18 had a 28% lower under five child loss in over all the country and a 23% lower under five child loss in rural Ethiopia than those mothers whose AFM was less than 18. A further investigation on this variable reveals that AFM had a significant effect on life time child loss experience of mothers. The chance of life time child loss for mothers whose AFM greater than or equal to 18 was 0.4 times that of mothers with AFM less than 18.

Even though AFB was not obtained to significantly affect under five child loss, it was obtained to significantly affect mother's lifetime child loss experience. Table 13(see in annex) reveals that this variable has a significant effect on over all the country, urban and rural mothers on lifetime child loss.

4.3.4. Fertility Determinants by Place of Residence.

4.3.4.1. Socio-Economic Determinants of Fertility

From the socio-economic variables the poison regression model obtained religion, place of residence and maternal education to significantly affect fertility of mothers. In addition to this, there was a difference in these determinants by urban-rural residences. The result of table 4.3.3 shows the effect of one variable controlling the others which are included in the model.

The study finds out that religion was among the determinants of fertility. Taking Orthodox as reference only Muslim mothers were obtained to be significantly different in average children born in the last five year. In total Ethiopia there was 8% higher increase on average children born for Muslim mothers compared to orthodox, in addition to this in urban Ethiopia Muslim mothers had at least a 10 % increase in average children born in five years before survey. More over religion was obtained to bring a significant difference in CEB in over all the country and in urban Ethiopia, but it was insignificant for mothers who live in rural Ethiopia. The result of table 14 in annex reveals that Muslim mothers had at least a 7% and protestant mothers had 6% higher average children ever born. Similarly in urban Ethiopia there was a wide gap in children ever born by Muslim and Orthodox mothers. Muslim mothers had on average 20% higher births in their life time than Orthodox mothers.

In this study place of residence was obtained to significantly affect the fertility of mothers. The result reveals that mothers who live in urban Ethiopia gave 8% reduced average children born in five years interval. There were different factors responsible to fertility difference by place of residence. With out considering the effect of all these factors place of residence alone found to affect fertility of mothers. The result tells us controlling the effect of all the other factors in the model.

Education, work participation and exposure to mass media are some of the means by which women gain status and autonomy (Dey and Bhavsar, 2002).These are essential factors to empower women in decision making in every activity of her reproductive life. Several studies have consistently obtained a strong relationship between mother's education and fertility. This study also approves their finding. Maternal education was obtained to significantly affect average children born with in five years by mother's educational level in over all the country and urban.

During the analysis, the categorization for maternal education in urban and rural was in different way since less number of mothers with education more than secondary level in rural Ethiopia. Even though average children born by maternal education was obtained to be insignificant for rural mothers, ACEB was obtained to be significantly different by maternal education in all the models.

According to the finding of this study (table 4.3.3.). There was at least 10% reduction in average children born with in five years by mother's education to incomplete secondary compared to mothers with no education. The reduction increased at least to 22% by having a complete secondary and above educational level. More over the effect of maternal education on fertility in urban was obtained to be stronger. Mothers in urban Ethiopia with incomplete secondary education reduce their average children born in five years by 15% compared to those with no education. A further investigation on maternal education revealed a significant difference in ACEB even in rural Ethiopia. In rural Ethiopia, Even though there was not any significant difference in ACEB between those with no education and primary education, Mothers with incomplete primary and above were obtained to have a significant difference in mean number of children ever born compared to those with no education.

Table 4.3.3. Parameter estimates of Multivariate Poisson Regression Model of CB in the last five years for Rural and Urban Mothers in Reproductive Age by Socio-economic Factors, EDHS 2005.

Children born in the last five year	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.
	Total Model1		Total Model2		Urban Model1		Urban Model2		Rural Model1		Rural Model 2	
Exposure-to-media												
Yes	.97	.017	.98	.017	.93	.060	.92	.059	.97	.018	.98	.018
No	1.000		1.000		1.000		1.000		1.000		1.000	
Religion												
Orthodox	1.000		1.000		1.000		1.000		1.000		1.000	
Protestant	1.06	.024	1.05	.030	1.11	.093	1.09	.091	1.04	.033	1.06	.033
Muslim	1.08**	.020	1.08**	.025	1.15**	.074	1.10**	.071	1.03	.028	1.02	.028
Others	1.05	.047	1.04	.050	S		S		1.03	.051	1.03	.051
Place of residence												
Rural	1.000											
Urban	.92**	.028			X	X	X	X	X	X	X	X
Region												
Tigrai			1.000		1.000		1.000		1.000		1.000	
Afar			.95	.045	1.01	.166	1.03	.170	.96	.049	.99	.049
Amhara			1.01	.033	1.04	.154	1.10	.164	1.01	.034	.96	.032
Oromiya			1.02	.035	1.01	.146	1.02	.148	1.03	.038	1.06	.038
Somali			1.00	.045	1.09	.162	1.07	.160	1.02	.050	1.07	.052
Ben-Gumz			1.02	.042	1.09	.175	1.10	.177	1.02	.044	1.01	.044
SNNP			.96	.036	1.06	.147	1.07	.150	.96	.038	.99	.039
Gambela			.88	.044	.94	.149	.99	.158	.89	.047	.90	.047
Harari			1.00	.048	.98	.133	1.01	.137	1.03	.057	1.04	.057
Addis Ababa			.90	.054	.95	.120	.95	.119	S		S	
Diredawa			.99	.050	1.01	.134	1.01	.132	1.06	.065	1.09	.067
Work Status												
Not working	1.02	.019	1.03	.020	1.04	.055	1.06	.056	1.02	.021	.96	.018
Working	1.000		1.000		1.000		1.000		1.000		1.000	
Education												
No-education	1.000		1.000		1.000		1.000		1.000		1.000	
Incomplete -primary	.98	.023	.98	.023	.89	.065	.88	.064	1.01	.026	1.00	.025
Complete -primary	.90	.063	.91	.064	.82	.115	.82	.116	M		M	
Incomplete -secondary	.90**	.042	.89**	.040	.85**	.059	.85**	.059	.97	.081	.97	.164
Complete-secondary and above	.78***	.054	.76***	.052	.77**	.068	.76**	.068	M		M	
Const	0.088***	.053	0.084	.052	.072***	.200	.072***	.195	.073***	.053	.088***	.060
N	9181		9181		1194		1194		7952		7952	
Age	(exposure)											

***significance p<0.001 **significance P<0.05 M-merged with the above category X-not applicable

Note-The shaded region indicate the variable is dropped due to multicollinearity

Data Source. EDHS 2005 Computed by the Author

4.3.4.2. Behavioral and Demographic Determinants of Fertility.

Among the behavioral and demographic factors the model obtained child loss experience, age of mother, marital duration, AFM, AFB, duration of breastfeeding, and type of contraceptive method to significantly affect fertility of mothers. In addition to this, there was a difference in these determinants by place of residence. The result of table 4.3.4 reveals the effect of the variable controlling the other factors which affect fertility.

Child loss experience was obtained to significantly affect fertility. This study tried to investigate the influence of child loss experience on fertility of mothers with the experience in different ways. The child lost might be infant or under five, both of them were found to affect fertility significantly with $P<0.05$. The result of table 4.3.4 reveals that child survival reduces fertility of mothers. Mothers with no under five child or infant loss experience had 10% lower children born in the last five year. In addition to this there was a great variation in children born by urban and rural mothers with respect to their child loss experience. Mothers in rural Ethiopia who came across infant or under five child loss experiences gave 11% increase in average children born during five years compared to those who had not the experience. But no effect at all in urban areas.

A further investigation on life time child loss experience was made to check its consistency with the above result. The result of table 15 in annex indicate that, life time child loss experience was obtained to significantly ($P<0.001$) affect the fertility of mothers with the experience. According to the result, mothers with the experience of child loss in their life time had at least 15% higher average children ever born than those who had not. This effect holds true for both rural women and urban women. Women in urban was obtained to show at least 19% increase in average children ever born and similarly with a slight difference women in rural were obtained to show at least 15% increase in CEB with greater difference in urban.

It is clear that old age mothers and those whose marital duration was longer expected to give more birth than younger and whose marital duration was shorter. This is due to longer period of exposure to childbearing. But greater effect on childbearing in the last five year is not expected since they have all the same exposure apart from little exposure in age group 15-19 and mothers whose marital duration was 0-4 years.

Though AFM was expected to bring a significant difference in over all Ethiopia. It only found to be significant in rural Ethiopia. In rural Ethiopia mothers who marry before age 18 gave 12% higher average children born in five years interval.AFB was found to be stronger to affect fertility in over all Ethiopia. Even though the crude effect of this factor on the fertility of mothers was significant in both rural and urban, there was difference in the effect of this factor. In rural Ethiopia, it was found to bring a 4% difference in average children born with in five years but in urban Ethiopia there was an 11% difference in average children born by mothers AFB. Mothers who began birth early give more number of births than who began lately. In addition to the above, a further investigation on the effect of both AFM and AFB on fertility (measured by CEB) was made and found to significantly affect the number of CEB. Table 15 in annex gives you the additional result.

The study found out that mothers who breastfed to their child for less than six months as of birth did not have a significant difference in average children born with in five year compared with those who fed for about six months to one year duration. But those mothers who fed breast milk for more than one year had a significant difference in average children born with in five years. Total Model1 table 4.3.4 revealed that there was at least 9% reduction in average children born with in five years by feeding breast milk for about 1-2 years compared to those who fed for about six months or less. The result tells us that longer duration of breastfeeding for a new born child reduce ACB with in five years.

In addition to this, a difference by place of residence was observed. For urban mothers, there was not any significance difference in mean number of children born with in five years by mother's breastfeeding less than two years. This might be attributable to the concentration of educated and employed mothers who feed breast milk for short duration in urban followed by contraceptive. By breastfeeding for 2-3 years, there was at least 17% reduction in average children born in urban. But the reduction in rural was at least 24% feeding for the same duration compared to the reference category less than six months.

The effect of breastfeeding on fertility measured by CEB was obtained to be significant. There was a significance difference in ACEB between mothers who breastfed for more than two years

Table 4.3.4. Parameter estimates of Multivariate Poisson Regression Model of CB in the last five years for Rural and Urban Mothers in Reproductive Age by Behavioral and Demographic Factors.EDHS 2005.

Children born in the last five year	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.
	Total Model1		Total Model2		Urban Model1		Urban Model2		Rural Model1		Rural Model2	
Under five child loss experience												
Yes	1.000				1.000						1.000	
No	.90**	.028			1.01	.127					.89**	.029
Experience in infant loss												
Yes			1.000				1.000		1.000			
NO			.90**	.032			.99	.141	.89**	.033		
Sex												
Female	1.000		1.000		1.000		1.000		1.000		1.000	
Male	.99	.015	.99	.015	.98	.046	.98	.046	1.001	.016	.99	.016
Age-group												
15-19	1.000				1.000						1.000	
20-24	1.08**	.046			1.02	.131					1.09	.049
25-29	.93	.038			.91**	.115					.93**	.041
30-34	.79***	.033			.75***	.100					.79***	.036
35-39	.66***	.029			.62***	.085					.67***	.031
40-44	.52***	.027			.52***	.087					.52***	.028
45-49	.43***	.028			.41***	.096					.43***	.029
Age at marriage												
<18	1.000				1.000				1.000			
>=18	.97	.017			1.003	.052			.88***	.015		
Age at first birth												
<=19			1.00				1.000				1.000	
>19			.88***	.014			.89**	.047			.96**	.017
Marital duration												
0-5			1.000				1.06	.071	1.00			
5-9			1.18***	.033			.95	.071	1.21**	.038		
10-14			.97	.028			.79**	.066	.98	.031		
15-19			.82***	.025			.56***	.064	.83***	.028		
20-24			.71***	.024			.48***	.084	.73***	.027		
25-29			.55***	.024			.45***	.176	.56***	.026		
30+			.48***	.038			S		.49***	.040		
Duration-breastfed												
0-6	1.000		1.000		1.000		1.000		1.000		1.000	
7-12	1.01	.024	1.00	.024	1.07	.073	1.06	.073	.99	.026	1.00	.026
13-24	.91***	.020	.91***	.020	.89	.058	.89	.058	.90***	.022	.91***	.022
25-36	.77***	.022	.76***	.022	.83**	.070	.82**	.070	.75***	.023	.76***	.023
36+	.66***	.034	.66***	.034	S		S		.65***	.035	.66***	.036
Contraceptive method-type												
No-method at all	1.000		1.000		1.000		1.000		1.000		1.000	
Traditional	.89	.087	.90	.088	.94	.127	.93	.126	.88	.137	.85	.132
Modern	.90***	.024	.89***	.024	.93	.050	.93	.050	.90**	.029	.90**	.028
Const	0.088***	.053	0.084	.052	.072***	.200	.072***	.195	.073***	.053	.088***	.060
N	9181		9181		1194		1194		7952		7952	
Age	(exposure)											

***significance p<0.001 **significance P<0.05 M-merged with the above category X-not applicable

Note-The shaded region indicate the variable is dropped due to multicollinearity

Data Source. EDHS 2005 Computed by the Author

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMENDATION

5.1. Discussion

Even though the study gave much attention to child loss experience as a determinant of fertility of mothers using multivariate logistic and Poisson regression models, it has also shown the effect of some of the socio-economic, behavioral and demographic determinants of both fertility and child mortality in Ethiopia and by urban-rural residence. The result revealed that the strength of the effect of socioeconomic, behavioral and demographic variables varied by place of residence.

It was found out that maternal education, longer duration of breastfeeding, starting child birth after age 19 and avoiding early marriage have a great role on both child survival and fertility regulation. In addition to this, exposure to media and access to wide range of modern contraceptive use affect fertility.

Substantial difference in fertility (measured by CEB and CB) between mothers with child loss experience and without any such experience. Moreover, both mothers with infant and under five child loss experiences were found to have higher fertility than mothers with no experience and the model revealed fertility determinants in terms of both births in last five years before the survey and children ever born. In addition to this, the study clearly indicates that there was a significant difference in fertility between urban and rural residences. The study tried to investigate what factors are responsible to child loss using the multivariate logistic regression. This helps to detect ways of reducing child mortality and then to fertility regulation.

In a study conducted in rural Butajera, Yohanis Fitaw and others (2003) show that Child mortality affected number of children ever born alive significantly (OR= 7.39, 95% CI: 4.62, 9.08). The result of this study also revealed that at least a 15% increase in number of CEB was obtained by mothers with the experience of child loss. This indicates that those mothers with child loss experience gave more births and even may have a substantial effect in increasing the TFR for the country as well. High fertility is responsible for population growth and women's reproductive health problem. This might not be considered as a problem for some, but those mothers with the experience increase their life time pregnancy to give more birth and they might end up with some complication. Almost 600,000 women each year die from pregnancy related

causes and 99% of them in developing countries. About 1 in 48 women in developing countries die from pregnancy related causes, compared with only 1 in 1800 women in developed countries (Tsui et al., 1997). A child's probability to survival influences the number of births (Choudhury et al., 1976). Similarly, this study find out that mother with no under five child loss experience reduced their birth by 10% with in five years interval when compared to all women.

Any change in breastfeeding patterns that is not accompanied by a commensurate increase in contraceptive use, has the potential to significantly raise fertility (Lindstrom and Gebre-Egziabher, 2001). Here the model showed the effect of breastfeeding alone on fertility controlling other factors which might affect fertility. That is to say that if a woman was using only breast feeding as a means of widening birth interval, its consequence can easily and confidently observed. Otherwise if the woman automatically shifted to follow other family planning method, its effect cannot easily be detected. This problem can be attributable to why breastfeeding was not found to have a significant effect on CEB in urban Ethiopia. Usually women in urban Ethiopia use more of other methods including contraceptives than breastfeeding for longer duration.

Breastfeeding and the pace of childbearing are the most important reproductive patterns affecting child mortality risks, and their strong and consistent effect tend to persist even after the introduction of various socioeconomic factors as controls. Short duration of breastfeeding increase the risk of death during the first two years of life (Aguirre, 2007). On the other hand (Eshetu and Markos, 2002) clearly showed that short birth intervals are not crucial problems in populations that typically breastfeed for more than two years. Consistently this new study show that longer duration of breastfeeding increases child survival and decrease fertility. Surprisingly this study revealed the effect of breastfeeding on child survival even after age five. This implies that breastfeeding for longer duration has great role in improving the health status of a child.

The study clearly reveals that longer duration of breastfeeding increases the survival status of a child; this behavior indirectly touches their fertility as improvement in child survival lowers their lifetime pregnancy. The mother's antibodies in breast milk provide immunity to disease (CSA and ORC Macro, 2006). Even though this paper focused on any breastfeeding not exclusive, the duration itself was obtained to have a great role directly on child survival and indirectly on life

revealed not statistically significant change by maternal education in the risks of child loss in urban Ethiopia.

Births to mothers in the age group 15- 19 face higher mortality risks than births to mothers in the age groups 25-29 or 30-34(Eshetu and markos, 2002). The chances of infant deaths are expected to be higher at younger and older ages while lower for mothers at middle ages, there is a U-shape relationship between infant deaths and maternal age (Teshome and Chaudhury,1991). Age of the mother plays a great role in child health since mothers with teen age have not great experience to care for children that will be gained through time. Mothers in old age group had more birth experience and she become nutritionally depleted and the new born child become under weight which exposes the baby to death.In addition to this older mothers have greater exposure to child loss experience through out their life than younger mothers. The multivariate logistic regression model showed mothers in age group 45-49 had a 2.8 times higher risk in under five child loss than mothers in age group 15-19. But the other age groups did not show significance variation. Even though this study showed almost a U-shape in under five child loss by age of mother in urban Ethiopia which supports the result obtained on the descriptive part (see Fig 3.2), there was not statistically significant change in under five child loss by age of mother.

Marital duration is less likely associated with lower number of CEB and more likely associated with higher number of CEB, similar association can be seen with number of children surviving (Wasao, 2001). Similarly this study showed that mothers who were in marital union for longer duration obtained to have more number of CEB.But their five year experience revealed mothers who were in marital union for longer duration associated with less number of CB. This implies in Ethiopia women wants to have their desired number of children early after marriage which may affect the health status of both the child and mothers. Since they have to condense their birth interval to complete their desire number of CEB early after marriage. In addition to this the multivariate logistic regression showed marital duration associated with more chance of child loss experience, this is possibly attributable to time exposure. Similar to childbearing, chance of having the experience in child loss increases with increase in time exposure.

Different works on child marriage supports the idea that child marriage does have a contribution on promoting illiteracy, child mortality, birth rate, and low life expectancy for women (Mturi and

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ANNEX

Table 1. Brass P/F ratio method of calculating TFR for mothers with child loss experience

Age Group	No of Women	Children Ever born	Births in Past Year	P(i)	f(i)	¢(i)	F(i)	P/F
15-19	92	165	55	1.7935	0.5978	2.9891	1.8318	0.9791
20-24	462	1322	231	2.8615	0.5000	5.4891	4.5234	0.6326
25-29	887	4043	366	4.5581	0.4126	7.5523	6.7291	0.6774
30-34	891	5256	363	5.8990	0.4074	9.5893	8.7955	0.6707
35-39	828	6127	293	7.3998	0.3539	11.3586	10.6815	0.6928
40-44	399	3354	110	8.4060	0.2757	12.7371	12.1884	0.6897
45-49	212	2050	57	9.6698	0.2689	14.0814	13.5463	0.7138
Total	3771							

Age Group	index	coefficients			W(i)	f*(i)	k	f*(i)	Estimated Number of Births
		X	y	z					
15-19	1	0.031	2.287	0.114	0.1322	0.6639	0.6550	0.4349	40
20-24	2	0.068	0.999	-0.233	0.0966	0.4738		0.3103	143
25-29	3	0.094	1.219	-0.977	0.1015	0.4141		0.2712	241
30-34	4	0.12	1.139	-1.531	0.1145	0.4066		0.2663	237
35-39	5	0.162	1.739	-3.592	0.1354	0.3507		0.2297	190
40-44	6	0.27	3.454	-21.497	-0.0729	0.2188		0.1433	57
45-49	7					0.2885		0.1889	40
							Total	1.8446	948

TFR	9.223
GFR	0.251

Data Source: EDHS 2005 computed by the author.

Table 2. Brass P/F ratio method of calculating TFR for mothers with no child loss experience

Age Group	No of Women	Children Ever born	Births in Past Year	P(i)	f(i)	¢(i)	F(i)	P/F
15-19	441	583	231	1.3220	0.5238	2.6190	1.5952	0.8287
20-24	1600	3179	741	1.9869	0.4631	4.9347	4.0208	0.4941
25-29	1958	6027	845	3.0781	0.4316	7.0925	6.2387	0.4934
30-34	1101	4948	449	4.4941	0.4078	9.1315	8.3233	0.5399
35-39	671	3818	261	5.6900	0.3890	11.0764	10.3293	0.5509
40-44	245	1638	76	6.6857	0.3102	12.6274	12.0915	0.5529
45-49	74	561	7	7.5811	0.0946	13.1004	12.9957	0.5834
Total	6090							

Table 4. Children ever born and Sex ratio by Women's age in 5-Year interval. EDHS 2005

Age of mothers in 5-year intervals	Sex of children ever born		Sex ratio
	Male	Female	
15-19	489	414	1.18
20-24	2631	2400	1.10
25-29	5813	5828	1.00
30-34	6375	5773	1.10
35-39	6003	5682	1.05
40-44	2854	3424	0.83
45-49	1525	1864	0.82
Total	25690	25385	1.01

Data Source: EDHS 2005 computed by the author.

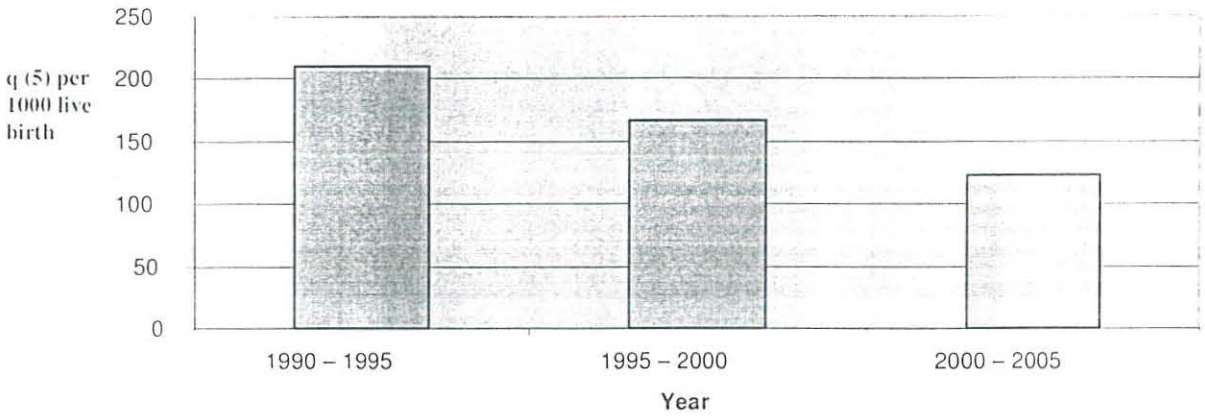
Table 5. The correlation between life time child loss experience and total children ever born.

Variables	AFM	AFB	Age in 5-year intervals	Marital duration grouped	Type of place of residence	Region	life time child loss Exp	TCEB
AFM	1	.708**						
AFB	.708**	1						
Age in 5-year intervals			1	.836**				
Marital duration grouped			.836**	1				
Type of place of residence					1	-.381**		
Region					-.381**	1		
life time child loss Exp							1.00	0.451**
TCEB							0.451**	1.00

** Correlation is significant at the 0.01 level (2-tailed).

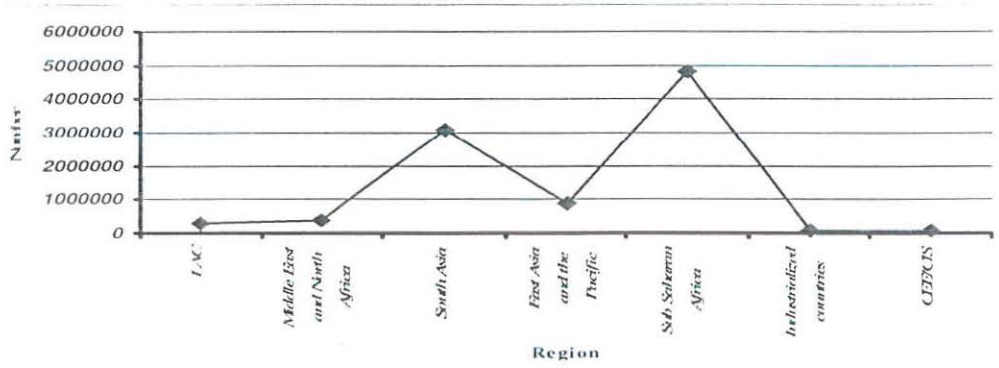
Data Source: EDHS 2005 computed by the author.

Fig 6. Trend in Under five mortality in the country



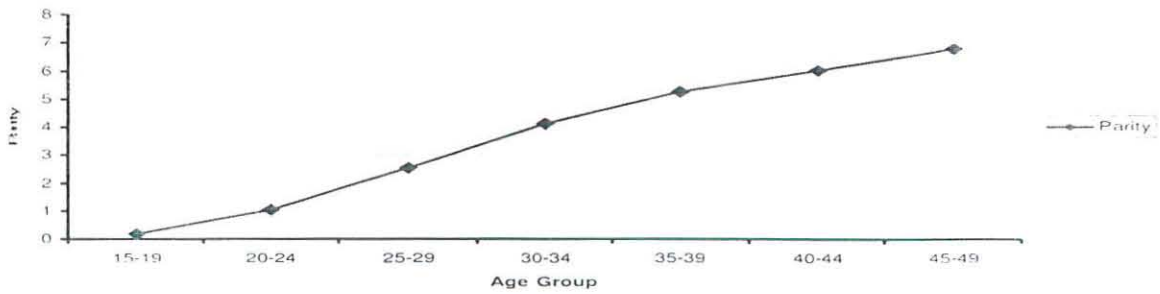
Data Source. EDHS 2005 and computed by the author

Fig 7.NUMBER OF UNDER FIVE CHILDREN DIED IN 2006 BY REGION.



Source. UNICEF 2008.

Fig 8 Average Parity by Age Group of Mothers, EDHS 2005



Data Source: EDHS 2005 Computed by the Author.

DECLARATION

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

Name Mesrach Hailu

Signature

Date 06/07/2009

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

Advisor	Signature	Date