

DETERMINANTS OF FERTILITY DECISIONS AT A HOUSEHOLD LEVEL IN RURAL ETHIOPIA.

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Declaration

I, (Abeba K. Woldesenbet), declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature.....

Date.....15/12/2010.....

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Abstract

High fertility has the potential to affect the health and well being of mothers and the survival of their children. Even though fertility in Ethiopia shows a declining trend at the national level, the onset of fertility decline is yet to come in rural areas. The main objective of this research is to identify major factors affecting the observed high fertility in rural Ethiopia. The study area was selected based on the Ethiopian demographic and health survey made by the Central Statistical Agency (CSA) in 2005. Analysis of the study is based on data collected from 81 household respondents, with the woman in her reproductive ages of 15-49 years, in the Alaje district of Southern Tigray-Ethiopia. Multivariate regression analysis is employed to identify major fertility determinants using Ordinary Least Squares (OLS) method. In-depth interview and discussions with the study subjects was also made to supplement the analysis. The regression results show that among the ten variables selected; ever use of contraception, parental perception of children as an old age security, land holding status, ideal number of children couples wish to have, and female literacy significantly affect fertility decisions at household level. These households, whose ideal number is small, where couples use contraception at least once, where women have some education, and hope will have their own economic means to support their old ages and have access to land tend to have reduced fertility than their counter- parts. The analysis also reveals that household income showed positive impact on fertility, and this aspect needs the attention of concerned authorities in their poverty reduction strategies. Moreover, the current study indicates that intermediate variables like age at first marriage and duration of breast feeding, and men's education have minimal effect on fertility. The survey also reveals that reproductive health facilities are insufficiently addressed in the study areas. Hence, high governmental and health administration authorities' commitment is vital to improve the health condition of mothers and children. Besides, socio-economic development accompanied with ideational change in favour of small family size is paramount to induce fertility transition in the study areas.

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Chapter One

I. Introduction

Background of the study

Fertility in sub-Saharan African countries remains high among the developing countries of the world (1990; Cohen 1998; Allen & Thomas 2000). A high economic, social and psychological value attached to children explains the region's exceptional and sustained high fertility in the world. High child and infant mortality due to limited maternal and child health services are also believed to be contributing to the observed high fertility rate (Allen & Thomas 2000; Ethiopian Society of population studies 2008). Increased maternal and child health risks are therefore associated with high level of fertility (Fitaw et al. 2003; Bhargava 2006). Thus, factors contributing to the observed high fertility are worth investigating to improve maternal and child health situations in these countries.

Ethiopia, having a population of 77 million (CSA 2005; Regassa 2007) growing at a rate of 2.7 per annum is the second most populous country in sub-Saharan African countries, next to Nigeria (Alene & Worku 2009). According to Ethiopian Demographic and Health Survey (EDHS, 2005) , there is a little difference on the total fertility rate (TFR) observed between 2000(5.5 births), and 2005(5.4births) in the country (CSA 2005). The report explains that this slight change is due to a reduction in TFR in urban areas by over half a child during the time span indicated.

There is a significant difference in fertility between urban and rural areas in Ethiopia (Cohen 1998; CSA 2005). While Addis Ababa, capital of Ethiopia, experiences a below replacement birth rate (1.8 children per women) and urban average fertility is 2.4; fertility in the rural areas stagnated at 6 children per women (Sibanda et al. 2003; CSA 2005; Regassa 2007; Teller et al. 2007; Gurm & Mace 2008).

Studies have documented that the factors responsible for the high and stable fertility observed in rural Ethiopia are; labor intensive agricultural economy (Short & Kiros 2002; Ethiopian Society of population studies 2008), high socio-economic and cultural values attached to

children (Bhargava 2006), value of children as an old age security (Ethiopian Society of population studies 2008), low levels of female educational attainment, limited employment opportunities (Bhargava 2006), low contraceptive prevalence rate (Short & Kiros 2002; Regassa 2007; Teller et al. 2007), early marriage (Lindstrom & Kiros 2007; Alene & Worku 2009) and absence of quality health care services (Bhargava 2006) among others.

Tigray regional state is one of the 9 state administrations found in Ethiopia (CSA 2005). The total fertility rate (TFR) for the Tigray regional state is reported as 5.1 children per women (CSA 2005); TFR for the country as a whole is 5.4 children per women. The figures for the TFR of Tigray could have been higher if only the rural part of the region were considered (Ezra 2001).

Tigray covers an area of 80,000km² of which around 15,000km² is estimated to be used for agricultural purposes (Ezra 2001). Eighty five percent of the Tigrayan population lives in rural areas and are mainly dependent on agriculture. The region has been characterized by recurrent drought, famine and environmental degradation (Kiros & Hogan 2001). Ezra (2001) stated that the northern part of the country is the major region severely affected by famine and drought than any other region and thus people tend to migrate to the neighboring regions in the south and west for food and seasonal employment.

In the past three decades, deadly famine and food shortages are recorded in 1972/73-1974, 1983/84-85 and 1987-88 that mainly affected the northern part of the country. Besides, the region has been a major victim and field of civil war that lasted for about 17 years until the current government of Ethiopia came to power in 1991 (Rahmato 1994; cited in Lindstrom & Berhanu 1999). After 9 years of relative peace in the region, the Ethio-Eritrea war in 1999/2000 took place on the borders of Eritrea and Tigray, and primarily affected the Tigray region more than any other region in the country.

War and political instability depresses fertility temporarily for several reasons (Lindstrom & Berhanu 1999). Assuming conscious fertility decisions, couples may decide to postpone births during periods of war. Famine and political instability results in emotional stress and loss of appetite that may have an effect on frequency of sexual intercourse and conception. As a result of displacement of men (husbands) from their homes, prolonged war has a fertility reducing effect at least until the war ends and surviving soldiers return home. Moreover, Ezra (2001) stated that the northern part is 'more isolated' than any rural communities in Ethiopia.

Due to its inaccessibility and remoteness, health care services, water, sanitation and other social infrastructures are insufficiently addressed (Kiros & Hogan 2001).

Despite all the adverse conditions, however, the region's fertility is closely comparable with other regions' in the country (5.1 children per women in 2005). This can be due to fertility boom following the demobilization and home return of previous solders (Kirk 1996). Due to such peculiarities therefore, the factors that explain the observed high rural fertility in the Tigray region are worth investigating. The current study focuses on determinants of marital fertility with the women in between their reproductive ages of 15-49 years.

Research Objectives

The current study addresses the following objectives

1. The major factors responsible for the high and stable fertility prevailing in the rural areas of Tigray will be identified.
2. Each factor affecting fertility will be listed and discussed in terms of their relevance (magnitude) in affecting household decisions to have the observed number of children.
3. Some policy implications will be drawn based on the findings of the study for consideration by concerned authorities; for example at a district (*Woreda*) level. Possible areas of intervention will also be identified as mechanisms to encourage fertility decline in the study areas.

The Study Area

Ethiopia contains 9 regional states and two town administrations; Addis Ababa and Diredawa. Tigray is one of the 9 regional state administrations, located in the northern part of Ethiopia. Tigray regional state is further divided in to four administrative zones; east, central, west and south (Ezra 2001; Kiros & Hogan 2001). These four zones are further divided in to 35 woredas (districts); and each woreda is further divided in to kebeles.

Alaje Woreda is found in the southern part of Tigray. The woreda (district) contains 21 kebeles, the smallest administrative unit in Ethiopia. Adishehu is one of these 21 kebeles in the woreda. It is located 85 kilometers south of Mekelle, capital of Tigray. Adishehu serves as a center of and a common market place for the woreda. The only health center for the woreda is located in Adishehu. There is one health post in each kebele according to the explanations

of the Woreda health center administration head. According to him, the minimum nurses required in each kebele are eight although all kebeles except Adishehu have only three nurses allocated by the regional office.

The average distance that respondents have to walk to the only health station in the study areas is around 2.08 kilometers. Respondents were asked regarding the accessibility and affordability of health care services. Majority (53%) say that it is expensive to get health care services and thus do not usually visit the health station. They do not visit the health station unless their sickness is too serious; like they are unable to walk, eat, and go to toilet. Even those who say are able to get health care services, say that they do not get quality services; no proper treatment, it is hard to get the subscribed medicine, some also say that they temporarily stopped using contraception because they were told the contraceptive they want (implants) is not available in the clinic.

The clinic administration head said there are problems with getting equipments to make implants (long term control), and emergency surgery when people felt inconvenient with the contraceptives, there are no male or female sterilization services in the woreda and people in need of it have to travel around 85 kilometers (to Mekelle) to get the service. According to the head of the health center, continuity of the provision of contraceptive services is questionable as far as contraceptives are provided for free in the presence of actual shortage of budget (from the regional government) and funding (from NGOs) to deliver the service.

The office believes, and the study also reveals, that people are getting awareness of the existence of one or more family planning services. However, due to insufficient knowledge, he said, people are considering contraceptives (like the injectables and implants) lead to sterility. People are unaware of the side effects of each modern contraceptive. The health officials do not tell about the side effects rather focus on urging people to use one or the other method.

The head of the Maternal and Child Health (MCH) official in the clinic, stated similarly. She stated that even though there is full preparation to provide family planning services there still exist funding problem. She said, there are health officials to educate people once in a week in each health post so that people can get sufficient information about family planning. However, people still think that contraceptives leads to sterilization and do not want to use any until they get the number of children they believe is enough. This may be due to the

campaigns undertaken by the government to urge people use contraceptives without acknowledging the side-effects of each method. With insufficient family planning knowledge, people are prone to believe rumors. I found that majority of the contraceptive users in the study areas rely on injectables. When young women use it, they stopped seeing menstruation; maybe that is why people associate contraceptives with sterility.

The head of the MCH, said that she used some in the past and there is indeed negative side-effects of using contraceptives. She was not using any method at the time of the survey because she was not comfortable with the method she was using (implant). She has 3 children and cannot say she will stop having additional child (ren). She said; “I want to have additional children but only when my children get to school. She told me that, people say having one child is equivalent as if no children is born; two as if it is one...” According to her, “children are durable assets and once grown they will work and help themselves and once they get job will help their parents forever.”

Districts in the Tigray regional state

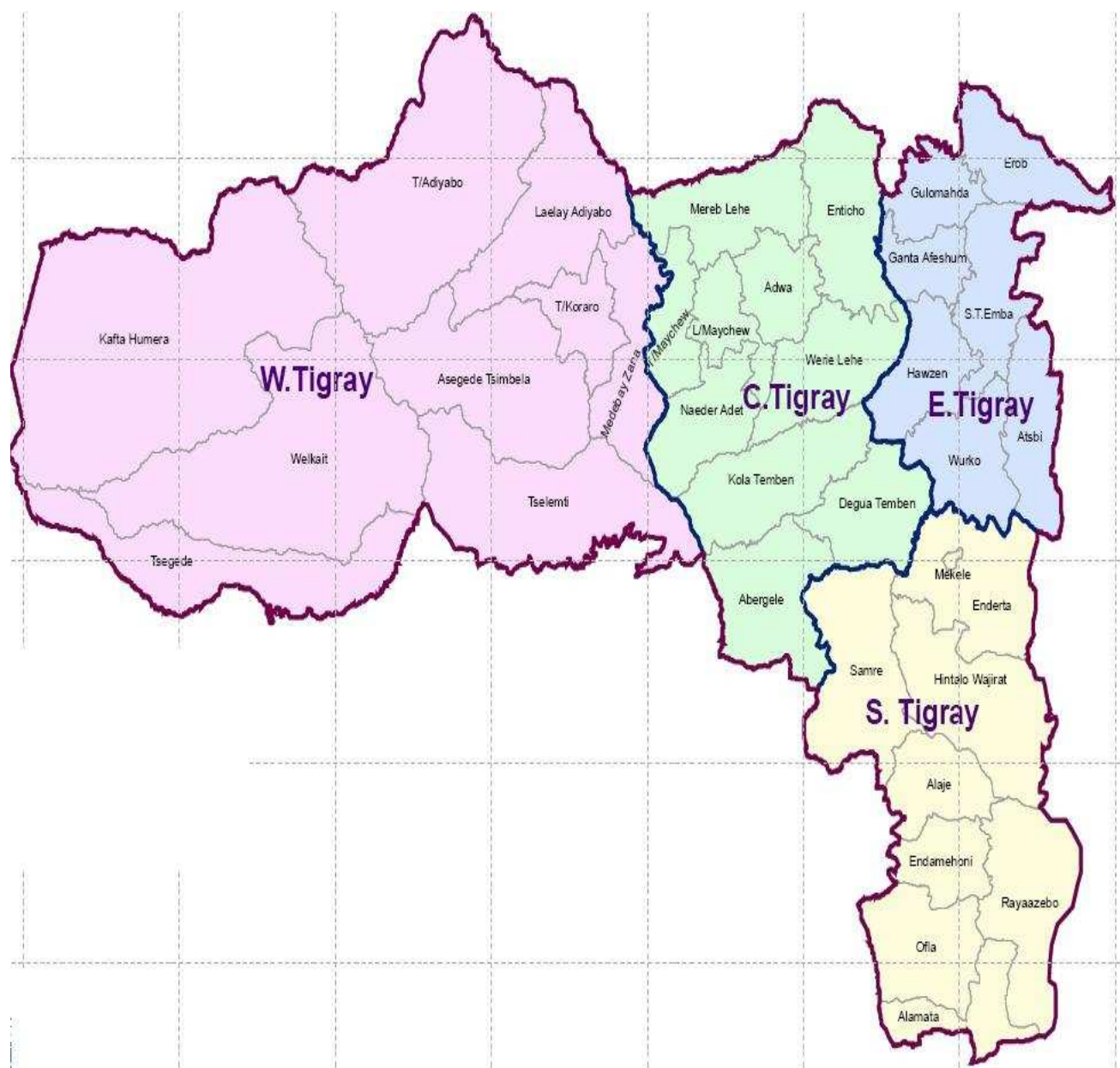


Figure1: Showing the geographic location of Alaje district- southern Tigray-Ethiopia

Source: On line data base: <http://www.ethiodemographyandhealth.org/Tigray.html>

II. Theory and Conceptual framework

A. Theory

This chapter introduces the development of theories of fertility transition over the last three decades. Each theory is discussed based on chronological order. The purpose for such presentation is to provide theoretical base in understanding fertility transition and to use such theory in the presentation of empirical evidence in later chapters. However, I am not trying to present all theories of fertility decline exhaustively. An attempt is made to present those theories that have relevance for the current study. I also tried to connect some research results obtained in different parts of Ethiopia with the broad theories developed. After a brief discussion of the theories I draw a conceptual framework on which the current research is based.

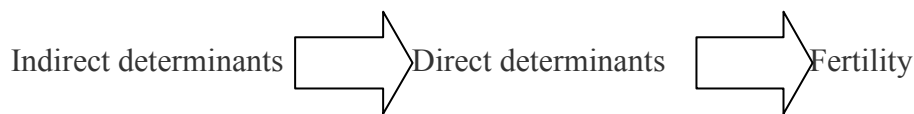
Bongaarts' Proximate Fertility Determinants

John Bongaarts (1978) is notable for his contribution of a framework for analyzing fertility differentials among societies and across time. He classified fertility determinants in to two; those that directly affect fertility known as 'intermediate variables or Proximate fertility determinants' and those that affect fertility only indirectly called Socio-economic, cultural and environmental variables (Bongaarts 1978). Intermediate variables include biological and behavioral factors grouped in to four major variables by the author. These include proportion married, contraception use, induced abortion and lactational insusceptibility. To describe them briefly:

- a. Proportion married: measures the proportion of women that are involved in regular sexual intercourse. The term 'marriage' is used to include any union or formal marriage that exposes women of reproductive age to regular and stable sexual activity. Other factors being constant, marriage has a direct positive influence on fertility.

- b. Contraception; any conscious method used to prohibit the risk of conception is regarded as contraception. This includes abstinence, use of any traditional or modern method and sterilization, all of which reduce fertility directly.
- c. Induced abortion; deliberate action to stop the normal fetal development, has obviously negative effect on fertility.
- d. Lactational insusceptibility; refers to the time-span (following pregnancy/birth) women remain unable to conceive until the return of ovulation and menstruation. This includes post partum amenorrhea prolonged by extended breast feeding.

A distinguishing feature of an intermediate variable is that fertility *necessarily changes* when an intermediate variable changes (Bongaarts 1978). The use of contraception for example has measurable direct negative effect on fertility while a socio-economic variable such as education affects fertility only indirectly through delayed marriage/ use of contraception. Thus, one or more socio-economic, cultural or environmental variables should act through one or more of the intermediate variables to affect fertility (Bongaarts 1978). Diagrammatically;



Critique;

A predetermined channel through which fertility is supposed to be affected ignores variations of fertility determinants in different regions and across time span (Frejka 2001). In Frejka’s own words;

“The joint effect of all the proximate variables determines fertility levels and trends. For the analysis of fertility differentials and trends only those determinants are meaningful whose effect differs in time and space. If large variations of a determinant have only a small effect on fertility trends and differentials, or if a determinant hardly varies among populations, its analysis will not yield useful scientific or policy relevant insights. Thus the selection of the analytically important factors depends on how sensitive fertility is with respect to a particular determinant and the variability of the determinant among populations.” (Frejka 2001: 5557).

Regardless of such criticism however, many scholars in Ethiopia applied the Bongaarts framework to determine the proximate fertility determinants and identify the factors (among the intermediate variables) that explain fertility levels the most (Fitaw et al. 2003; Alene &

Worku 2009). A study by Alene and Worku (2009) using the Bongaarts framework, reported that among the four proximate determinants considered, post partum insusceptibility, followed by contraceptive use (mainly in urban areas), and delay in first marriage are the most significant factors affecting fertility decline in North and south west Gondar zones.

Demographic Transition Theory

The demographic transition theory was formally known as a ‘theory’ in 1945 by Notestein and continued to influence research until 20 years later (Kirk 1996). ‘Demographic transition’ refers to a state where countries are transformed from a situation of *high fertility* and *high mortality* in to a state where both are low through ‘*modernization*’ (Kirk 1996). As a result of access to better health care services industrialized countries achieved greater reductions in mortality rates. Following a reduction in mortality, these countries sooner or later achieve declining birth rates (Allen & Thomas 2000). The effect of reduced mortality on fertility is through reducing the desire for more children for replacement purposes.

Although specific causal relationships were not identified, ‘modernization’ in general is considered as a key factor for fertility decline. Modernization includes urbanization, industrialism, universal education, employment opportunities in the formal sector, better living conditions, better health care services and low mortality. The cumulative effect of such modernization factors in bringing fertility transition is through rising child costs and reducing the economic value of children to the household (Cleland & Wilson 1987) Notestein thus anticipated rapid fertility decline in Europe, North America and Oceania while Africa, Asia and central, and South America were deemed to experience high fertility until sufficient modernization takes place (Kirk 1996).

The model however was criticized for its emphasis on socio-economic factors as the main determinants of fertility decline while little attempt was made to include cultural values as fertility determinants (Kirk 1996).

In line with modernization theory, Hailemariam (1992) argued that high fertility is likely to persist in Ethiopia until significant socio-economic development is achieved that can offset the cultural and social norms in favor of high fertility. He stated that early marriage, high infant and child mortality, low level of contraception prevalence, high economic and security value of children, limited role of women in the society (no inheritance of land to female

children, comparatively low female enrollment) due to discriminatory social and cultural norms are the reasons behind high fertility in Ethiopia. He concluded that high fertility is the cause for economic and social problems and calls for modernization factors as a remedy to reverse such trend in the country.

Micro-economic theory of fertility decline

In contrast to demographic transition theory, micro-economic theory mainly focuses on the 'individual' as a rational decision making entity that strives to maximize utility (Becker 1960; Tremayne 2001). With the help of contraception, couples are considered to have perfect control on fertility; the numbers and the space between births. The model assumes children as 'consumer goods'; children bring psychological utility to their parents. Sometimes children provide monetary income to their parents and thus are considered as production goods. On the other hand, individuals incur costs to have children; costs of rearing and raising children. The demand for children thus depends on parental desires, household income and costs of having and raising children. Thus, the model is based on an assumption that individuals tend to have children when all the benefits exceed the costs (Tremayne 2001). The number of children desired reduces as the associated cost of children goes up.

Thus, the theory states that fertility decline can be achieved through economic growth; reduced child mortality and rising costs of children. With economic advancement there is access to better health care services and child mortality reduces. Since couples are interested in the number of surviving children than the number of births, reduction in child mortality means few numbers of children desired, as stated in demographic transition theory (Becker 1960). High income growth increases parental investment on children to achieve more quality than the quantity of children. More quality means higher costs of raising children; higher expenditures on food, education, and health care services. These higher costs of raising children result in richer families wanting few numbers of children than the poor ones (Becker 1960; Kirk 1996).

Weaknesses; the model's weaknesses lie on its assumptions; firstly, the assumption that couples fertility decisions as being solely dependent on 'individual advantage' ignores the effect of extended families, cultural values and social institutions affecting fertility in less developed countries. Second, the assumption of perfect fertility control through contraception is absent in traditional societies (Kirk 1996).

Based on such objections, Richard A. Easterlin (1975) developed a model for determinants of fertility decline. He tried to incorporate socio-economic variables- as demand factors (from the micro-economic theory); cultural and religious factors constraining fertility (as affecting child supply) and costs of having children (cost factors) as equally contributing to fertility transition. He stated that all factors affecting fertility decline must operate through one or more of such variables (demand, supply and cost factors) in affecting fertility.

Although Easterlin's model seems to be all inclusive and was theoretically sound and adopted as a framework for analyzing fertility determinants, it is highly criticized for being difficult to apply in practical research (Kirk 1996). Another critique is on the model's assumption; couples decide the number of children desired at the time of marriage and adopt it throughout their reproductive lives. This assumption fails to permit for possible adjustment of fertility decisions based on existing household situations.

Although not in its strict economic sense some studies focus on socio-economic and cultural factors as the main fertility determinants in both urban and rural parts of Ethiopia. A study by Kinfu (2000) in the determinants of fertility decline in Addis Ababa reported that a below-replacement fertility level is achieved in the capital of Ethiopia mainly due to value orientation and future aspirations of women (ideational change). This motive, according to the author is supposed to be initiated by the increased female educational attainment and formal sector employment enjoyed by women since 1994.

This implies that sufficient socio-economic development is the base for ideational change; which is still in line with modernization theory. Kinfu's argument gives credit to indicators of economic development like education, formal sector employment that are supposed to bring about ideational change. Value orientation and future aspirations of women (individual decision makers) recognizes a substance of cost benefit analysis where women treat their advancement as benefits of postponing child bearing.

Caldwell's Intergenerational Wealth flow Theory

John C. Caldwell is known for the 'restatement' of the demographic transition theory through integrating socio-economic, cultural and institutional factors affecting fertility decline based on his own research experience in developing countries (Cleland & Wilson 1987; Kirk 1996). He has made a significant contribution to demographic research for three decades; as early as

1976 (*toward a restatement of demographic transition theory*(Caldwell 1976)) until the present (*On Net Intergenerational Wealth Flows: An Update*(Caldwell 2005)). Unlike the modernization theorists, he clearly stated that fertility decisions are ‘economically rational’ only within the domain of ‘social ends’. The movement towards controlled fertility is mainly the ‘product’ of social change rather than economic advancement although with economic implications (Caldwell 1976). He further warns that, high fertility is likely to happen with modernization, if such advancement is ‘unaccompanied’ by ‘social change’. The author thus, clearly stated that it is economically rational to maintain high fertility in the traditional societies and of low levels of fertility in the developed world.

The main reason for the persistent high fertility in traditional societies is the motives of “intergenerational wealth flow” where wealth flows up wards from children to the parents. Wealth is defined as the flow of money, goods, resources and insurance provided by one person to the other. Children provide labor and other economic benefits when they are dependents. And when they reach adulthood they are expected to take care of their elderly parents; this according to the author is economically beneficial for parents in favor of large family size. Especially men who invested a little in raising children but gain more from children (male lineage, social respect) and are against contraception (Caldwell 1976; Cleland & Wilson 1987).

According to Caldwell, there should be a reversal of wealth flows from the older generation to the young generation that makes large family size non-beneficial.

“...the fundamental issue in demographic transition is the direction and magnitude of intergenerational wealth flows or the net balance of the two flows...” (Caldwell 1976: 344).

There should be institutional and cultural change in favor of nuclear family, massive investment in education, and value orientation that may bring fertility decline. Caldwell tried to show the prominence of cultural and institutional values in affecting fertility which can precede economic development in bringing fertility decline as in the case of Bangladesh and South Africa demonstrated (Kirk 1996). For him, ‘emotional nucleation’ for example should precede ‘economic nucleation’ for fertility transition to occur as he claims that studies in Ghana confirmed. Significant correlation has been found between ‘kinship type’ and the ‘kind of family’ that university students in Ghana are in and the number of children they want (Caldwell 1976).

Caldwell's contribution to population studies

The theories discussed so far can be grouped in to two broad areas based on their views on fertility and population growth. The modernization and micro-economic advocates believe that sufficient economic development is necessary to bring declining fertility. This is in line with the neo-Malthusian view (discussed below- role of the state) in the sense that people tend to act rationally as a result of modernization. On the other hand, many scholars like Caldwell, Cleland and Wilson (1987) give primacy to socio-economic and cultural variables (which is in line with social view) in affecting fertility. Therefore, it can be argued that Caldwell's wealth flows theory contributes to a 'social view' in the broad areas of population studies.

The 'social view' as opposed to 'neo-Malthusians' asserts that high population growth in developing countries is a manifestation of low economic and social development.(Allen & Thomas 2000). People tend to favor large family size because children provide economic benefits, social prestige, labor contributions, and are used as old age insurance for their parents.

The social view put forward some insights to reducing fertility; better health care services and educational opportunities especially for women, better living standards, reduced child mortality, improving the position of women, and equitable economic and social development as the means of reducing fertility. As opposed to neo-Malthusians, advocates of the social view believe that family planning services are only necessary as a means of promoting couples' choices in achieving their desired number of children, and not as a means for population control.

Therefore, Caldwell's intergenerational wealth flows contributes to the social view in several ways.

1. His assumption of large family size as 'economically rational' in traditional societies acknowledges that population growth is not a problem in itself but a symptom.
2. His recognition of the return on investment on children (economic, social and security benefits) is also in line with the social view in that people tend to have many children because they are poor and children are cheap to acquire (although there are increased maternal and child health risks as the number of children born per woman increases).

3. Based on his field experiences, Caldwell commented that widespread application of family planning practices do not bring significant fertility decline in sub-Saharan Africa with the exception of South Africa and Central Kenya (Caldwell 2005). It can be understood here that family planning programs aimed at lowering population growth than assisting people in achieving their goals (reproductive rights view) have insignificant results as is pointed out by the social view advocates too.
4. Furthermore, Caldwell's focus on social change as the main driving force for fertility transition acknowledges the importance of cultural norms, value systems, religious beliefs with in which the 'economically rational' decision maker operates. However, while the social view advocates call for both economic and social development as equally important preconditions for fertility decline; Caldwell's model provide credit primarily to non-economic ones-'social change or westernization'.

Applicability of Caldwell's theory in Ethiopia

Although studies done in Ethiopia do not explicitly demonstrate the immense contribution made by Caldwell (they do not mention wealth flows either: to my knowledge so far!), it seems that the theory has some practical applicability in Ethiopia too.

J. C. Caldwell and P. Caldwell (1990) argued that the high and stable level of fertility in sub-Saharan Africa, where Ethiopia is a member, is attributed to the traditional and religious beliefs of ancestral continuation rather than the mere absence of economic development or ineffective family control mechanisms. In line with such arguments, several studies have found that socio-economic factors like low levels of educational attainment, limited employment opportunities, limited access and quality of health care services, high child and infant mortality, economic, social and emotional value of children especially sons, subsistence farming practices necessitating use of family labor are responsible for the observed high levels of fertility in rural Ethiopia (Hailemariam 1992; Bhargava 2006)

A study by Eyayu et al. (2004) in the remotely located areas of southern Ethiopia found that traditional way of child spacing for the purpose of child and maternal well-being and as a protection for the violent way of life in these areas are the reasons that motivate people control fertility. By child spacing, the authors refers to any traditional method (like sexual abstinence) parents use to delay conceiving the next child until the first one is able to stand by him/her self. By the same token, Regassa (2007) found son preference, nutritional status, and

land size to have fertility enhancing effects, while duration of abstinence was associated with strong negative effect on fertility in remotely located societies of southern Ethiopia.

In such remotely located societies, the social ends; child and maternal well being and protection from the violent way of life, son preference etc calls a desire for reduced fertility. It is not because of wider application of contraception or due to modernization that these societies willingly control fertility. However, it is because their way of life (violent), how they interact with themselves, and the absence of formal institutions that can deal with such ethnic conflicts; that shape their reproductive performance.

Theories on the Role of the State

There are two broadly distinct views on Population growth that shape the interventions made by national governments and international aid agencies regarding fertility (Allen & Thomas 2000); the ‘Neo-Malthusian View’ and the ‘Social view’. Neo-Malthusians consider high population growth as a ‘cause’ for poverty and social misery. They argue that poor people tend to have many children due to lack of farsightedness and negligence. Governments and international aid agencies can therefore intervene to help reduce population growth through instituting population control methods in such populations (Allen & Thomas 2000).

Advocates of the ‘Social view’ on the other hand perceive population growth as a symptom rather than the cause for socio-economic problems (Allen & Thomas 2000). People tend to have many children because they are poor. Children are relatively cheap to produce and provide economic, social and security values which justify for their acquisition. Therefore, improving the economic, social and health conditions (and their accessibility) in such societies are at the centre of fertility reduction: “development is the best contraceptive” (Allen & Thomas 2000):134.

A fundamental shift in perspective regarding fertility is being underway as a result of a ‘new consensus’ that took place in Cairo in 1994 (Allen & Thomas 2000; Tremayne 2001). The International Conference on Population and Development (ICPD, Cairo 1994) is meant to shift the attention of international donor organizations and developing countries governments from a focus on ‘population control’ to supporting ‘reproductive health rights’. Specifically the conference acknowledged a shift from the concept of ‘family planning’ to ‘reproductive

health and rights'. Women's empowerment to exercise full rights and responsibility on their 'reproductive choices' is at the centre of reproductive health rights.

The Cairo consensus has an element of the 'social view' in that it tries to guide governments and international agencies in helping the needy ones exercise their rights (reproductive choices). Family planning programs and other resources should be made available to *achieve peoples' reproductive desires*. This may be done through promoting mass education, creating employment opportunities, access to better health care services, creating social security systems, and reducing child mortality which are in line with the 'social view' perspective (Allen & Thomas 2000). This is believed to empower people (especially women) to make informed, willing and responsible choices in decisions regarding fertility at the micro-level.

The contribution of the Cairo consensus that may be used as a complementary to the social view (at least in this study) is the concept of reproductive health and rights and women's empowerment in decisions concerning fertility. This view, however, is judged to be the western neo-liberal notion of the 'individual' (Tremayne 2001). The applicability of the consensus in various societies and local realities (Cairo, 1994) is therefore highly doubted (Tremayne 2001). In traditional societies like Ethiopia (women with predetermined social role), have only marginal control over their sexuality and reproduction (Hailemariam 1992). The applicability of the Cairo consensus thus, depends on how the role of women changes in a given society (Allen & Thomas 2000).

B. Conceptual framework

A conceptual framework that incorporates all the theories that explain fertility differentials at a household level in rural areas of Ethiopia are certainly essential for this research. Different theories on fertility determinants give more emphasis on different factors (as discussed above); proximate fertility determinants, socio-economic, and ideational factors.

Considering the low level of development, low level of living standards and traditional way of life in rural Ethiopia, socio-economic and ideational factors are believed to be important variables in explaining fertility, besides the biological and behavioral factors called

intermediate variables (Bhargava 2006; Regassa 2007; Ethiopian Society of population studies 2008).

Thus, this paper mainly leans on the Caldwell’s intergenerational wealth flows theory which attempts to include both socio-economic and ideational factors as determinants of fertility in developing countries (Cleland & Wilson 1987). Consideration is also given to relevant international agreements reached that may have an impact on fertility decline- like the Cairo consensus.

In this research project therefore, I include intermediate, socio-economic and ideational variables that can determine or influence fertility given the current economic, social and cultural characteristics of the study subjects. That is, this study mainly focuses on ten selected variables that incorporate the intermediate (age at first marriage, duration of breast feeding and contraception use), socio-economic (education of both husband and wife, household income, land holding status of household members, and child mortality) and ideational factors (ideal number of children, and parental perception of children as an old age security) in explaining the observed high fertility in rural part of north Ethiopia, Tigray.

The simple diagram below illustrates the framework for analyzing fertility determinants in the study area.

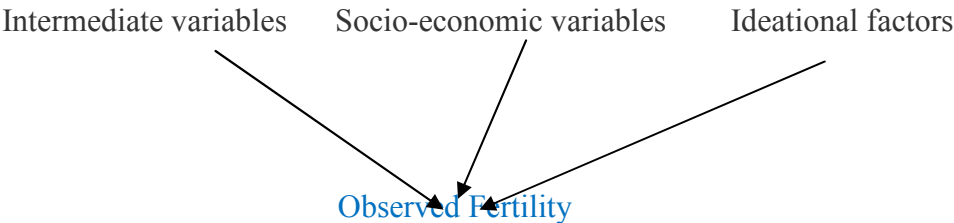


Figure 2: Conceptual framework for analyzing fertility determinants

Chapter Two

Research Methodology

Data and Sample

This research project makes use of both primary and secondary data. The secondary data is obtained from the Ethiopian Demographic and Health Survey (EDHS), conducted by the Central Statistical Agency (CSA) in 2005 nationwide. This data is collected in all regions of the country; where selected woredas (districts) are taken in each region. Such secondary data is used to choose a study region for the current research. With total fertility rate of 5.1 children per woman and peculiar history of famine, war and inaccessibility, as compared to other regions in Ethiopia, the Tigray regional state is chosen as a study area. The census records of the Tigray region were further revisited to identify the woreda/district with relatively higher fertility.

The primary data collection was carried out from December 2009 to January 2010. Semi-structured questionnaire was designed consisting of both closed and open-ended questions. This helps the collection of both quantitative and qualitative data which is suitable for both quantitative and qualitative data analysis. Ten in-depth interviews (in each questionnaire) were made for both husband and wife in a household with the wife between ages 15-49 years. During the interview I made continuous records of the responses to such open-ended questions in 81 households. That is, 81 women (wives) and 65 men (husbands) respondents; (146 study subjects in total) were interviewed. Questions were asked in a way that maintains husband-wife harmony while assuring that the required data is obtained. Couples in a household were asked same questions, except those that need to be answered by women, like duration of breast feeding, why women first get pregnant and the like.

The research area was selected from the records obtained from Central Statistical Agency (CSA) which is located in Addis Ababa-Ethiopia. After obtaining the records for the current fertility of Tigray which is located in the Northern part of Ethiopia, Alaje was identified as the woreda with relatively high fertility. District Administrators in Adishehu were approached to further identify the villages with relatively 'high' and relatively 'low' fertility in that district (woreda).

From a lottery of the kebeles in Alaje, Adishehu is selected as the study area. There are four zones (divisions) in Adishehu, namely, Maibel (zone one), Eitek (zone two), Lekatit (zone three) and Woyin (zone four). From the records of the woreda administration it was found that Maibel is with the highest fertility village and Woyin shows the least. To make comparisons possible, Maibel and Woyin were selected as relatively high and relatively low fertility villages in Adishehu respectively for the current study. One field assistant was assigned for each village by the district administrator for their assistance in conducting the research.

To reach 81 sample households, systematic sampling method was followed, where one household was randomly selected in each village and every fifth door was interviewed until the required sample size is obtained. When the respondent in the fifth door was not available at the time of data collection, the next door is taken instead and the system follows from this door again.

There are a total of 466 households in both villages; 268 couples live in the high fertility area while 198 households are living in the low fertility village. A total of 81 households (146 respondents) were asked; of which 50% are from the relatively high fertility area and the other 50% from the relatively low fertility village.

Of the total women surveyed, only 16 percent are employed for a paid work, and the rest are housewives. However, some women that reply are housewives are engaged in self employment activities such as farming (17%), daily labor (6%), and trading (16%). 24% of women surveyed have secondary education and above, 23% with primary education and the rest 53% are illiterate. On the other hand majority of men (51%) have completed secondary school and above (8 years of schooling and beyond). The average household income for the two villages is around 1,290 ETB (100USD) per annum. The average income per household is relatively smaller in the high fertility village (1,179birr) than in the lower fertility zone (1,405birr). At village level, this may imply that the poor is in favor of large family size (supportive of the 'social view'). 97.5% of the respondents are Orthodox Christians while 2.5 percent are Muslims.

Total average fertility is computed for both villages; the average number of children in the high fertility village is 5.4 and around 4 children in the low fertility village. However, women in the low fertility village are found to be younger (63 percent are between the ages of 20-35 years) as compared to those in high fertility village (only 35 percent).

Moreover, majority of respondents (80%) are married couples that stay together at the time of the survey. 10% of women respondents are divorced, 4% are separated for work/ study purposes and the remaining 6% are women under widowhood. Thus, the survey covered 81 women and 65 men respondents that add up to a total of 146 research subjects.

The Model

Ordinary Least Squares (OLS) for Multivariate Regression Analysis:

In explaining the relative importance of each explanatory variable to the dependent variable, Ordinary Least Squares (OLS) method is applied in several studies. It is widely believed that the dependent variable (Y), i.e. the number of children ever born for ever married women aged 15-49 is linearly dependent on a number of explanatory variables (the X's) (Schltjer et al. 1983; Ainsworth et al. 1996; Dabral & Malik 2005; Bhargava 2006; Regassa 2007; Osili & Long 2008).

OLS is applied to identify the influence of an explanatory variable on the dependent variable, while keeping the effect of other independent variables constant or under a *ceteris paribus* assumption (Gujarati 2003). This is similar to that used by (Islam & Khan 1991) for path analysis. The difference is that while the path analysis assumes the socio-economic variables to operate through the so called intermediate variables; OLS assumes each variable, provided it is significantly different from zero has its own independent effect on the dependent variable.

Therefore, if a variable has only an indirect impact on the explained variable its coefficient, after it is regressed together with the variable which it is supposed to operate, should be insignificant. To clarify it more, if education a socio-economic variable, for example, is assumed to be affecting fertility only indirectly, through affecting one or more of the intermediate variables, its magnitude after the regression should be negligible as compared to the intermediate variables in affecting fertility.

Shapiro and Thembashe (1997), indicated the multifaceted effects of education on the demand for children both directly and indirectly. Education negatively affects the desire for more children through employment in modern sector (thus less time for child rearing), more educated mothers are in favor of quality children (thus higher costs to have more children), raising the age at first union (marriage), attitudes towards fewer number of children and

modern control mechanisms (avoiding unwanted pregnancy), and reduced child mortality of better educated mothers. The authors used the method of weighted ordinary least squares for the analysis of children ever born to a women and found that education of women, women's employment in the formal sector, and ethnicity; all of which are socio-economic variables, significantly influencing family size. Mesfin (2002) supports this idea of "education-fertility hypothesis" that better educated women did consistently show to have fewer children in Tigray- Ethiopia.

Given the ten assumptions of the classical linear regression model (CLRM), the OLS estimators (B's) are the Best Linear Unbiased Estimates with minimum variance (BLUE). This is known as the Gauss-Markov theorem (Gujarati 2003). In the method of OLS, it is assumed that any relationships that may exist between the explanatory and explained variables, is non-recursive. That is, the causal relationship that may exist between the dependent variable and the independent variable (s) flows from the latter to the former variable only (Gujarati 2003).

Since the main objective of this study is to investigate the relative *direct* contribution of each explanatory variable on fertility, I use the OLS method and allow each variable equal chance of being included in the model.

Variables included in the Model

Based on a priori findings, theoretical background and prevailing situation of the study subjects, ten independent variables were selected and regressed against the dependent variable- fertility (the number of children ever born per ever married women of reproductive age).

Some studies in Ethiopia (Kinfu 2000; Sibanda et al. 2003; Alene & Worku 2009) considered the intermediate variables; age at first marriage, contraception use, breast feeding duration and induced abortion to directly affect fertility and indicate the variable(s) that affects fertility the most.

On the other hand, socio-economic variables like educational status of women, household income, employment status and other socio-economic and cultural variables are found to be

important in explaining the variation in fertility in different parts of the country (Hailemariam 1992; Ezra 2001; Bhargava 2006; Ringheim et al. 2009).

Thus, ten explanatory variables are selected as determinants of fertility for this study, namely age at first marriage, contraceptive use, duration of breast feeding, educational level of wife and husband, household income, ideal number of children couples desire, child mortality, use of children as old age security, and land holding status.

However, religion, ethnicity and cultural differences are not entered to the model (OLS) due to the fact that there is no variation in such variables that justifies including them in the model. That is, around 97.5 percent of the respondents are Orthodox Christians and 2.5 percent are Muslim; all the respondents belong to the same ethnic group *Tigre*. This is similar to that of (Fitaw et al. 2003) who exclude religion (Muslim), ethnicity (Gurage) and culture as these factors show no difference among the study subjects of rural Butajira (southern Ethiopia).

Accordingly, the variables included in the model, their abbreviations and measurements are listed below.

Variable	Abbreviation	Expression
X ₁ : Age at first marriage	AGFM	in Years
X ₂ : Ever use of contraception	CONT	dummy Variable 1 if yes and 0 if no
X ₃ : Duration of Breast feeding	DOBF	in months
X ₄ : Wife's Education	EDUW	completed Years of Schooling
X ₅ : Husband's Education	EDUH	completed Years of schooling
X ₆ : Household Income	HHIN	Ethiopian Birr per year
X ₇ : Ideal number of children	INCH	in number
X ₈ : Child Mortality	CHMO	dummy 1 if yes, 0 otherwise
X ₉ : Old age security	OASE	dummy: 1 children 0 other wise
X ₁₀ : Land Holding status	LAHO	dummy: 1 if yes, 0 for no

Research hypothesis

The hypothesis below, in terms of expected signs, is based on several empirical studies conducted and results expected a priori.

Age at first marriage (agfm) is the age at which women are formally exposed to sexual intercourse and thus, conception. Holding other variables constant, early marriage has a direct positive effect on fertility (Bongaarts 1978; Dabral & Malik 2005). In Ethiopia, marriage is usually universal, starts early and mostly precedes conception (Lindstrom & Kiros 2007; Alene & Worku 2009). Since contraception in the country is among the lowest in the world, barely 8%, early marriage increases the number of years that a woman is able to conceive (Fitaw et al. 2003; CSA 2005). Thus, early marriage can be associated with more number of children born per women in her reproductive ages.

Ever use of contraception (cont); is a conscious way of controlling births. Contraception is used either to limit births or to have sufficient birth intervals and thus reduce fertility. Use of any birth control methods is therefore expected to result in lower rate of child birth (Bongaarts 1978; Cohen 1998; Kinfu 2000; Bhargava 2006).

Duration of breast feeding (dobf); those who do breast feed their children or abstain from sex after birth have a lower probability of conceiving, than those that do not breast feed or abstain from sex at all; when there is no use of modern contraception shortly after birth. Thus, breast feeding and/or abstinence, whichever is longer is believed to have reducing effect on fertility (Kinfu 2000; Fitaw et al. 2003; Alene & Worku 2009).

Women's Education (eduw): it is well documented that educating women, is not only a way of reducing fertility but also is the engine for development (Ayoub 2004; Osili & Long 2008; Ringheim et al. 2009). Young women that stay in school well beyond secondary school can postpone early marriage, have the knowledge and can use contraception effectively, educated women are in favor of quality than quantity of children, education of parents reduces the need for financial support from children in their old ages, parental education reduces infant and child mortality, and assuming that women prefer to have fewer children than their husbands; education is a better way of increasing the bargaining power of women in a household (Mesfin 2002; Bhargava 2006; Osili & Long 2008; Alene & Worku 2009; Ringheim et al. 2009).

However, few years of women's education has fertility enhancing effects (Shapiro & Tambashe 1997). Through improved diet, reduced duration of breast feeding and short post partum abstinence; few years of female literacy can result in slightly rising fertility as compared to those that do not have any education. This effect is however found to be offset

by the use of contraception and late age at first marriage of educated women; if they continue to attend school at least up to secondary level (Ainsworth et al. 1996; Shapiro & Tambashe 1997). Thus, education is supposed to have a direct and indirect negative effect on fertility

Education of husband (eduh); most studies concerning fertility are concerned with women of reproductive age as the only study subjects (Mesfin 2002; Fitaw et al. 2003). However, as long as men are involved, if not are the sole decision makers, it is ideal to include them as part of the study subjects. It can be argued that educated men prefer quality than quantity of children, understand and discuss with their wives (in a better position to discuss and adopt contraception), and thus are in favor of fewer numbers of children than their counter parts (Kimuna & Adamchak 2001; Mesfin 2002; Short & Kiros 2002; Ringheim et al. 2009).

Household income; the effect of income on fertility is not clear cut (Dabral & Malik 2005; Aassve et al. 2006). In comparing, between and among different regions of the world, the poor tends to have more children than the rich ones (Alene & Worku 2009). The poor prefers to have more children in hopes of economic support from their children and due to higher infant mortality (Allen & Thomas 2000; Dabral & Malik 2005).

Examining the fertility behavior of households with different income levels in the same community, however, reveals that the poor prefers to have few children and compete for a better living (Gurmu & Mace 2008). Alene and Worku (2009) found a direct association between fertility and family expenditure (which can be used as a proxy for household income) in their cross-sectional studies in North and south Gondar zones-Ethiopia. (Gurmu & Mace 2008), on their studies in Addis Ababa, found a strong positive relationship between disposable income and fertility. Thus, since my research subjects are two remotely located villages in the Northern part of Ethiopia, a positive relationship between income and fertility is expected.

Ideal number of children (inch); those who wish to have a larger family size, are expected to have more children than those that want to have a few. That is, there is a positive association between the number of children desired and actual number of children born (fertility) per household (Kiros & Hogan 2001; Short & Kiros 2002; Dabral & Malik 2005; Bhargava 2006; Hamadeh et al. 2008).

Child Mortality (chmo); child loss may be followed by subsequent rising fertility for two reasons. One is due to the termination of breast feeding and on set of menstruation that results in high risk of conception (Bhargava 2006). The other is couples intentional need to replace their deceased child (Fitaw et al. 2003; Dabral & Malik 2005; Lindstrom & Kiros 2007; Alene & Worku 2009). Thus, child mortality and fertility are assumed to have a positive relationship.

Old age security (oase); There is no well established social security systems in less developed countries like Ethiopia. The only social security system in Ethiopia is pension for those civil servants who provide services in the public sector at their age of retirement (United Nations 2004). As 85% of the population is employed in agriculture mainly for self production, only a small fraction of people, mostly living in urban areas are eligible for old age pension. In the absence of formal security systems, the value of children as an old age security is a likely option (Caldwell 1976; Cohen 1998; Short & Kiros 2002).

Considering the poverty condition in Ethiopia, most people are not in a position to save for their old ages. Thus, they have to depend on other source of security than their own savings. Therefore, most couples are in favor of large family size, especially boys, hoping that one or more better-off children will take care of them (Ayoub 2004). This belief (strategy) is expected to influence fertility positively.

Land holding status (laho); fertility can also be affected by the status of land holdings of the household members (Dabral & Malik 2005). Those that own land need family labor in carrying out farming activities than their counter parts and thus are in favor of large family size (Aassve et al. 2006). However, land ownership status has an indirect negative effect on fertility through providing future economic security to land owners (Schltjer et al. 1983). This may reduce the need for having additional children in expectation of future economic support.

In Ethiopian context, children regardless of their sex are involved in farm activities and helping out household chores (Short & Kiros 2002). Moreover land in Ethiopia is public property, farmers have user rights and do not own land at all (Gebreselassie 2006). Thus, land holding status of household members is assumed to affect fertility positively in the study areas.

The hypothesis therefore is; while age at first marriage, use of contraception, breast feeding duration, education of women and their husbands affect fertility negatively, household income, ideal number of children, child mortality, value of children as an old age security and land holding status are expected to have a direct influence on fertility.

In equation form;

$$Y = \beta_0 - \beta_1 X_1 - \beta_2 D_1 - \beta_3 X_2 - \beta_4 X_3 - \beta_5 X_4 + \beta_6 X_5 + \beta_7 X_6 + \beta_8 D_2 + \beta_9 D_3 + \beta_{10} D_4 + \mu$$

Where: Y is the dependent variable; the number of children ever born for ever married women of reproductive age.

B_0 is the intercept term, the average value of Y when all the explanatory variables are set zero (excluded from the model).

X_i, D_i are explanatory variables (regressors); $i= 1, 2, 3...10$

μ is the error term that includes all variables not entered in to the model.

B_1 - B_{10} , are the regression coefficients. They are unknown parameters and must be estimated from the data.

The Betas (B 's), defined as partial regression coefficients, show the change in Y per unit change of a given X . For example B_1 in the equation above indicates the average number of children that can be reduced by increasing the age at first marriage of women in the study areas by one year; holding the influence of all other explanatory variables constant.

The interpretation of D_i 's, categorical variables, in affecting fertility should be made in relation to the control group. In this model, 1 stands for the presence of a characteristic represented by the variable while zero represents for the absence of that character (and therefore the control group). Thus, while interpreting a negative parameter estimate for contraception use, for example, those that use contraception are assumed to have fewer children by a magnitude of the estimated parameter relative to those that do not use contraception at all.

Chapter Three

Results and Data Analysis

Based on these hypotheses, a multivariate regression analysis is conducted using the STATA software. The results from such regression are presented below.

Source	SS	df	MS			
Model	327.914434	10	32.7914434	Number of obs = 81		
Residual	216.70285	70	3.09575499	F(10, 70) = 10.59		
Total	544.617284	80	6.80771605	Prob > F = 0.0000		
				R-squared = 0.6021		
				Adj R-squared = 0.5453		
				Root MSE = 1.7595		

fert	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
agfm	-.0812027	.0658998	-1.23	0.222	-.2126356	.0502302
cont	-.9650286	.4776494	-2.02	0.047	-1.91767	-.012387
dobf	-.058684	.0267997	-2.19	0.032	-.1121342	-.0052337
eduw	-.1073105	.0543915	-1.97	0.052	-.215791	.00117
eduh	-.047096	.0485885	-0.97	0.336	-.1440026	.0498106
hhin	.0001778	.0000895	1.99	0.051	-6.23e-07	.0003562
inch	.4663451	.1010508	4.61	0.000	.2648057	.6678845
chmo	-.0861955	.468062	-0.18	0.854	-1.019716	.8473248
oase	.9648639	.4343745	2.22	0.030	.0985314	1.831196
laho	-.8512837	.4162485	-2.05	0.045	-1.681465	-.0211023
_cons	5.596202	1.628573	3.44	0.001	2.348116	8.844288

Table 1: stata out put window

The upper most table displays the ANOVA table, which indicates the explained sum of squares and the residuals. The F-value (10.59) reported just above the R^2 value measures whether the explanatory variables entered in the model are jointly significant or not. The probability of rejecting a true hypothesis (H_0 : all the parameters are jointly insignificant) is zero ($\text{prob}>F=0.000$). This indicates that the model as a whole significantly explains the variation in fertility.

As can be seen from the output window above, the value for R^2 and adjusted R^2 is 60.21% and 54.53% respectively. Using the adjusted R^2 which is more appropriate in a multiple regression setting, 54.5 percent of the variation in fertility is explained by the model.

The lower table shows all variables included in the model, their magnitude, sign, and a column for t-statistic and P value; indicating the significance of a variable in affecting fertility. The coefficient (abbreviated as coef) column shows the magnitude and sign of each predictor variable; the larger the value of the B coefficient the stronger its effect on fertility is. Based on this, we can list the variables in order of their strength (magnitude) in affecting fertility; contraception use, old age security, land holdings, ideal number of children, women's education, child mortality, age at first marriage, duration of breast feeding, husband's education, and lastly household income.

The P value, which is the exact level of significance, shows that age at first marriage, child mortality and husband's education are not statistically different from zero, which means they have insignificant influence on fertility. All the remaining variables are statistically significant at 5% level. Referring to the hypothesis presented earlier, the stata out put also reveals that all variables except child mortality and land holding status have the expected signs. Child mortality has both an unexpected sign and is insignificant, land holding status has a larger beta value but in unexpected direction.

The last row in the output window provides the coefficient for B_0 ; showing the average value of the dependent variable, number of children ever born per ever married women, when all the explanatory variables are set to zero. The B_0 value of 5.59 is the average total fertility for these two villages. B_0 value for the two villages surveyed would have been higher if all women included in the survey were at the end of their reproductive years (around 45-50 years old).

The interpretation of the explanatory variables as presented in the stata out put window above is as follows.

The coefficient of contraception use (.965) shows that; those couples that ever use contraception at least once, reduce fertility by almost one child as compared to those that do not have such experience. Old age security stood second in affecting fertility in this study (0.964). This implies that those couples who are hoping their child (ren) will help finance during their old ages end up having an extra child than those who plan to have other means of financing.

Land holding status shows a strong negative effect on fertility; those who own land have 0.85 children *lower* than those who do not own land. This is contrary to the hypothesis that those household members that have access to land are associated with higher number of children born per household. But, from the view point of old age security, those who own land may have plans of financing their old ages from farm income (as majority of the respondents have land user rights in the study areas), at least by renting their land and may not need to have an additional child. This is similar to the findings of the negative effects of land holdings on fertility among Gujjars of Delhi in rural India (Dabral & Malik 2005).

Next is the ideal number of children couples wish to have (0.466); an increase in the ideal number of children by one unit leads to a 0.466 increase in fertility. In other words, as the ideal number of children increases by two, fertility increases by almost one child holding all other variables constant.

Women's education has a value of -0.1 indicating that educating women for additional one year reduces the number of children ever born per women by about 0.1. Osili and Long (2008) stated that the OLS estimate of the fertility reducing effect of educating women is a bit underestimated, which can imply that education apart from the above parameter estimate can have strong negative effect on fertility. However, the OLS value of 0.1 measures only the direct effect of education on fertility. When the indirect effects are accounted, the overall effect of education can be greater. On the other hand, educating men (husbands) shows fertility-reducing effects by 0.047 children but is statistically insignificant. This is regardless of the fact that men have better educational attainments than their wives and the proportion of men who attended school is higher in the study areas.

Even though it is not statistically different from zero, the coefficient of age at first marriage reveals that a delay in age at first marriage by one year has the effect of reducing fertility by 0.08 children. Similarly, increasing the duration of breast feeding by one month has a reducing effect on fertility (conception) by 0.06 children. Child mortality shows a magnitude of -0.08 (and is statistically insignificant) which means a child's death leads to fertility reduction by 0.08 children. The last variable affecting fertility in this model is household income. The results show that increasing household income by 100 Ethiopian birr (ETB) increases the number of children born by 0.01.

Testing the Assumptions:

In the methodology part, it was stated that the method of Ordinary Least Squares is best unbiased estimator given the 10 assumptions of classical linear regression model (CLRM) are fulfilled. Thus, the next ideal step is to test if all the assumptions are met. However, in practice few of the assumptions are tested. Accordingly, given the data used in this study is cross-sectional data normality, multicollinearity and heteroskedasticity tests are made.

First, a test for **normality** of the distribution of the error term using the Shapiro-Wilk W test is done and the following result is obtained.

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
error	81	0.96952	2.114	1.641	0.179

The null hypothesis for the test is that the error terms ($\mu's$) are normally distributed. The table shown above reveals the probability of rejecting a true null hypothesis is 17.9%. Thus, the test for normality is not rejected. This means the error terms are normally distributed. Hence, the t and F tests based on the model results are valid.

The second test is the test for **multicollinearity**. That is, to test if two or more explanatory variables have perfect linear relationships with each other. Given that OLS breaks down in cases of perfect relationships, a test of multicollinearity is a test of degree of correlation. Since variance of results obtained from a model with high degree of multicollinearity is high, an insight about the consequence of multicollinearity is obtained by computing variance inflation factor. The stata out put shows the following result;

Variable	VIF	1/VIF
eduw	2.08	0.479958
eduh	1.68	0.596820
inch	1.38	0.725246
cont	1.37	0.728839
agfm	1.32	0.757258
hhin	1.17	0.854272
chmo	1.17	0.858003
oase	1.13	0.881296
laho	1.13	0.885716


```

      dobf |          1.06    0.941754
-----+-----
Mean VIF |          1.35

```

The mean variance inflation factor is only 1.35, i.e., the inflation on the variances of the explanatory variables due to correlation among them. Since the mean VIF is close to 1 as the VIF's for the respective independent variables, we concluded that the degree of linear correlation among the independent variables is small. Interestingly, as mentioned above, there may be an indirect effect from education through the correlation with other independent variables since its VIF is larger than the other explanatory variables. This supports the previous claim that the effect of education on fertility might have been underestimated. Moreover, since we have R^2 value of 0.6 (not inflated) and all the variables except child mortality, household income and education of men are individually significant (as shown by the respective t-statistic on the stata out put window), I believe that the data on the selected 10 independent variables considered does not suffer from the problem of multicollinearity. Thus, the magnitude of each explanatory variable discussed above, is found to be its own influence on the dependent variable-fertility.

The next test considered while dealing with cross-sectional data is the test for the presence of constant variance called **homoskedasticity**. The null hypothesis here is that there exists constant variance (homoskedasticity).

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

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Variables: fitted values of fert
chi2(1)      =      1.83
Prob > chi2  =      0.1767

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According to the Breusch-Pagan test, the null hypothesis cannot be rejected for the p value is around 17.16%. This means variance of the error term is constant which is in line with the assumptions on which the OLS method is based.

Chapter Four

Discussion

This research project is based on two data sources; primary and secondary data. The secondary data is used to identify the research area, based on the records obtained from the Central Statistics Agency (CSA 2005) located in Addis Ababa-Ethiopia. I used primary data collected between December 2009 to January 2010 to make both quantitative and qualitative data analysis. As presented in chapter three, multivariate regression analysis was made to identify the major factors that affect fertility among the ten variables selected. The discussion part in this chapter is thus based on results obtained from the quantitative data analysis and qualitative data (in-depth interviews and discussions) collected during my interview with the research subjects. Of the twenty five questions prepared and asked (see questionnaire in Appendix1), ten open-ended questions were discussed in detail with 146 respondents. Open ended questions were designed to enable the collection of qualitative, non numeric data. Hence, the results obtained from the OLS model were not taken at face value, i.e. variables like contraception use that are found to have strong influence from the quantitative data analysis were discussed considering the responses and conversations made and actual fertility performance of the research subjects.

Moreover, the qualitative data collected enables me to make practical explanations when the results from regression analysis are contrary to the hypotheses; as in the case of land holding status for example. Hence the following discussion is based on a combination of quantitative and qualitative data collected during the survey, relevant theories of fertility transition and related studies undertaken in Ethiopia.

I. Proximate Fertility Determinants

Age at first marriage

Age at first marriage is the age at which women are formally entered in to sexual intercourse that can lead to a high probability of conception (Bongaarts 1978; Schltjer et al. 1983; Dabral & Malik 2005). In countries like Ethiopia, marriage is usually universal and starts early

(Lindstrom & Kiros 2007; Alene & Worku 2009). Due to the fact that contraceptive prevalence is among the lowest in the world; barely 8% early marriage can lead to teen age pregnancy (Fitaw et al. 2003; CSA 2005). Thus, increasing the age at first marriage reduces the number of years that a woman is able to conceive, and thus negatively affects fertility (Fitaw et al. 2003; Alene & Worku 2009).

The current study indicated that delaying the age at first marriage by one year, in the study villages; reduces fertility by about 0.08 children. However, it is found to be statistically insignificant even at 0.2 level of significance and stood seventh in terms of its magnitude. This is contrary to the theory that socio-economic variables like education, must act through one or more of the proximate variables- in this case age at first marriage to affect fertility directly (Bongaarts 1978). The present finding reveals that age at first marriage has a small magnitude and is insignificant in affecting fertility compared to socio-economic variables like education and land holding status.

Looking at the age distribution of women respondents; such finding can be due to the fact that there is no considerable variation in age at which women respondents formally enter in to marriage (almost all marriages happen early). This is expected because there is almost no difference in religion, ethnicity or culture among the study subjects to result in different perceptions on marriage. The histogram below is created to show the age distribution of women at their first marriage in the study areas.

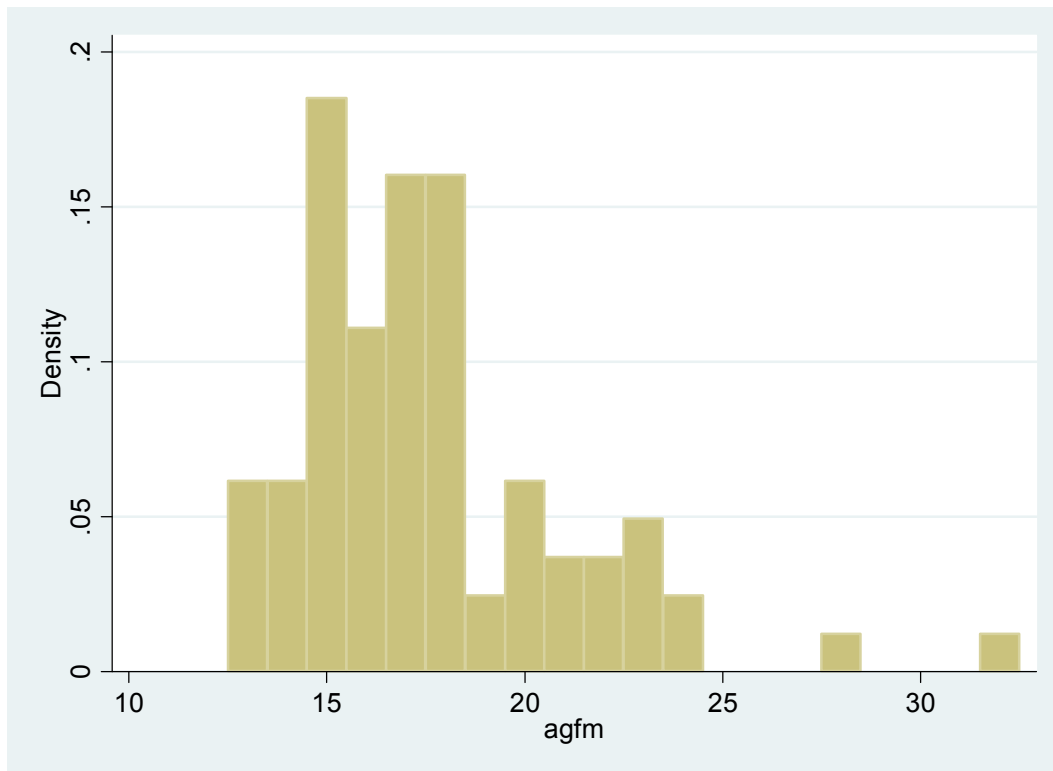


Figure 3: age distribution of women respondents at their first marriage

Source: Fieldwork

The above histogram shows that most women in the study areas enter in to formal marriage well before the age of 18 years. This is sufficiently below the national minimum age of 18 years set by the government (Office of the Prime Minister 1993). Considering the low contraceptive prevalence in rural Ethiopia, early marriage is expected to lead to early motherhood (Teller et al. 2007). Therefore, even though the OLS estimate is insignificant probably due to similarity in the age at which women formally enter in to marriage, early marriage is in line with the high fertility prevailing in rural Ethiopia, particularly the high overall fertility in the study areas.

Teller et al. (2007) reported a gradual increase in age at first marriage in Ethiopia in recent years due to rising female enrolment rates. From the records of women’s education of the study subjects, 24% of women respondents have attended school for eight years and above. Most of them (14 out of 21) are located in the relatively low fertility village. Thus, it can be noted from the above histogram, that the slight increase in the age at first marriage may be

due to the slight increase in the proportion of women attending secondary school and above, in recent years.

Ever use of contraception

Higher contraception use is widely believed to result in lower rate of fertility (Khan & Raeside 1997; Aassve et al. 2006). Contraception could be used to limit births or have sufficient birth intervals (Bongaarts 1978; Caldwell & Caldwell 1990). Short and Kiros (2002) argued that high fertility in Ethiopia is mainly attributed to the limited family planning knowledge and exposure in the country. Teller et al. (2007) also conclude similarly; in their own words, "...however, a key determinant of the speed at which it will continue falling is the extent to which couples use or fail to use contraception to control the number and spacing of their children" (Teller et al. 2007: 11). Such arguments are in line with the neo-Malthusian view that lower rate of population growth (fertility) can be achieved through universal adoption of contraceptive methods.

Looking on the findings from the current study, 64 percent of women (52 out of 81 respondents) in their reproductive ages reported they use modern contraception at least once. From the regression analysis, contraception use stood first in affecting fertility in the study villages with a magnitude of -0.96. It is statistically significant at 5% level of significance, $P=0.047$. *But why is fertility still high?*

One possible explanation is; high fertility is prevalent in the study areas due to couples' desire for more children. These respondents that say are using contraception (majority) use a method or two to have sufficient birth interval and in fear of exceeding the number of children they want. Respondents used to mention that "it is good to use contraception methods so that the next child will be born when the previous one is able to feed and walk by him/her self." All women respondents that encountered unwanted pregnancy (ies) say that the only measure they took is to stop breast feeding to their current baby and carry on with their pregnancy. They said, "Baby is a gift from God and should not be aborted". The Orthodox Christian church teaches its followers not to kill already conceived babies. Therefore, respondents proactively take contraceptives in fear of exceeding the number of children they want to have.

Caldwell (1976), in his study in urban areas of Nigeria, found that contraception users are characterized by both high fertility and ideal number of children. His explanation for the

situation was that it is due the fact that the net wealth flow is not fully reversed and thus contraceptors are not fully motivated to use it effectively. Contraception is mainly used to replace sexual abstinence after birth, for premarital sexual relations and for extra marital sexual relationships. In line with this explanation, Teller, et al. (2007) stated that although contraception use in Ethiopia is threefold in 2007 as compared to the level in 1993, rural fertility remained high and stable.

The table below is created to substantiate as to why fertility remains high even though most women reported they used at least one method at the time of the survey.

	inch										
cont	3	4	5	6	7	8	9	10	11	12	13
0	1	2	2	5	6	4	2	3	1	2	1
1	1	11	7	15	5	8	1	1	2	1	

Table 2; source: fieldwork

The column cont, for contraception use, has a value one if respondents say they use any control method to date; it is zero if they do not have such experience. Our interest here is to create a link between ideal numbers of children (inch) among women who use contraception; to better understand the practical contribution of contraception on fertility of the research subjects. ‘Ideal’ number of children (inch) refers to the number of children couples wish to have if they were able to achieve that number (Bhargava 2006). The lower row, in the above table, corresponding to cont=1 shows that of those who say they have used a method (52), 33 of them (63%) stated 6 and above as ideal number of children. Assuming a positive relationship between ideal number of children and fertility, as is found from the regression results, it can be inferred that as long as couples’ ideal number of children remains high, contraception is used to space between births than to limit it. This is in line with the study of Caldwell and Caldwell (1990) where contraception is mainly used to achieve sufficiently longer birth intervals, and reduce post partum abstinence.

Moreover, almost all respondents that are using contraception say that they are using injectables that last for only 3 months, as the main modern method. Teller et al. (2007) reported similar finding for the whole Ethiopia where only few users (< 1%) use permanent

contraception methods in the country. Respondents say that it is good to use contraceptive methods, like injectables so that they are able to conceive their next child when appropriate.

Wilson and Cleland (1987) stated that as a result of socio-economic change or modernization, traditional ways of contraception like prolonged breast feeding and sexual abstinence are distorted. To maintain their earlier desired number of children people may need to use contraceptives. Hence, even though the Ethiopian government has planned to increase the contraception prevalence rate from 4% in 1990 to 44% in 2015 to reduce population growth (Ringheim et al. 2009), the current study shows that the use of contraceptives is not necessarily associated with fertility decline.

From the neo-Malthusians view, the contraception use versus fertility discourse could also be due to non-continued use of contraceptives. Most respondents who stopped using contraception say that they stopped because they felt sick or inconvenient with the method they previously adopted. It is also indicated that couples hesitate to use long term control mechanisms, not because they don't know any method (100% say they know at least one method), but because they are not sure if they are going to need additional child (ren). Some women also reported that they do not want to use long term contraception because their husbands may want children in the future, and knowing that their wife terminate child bearing, may want to marry another one. This shows that children are used to strengthen couples intimate relationship and ensure its continuity. This still shows the high value attached to children and makes people hesitate to terminate child bearing.

Similarly, women in the study areas hesitate to use family planning methods due to the social taboos about the side effects; *use of a method leads to sterilization*. However, either the source of such information or actual infertility side effects of modern contraceptives are not found from the interview. During the survey it was also noted that people have some information about one or two methods; usually the pills and injectables, but have no information about the existence of alternative methods like, IUD and male sterilization. Moreover, the district health station administrator in Woreda Alaje stated that “we provide contraception tools for free, however, we are facing difficulties of funding from NGOs and regional administration ; sometimes we have the implant, but lack the equipment to do it.”

The increased construction of health posts and deployment of health extension workers by the Ethiopian government (Ringheim et al. 2009) could therefore be used as a way of creating

knowledge about the availability of alternative family planning methods and continued provision of reproductive health facilities to women. Women with this opportunity could make informed decisions about their family size and have various options to support their choices. Such activity can also have reducing effect on the ideal number of children desired through reducing infant and child mortality. This is because people may desire to have more children in expectation of future child losses so that enough number of children will survive to maturity.

Duration of breast feeding

Women that breast feed their children for prolonged period or abstain from sex after birth have lower probability of conception than their counter parts, when women do not use contraception during this time (Bongaarts 1978). Studies in Ethiopia have reported that the longer the duration of breast feeding (by 6 months and above) the lower the number of children born to a woman on average (Kinfu 2000; Fitaw et al. 2003; Alene & Worku 2009). Thus, breast feeding and/or abstinence, whichever is longer is believed to have reducing effect on fertility.

The duration of abstinence in the current study areas is until a baby gets baptized (40 days if a boy or 80 days if a baby girl) among the orthodox Christians, and all Muslim respondents say that they abstain up to 40 days. This is much shorter than the average duration of breast feeding (23.7 months) in the study areas. That is why duration of abstinence is not entered as one explanatory variable in the model. The duration of breast feeding in this study is a bit longer than the national average; which is 19 months (Lindstrom & Kiros 2007). But considering the relatively short breast feeding duration in urban areas it is more or less similar to the average breast feeding duration in rural Ethiopia.

In the current study areas breast feeding is found to be negatively associated with fertility as expected. Increasing the duration of breast feeding by one month has a reducing effect on fertility (conception) by 0.06 children, and is statistically significant $P=0.032$. All women interviewed said they breast feed their child (ren). Only 6 of all women surveyed reported breast feeding duration of 5-9 months. The reason for this is because they want to continue their education or due to their employment in the formal sector; and hence is inconvenient for them to breast feed their children consistently. Breast feeding in the study areas is used as a way of feeding the baby and not as a means of contraception.

The effect of breast feeding in reducing fertility is well documented in rural Ethiopia. Getu and Alemayehu (2009) for example, in their studies in North and South Gondar zones found that breast feeding is the most powerful proximate determinant in reducing fertility in these areas. The same study reported the weak fertility inhibiting effect of age at first marriage and contraception. Similarly, Kinfu (2000) found breast feeding to have negative impact on fertility, but next to age at first marriage and contraception use in Addis Ababa. Although we cannot compare the case of Addis Ababa (capital of Ethiopia) with rural areas it can be noticed that as women are more educated and thus have formal employment, the duration of breast feeding reduces and its effect on fertility becomes weak (Bhargava 2006).

As is indicated with the presentation of the effect of early marriage on fertility, duration of breast feeding did not confirm Bongaarts' (1978) claim that all variables other than the proximate determinants have only an indirect effect on fertility. All proximate variables except contraception prevalence resemble a much lower magnitude in affecting fertility as compared to socio-economic and cultural factors considered in this study.

II. Socio-economic variables

Women's Education

Studies have documented that educating women is not only a way of reducing fertility, but also is the engine for development (Ayoub 2004; Teller et al. 2007; Osili & Long 2008; Ringheim et al. 2009). Education is believed to have both direct and indirect negative effects on fertility for both rural and urban areas and across all age cohorts (Ainsworth et al. 1996). Women with secondary school and above are in general found to give birth to fewer children even for those countries whose contraception prevalence is minimal (Ainsworth et al. 1996). Women, especially the educated ones, prefer to have lower number of children than their husbands (Mesfin 2002; Osili & Long 2008).

Although specific reasons are not specified, Mesfin (2002) indicated that Tigrian men in general are in favor of large family size as compared to their wives in all age groups. Short and Kiros, (2002) also reported that desired number of children is high in Ethiopia, when differences occur, men tend to prefer more children than their wives. Aassve et al.(2006)

reported similarly that men in Ethiopia are socially perceived as successful, if they are able to raise more children. In more general sense, Caldwell and Caldwell (1990) stated that in traditional societies of Africa, men are in favor of large family size because more number of children especially sons is one way of assuring the continuation of male lineage, fathers with more grown up children get pride and social respect, and children are used as way of ensuring family security and maintain political dominance in their village. This is despite the fact that women bear physical and emotional risks from frequent pregnancies and subsequent births and have to specialize in rearing and raising children (Caldwell & Caldwell 1990).

Ainsworth et al. (1996) highlighted as to how female literacy affects fertility and contraception use in their studies in 14 sub-Saharan African countries. Education reduces fertility through rising opportunity cost of having children as a result of participation in paid jobs, better wife-husband communication, quality preference than quantity, reduced child mortality and more information and effective use of contraception of educated women than their counter parts. Such explanations are in accordance with the modernization and micro-economic theory of demographic transition.

Similar results have been found by Ayoub (2004) in Tanzania, where more educated women are in favor of small family size due to increased value of their time. “Given the opportunity costs of childrearing (which is time-intensive), the utility of the woman will be maximized by reducing the number of children to reproduce and spend more time in other earnings-activities.”(Ayoub 2004: 145).

Bhargava (2006) stated the significance of variables affecting ‘ideal family size’ as the major determinants of the actual fertility observed in Ethiopia. Among others, education of women has strong impact on fertility reduction through attitudinal change in favor of small family size. Aassve et al. (2006), also call the need for attitudinal change as a means for fertility transition. The authors stated that the presence of “social norms, in which men are perceived successful if they have many children, and women are expected to specialize in household production and rearing of children”(Aassve et al. 2006: 32) are at the root of explaining the observed high fertility in Ethiopia. Similarly, Osili and Long (2008) found a direct fertility reducing effect of female literacy in Nigeria, the most populous country in sub-Saharan Africa followed by Ethiopia. “The analysis suggests that increasing female education by one year reduces early fertility by 0.26 births”(Osili & Long 2008: 1).

This negative effect of women's education on fertility is also well documented in India. Taking the case of Kerala, a state known for its women education and lower average fertility, it really demonstrates the direct reducing effect of female literacy among the densely populated countries like India (Dabral & Malik 2005). The influence of education on fertility in such areas is through delay in age at first union as the authors stated. Women's education also reduces fertility through; reducing infant and child mortality (no need for replacement), attitudinal change to control births and employment in the modern sector (Shapiro & Tambashe 1997).

Consistent with a priori findings, the current study confirms that female literacy has indeed fertility reducing effect. Women's education (eduw) has a magnitude of -0.1 and is statistically significant at 5 percent level of significance $P=0.05$. This can be interpreted as; as women remain in school for one additional year, fertility reduces by 0.1 children, holding all other variables constant.

The effect of educating women gets stronger when women are able to stay in school well beyond primary education (Fitaw et al. 2003; Ayoub 2004; Bhargava 2006; Osili & Long 2008; Alene & Worku 2009). Shapiro and Tambashe, (1997) indicate that few years of women's education may have fertility enhancing effects through better maternal health, reduced duration of breast feeding and postpartum abstinence. Ainsworth et al. (1996), also stated that early stages of education can have positive association with fertility:

“Literacy is certainly not achieved in a single year of schooling and, under the circumstances that prevail, may not even be achieved until completion of primary school. A more plausible explanation is that the (small group of) women who completed only a few years of schooling are those who became pregnant, whose families wanted them to get married, or who simply could not keep up and therefore stopped their schooling” (Ainsworth et al. 1996: 103).

This effect is however; offset by the use of contraception and late age at marriage of educated women if they continue to attend school at least up to secondary education.

The data from the current survey shows that 53 percent of women respondents in these two villages have no formal education. Of this, around 65 percent (26/40) are found in the high fertility village. The average level of schooling in these two village areas is barely 4.18 years. This shows that most women in the study areas are regarded as those with no schooling or with little primary school experience. Moreover, only 24 percent of women respondents have

eight years of schooling and above. 44 percent of those who respond that they had some education are with only primary education. In terms of educational attainment, the low fertility village is found to be better-off than they are in the high fertility area all the way from primary, secondary and college/university level.

The fertility reducing effect of education in the study subjects therefore could have been higher if women in the study areas had better educational opportunities. To substantiate it more; a study by Ayoub (2004) in Tanzania pointed out the insignificance of higher education as one explanatory variable due to the fact that only few respondents are with higher education. Ainsworth et al.(1996), in their cross country study on fertility determinants found the effect of education on fertility to have strong negative association in countries where the proportion of women with higher education is high.

Similarly, an analysis of the effect of education on fertility and poverty reduction in Ethiopia conducted by Aassve et al. (2006), indicate that the impact of education on fertility and poverty reduction is more prevalent in urban areas than in rural areas due to the fact that female literacy is much lower even not comparable to urban educational opportunities. The authors call for state's attention to increase enrolment rates in rural areas together with better educational infrastructure to reduce female drop outs.

Men's Education

Most studies concerning fertility are concerned with women of reproductive age as the only study subjects (Mesfin 2002; Fitaw et al. 2003). However, as long as men are involved, usually they are the sole decision makers in matters including fertility in developing countries like ours, it is ideal to include them as part of the study subjects (Mesfin 2002; Short & Kiros 2002; Ringheim et al. 2009). Mesfin (2002), in his study of fertility and family planning programs in the Tigray region found that men usually prefer more children than their wives. This higher preference for children by men resulted mostly in higher fertility rates in the study areas. This, according to Mesfin is due to the dominance of men in all household decision making.

A study in Kenya regarding men's role in fertility reduction indicate that a reduction in the average number of children in 1990s has been achieved partly due to the change in men's

attitudes towards large family sizes and increased husband-wife communication usually among the educated men and women (Kimuna & Adamchak 2001).

Furthermore, men's contribution to fertility reduction is due to the fact that educated men prefer quality than quantity of children, understand and discuss with their wives, have positive support towards use of contraception and thus fewer numbers of children for the family than their counter parts (Ainsworth et al. 1996; Mesfin 2002). However, it is indicated that educating men has lesser effect on fertility reduction than educating their wives (Ainsworth et al. 1996; Kimuna & Adamchak 2001).

Looking at the regression results presented, it is found that men's education has fertility reducing effect. The coefficient of husband education (eduh) shows a reduction in the number of children born by 0.047 for each year of schooling, holding all other factors constant. But it is not statistically significant even at 0.3 level. This is despite the fact that men are better off in terms of their proportion and level of schooling achieved than their wives in the study areas. The same educational opportunity (enrolment rate) differences are also observed at national level (CSA 2005).

Therefore, if the policy option is to reduce fertility through education, as is stipulated in the Ethiopian population policies (Office of the Prime Minister 1993), focusing on female literacy has better results than men, at least in the study areas. This is consistent with various findings obtained in developing countries like Tanzania (Ayoub 2004), Nigeria (Osili & Long 2008), and fourteen sub-Saharan African countries (Ainsworth et al. 1996). Thus, it can be argued that women spend a lot of time in child rearing activities and if they stay at school, will need to postpone marriage, are likely to desire few children and use contraception effectively than men.

Household income

The effect of income on fertility is not clear cut (Dabral & Malik 2005; Aassve et al. 2006). In comparing, between and among different regions of the world, the poor tends to have more children than the rich ones (Dabral & Malik 2005; Alene & Worku 2009). Dabral and Malik (2005) found negative relationship between household income, especially women's earnings and fertility. They stated that when people get richer they become more interested and willing to acquire other consumption goods than children. The poor prefers to have more children in

hopes of economic support from their children and due to higher infant mortality (Dabral & Malik 2005). This has an element of the 'social view' in that high fertility is motivated by the lack of economic means by the poor. Poor people are willing to have more children in expectation of economic, security and labor contributions from children (Allen & Thomas 2000).

On the other hand, examining the fertility behavior of households with different income levels, in the same community, reveals that the poor prefers to have few children and compete for a better living (Gurmu & Mace 2008). Alene and Worku (2009) found direct positive influence of family expenditure (which can be used as a proxy for household income) on fertility in their cross-sectional studies in North and south Gondar zones-Ethiopia. This is because the rich can afford to raise many more children than the poor ones. Gurum and Mace (2008), on their studies in Addis Ababa, found strong positive relationship between disposable income and first birth.

“According to the results of the multivariate regression model each increase in income category causes a marked and highly significant increase in the risk of giving birth to a first child, despite controlling for marital status, and the other relevant covariates”(Gurmu & Mace 2008: 347).

During the survey for the current study, respondents were asked about their income in Ethiopian Birr (ETB) per year. The average household income for the two villages is around 1,290 ETB (100USD) per annum. This does not include the wealth of the household members like houses, cattle, and savings. Traders show the highest income per year, and daily laborers earned the least in the study areas. Besides, land holders on average show much lower income (770ETB per annum) as compared to non-farming families; traders, civil servants and daily laborers (1,880ETB per year) during the survey. On the other hand, as land is almost equally distributed per adult, there is more homogenous income distribution in farming households than their counter parts. At the same time land holders are found to be less affected by variations in food prices than their counter parts because they are mostly food producers than sole consumers.

The regression analysis for the current study revealed a positive relationship between household income and number of children born per household. The income coefficient (hhin), has the lowest value in absolute terms (0.00018), but is statistically significant at $P=0.051$. This indicates that as household income per year increases by 100 Ethiopian Birr (ETB), the

number of children born per household increases by 0.018 in these village areas. However, since land holders have much homogenous income from year to year, their fertility decisions are much less affected by income situations than their counter parts.

This result is in conformity with the findings obtained by (Gurmu & Mace 2008) in Addis Ababa, (Alene & Worku 2009) in North and South Gondar zones, (Islam & Khan 1991) in Bangladesh. The explanations for the positive relationship between fertility and household income in Addis Ababa for example is, people who think do not fulfill basic needs want to delay marriage, and if married decide to control births until they at least are able to have housing, able to pay for schooling (private schools) for their children and the like. Similarly couples in the study areas may want to limit births if they think are unable to raise more children. The current finding however does not confirm the arguments by demographic transition theory and micro-economic theory that economic growth is the main driving force for fertility reduction.

The weak contribution of household income to the observed fertility however is due to the fact that people in the study areas are mostly poor; the average household income is 1,290 ETB per year of which around 47% earn barely 200-600 ETB per year. Respondents were asked about the source of their income and most of them stated farm income, petty trade, and daily labor as their main source of income. Most women in the study villages are house wives, where they are supposed to take care of children and family, do the entire house hold chores, with no compensation in return. Only 16% of women, most of which are found in the low fertility village earn income from employment in the formal sector.

This finding, although with a lowest contribution in its magnitude has important implications that concerned authorities should follow closely. The desired number of children in the study areas is much higher than the observed fertility. The reason for not achieving their desires, as most respondents stated is due to economic difficulties. This shows that couples may have a tendency of having more children as their income levels improve. This in turn implies that economic development and programs of poverty reduction should be accompanied with appropriate counseling and knowledge creation activities in favor of small family size.

Land holding Status

In his wealth flows theory, Caldwell (1976) argued that the relatively high fertility sustained in sub-Saharan Africa (where Ethiopia is a member) is due to the motives of 'intergenerational wealth flows' where the flow is from the younger to the older generation. Children provide labor and other economic benefits starting as early as 5-7 years of age. Caldwell raised an example from a study of a village near to Nigeria, where parents intentionally delay sons' marriage to assure enough labor contribution to the farming household. The author stated that children cover their costs and start to contribute economic benefits to the household before they reach 16 years of age. Thus, besides anticipated future benefits, children's current economic and non-economic services make large family size beneficial in traditional, agricultural societies of sub-Saharan Africa. By traditional society Caldwell (1976) refers to a pre-modern, predominantly agricultural society where governments or religious organizations can shape individual and community level activities by offering social protection systems than a self-sufficient family do in primitive societies.

Land holding status of one or more of the household members therefore, has a bearing on fertility (Schltjer et al. 1983; Stokes et al. 1986; Dabral & Malik 2005). Since land is the basis of livelihood in rural developing countries like Ethiopia, it is ideal to include access to land as one explanatory variable for the current study focuses on two village areas located in rural areas of Ethiopia. M. Cain (1985) states that the relationship between land holdings and fertility should be interpreted considering the land tenure system, existing labor market and presence/ absence of non-farm employment in a given society.

I took land holding status, rather than land size as one explanatory variable since land is distributed by the government of Ethiopia based on household family size. So given the study subjects are living in the same district, there is no considerable difference in farm size that justifies for its inclusion.

The current government of Ethiopia announced the continuation of state ownership of land when it came to power in 1991 (Gebreselassie 2006; Crewett et al. 2008). Land holders (farmers) have user rights, with no ownership rights, where the sale or mortgage of land is deemed illegal. However, land can be inherited from parents to their children or grand children (with written approval from the government officials) when they get too old or died. According to the explanation of the woreda administration head, household members are

eligible to get access to land if they live for at least six months in the village and do not have employment in the formal sector. Land is subject to redistribution by the government when the previous owner dies without children or leaves the village for more than six months. This leads those without land to wait until land is available following the permanent relocation of a family (ies) or death of a land owner(s) without immediate heir.

The rationale from the government's side is to assure the continued use of land by rural households that are in need of land. This is supposed to prevent the sale/permanent loss of land by poor households in their bad times or harvest failures. Such land tenure system is, however, at odds with opposition political parties, and many international aid agencies in favor of the privatization of land rights (Crewett et al. 2008).

The subsistence, small holder farming system in Ethiopia, and land use rights that perpetuate such system require utilization of family labor. Children regardless of their sex are involved in farm activities and helping out household chores especially in rural parts of Ethiopia (Short & Kiros 2002). Children look after cattle and other belongings, involve in weeding crops, and harvesting in addition to household chores; collecting fire wood, fetching water, looking after young sisters and brothers and the like. Thus, such small holder farming system which is labor intensive assures the continued need for child labor by farm households (Aassve et al. 2006). Unless supported by agricultural package that reduces the need for child labor, the present land use rights in Ethiopia are supportive of high fertility (Crewett et al. 2008). Thus, land holding status of household members is assumed to affect fertility positively in the study areas.

Furthermore, since land is public property in Ethiopia, farm households only have user rights; this limits the reliability of the land for future security purposes. This in turn implies that children are the most secure assets to invest than land under such circumstances (Stokes et al. 1986). This too is supportive of the assumed positive relationship between land holding status and fertility in the study areas.

On the other hand, Schltjer et al. (1983) stated that land ownership has both direct and an indirect influence on fertility. Those who own land may need more children for labor requirements than their counter parts which results in rising fertility. The indirect impact is through providing economic security where people can depend on their own holdings (in this case land) than children for their old ages. This results in reduced preference for more

children by the farming family. Schltjer et al.(1983) point out that a negative relationship can be found if the indirect effect of land ownership more than offsets the positive impact on fertility.

Aassve, et al. (2006) reported the existence of positive relationship between household's child labor utilization and fertility in rural Ethiopia. In the authors' own words,

“Another important finding of our study is the significance of child labour as a symptom of both high fertility and high poverty. Whereas we do not find any significant effects in urban areas, possibly due to small sample size, we do find that child labour is associated with higher fertility and higher poverty in rural areas” (Aassve et al. 2006: 32).

Moreover, additional child is used as a means of getting additional land or retaining an existing one as land distribution is based on family size in Ethiopia (Gurmu & Mace 2008). Therefore, large family size may still be beneficial for the farming household to get additional land or retain an existing one.

The multivariate regression analysis for the current study subjects, however, shows a strong negative influence of land holding status on fertility. The coefficient of land holding (laho) is - 0.85, and is statistically significant at 5% level of significance ($P=0.045$). This suggests that holding the effect of other variables constant, couples that have access to land have lower fertility than their counter parts by 0.85 children. This is contrary to the hypothesis; couples that have access to land give birth to a higher number of children than their counter parts.

According to Caldwell's wealth flow theory, children are deemed to have a life-long support starting from childhood until after the parent's death. The negative sign obtained from the regression analysis could therefore lead to two premises; either the farming families use hired labor; or the old age value of children was the main motive for having more children rather than the assumptions in the child labor requirement-fertility hypothesis in the study areas.

Schltjer et al. (1983) in their study of land ownership, farm size and fertility levels in rural Egypt found that while fertility is positively related to farm size, land ownership status is inversely related to family size. The authors stated that the relationship is negative because those households that have ownership rights do not need extra child (ren) for an old age security. “Thus, concep-tually, it is likely that agricultural policies directed at broadening land ownership will reduce desired family size through reduc-tion in the weight assigned to future paren-tal

security obtained from children. This finding supports the view that land ownership provides parents an alternative source of security for old age” (Schltjer et al. 1983: 400).

Stokes et al.(1986) raised the issue of land ownership versus old age security and argued that those individuals that are hopping will live long enough acquired twice as large land compared to their counter parts in India. Households with the husband with ownership of land are also found to have few numbers of children desired and mostly use contraception. This according to the authors is due to the reduced desire for more children by farming families as compared to their counter parts.

Hence, since farm households in rural Ethiopia depend on family than hired labor, a more plausible explanation for the negative effect of land holding status on fertility is due to the indirect impact of land to old age security. The results suggest that access to land reduces the desire for large family size by almost a child as compared to non-farm households. This is despite the fact that farm households in Ethiopia have no ownership rights. Therefore, even though land is not a perfect substitute for children and children provide psychological and non-monetary benefits to parents; land ownership may lead to less parental dependence on children for economic support. This implies that such reliance and the need for more children, can be reduced when parents have an-other option to depend on- like land. Hence the land-fertility relationship for the current study shows that it is the lack of economic security that partly motivates people in favor of large family size.

In summary, land-security and land-labor requirement hypothesis need additional research and investigation as they affect fertility in opposite direction. Given the land-ownership/use right issue in Ethiopia, research has to focus on the pros and cons of such policy as land is the only means of livelihood in poor rural households. And if, as is found from the current study, land ownership status offsets the land-labor need and results in reduction in fertility, privatization of land rights to those who have the access could bring more promising results on fertility reduction. On the other hand, the research also suggested that increasing access to land to those in need of land currently, may lead to declining fertility. This ‘land ownership rights’ deserves more attention both on the part of the government and research community as well.

Child Mortality

Child loss may be followed by subsequent rising fertility for two reasons. One is due to the termination of breast feeding and on set of menstruation that results in high risk of conception (Bhargava 2006). The other is couples intentional need to replace their deceased child (ren) (Khan & Raeside 1997; Lindstrom & Kiros 2007). Put it in another way, women who have more surviving children want to limit births than their counter parts (Bhargava 2006). Thus, child mortality and fertility are assumed to have a positive relationship; couples who experienced child death (es) are found to have more live births than those that do not have such experience (Fitaw et al. 2003; Dabral & Malik 2005; Alene & Worku 2009). Nevertheless, having more children in anticipation of future deaths of children; known as 'hording effect' is not found to be practiced in Ethiopian case (Lindstrom & Kiros 2007) and is not considered here.

Lindstrom and Kiros (2007) in their studies of child mortality versus fertility in Ethiopia found that couples who experience child death to an index child (a child whose birth creates an interval) are likely to have conception immediately so that they can maintain the same intervals between births. Dabral and Malik (2005) in the case of Gujjars of Delhi in India indicate that fertility and child mortality move in the same direction. However, these two variables are affected by other variables, like education, income, health care services etc and are affected with each other. Therefore, there is a "chicken-egg dilemma" here; is it child mortality leading to higher fertility or higher fertility resulting in more child mortality? (Fitaw et al. 2003).

The regression analysis for the current study revealed that child mortality has both unexpected sign (negative) and is statistically insignificant. The value corresponding with child mortality (chmo) is -0.086 with P value of 0.854. It can be interpreted as; couples that experience child death(s) are likely to reduce fertility by 0.086 children; which implies there is no evidence of increased fertility following the death of child (ren) in the study villages. This finding is neither consistent with the existing literature nor essential for policy implication.

Writing on the relationships between child mortality and fertility, (Cleland & Wilson 1987) argued that there is no statistically significant influence of child mortality on fertility. This is due to 'the chicken-egg' dilemma (endogeniety problem) between fertility and child mortality. This however, can imply that even though the OLS estimate is not significant it doesn't mean

that it is irrelevant. To describe the relationship between child mortality and fertility in the study areas, the following table is created.

Child Mortality

Child Death	High fertility	Low fertility	Total
Yes	15	8	23
No	25	33	58
Total	40	41	81
No of births	216/40hhs	160/41hhs	376

Table 3; Source: Field work

At village level, child mortality is higher in the high fertility area (15 child losses out of 216 live births: 6.9%) while couples in the low fertility village experienced relatively lower child deaths (8 for 160 live births: 5%). However, the question of chicken-egg dilemma is still there; is it because of higher number of births that leads to 15 child losses in the high fertility area or the relatively more number of child losses that lead to more (216) live births? For now we can say that increased child health risks and mortality are associated with high fertility in the study areas.

III. Ideational Factors

Old age security

Poor people are mostly not in a position to save for their old ages (Schltjer et al. 1983; Ringheim et al. 2009). In the absence of formal security systems, the value of children as an old age security is a likely option (Schltjer et al. 1983; Cohen 1998; Ringheim et al. 2009). Most couples therefore feel protected when they have more children, especially sons, than their counter parts (Ayoub 2004). This belief (strategy) is expected to influence fertility positively. Put it in another way, people that are eligible to an old age social protection are found to have few numbers of children than their counter parts. In their regression analysis regarding the effect of state provided social security systems in the US and Europe, Boldrin et al. (2005) found that an increase in an old age pension payments leads to a substantial reduction in the number of children born per women.

The authors conclude that the below replacement fertility levels prevailing in these countries is by and large due to the state provided social welfare which reduces the need for more children in hopes of economic support.

A more thorough look on the positive effect of parental support expectation during old ages on fertility in the Philippines and Taiwan, by Susan De Vos (1985), clearly indicate that there is an independent positive effect of children's old age support in both countries. This finding is robust in the sense that, the regression is run after controlling for socioeconomic, demographic and household specific characteristics and these two countries reveal different cultural and historical background. The effect of old age support expectation was found to be stronger among those with less educational status and less urbanized areas than their counter parts.

Old age security stood second in affecting fertility in the regression analysis for the current study areas. Old age security has a value of 0.964 and is statistically significant at 5 percent level of significance (P value= 0.030). This implies that keeping the influence of other variables constant, couples who believe their children will help deal with their old ages are more likely to have one extra child than those who are planning to use other means. As expected and consistent with previous findings, old age security has a positive and strong influence on fertility in the study areas.

Respondents were asked how they are going to finance their living expenses during their old ages and most of them said that they believe their children will help them through. Some say that "we are educating our children in order to help us during our difficult times". Children are socially expected to send remittances to their parents as soon as they get job no matter how much they earn; at least on holidays.

To describe this finding more, I tried to ask if couples would reduce the number of children they want had the state provided them with some social protection for their old ages. Question no.23 (App.1); *if there is any social security systems like pension for people aged 64 and above, do you think this will change your desired number of children?* 1. Yes 2. No

Village	Yes	No	I don't know
High Fertility	23	15	2
Low	28	13	0
Total	51	28	2

Table 4; Source: Fieldwork

53 out of 81 respondents say yes, they could have reduced their desired number of children if there is any mechanism of assuring that they are safe and protected when they get old, sick or disabled. To these who said yes, I asked them how many children they would prefer to have under such scheme. Sixty percent of them said that their desired number of children could have been at most four. This implies that the high desired number of children, which we argued is the main factor influencing fertility in these village areas, could have been partly influenced had there been any social security systems instituted to those in need. The only social security system in Ethiopia, (to my knowledge!), is pension for people employed in the formal sector at the time of their retirement. Thus, as only 19% of the respondents are currently working in the formal sector, majority of the people living in these areas are going to need help from their children in the future.

This finding has vital policy implication in that if high fertility is a challenge to poverty reduction in these rural areas or in other rural areas of Ethiopia in general, as can be argued, they have to deal with instituting some kind of protection to those in need. Hailemariam (1992) suggested that public protection to those in need, women educational and employment opportunities and creating awareness towards small family size are some of the areas policies can work on to induce declining fertility.

Ideal Number of Children

‘Ideal’ number of children refers to the number of children couples wish to have if they were able to achieve that number (Bhargava 2006). The ideal number of children in Ethiopia is high; with men mostly preferring to have more children than their wives (Mesfin 2002; Short & Kiros 2002; Bhargava 2006). African men in general benefit from having large family size; because the returns they gain is by far more than their very limited contribution in child rearing activities (Caldwell & Caldwell 1990). Caldwell and Caldwell (1990) suggested more

urbanization, adoption of family control methods, cultural and ideational change as prospects for fertility reduction.

From his OLS regression results, Bhargava (2006) found the demand for higher number of children (by both parents) significantly affecting fertility. Those couples who wish to have a larger family size are found to have more children than their counter parts. Bhargava further argued that there is a need for the counseling of couples about the benefits of small family size together with accessible and affordable health care services. Bhargava stated “To be successful, family planning efforts will need to accommodate the high demand among Ethiopian couples for children” (Bhargava 2006: 379).

Similarly Dabral and Malik (2005) indicate that the ideal number of children that couples wish to have is the second most significant factor affecting fertility among Gujjar communities in India. Such argument is also supported by Hamadeh, R. R., Al-Roomi et al. (2008) in the study of fertility determinants in Kuwait, Arab state, where fertility is positively associated with the number of children couples state as ideal. They indicated that fertility in Kuwait is high due to strong influence of men, and men have a desire to have more children.

The regression analysis for the current study shows that the ideal number of children that couples wish to have has a strong positive effect (0.466) on fertility and is statistically significant (P value= 0.000). A magnitude of 0.466 indicates that as couples’ desire for more children increases by two, fertility increases by one child holding all other variables constant.

Looking at the fertility levels achieved the number of children born increases as couple’s desire for high number of children increases. Following the answer for their ideal number of children, respondents were asked if they manage to have the number of children they state as ideal; most of them say no. Among those who respond no, majority say that since living expenses are rising, they are unable to achieve the ideal number stated. If not for the economic difficulties, people in the study areas could have given birth to as many children as they stated ideal and fertility could have been much higher than the current level, approximately 6.7 children per women. This is despite the fact that the Woreda health centre is urging people to use family planning methods, and most women reported use of modern contraception methods at least once. Hence, it can be argued that there are built-in values (ideational) that motivate people maintain large family size besides other socio-economic factors discussed above.

This result is supported by a number of studies undertaken in Ethiopia, especially in rural areas (Short & Kiros 2002; Bhargava 2006). Taking the case of Addis Ababa, people want to have small family size mostly for economic reasons, value orientation and self fulfillment needs by women in the city (Kinfu 2000). Since the number of children couples wish to have is small, they manage to demonstrate a below replacement fertility level in a country where population growth is often believed to be a bottle neck to poverty reduction for decades.

M. Ezra (1997) pointed out that attitudinal changes are being underway in the northern part of Ethiopia due to the unbalanced population growth with fixed land available. These according to Ezra motivate people to use family planning methods as a result of low number of children desired which makes the observed fertility decline irreversible. Similarly a reduction in the number of children born was said to have partly happened in Kenya due to a change in men's perception of ideal family size (Kimuna & Adamchak 2001). This is achieved through the increased support and involvement of men in family planning programs.

An important finding of the current study that is worth noting is that ideational factors like culture, religion and ethnicity (that are not entered in the model) are significant to shape people's perceptions in favor of large family sizes (Caldwell 1976; Cleland & Wilson 1987). Most respondents struggle to be economically strong so that they can form a family, have kids and get recognition as a functioning social unit in their community. Hence, given the low percentage of women attending school, most of them are housewives, and given that women marry relatively early, fertility will remain a challenge to concerned authorities unless appropriate measures are taken to influence the high desire for children apparent in the study areas.

Chapter Five

Conclusion and Policy Implication

Conclusions

The previous chapter is devoted to discuss factors that influence the observed fertility levels in Adishehu, Tigray-Ethiopia. In this chapter, I present a summary of the main findings and the conclusion.

There are three aims for conducting the research. First is to identify the factors responsible in explaining the observed fertility in rural areas of Tigray- Ethiopia. Second, the research aimed to point out the relative importance of each factor in affecting household decisions concerning fertility. Lastly the study aimed to suggest possible policy interventions based on the research findings.

The study was conducted in Adishehu; where half of the respondents were from a relatively high fertility village (Maibel) and the second half from the low fertility village (Woyin). Both villages are located in the same district (woreda Alaje). Random systematic sampling method was followed to reach 81 household respondents. Semi-structured questionnaire was designed with both open-ended and closed-ended questions. Open-ended questions were used to collect qualitative data to supplement the analysis.

The study revealed that fertility is still high in rural areas of Tigray-Ethiopia. The average total fertility of 5.59 children per women found from the regression analysis shows that despite the history of draught, famine and war in the region, fertility is still comparable to other village areas in the country. The study also assumed that a fertility boom could happen in recent relatively peaceful times as these village areas are situated in an area severely affected by civil war and famine.

In comparing these two village areas, the low fertility zone is better-off in terms of socio-economic factors like educational attainment, employment in the formal sector, household income, and child mortality. More child deaths and health risks are found in the high fertility village than the low fertility village.

From the results found in chapter three, major factors responsible for the observed fertility in the study areas among the ten variables considered are contraception use, parental perception of children as an old age security, land holding status, ideal number of children couples wish to have, and female literacy. However, household income and men's (husbands') education reveal important policy issues despite the lower magnitude found in the regression analysis.

Intermediate variables (age at first marriage, contraception use, and duration of breast feeding) were considered as direct fertility determinants and other variables (socio-economic and ideational factors) must act through one or more of the proximate variables to affect fertility. Many scholars in Ethiopia apply Bongaarts' framework in analyzing fertility determinants. However, the present study does not confirm such applicability in the research areas. All proximate variables considered, except contraception use showed very minimal effect on fertility of the research subjects.

From the multivariate regression analysis contraception use stood first in affecting fertility in the study areas. However, despite the fact that 64% of respondents report the use of modern contraceptive methods at least once, fertility is still high in the study areas. The findings suggest that as far as couples' desired number of children is high contraceptives are used to have sufficient birth intervals and in fear of exceeding the ideal number of children desired than to limit fertility.

Besides, respondents, especially those who stopped contraception use at the time of the survey stated that inconveniences with the method used previously, social taboos against contraception and lack of availability of the method they want make them unable to use modern contraception methods when they need.

In terms of educational attainment, men are better-off than women. However, women's education showed significant reducing effect on fertility as compared to their husbands. Women's education could have higher influence on fertility reduction if women in the study areas had better educational opportunities in the past. Women's education has been found to have its independent reducing effect on fertility besides the indirect influence that is not shown by the model.

Household income showed the least influence on fertility in the regression analysis, and respondents on average earn low income per year (1290 ETB). While analyzing the income

distribution of respondent households, land holders reveal more homogenous income distribution as compared to traders, civil servants and daily laborers. Thus, the impact of income variations on fertility decisions is more apparent for non-farm households than for farming families. The findings suggest that improvements in the income situation of the study subjects need to be accompanied with better access to information and appropriate counseling at a household level as an extra income earned is associated with rising fertility

Contrary to the assumed positive influence of land holding status on fertility, the present study reveals a negative relationship. This implies that household respondents that have access to land are found to reduce fertility by almost a child than those without access to land. Despite the prevailing land tenure system in Ethiopia (land holders do not have ownership rights); land access provides some kind of economic security in the study areas which motivate them to reduce fertility. This leads to the premises that privatization of land rights to land users could have more promising results on fertility reduction. However, such finding also reveals that access to land to those in need of land (but do not have the access currently) could lead to fertility reduction in the study areas. Thus, research has to focus on the pros and cons of land privatization in Ethiopia together with full commitment from the government's side for change.

In terms of old age security, one or more better off children are expected to take care of their elderly parents or when the need arises. Respondents used to mention that “we are educating our children now so that they can help us when they get jobs”. The positive relationship between household income and fertility shows that people want to invest any additional birr they earn in producing additional children in expectation of future economic support from them. As parental perception of children as an old age security is the second major factor in explaining fertility levels in the study areas, it is a fertile room for policy intervention. That is, there is promising fertility reducing effect for any social security system that may be instituted in the country.

Lastly, ideal number of children showed strong positive influence on fertility. As long as couples' desired number of children remains high fertility shows rising pattern. This shows the high economic and non-economic value attached to children in these research areas. As can be seen from the results presented, any extra income earned is invested in achieving the number of children couples wanted. Respondents say that the reason for not achieving their ideal number of children is due to economic difficulties they are facing recently. Most women

respondents report use of contraceptives in order to achieve sufficient birth intervals and in fear of exceeding their desired number of children.

Why is 'ideal' number of children high?

The research suggest that people assign high value to children due to low economic status, absence of social security systems when needed, inaccessible and unaffordable health care services (fear of child losses) together with traditional norms in favor of large family size. Considering the high average desired number of children for the current study subjects (6.7children per woman), high fertility will remain a challenge for policies aiming at fertility reduction.

Policy implication:

The observed high fertility levels in rural Ethiopia in general, and in these research areas in particular are the manifestations of the socio-economic condition of the society. Thus, policies of poverty reduction and economic development identified by the government need to be followed up in a way that can improve the income situation of the poor. The research point out that daily laborers and low-income earners are highly affected by rising food prices recently. At the same time farm households produce much lower income than they need for their consumption. Thus, policies aiming at creating income earning possibilities while ensuring minimum income differences are necessary. For example, access to credit and savings instruments at local level with appropriate entrepreneur counseling will help create self-employment opportunities and improve the condition of the disadvantaged communities.

The study indicated that high ideal number of children desired is a strong predictor of the prevailing high fertility in the study areas. Therefore, population policies especially the district (woreda Alaje) administration has to do more with the factors that motivate people desire high number of children. Universal education is one way of assuring peoples' own resources for old age security as a result of employment in the formal sector. Education also leads to attitudinal change among the young generation in favor of small family size. Moreover, privatization of land rights provides some sort of future economic security to parents which in turn can reduce couples' preference for more children in the study areas. Besides men tend to prefer more number of children than women. Therefore, increased involvement of both men and women in family planning programs, increasing enrollment

rates especially for girls, and availability of affordable quality health care services can help couples to reconsider the number of children they wish to have.

Furthermore, the research indicated that there are some inefficiencies on the part of the district health centre service provisions and actual shortage of budget allocated by the regional government or funding from NGOs. Increasing availability of various kinds of contraceptives and informing people all the options at hand is also vital to motivate them use family planning methods continuously. More specifically, allocation of qualified health personnel by the regional government, availability of health care services and equipments at faire prices at least in the district health center is necessary to improve maternal and child health risks in the study areas.

In general, socio-economic development accompanied with ideational change in favor of small family size is necessary to achieve desired results. Thus, policies that have fertility reducing impacts and at the same time could bring socio-economic development are vital. For example, universal education well beyond secondary school especially for women, creating employment opportunities, knowledge and accessibility of health care services, and well integrating social security systems to those in need are basic ones. Therefore, development, not the mere distribution of family planning services, is the best contraceptive.

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Appendix 1

Questionnaire

This questionnaire is designed for the sole purpose of research identifying the major determinants of fertility. Any information provided by the respondent is confidential and has nothing to do with politics. So, please be informed that your answer to these questions is very crucial for the successful accomplishment of the research objectives. I thank you for your willingness to respond to my research questions in advance!!!

1. General Information

Age	Sex	Marital status	Age at 1 st marriage	Educational level	occupation	religion	Ethnicity

2. How many children (biological) do you have to date? _____

3. How many people (excluding husband and wife) are living in the household? _____ Can you tell me their ages?

4. Do you think you need additional child (ren)? Yes ____, No ____

5. If your answer to question no.4 is yes, how many more? _____

6. If your answer to question no. 4 is no, why have you decided to stop?

7. After how many years of marriage did you have your first child? Within 2years ____, within five years ____, within ten years ____, more than 10 years _____

8. When you get pregnant for the first time, what was your reason for having that baby?

Age ____, b/c my husband needs ____, b/c it is socially expected to do so ____, others (specify)

9. Do you think you have (going to have) the number of children that you think one should have (ideal)? Yes____, No____

10. If your answer to question no. 9 is No, why do you think is the reason for this gap?

11. Have you ever been experienced any child loss? Yes, _____, No_____.

12. If your answer to question no. 11 is yes, how many? _____ Can you tell me the reason for the loss? _____ Have you tried to replace the loss by having another baby? _____

13. What is your source of income?

_____ How much is your monthly income (estimate)? _____

14. Do you have any health station in your locality? _____ How many kilometres is the nearest health centre in your village? _____. Is it affordable?

15. Have you heard about any family planning program(s)? _____ Do you think it is good to have family planning program(s)? Why or why not?

16. Have you used any modern or traditional contraception to delay or avoid unwanted pregnancy? Yes; traditional (why?)_____, Modern_____. No, (why?)_____

17. For how long do you abstain from sex after child birth? Three weeks-----, Six weeks----
-----Three months-----, more than 3 months (state) _____

18. Do you breast feed your child (re)? Yes____, No____, if your answer is yes, for how long? _____

19. Have you ever been experienced unwanted pregnancy while breast feeding? Yes,____
No____

20. Do your children perform any economic activity? Yes, (specify) _____. No, they don't _____

21. If your answer to question no 20 is no, where do your children spend most of their time? Playing____, watching after younger sisters or brothers____, helping with household chores____, I don't know_____

22. How do you think you will support yourself / and your spouse during old ages?

23. If there is any social security systems like pension for people aged 64 and above, do you think this will change your desired number of children? Yes____, No_____

24. If your answer to question no. 22 is yes, what could the number of children that you would possibly have? _____

25. If you were the head of the district administration in your *Kebele*, what could your priorities been concerning fertility or population control? Building more clinics____, distributing more contraceptives_____, educating people about birth control_____, others (specify) _____

Questions to concerned authorities:

1. Focus of the country's health policy
2. Existing maternal and child health care services and their affordability
3. Attitudes of people towards family planning programs