

Levels, Trends and Determinants of Lifetime and Desired Fertility in Ethiopia: Findings from EDHS 2005

Ethiopian Society of Population Studies

**In-depth Analysis of the Ethiopian Demographic
and Health Survey 2005**

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Contents

List of Tables	5
List of Figures	6
Abstract	7
1. Introduction	8
2. Objectives of the Study	11
3. Review of Literature on Determinants of Fertility Decline in Developing Countries	12
4. Data and Methods of Analysis	15
5. Levels and Trends of Current Fertility in Ethiopia	18
6. Actual and Desired Fertility Differentials	23
6.1 Trends in Lifetime Fertility	23
6.2 Levels and Differentials in Age at first Marriage, First Birth and Birth Intervals	26
6.3 Determinants of Lifetime Fertility in Ethiopia	31
6.4 Trends in Desired Fertility	35
6.5 Determinants of Fertility Intention in Ethiopia	37
7. Discussions of Major Findings	41
8. Summary and Conclusions	46
References	50
Annex	53

List of Tables

Table 1. Selected demographic and socio-economic indicators by region

Table 2. Trends and differentials in mean number of children ever born among all women in reproductive age, by age group and selected background characteristics: EDHS 2000 and 2005

Table 3. Percentage distribution of ever married women, and median age at first marriage, first birth and birth interval in relation to socio-economic and demographic characteristics of respondents: EDHS 2005

Table 4. Poisson regression analysis results predicting determinants of children ever born among currently married women, by age group: EDHS 2005

Table 5. Trends and differentials in percentage of women who want no more additional children among currently married women, by background characteristics of respondents: EDHS 2000 and 2005

Table 6. Logistic regression multivariate results predicting determinants of intention to limit additional child(ren) among currently married women: EDHS 2005

List of Figures

Figure 1. Total fertility rate, by place of residence: 2000-2005

Figure 2. Total fertility rate, by education: 2000-2005

Figure 3. Total fertility rate, by region: 2000-2005

Figure 4. Total fertility rate, by education: 2000-2005

Figure 5. Percentage distribution of women having had birth before age 20, by educational level and age groups

Figure 6. Proportion of women having had birth before age 20, by region

Figure 7. Median age at first marriage and first birth, by selected background characteristics of respondents: 2005

Abstract

Fertility is one of the most important elements determining the rate of population growth in developing countries like Ethiopia. It has the potential of affecting the well being of mothers and their offspring. High fertility and shorter birth intervals affect the survival chance of children, and the health status of mothers. Their effects even go to the extent of affecting the socio-economic development of a given country if proper care and action are not taken. The main objective of this paper is to identify socio-economic and demographic factors affecting lifetime and desired fertility of women in Ethiopia so that appropriate measures would be taken to achieve the policy goals set in the national policies and programs. Analysis of this study is based on the 2000 and 2005 Ethiopian Demographic and Health Survey data collected by the Central Statistical Agency and ORC Macro. Currently married women in the child-bearing age (i.e. 15-49) were used to fit multivariate results predicting determinants of lifetime fertility using Poisson distribution, and desired fertility using logistic regression models. Findings of the current study, in general, demonstrate that fertility has shown slight decline at national level and in rural areas; the decline is substantial in urban centres. Results of the multivariate models, too, reveal that there is significant variation in actual and desired fertility among selective groups. Women living in urban areas, educated and employed women, tend to have lower lifetime fertility while those living in Somali, Oromia and SNNP regions and experiencing child death lean to have more children. Women belonging to Protestant and Muslim religious groups are also found to have relatively higher lifetime fertility when compared to those following Orthodox Christian religion. Region specific studies based on reasonable samples are required to identify factors regulating lifetime and desired fertility in each of the regions. Assessing the extent to which reproductive health and family planning programs are implemented in each of the regions is also one of the important conditions to narrow the gaps in levels of fertility across regions.

1. Introduction

Fertility is one of the elements in population dynamics that has significant contribution towards changing population size and structure over time. Fertility rate is the highest in sub-Saharan Africa than any parts of the world, mainly due to strong kinship networks and high economic and social values attached to children (Romaniuk, 1980; Caldwell and Caldwell, 1987; Hinde and Mturi, 2000). The low level of economic development contributing to high infant and child mortality in the region is also another factor contributing to high fertility resulting in rapid rate of population growth (Lindstorm and Berhanu, 1999). According to Bongaart (1999) the desired family size is more than four children in sub-Saharan African countries, where child mortality is high and poverty is rampant. This trend appears to continue in the future.

As mentioned above, Ethiopia is one of the developing countries with high fertility and rapid population growth rate. The country's population in 2005 was estimated at 77 million (CSA, 2006), placing it as the second most populous nation in sub-Saharan Africa. According to the 2005 Ethiopian Demographic and Health Survey, the total fertility rate at national level was 5.4 children per woman (CSA and ORC Macro, 2006) indicating that much efforts should be made to attain the targets set in the national population policy of Ethiopia by 2015. Early age at first marriage, desire for more children and extremely low contraceptive use are some of the major reasons behind such high fertility rate (Assefa, 1992; Kinfu, 2001; Gibson and Mace, 2002).

Ethiopia, being one of the developing countries where subsistence agriculture is the major economic activity, families often prefer large number of children since they are considered as an economic asset rather than liabilities. In rural areas, parents want to have large number of children to get assistance in farming activities (Bairagi, 2001) and emotional as well as economic support during old ages (Fapohunda and Todaro, 1988). According to Caldwell (1982), the economic importance of children is over lifetime. African children do not only provide support during childhood and adolescent ages but also beyond these ages. More psycho-social and economic support is expected when parents are getting older. Old-age security is one of the major motivational forces for having as many children as possible in Africa. In traditional societies, children are also expected to strengthen the extent of kin relations, which implies not only economic benefits but also physical protection. Getting larger in number is tantamount to strength in physical security. Like many countries in sub-Saharan Africa, traditional norms and values in Ethiopia are in favour of high fertility. Having many children is considered as a virtue and respect of God in a number of Ethiopian rural communities (Desta and Seyoum, 1998).

The Ethiopian government has been making several efforts to reduce fertility levels since 1993, the first time an explicit national population policy aimed at reducing total fertility rate from the then 7.7 children per woman

to 4.0 by 2015 was launched (NPO, 1993). Increasing age at first marriage to at least 18 years, enhancing women's status through providing them with better employment and educational opportunities, expanding family planning services and information, communication and education on ways and means of limiting family size are some of the strategies designed to implement the population program. Various international agencies and non-governmental organizations have also made efforts to provide technical, material and financial support to the Ethiopian Government in implementing the population program so that fertility would decline over time.

Even though fertility has shown a declining trend at the national level, the transition has not begun in some of the regions. There are clear regional differences in fertility levels and trends in Ethiopia. Some of the regions like Addis Ababa have achieved a below replacement level of fertility (TFR=1.8) while others such as Oromia (6.2), Somali (6.0), and SNNP (5.6) regions have total fertility rates that are above the national average. Cultural and traditional barriers to effectively utilize modern birth control methods, low status of women and gender inequality, as well as poor health service coverage are some of the difficulties in implementing programs that would contribute to fertility transition in these regions (Machera, 1997). According to Caldwell and Caldwell (1987), in areas where traditional social and economic systems persist, fertility hardly shows change. It rather stagnates if not increasing. The fundamental change in fertility level requires disintegration of the traditional social system as well as transformation of the economy from consumption to market oriented activities. Lack of change in the family system from extended to nuclear, as well as the persistence of agrarian economy that favours large family size could maintain high fertility levels.

Despite a decline in mortality level over the last couple of decades, malnutrition, limited access to health facilities, epidemics and low standards of living are hindering further improvement in health. Consequently, parents' concern over the survivorship of infants and children are factors still deterring a further decline in fertility at least in areas where access to maternal and child services are very limited. The effect of infant and child mortality on fertility is one of the major concerns of parents, public health planners and policy makers.

Like other developing countries, significant variation in fertility level was observed among rural and urban residents of Ethiopia. For instance, according to the 2005 Ethiopian Demographic and Health Survey report, fertility is the lowest (TFR = 3.3 children per woman) in urban Ethiopia while it is the highest (about 6 children per woman) in rural areas. Modernization factors such as better access to education and media, employment opportunities in the modern economic sector and wider access to family planning services are some of the major factors that put urban fertility down in the Ethiopian context (Kinfu, 2001; Sibanda et al., 2001). The effect of poverty on fertility decline in major towns of Ethiopia is also not negligible (Eshetu and Mace, 2001).

Different fertility regulation mechanisms such as use of modern contraceptives, termination of pregnancies and delayed marriages that have contributed much towards fertility reduction in urban areas are not available in rural areas to play similar roles (Markos, 1997). In addition, socio-cultural factors leading to large family through high value attached to children and kin support have not yet been diminished to result in scarcity of resources/ time to bring up children (Smith, 2004; Eshetu and Mace, 2008). Because of controversies on the rationales behind the onset of fertility decline in developing countries, there is a strong need to undertake a study aimed at identifying factors contributing to fertility decline (if any) and assessing the prevalence of fertility decline at national and subnational levels. The main issues to be addressed in this paper are, therefore, to investigate (a) whether or not fertility decline has started in Ethiopia, and (b) if the practice is the same across regions.

2. Objectives of the Study

The main objective of this study is to assess levels and determinants of lifetime and desired fertility at national and regional levels that have implications for program review and implementation of the population programs in Ethiopia.

Specifically, the study aims at:

- Assessing whether there is decline in fertility rate at the national level or not;
- Examining factors responsible for fertility change (decline or increase) in each of the regions and across other variables;
- Identifying factors affecting fertility intention; and
- Suggesting appropriate policy measures to be taken in Ethiopia to achieve the stipulated goals in the sphere of reproductive health outcomes.

3. Review of Literature on Determinants of Fertility Decline in Developing Countries

Different theories on fertility decline such as the demographic transition theory (Kirk, 1996), and neo-classical micro-economic theory (Becker and Lewis, 1973; Willis, 1974) have suggested that the low level of economic development that results in high infant and child mortality, low contraceptive use, low status of women and their limited achievements in the sphere of educational and employment opportunities are the major causes of high fertility in sub-Saharan Africa. According to this group of scholars and population experts, the onset of fertility decline could only be possible if and only if sound and radical socio-economic development calling for low fertility is taking place. For this group, poverty is an escalating factor of high fertility norm and poor countries continue to have high birth rate until they would be successful in implementing their poverty eradication programs. In view of the classical economists, 'economic development' is the only and best way of regulating fertility.

High fertility in traditional African societies, according to Caldwell and Caldwell (1987), is associated with the economic benefits that children provide to their parents. Children are not only sources of joy but also of economic benefit from the very beginning. African children contribute labour to farming activities during their adolescent and youth age besides being major financial support later on. The need for such supports (i.e. labour and financial contributions) is believed to maintain the high fertility norm in African countries. Comparing such a scenario with the situation in the Western World, Caldwell (1982) stated that modern and industrial societies prefer small family as they need to invest more time and resource on fewer children. Parents from developing countries, on the contrary, wish to have more children for they do not bear much cost to bring them up; they rather gain a lot from their children.

Exploring other possibilities that lead to fertility decline in developing countries, Cleland and Wilson (1987) also came up with the new theory of fertility transition – the ideational theory of fertility decline. This theory states that fertility decline in developing countries should not necessarily require economic advancement through industrialization; parents should have better access to family planning information and services. Diffusion of new ideas that penetrate into traditional norms and values could bring about change in fertility behaviour without necessarily calling for the preconditions stated in other theories: a decline in infant and child mortality (Palloni and Rafalimanana, 1999) as well as a radical change in socio-economic development (Kirk, 1996).

Contrary to the arguments mentioned above, other scholars in the fields of evolutionary demography (Betzig, 1988; Kaplan, 1996), anthropological demography (Smith, 1984; Turke, 1989), and behavioural ecologists (Abernethy, 1992; Low, 2000; Mace, 2000), nonetheless, argue that fertility decline is not only a function of economic development but could also be the outcome of undesirable circumstances that lead to frustration and desperation due to economic hardship and catastrophes as well as socio-cultural traditions. According to the arguments made by the latter group, limited access to resources to bring up newly born babies has significant impact in postponing timing of marriage and child delivery. Use of contraceptive supplies to space the interval between births and/or the attempt to stop having children as well as terminating unplanned and unwanted pregnancies among the unemployed and less educated women could be the results of resource constraints to support newly born babies than time constraints to bear and rear children. In their view, had poverty always perpetuated high fertility, the decline in fertility rate would have never been observed in some of the non-industrialized countries.

Cultural factors such as kin support and traditional values as well as norms perpetuating high fertility have also their own independent and intrinsic effect on fertility in developing countries like Ethiopia. In traditional societies where high values are attached to male heir and child rearing is not only the responsibility of biological parents but shared by close relatives and neighbours, fertility remains to be high (Turke, 1989; Low, Clarke and Lockridge, 1992). Among these societies, fertility may not decline in response to economic hardship since the costs are shared and individual mothers would not feel the pain of resource constraints. The signal of fertility decline among traditional societies where such support was temporarily absent as a result of drought and famine has already been observed in drought prone areas of Northern Ethiopia (for details see Markos, 1997). Qualitative studies aimed at explaining fertility differentials in traditional societies (Borgerhoff Mudler, 1987; Turke, 1989), in general, state that what matters in fertility transition is not only women's access to resources (wealth, information, employment opportunities and the like) but also the cultural elements and nature of interfamilial support to bring up the newly born child. In societies where kin support prevails, the pressure and influence of having additional child is also profound (Turke, 1989).

Experiences from Latin America (Guzman, 1994), East as well as South East Asia (Casterline, 1994), in general, showed that fertility decline is the outcome of modernization factors and social transformation that are expressed in rapid falls in persons engaged in agriculture, the growth of market economy along with expansion of the wage earning sector, the steady rise in schooling, active participation of women in production activities, and wider access to family planning information and services. Rapid decline in fertility was possible in these parts of the world due to the integration of three key elements required for change in family size: modernization of the economy, diffusion of new family ideals and active government policies favouring family

planning programs. Compared to what is discussed above, the prevailing situation in Ethiopia is quite different. Children are still playing a decisive role in the agrarian economy while the traditional family system is playing active roles in the production as well as reproduction spheres. The level of urbanization is under 20 percent while female literacy rate, the engine for promotion of development, is quite low - only 29.2 percent in 2005 (CSA and ORC Macro, 2006).

As indicated above, there is no single factor responsible for explaining fertility transition as argued by demographers and development studies experts. Depending on the prevailing situation of a given country, the rationale behind fertility decline could be attributed to changes in socio-economic conditions as well as cultural transformation. Fundamental issues and approaches used in each of the theories mentioned above could thus be taken into account while assessing the determinants of fertility in Ethiopia at regional and national levels.

4. Data and Methods of Analysis

In this study, the 2005 Ethiopian Demographic and Health Survey data is used to explain variations in fertility. In order to assess fertility levels, trends, differentials and determinants, information compiled on lifetime fertility (i.e. total number of children ever born), birth interval (i.e. the interval between consecutive births) and fertility intention (i.e. intention to have additional child (ren)) are used to undertake bivariate and multivariate analyses. Apart from taking percentage distributions and average values on the number of children ever born and the span between consecutive births, different models have also been fitted using the Poisson distribution and the logistic regression models. Kaplan-Meier life table (Norusis, 1994) is also used to calculate median values by taking censored events into account.

Factors determining fertility measured as count data (i.e. children ever born to a woman by the time of the survey) are assessed using the recently developed count data modeling; namely, the Poisson regression model. It is a recently adopted model used to investigate the relation between the number of children ever born and the socio-economic and demographic variables of women obtained from a given survey (Winkelmann and Zimmermann, 1995; Long, 1997). Poisson regression is one of the robust models for the analysis of discrete data that are based on the assumption that the dependent variable (number of live births to a woman) is distributed as Poisson, and its logarithm is a linear function of the independent variables (Chattopadhyay, 2006), which is

given as:

$$\mu_i = e^{\beta_0 + \sum_{j=1}^k \beta_j x_j}$$

Where μ_i is the expected number of children per woman i

β_0 is the intercept;

β_j 's are regression coefficients; and

X_j 's are explanatory variables.

The number of live births is a discrete variable, and the distribution between different strata of the population clearly demonstrates asymmetrical distribution with a modal value of 0, supporting the appropriateness of modelling children ever born as a Poisson process.

With regard to the interpretation of Poisson regression coefficients, suppose β_j is the coefficient of a 0-1 dummy variable, then the exponentiation of this coefficient (i.e. $\exp(\beta_j)$) represents the proportionate change

in the average number of children ever born when the value of the variable changes from 0 to 1, holding everything else constant. Similarly, when β_j is a Poisson regression coefficient for a continuous variable, then $\exp(\beta_j)$ represents the proportionate change in the mean number of children ever born when the value of the predictor variable increases by one unit, holding everything else constant (Wang and Famoye, 1997).

Attempts are also made to assess determinants of desired fertility, as respondents' intention to have additional child(ren) have non-negligible effect on their future fertility and plan for provision of family planning services. Results of such analysis could indicate the extent of demand for family planning and its potential impact on the level of reproduction (Bongaarts and Potter, 1993). The dependent variable, i.e., the desire for additional child(ren) is coined from the information on the proportion of women of reproductive age who want another child(ren). The Demographic and Health Surveys conducted in Ethiopia in 2000 and 2005 asked whether a woman wanted to have another child soon, after two years, or wanted no more children (CSA and ORC Macro, 2001 and 2006). On the basis of responses to this question, a dummy variable was created: those who 'desire to have more children' and those who 'want to limit their fertility'. Women who reported that they are sterilized and declared infecund are excluded from the analysis for the mere fact that their inclusion could affect the plan for provision of fertility regulation strategies. Having a dependent variable classified into dummy, a binary logistic regression model, was fitted to identify determinants of desired fertility among respondents to the survey. The model is given as:

$$\left(\frac{P_i}{1 - P_i} \right) = e^{\beta_0 + \beta_1 X_1 + \dots + \beta_p X_p}.$$

Where

P_i is proportion of individuals with a positive event,

's are parameters of the model,

and X's are explanatory variables.

In the present study, most of the socio-economic and demographic variables compiled in the EDHS are used as explanatory variables. Socio-economic variables such as a woman's education, religious affiliation, region and place of residence at the time of the survey, wealth index, access to media, a woman's occupation and her decision-making autonomy, as well as demographic factors like age of the woman at the time of the survey, child loss experience, number of surviving children, current and ever contraceptive use experiences, and age at first marriage are included to fit respective models.

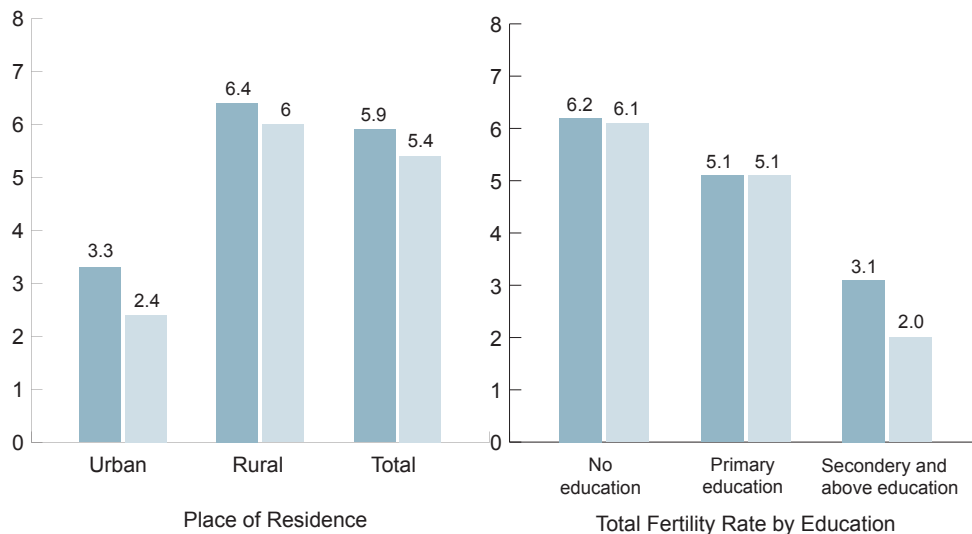
The quality of data was checked, before fitting the models, using different techniques such as single age distribution, sex ratio at birth, mean parity and proportion of dead children. Despite some fluctuation in women's age distribution, evidencing for the existence of digital preference and age heaping while reporting current age and age at the birth of each of the children and bias in reporting sex of dead children, the overall quality of the 2005 Ethiopian Demographic and Health Survey data is within acceptable range to undertake further analysis.

In addition, focus group discussions and key informant interviewers from all regions except Dire Dawa and Harari regions which have similar demographic characteristics with Addis Ababa and other major towns in Ethiopia were used to further enrich the statistical findings. The data collected using these instruments focused on values of children, fertility intention, traditional norms and values governing timing of birth as well as the impact of early marriage and child mortality on fertility. The summarized responses, obtained from the interviews and focus group discussions, are used to explain the reasons behind fertility change at national and regional levels.

5. Levels and Trends of Current Fertility in Ethiopia

As indicated in Figure 1, the total fertility rate (TFR) of 2005 is lower both in urban and rural areas. TFR in rural areas has slightly declined from 6.4 children per woman in 2000 to 5.9 children in 2005. The decline in urban areas is about one child: fertility rate has been dropped from 3.3 children per woman in 2000 to 2.4 children per woman in 2005. Much decline in fertility among urban respondents as compared to those residing in rural areas has profound implication for the need to pay much attention in promoting reproductive health and family planning programs in rural areas. Actually due to the predominance of rural population in Ethiopia, TFR at national level has shown slight change. Age specific fertility rates (ASFR), computed using number of births in the last five and three years preceding the survey, show no change in patterns of fertility at national level and in rural areas. However, there is a marked difference in urban centres (see figures 1A to 2B in the appendix).

Figure 1 & 2: Total Fertility Rate by Place of Residence: 2000-2005

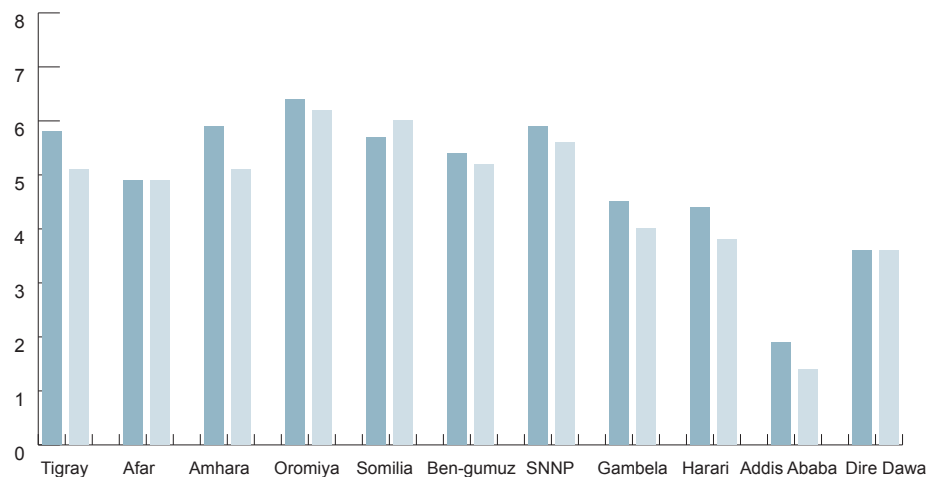


Source: CSA and ORC Macro, 2001 and 2006.

The trend in TFR classified by educational level has also demonstrated a considerable decline in TFR among those receiving secondary and higher education than those having lower and no education at all (see figure 2). Fertility appears to remain constant among the majority of Ethiopian women who have no or basic education while it has shown a decline of about one child among those who had better training opportunities. The figure clearly depicts the effect of education on fertility over the five years period between consecutive surveys.

Looking at the trends in TFR across regions between 2000 and 2005, one can observe a decline in fertility in Tigray, Amhara, Gambella, Harari and Addis Ababa; a slight change in fertility in Oromia, SNNPR and Benishangul Gumuz; no change in Afar and Dire Dawa; and some increase in the Somali Region. Whether the changes observed here are considerable or not, however, depends on the results of statistical tests.

Figure 3: Total Fertility Rate by region 2000-2005



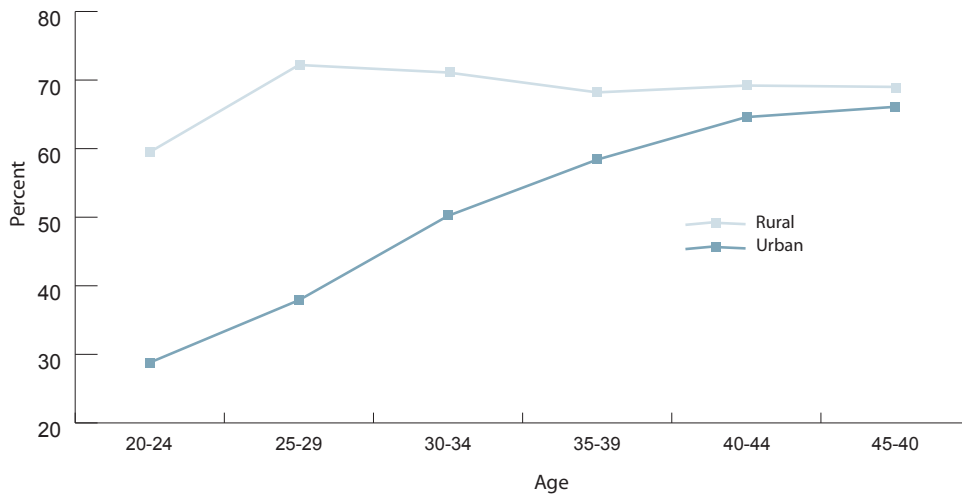
Source: CSA and ORC Macro, 2001 and 2006.

Given the fact that Ethiopia follows an ethnic based federal system, the variation in total fertility rate across different regions of the country could simply be a reflection of differences in cultural values and norms affecting fertility for most of them, with the exception of Addis Ababa and Dire Dawa City Administrations, where the population is of mixed type as they belong to different ethnic groups (CSA, 1999). The reasons behind variation in fertility levels during the five years interval between the two surveys not only calls for qualitative studies to assess the impact of cultural norms and values but also assessing the extent of regional governments' commitment and allocation of resources in providing the means to curb the prevailing high fertility rate.

Efforts were also made to assess trends in fertility by looking at the proportion of women who had children by age 20. As indicated in figure 4, the proportion of urban women who have had at least one child before celebrating their 20th birthday has shown considerable change across women belonging to different birth cohorts. Wider rural-urban gap in fertility has been observed in the recent past while the gap is narrower at earlier days (see figure 4). The narrow gap in the proportion of women having had at least one child among women in their late reproductive age (i.e. 35 years and above) showed that urban fertility began to decline at a very fast rate over the last two decades probably since the change of government and adoption of national

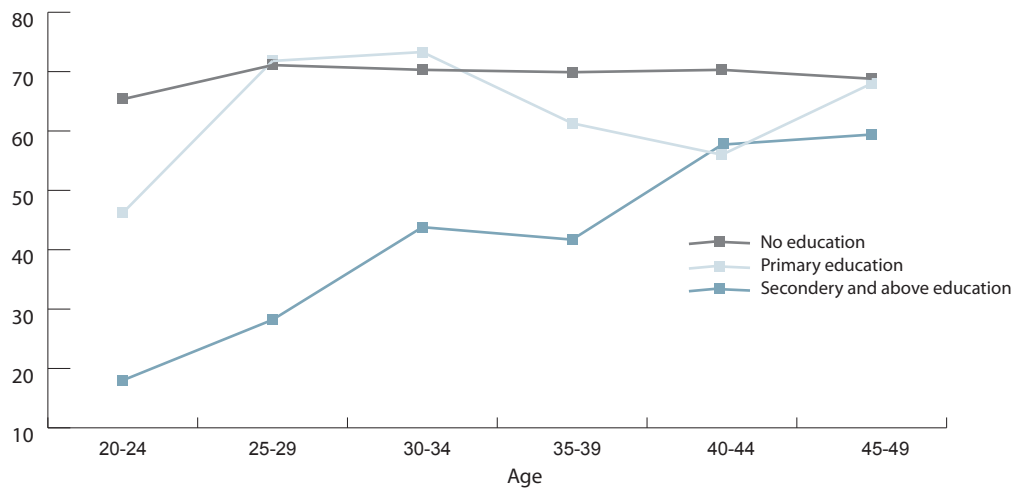
population and other policies creating favourable condition to regulate fertility. An increasing cost of living in urban areas since early 1990s (Ethiopian Economic Association, 2002) could also be another factor explaining the repaid decline in fertility among urban dwellers.

Figure 4: Percentage of women having had first birth before age 20 by place of residence



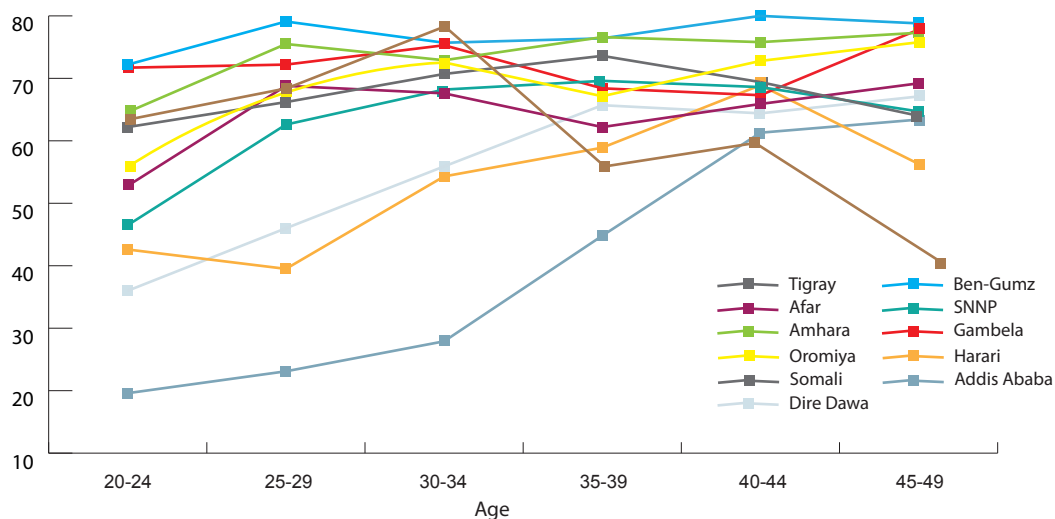
Noticeable differentials in trends having had at least one child by age 20 are also observed among women achieving different levels of education. As can be seen from figure 5, the proportion of women having had at least one child by age 20 had shown tremendous decline among those women receiving secondary or more education while the change is inconsistent among those who attained primary level education. No change has been observed among those who had never been to school. The proportion of better-educated women experiencing child delivery by age 20 had declined from about sixty percent among older cohorts to below 20 percent among youngsters (see figure 5). This indicates that fertility transition is not taking place among women belonging to all socio-economic strata but selectively. Overall fertility reduction may not be observed if it does not happen uniformly or proportionately among all women belonging to different categories.

Fig.5. Percentage distribution of women having had birth before age 20 by educational level and age groups



According to figure 6, considerable change in proportion of women having had first child by age 20 is observed in Addis Ababa and the Dire Dawa City Administration. Even though women residing in SNNP, Amhara, Oromiya and Benishangul Gumuz regions started to experience decline in having children by age 20 among the younger cohorts, the situation in other regions appears to remain the same. Fluctuations in the proportion of women having had children by age 20 among those living in Gambella and Harari regions could be the effect of small sample size.

Figure 6: Proportion of women having had birth before age 20 by Region



As shown in table 1, most of the women living in Somali and Afar regions have no access to the media, have low decision-making autonomy, have not gone through primary level education that enables them to negotiate with their partners, do not engage in work outside home but live in stable marriage as followers of Islam. Women who live in Gambella as well as Benishangul Gumuz regions have also low decision-making autonomy, little access to the media and poor educational attainment. Women residing in Amhara and Tigray regions are identified for widely entering into early marriage and dissolving first marriages in divorce mainly due to physical and mental immaturity upon family formation. Unlike women in other regions, those residing in Addis Ababa, Dire Dawa and Harari have better access to the media, educational opportunities, participating in decision-making autonomy, late marriage and use of contraceptives. They tend to lead modern life and reside in urban environment as these regions are basically meant to constitute city administrations.

Table 1. Selected demographic and socio-economic indicators, by region

Region	% Having frequent ¹ access to media	% Completed primary education ²	% Married by age 18 ³	% Married more than once	% Living in polygamous marriage	% With low decision-making autonomy	% Engaged in any kind of work	% Ever used contraceptives	Contraceptive prevalence rate	Under five mortality
Tigray	17.9%	16.4%	66.3%	33.9%	2.5%	38.1%	52.1%	30.2	16.5	106
Afar	11.6%	6.8%	61.1%	14.0%	19.8%	38.9%	87.4%	11.1	6.5	123
Amhara	16.3%	8.5%	80.4%	48.1%	1.9%	26.7%	62.7%	28.0	16.1	154
Oromia	20.6%	10.0%	53.5%	17.1%	15.5%	38.7%	63.8%	21.9	13.6	122
Somali	9.1%	5.1%	50.3%	7.2%	17.4%	44.8%	88.0%	4.1	3.0	93
Ben_Gumuz	13.7%	6.5%	72.1%	26.2%	20.7%	47.3%	55.5%	21.7	10.9	157
SNNP	13.5%	6.7%	50.9%	13.6%	17.8%	41.9%	71.9%	18.6	11.9	142
Gambella	11.4%	9.1%	67.5%	21.9%	25.8%	48.4%	66.7%	25.8	16.1	156
Harari	53.8%	42.1%	42.4%	16.2%	4.5%	18.2%	56.3%	45.5	31.8	103
Addis Ababa	70.8%	58.1%	24.3%	15.6%	1.8%	6.8%	47.3%	81.7	56.7	72
Dire Dawa	46.4%	33.8%	45.0%	15.5%	8.3%	11.1%	63.3%	45.9	33.3	136
Total	20.2%	11.9%	59.0%	23.0%	11.5%	35.7%	64.7%	24.1	14.7	132

Source: Computed by the author from EDHS 2005.

6. Actual and Desired Fertility Differentials

The reproductive behaviour of women in a given society is affected not only by their physiological structure and biological makeup but also by a number of socio-economic and demographic factors. Differences in age at entry into marriage, access to family planning services and their ability to utilize these services effectively and efficiently, respondents' age which has effect on their fertility experiences and desire to have more or less children, economic status of the household (i.e. possession of wealth to invest on offspring), and cultural and traditional norms in which the woman lives appear to play significant roles in creating variation in the level of fertility. In assessing differentials in fertility, attempts are made to observe the situation among women belonging to different categories of reproductive age: early (15-24 years), peak (25-34 years) and late (35 and above); such an assessment could help to observe the change across different age cohorts.

6.1 Trends in Lifetime Fertility

Mean number of children measured as average parity among all women of reproductive age is found to be 3.09 among all women in the 2000 EDHS but 3.14 in the 2005 survey (table 2). Though there was a slight increase in the average number of children ever born to a woman, the difference was not statistically significant to be considered. Mean number of children ever born has not shown statistically significant change by broader age groups of women in the reproductive age too. A statistically significant decline in mean parity is, however, consistently observed among urban residents while the changes in rural areas are not consistent. Rural women in their peak fertility age (i.e. 25-34 years) have shown a statistically significant increase in mean parity while the changes among women in other age groups were not considerable. This could be due to shift in timing of birth following the change in age at first marriage due to changes in policies and laws pertaining to timing of family formation (NOP, 1993; FDRE, 2000). Though there is a tendency of decline in mean parity among those having secondary and above education, there is unclear pattern among those having primary level education (table 2). A significant decline in mean parities is observed among those in their early reproductive age but there is an increase among those in later ages. This could again be because of shift in the timing of births towards later age rather than a decline in fertility as such. An increasing trend in mean parity among those having received no education could be the effect of traditional norms and values perpetuating large family size.

Table 2. Trends and differentials in mean number of children ever born among all women of reproductive age, by age group and selected background characteristics: EDHS 2000 and 2005

	15-24			25-34			35-49			All women		
	2000	2005	T-test	2000	2005	T-test	2000	2005	T-test	2000	2005	T-test
Region												
Tigray	0.67	0.59	-1.086	3.33	3.26	-0.45	6.33	6.28	-0.228	3.16	2.99	-1.24
Afar	0.64	0.61	-0.141	2.96	3.69	1.69	5.90	5.77	-0.230	3.08	3.22	0.42
Amhara	0.78	0.66	-3.098	3.63	3.42	-2.43**	6.33	6.48	1.297	3.39	3.26	-1.78
Oromia	0.62	0.69	2.153	3.78	3.83	0.72	6.79	6.63	-1.570	3.08	3.26	2.94**
Somali	.58	0.82	1.492	3.96	3.85	-0.33	6.95	6.47	-1.096	3.48	3.62	0.54
Ben_Gumuz	0.63	0.85	1.100	3.36	3.81	1.05	6.41	6.29	-0.195	3.01	3.29	0.78
SNNP	0.50	0.49	-0.91	3.18	3.70	5.50***	6.54	6.97	3.457**	3.11	3.29	2.19*
Gambella	0.75	0.99	0.62	2.97	3.06	0.127	5.59	5.05	-0.460	2.64	2.81	0.30
Harari	0.54	0.50	-0.12	2.60	2.22	-0.43	6.06	4.69	-0.914	2.65	2.02	-0.95
Addis Ababa	0.16	0.16	0.203	1.41	1.06	-2.38*	4.25	3.64	-2.096*	1.46	1.22	-2.15*
Dire Dawa	0.25	0.45	1.01	2.23	2.38	0.25	4.95	4.98	0.022	2.03	2.32	0.65
Place of Residence												
Urban	0.33	0.26	-2.43*	2.17	1.80	-3.90***	5.07	4.44	-3.99***	1.93	1.65	-4.17***
Rural	0.68	0.70	0.72	3.73	3.85	2.46*	6.81	6.69	1.890	3.35	3.46	2.79**
Respondent's Education												
Illiterate	0.73	0.94	7.56***	3.74	3.80	1.10	6.62	6.74	1.955	3.62	3.99	8.23***
Primary	0.43	0.34	-2.79**	3.19	3.71	4.84***	5.06	5.57	2.248*	1.71	1.76	0.83
Secondary	0.29	0.18	-3.89***	1.73	1.52	-1.89	4.06	3.49	-2.237*	1.08	0.99	-1.47
Total	0.61	0.61	-2.72	3.45	3.53	1.762	6.46	6.46	0.058	3.09	3.14	1.36
Number of cases											14 070	

***=P<0.000, **=P<0.01, *=p< 0.05

Source: Compiled by the author from EDHS 2000 and 2005 data sets.

Available evidences, in general, reveal that there is change in fertility in urban areas and some regions of Ethiopia (table 2, figure 1A to figure 2B in the Appendix). Detailed analyses of data by some selected background characteristics of respondents also show that there are inconsistent changes in the fertility level of women between the two surveys. A decline in mean parity in one of the categories (e.g. urban areas) is to be diminished by an increase or no change in another category. A major change in mean parity at national level could be observed if and only if there are consistent changes in fertility among women belonging to all categories. The inconsistent change in mean parities observed at the moment could be the outcome of a shift in timing of birth or fluctuations in figures resulting from sampling errors that would not result in a considerable change in overall fertility at national level.

As observed in table 2, there is slight variation in mean number of children ever born belonging to different categories of age group by region. Mean parity for the year 2005 is nearly the same as that for 2000 for most of the regions. A statistically significant decline in mean parities is, however, observed only among women in their peak reproductive age and residing in Amhara Region and those middle aged and older women living in Addis Ababa (table 2). Contrary to this, a considerable increase in mean parities is seen among some of the women residing in Oromia and SNNP regions. The change in mean parities among these groups of women is basically due to giving up using traditional birth control methods without adopting modern ones. The overall effect is, nevertheless, no change in fertility at national level. A decline in some of the regions appears to be offset by an increase elsewhere.

Unlike the situation in the regions, there is a noticeable variation among mean parities of women by their place of residence. Women living in urban areas demonstrate a statistically significant decline in average parities in all sub-age groups when comparison is made for EDHS data in 2000 and 2005. The difference in mean parities across various age cohorts is, however, inconsistent. No statistically significant change in mean parities are observed for women in early and late reproductive ages while a considerable change is observed for those in the peak fertility age probably due to a shift in timing of birth.

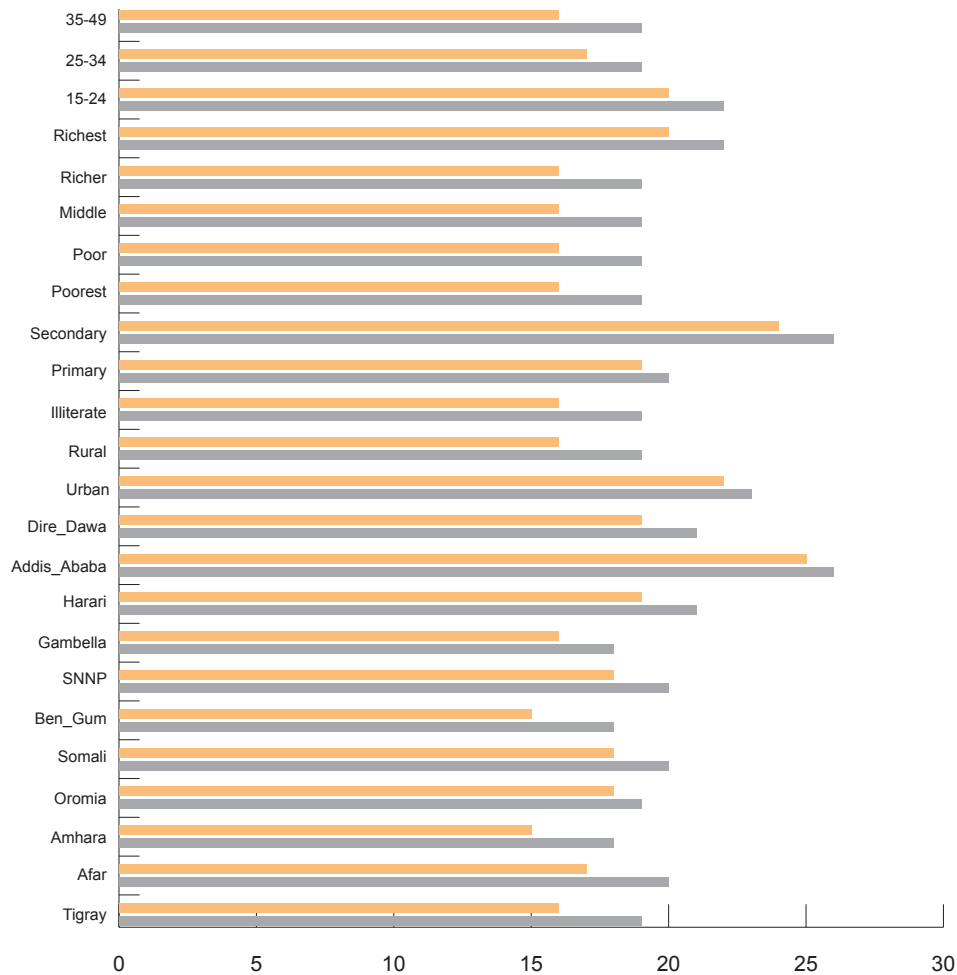
In general, there appears to be a considerable variation in average parities by region, place of residence and educational attainment. Women living in Addis Ababa and Dire Dawa city administrations as well as Harari Region, where the majority of the population are urban residents, have lower mean parities compared to those residing in other regions predominantly inhabited by rural residents. Even though an inverse relationship between educational attainment and mean parities are observed in all age groups, a consistent decline in fertility is not observed in all categories of educational level among women belonging to different age cohorts. The haphazard effect of education on fertility may not, thus, lead to fertility transition as it rather tries to maintain the status quo over time. A sharp decline in mean parity among those who have attained secondary and above education alone would not bring about fertility transition unless similar trend is observed in other categories of the educational level. Inconsistent change in patterns of mean parity across various categories of the women in different age groups, in general, reveals that fertility transition has not yet started in rural Ethiopia, where the majority of the population is living. Considerable change in fertility may not be observed in this country unless there are significant changes in fertility among the majority of the rural and uneducated women. A decline in fertility among selective groups (i.e. those residing in urban areas and attaining secondary and higher level education) alone would not alter the situation at the national level. Fertility transition is impossible when changes are confined to selective groups.

6.2 Levels and Differentials in Age at first Marriage, First Birth and Birth Intervals

Variation in birth intervals could be one of the factors affecting the total number of children a woman would have at the end of her reproductive life (Jejeebhoy, 1995). In non-contraceptive population, if marriage is stable and entry into marital life is early, fertility would definitely be higher as most of the women are at the risk of pregnancy starting from early ages. The total number of children born to a woman could, however, be less if there are interruptions in marital life and the tradition in a given society would not allow sexual consummation shortly after child delivery and there is a tendency to breast feed a child for longer duration without supplementary food.

In Ethiopia, where marriage is universal and takes place early (Desta and Seyoum, 1998) and the means to control fertility is not widely available, traditional norms and values such as duration of breast-feeding and postpartum sexual abstinence are expected to have non-negligible effect on the interval between consecutive births. Assessing the timing of entry into marital life and extent of marital instability may also help to explain the effect of such cultural norms and values on fertility behaviour of Ethiopian women.

Evidences from the current study show that average age at entry into marital life appears to be the lowest (i.e. 15 years) among women residing in Amhara and Benishangul Gumuz regions followed by those residing in Gambella and Tigray (16 years each). Highest age of entry into marital life is, however, observed among those living in urban dominant regions: Addis Ababa (25 years), Dire Dawa and Harari Region (21 years each). Median age of entry into marital life is 16 years among rural women of Ethiopia, still below the minimum age of marriage stipulated in the National Population Policy of Ethiopia (NOP, 1993) and the recently adopted Revised Family Law (FDRE, 2000). Since marriage takes place early in rural Ethiopia, child delivery is also taking place early. Median age at first birth among rural women is 19 years (table 3).

Figure 7: Median age at first marriage and first birth, by selected background characteristics of respondents: 2005

Being one of the developing countries where traditional norms and values are still governing the state of reproduction, age at first birth in Ethiopia appears to follow the pattern of age of entry into marital life. First births often take place in about two years period (table 3). There are, however, exceptions to such phenomenon. For instance, Amhara women who were victims of early marriage were not found to be mothers soon after marriage. There are about 45 months gap in average between first marriage and first birth in the Amhara Region, probably due to the high divorce rate in the region due to marriage without the consent of the girls (see table 3). According to Levine (1965, 2002), the Amhara society is characterized by a population where kinship has generally a limited role and co-operation is very thin. Thus, it is not surprising to observe high divorce rate among young girls who often prefer to run away to escape the marriages they did not like than living in them and have children.

Unlike what is mentioned above, the gap between age at first marriage and birth is shorter for those women who marry late. For instance, the gap between age at first marriage and first birth is less than two years in Addis Ababa where marriage tends to be late. Women in Addis Ababa, on average marry in their mid 20s (table 3). Premarital consensual union is also evolving in the city (Eshetu, 2005).

As observed from the data, teenage pregnancy and motherhood is one of the serious problems in rural areas and most of the regions. Though median age at first birth is 20 years at national level, most of the uneducated and rural women are at high risk of teenage pregnancy and motherhood. Further analysis of data by age cohorts of women, however, shows that there is a slight change in the timing of first marriage and child delivery (see figure 7). The median age at first marriage and birth among those in their early reproductive age (i.e. 15-24 years cohort) has increased to 20 and 22 years, respectively. Though it is an indication of progress with the ongoing effort to overcome the problems of early marriage and teenage pregnancy, the situation is still worse as most of the rural and uneducated women are at the risk of early marriage and teenage motherhood. Only women with secondary and higher education as well as those residing in Addis Ababa and other urban areas are in a better position as far as entry into marital life and motherhood are concerned. With the exception of women in the highest category of wealth status to some extent, no difference is observed in their timing of marriage and first birth. The evidences suggest that socio-cultural traditions in Ethiopia appear to have significant effects in determining timing of births and marriage than access to resources at the household level.

The average span between first marriage and first birth is found to be 24 months at the national level with a difference of two months between urban (25 months) and rural (23 months) residents (table 3). Longer interval between first marriage and first birth is documented in Amhara Region (45 months), followed by those residing in Tigray Region (32 months), where early age at first marriage is quite evident. Looking at the interrelationship between age at first marriage and age at first birth, one can easily notice longer interval among those who got married very early (i.e. before age 15) but shorter interval among those who got married after age 18 (table 3).

Table 3. Percentage distribution of ever married women, and median age at first marriage, first birth and birth interval in relation to socio-economic and demographic characteristics of respondents: EDHS 2005

Variables	% Ever married	% Ever had first child	Median age at first marriage	Median age at first birth	% Divorced first marriage ^{t1}	Marriage to first birth ^{t2}	Inter-birth intervals ^{t3}			
							2nd	3rd	4th	5th and higher
Region										
Tigray	76.8	69.0	16	19	44.1	32	34	34	35	36
Afar	84.9	72.6	17	20	24.2	24	27	27	28	30
Amhara	83.6	73.7	15	18	58.9	45	33	34	37	35
Oromia	74.0	69.2	18	19	24.6	21	28	28	32	31
Somali	82.1	78.6	18	20	14.0	18	27	26	26	28
Ben_Gumuz	83.9	75.8	15	18	30.8	26	31	29	32	33
SNNP	72.3	68.6	18	20	19.8	21	29	29	31	32
Gambella	84.1	77.3	16	18	36.8	21	35	38	45	35
Harari	66.7	59.0	19	21	26.9	22	27	31	33	28
Addis Ababa	43.5	40.7	25	26	39.9	21	34	38	50	39
Dire Dawa	68.1	60.9	19	21	31.9	22	27	31	38	29
Place of Residence										
Urban	54.5	49.3	22	23	44.2	23	34	38	41	36
Rural	79.4	73.3	16	19	33.1	25	29	29	32	32
Respondents' education										
Illiterate	88.5	82.4	16	19	36.4	26	29	29	30	32
Primary	52.6	46.5	19	20	28.6	23	31	31	32	33
Secondary	41.9	36.7	24	26	27.5	21	36	45	45	49
Wealth index										
Poorest	84.5	79.1	16	19	32.8	24	28	28	30	31
Poor	82.5	75.6	16	19	35.2	26	30	30	33	33
Middle	78.1	71.2	16	19	30.8	27	29	29	32	33
Richer	77.2	71.9	16	19	34.9	24	29	29	32	32
Richest	59.3	53.8	20	22	39.0	23	32	35	38	33
Woman's age group										
15-24	45.5	34.0	20	22	26.7	25	32	34	@	@
25-34	92.9	90.1	17	19	29.2	23	29	30	32	@
35-49	98.9	97.6	16	19	45.5	26	29	29	29	29
Age at first marriage										
Less than 15 years					44.4	35				
15-17 years					31.5	22				
18 and above years					22.7	19				
Survival status of index child										
Dead							25	25	25	26
Alive							30	31	34	33
Total	75.0	69.0	18	20	34.6	24	29	30	33	32
Number of cases /births	14 070	14 070	13 969	14 070	10 507	9 803				

@ Too few cases to make reliable estimates.

t1 Among ever married women

t2 It refers to the interval between first marriage and first birth for all ever married women.

t3 It is computed for second and higher order births only among those living in their first union.

This could be due to the effect of marital instability among those who got married early. Further analysis of data on the stability of first marriage, by the time of the survey, revealed that 60 percent and 44 percent of women residing in Amhara and Tigray regions, respectively, were not living in their first marriage. Most of them are assumed to end their marriage in divorce due to the arrangement of the union by their respective parents without their consent (Tilson and Larsen, 2000).

Essentially due to getting married at later ages, educated women often have their first babies within shorter interval after marriage. Interruption of first marriage among this group of women was also found to be the least (27 percent) as compared to those who have never been to school (36.4 percent). Not much change in the interval between first marriage and first birth is, however, observed among women belonging to various categories of wealth status across different age cohorts (table 3).

Non-first birth intervals between consecutive births were also computed for women living in their first marriage at the time of the survey, to overcome the effect of marital disruption. In addition to women residing in urban areas and attaining secondary and above education, women living in Tigray, Amhara, Gambella and Addis Ababa were found to experience longer inter-birth intervals. They exhibited over 33 months of gap between second and higher order consecutive births, while women in other categories were observed having a relatively shorter interval between births. The inter-birth interval in Somali, Afar and Oromia regions are, specifically, the shortest. These figures are even lower than the national average among all birth orders.

An immediate fertility response to the effects of infant/child mortality is clearly manifested across all births as shorter inter-birth intervals are documented for those losing their index child to death. Women experiencing child death, on average, got pregnant six months earlier than those who never faced the problem. Like the situations observed in the analysis of mean parities, a consistent increase in inter-birth intervals is observed only among women attaining secondary and higher level of education and those residing in urban areas (see table 3).

6.3 Determinants of Lifetime Fertility in Ethiopia

A Poisson regression model was fitted to assess factors affecting lifetime fertility among currently married women of reproductive age. This model is preferred to others since it has the potential to indicate determinants of lifetime fertility by taking children ever born as count data (Winkelmann and Zimmermann, 1995). Knowledge of fertility determinants is crucial to take action towards regulating the occurrence of births among those experiencing relatively higher fertility and encouraging others to maintain existing status quo even if they do not want to get their fertility reduced. In order to observe determinants of lifetime fertility among women in different age categories, the model was fitted for all women as well as those belonging to different reproductive age cohorts: early (15-24), peak (25-34) and late (35-49). Explanatory variables included in the model are region, place of residence, educational level, religious affiliation, access to media, wealth index, child loss experience, experience in contraceptive use, age at first marriage and woman's decision-making autonomy. A woman's age and age square are also included in the model as covariance.

In conformity to the results of the bivariate analyses, low fertility is observed among urban residents, those achieving secondary and above education, women who have frequent access to media, employed in the modern sector of the economy and are getting married after age 18. High fertility, on the other hand, prevailed among those experiencing child loss and women residing in some of the regions where values of children are supposed to be high. No statistically significant differences in lifetime fertility is, however, observed among women belonging to different categories of wealth status and decision-making autonomy, suggesting that development factors have not yet fully penetrated into fertility regulation as far as the Ethiopian situation is considered.

Lifetime fertility has been reduced by $((1 - \text{EXP}(\beta)) * 100)$ 16 percent among residents of urban areas as compared to those residing in the countryside (table 4). The extent of variation is nearly the same among women belonging to different age cohorts as well. Similarly, lifetime fertility has shown a declining trend among those attaining secondary and above education by 19 percent compared to those who have never been to school. Similar trend is, more or less, observed among women belonging to different age cohorts when educational level is taken into account. Frequent access to media as well as gainful employment both in agricultural and non-agricultural work also tend to reduce fertility (by about six percent each) compared to those who have no access to media and not working, respectively (see table 4).

Table 4. Poisson regression analysis results predicting determinants of children ever born among currently married women, by age group: EDHS 2005

Variables	15-24		25-34		35-49		All women	
	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)
Region								
Tigray	0.05	1.20	0.03*	1.06	0.02*	1.05	0.02***	1.07
Afar	0.09	0.91	0.04	1.06	0.04*	0.95	0.03	0.99
Amhara	.	1.00	.	1.00	.	1.00	.	1.00
Oromia	0.045***	1.39	0.03***	1.15	0.02*	1.06	0.02***	1.13
Somali	0.071**	1.24	0.04***	1.17	0.04***	1.17	0.02***	1.21
Ben-Gumuz	0.056*	1.14	0.03	1.03	0.03*	0.92	0.02	0.98
SNNP	0.056***	1.28	0.04**	1.09	0.03	1.04	0.02***	1.08
Gambella	0.061***	1.20	0.04*	0.92	0.04***	0.81	0.03***	0.90
Harari	0.064***	1.39	0.04	1.01	0.04	1.01	0.03*	1.05
Addis Ababa	0.09	1.11	0.05	0.92	0.04	1.02	0.03	1.01
Dire Dawa	0.072***	1.23	0.04	0.97	0.04	1.01	0.03	1.02
Place of residence								
Rural	.	1.00	.	1.00	.	1.00	.	1.00
Urban	0.07***	0.81	0.03**	0.85	0.03***	0.82	0.02***	0.84
Women's education								
Illiterate		1.00	.	1.00	.	1.00	.	1.00
Primary	0.04	0.96	0.02	1.03	0.03	0.96	0.01	1.01
Secondary	0.07**	0.82	0.04*	0.81	0.04***	0.82	0.03***	0.81
Religious affiliation								
Orthodox		1.00	.	1.00	.	1.00	.	1.00
Protestant	0.05	0.97	0.02**	1.08	0.02***	1.09	0.02***	1.08
Muslim	0.04	1.07	0.02***	1.09	0.02***	1.07	0.01***	1.07
Other	0.07	1.08	0.04	1.06	0.04*	1.08	0.03*	1.07
Access to media								
No Access	.	1.00	.	1.00	.	1.00	.	1.00
Infrequently	0.03	0.98	0.02	0.99	0.02	0.98	0.01	0.98
Frequently	0.05	0.93	0.03*	0.95	0.02**	0.93	0.02**	0.93
Women's occupation								
Not working		1.00		1.00		1.00		1.00
Agri - worker	0.04	0.95	0.02*	0.96	0.02**	0.95	0.01***	0.95
Non-agri worker	0.04*	0.88	0.02**	0.93	0.02**	0.94	0.01***	0.94

Table 4. Poisson regression analysis results ... among currently married women (cont'd)

Variables	15-24		25-34		35-49		All women	
	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)
Wealth index								
Poorest	.	1.00	.	1.00	.	1.00	.	1.00
Poor	0.04	0.93	0.02	0.98	0.02	0.98	0.01	0.98
Middle	0.04	0.95	0.02	1.00	0.02	1.01	0.02	1.00
Richer	0.04	0.99	0.02	1.01	0.02	1.06	0.02*	1.03
Richest	0.06	1.03	0.03	0.99	0.03	1.02	0.02	0.99
Child loss experience								
None	.	1.00	.	1.00	.	1.00	.	1.00
One	0.03***	1.39	0.02***	1.24	0.02***	1.21	0.01***	1.25
At least two	0.05***	1.96	0.02***	1.46	0.02***	1.44	0.01***	1.45
Contraceptive use								
Non-use	.	1.00	.	1.00	.	1.00	.	1.00
Ever use	0.03	1.02	0.02**	1.05	0.02***	1.14	0.01***	1.09
Age at first marriage								
Before 18 yrs	.	1.00	.	1.00	.	1.00	.	1.00
18 + yrs	0.04***	0.45	0.02***	0.69	0.02***	0.86	0.01***	0.76
Women's decision-making autonomy								
Low	.	1.00	.	1.00	.	1.00	.	1.00
Medium	0.03	1.04	.014	1.02	0.02	0.99	0.01	1.01
High	0.04	0.94	.021	1.02	0.02	0.99	0.01	0.99
Age	0.13***	3.50	.05***	1.43	0.03**	1.11	0.00***	1.28
Age squared	0.01***	0.98	.01***	0.99	0.00**	0.99	0.00***	1.00
Intercept	1.37***	0.00	.75***	0.01	0.64*	0.08	0.08***	.029
Total number of cases	2 163		3 402		2 960		8 397	

Reference categories have a value of 1.00 for *Exp(B)*.

Source: Computed by the author from 2005 EDHS data set.

Getting married at age 18 and later is also demonstrated to reduce fertility by 24 percent when compared to those who entered into marital life early; i.e. before age 18 (table 4). In countries like Ethiopia where contraceptive prevalence rate is low, increasing age at first marriage could reduce lifetime fertility by minimizing the exposure time to the risks of pregnancy. This approach, however, effectively operates as long as birth outside marriage is discouraged and kept minimal; as a result of repression from socio-cultural factors that prohibit premarital sexual relations and child-delivery before marriage.

Though not consistent among all age cohorts, religious differences in lifetime fertility are also observed in the current study. Muslim and Protestant women in their peak and late reproductive age appear to have more children when compared to those following Orthodox Religion. The difference is higher by about 8 percent in

each of the groups, and that is statistically significant (see table 4). Further analysis of the data by rural/urban settings, however, reveals that higher lifetime fertility is observed among Muslims living in urban areas while Protestants in rural areas tend to have larger family (data not shown here). The rationale behind having higher fertility among the Protestant religion followers in Ethiopia, which is contrary to the global situation¹, again needs further investigation. Despite showing a signal for fertility decline, no statistically significant difference in lifetime fertility is observed among those attaining primary level education and having infrequent access to media. Their lifetime fertility is nearly the same as those taken as a reference category.

There are significant differences in lifetime fertility among women residing in different regions of the country. When Amhara Region, which has a completed mean parity closer to the national average (CSA and ORC Macro, 2006), is taken as a reference category, Tigray, Oromia, Somali and SNNP regions appear to have higher lifetime fertility while Gambella Region was found to have the lowest fertility rate. Lifetime fertility in Somali Region is found to be higher by 21 percent when compared to the level in Amhara Region, followed by Oromia (13 percent), SNNP (8 percent), Tigray (7 percent) and Harari regions (5 percent). It is only women in the Gambella Region that exhibit 10 percent lower lifetime fertility. Women residing in other regions tend to have relatively the same lifetime fertility as that of women living in the Amhara Region when other confounding factors are held constant (table 4). Apart from slight changes among those women in their early reproductive age, lifetime fertility among women in the peak and late reproductive ages tends to replicate the situation observed among all women of reproductive age. The reason behind fluctuations in lifetime fertility among women in the early childbearing ages is partly due to the tendency of shifting the timing of births to later ages without intending to minimize desired family size or reduce the total number of children they wish to have in their lifetime.

According to results given in table 4, high fertility is observed among women experiencing child mortality. Death of a child tends to increase lifetime fertility by 25 percent while the death of two or more children increases it by 45 percent among all women of reproductive age. Fertility response to death of one and more children is, however, the highest (39 and 96 percent, respectively) among women in early childbearing ages indicating that child survival has significant effect on fertility if it happens at the very beginning. Even among women in their late reproductive age, fertility response to child death is considerable: 21 percent and 44 percent, for those losing one and two or more children, respectively. On the basis of such evidences, one could, therefore, argue that making efforts towards reducing infant and child mortality in Ethiopia could lead to further decline in fertility in the long run.

¹Protestant religion followers are expected to have liberal stand on the use of family planning methods, and thus have small family norm (Tawiah, 1984).

Another interesting finding of this study is the fact that Ethiopian women tend to use family planning after achieving their desired fertility. Ever users of contraceptives are found to have 9 percent higher fertility than non-users. Analysis of data across different age cohorts reveals that the tendency to use family planning after achieving desired fertility increases with age. Even though statistically significant difference in lifetime fertility by contraceptive ever use status is not observed among women in their early childbearing age, women who have ever used contraceptives appear to respectively have 5 percent and 14 percent higher lifetime fertility than non-users among those in the peak and late reproductive ages (table 4). Devising a strategy to let women use contraceptives to space between births from the very beginning rather than looking for it to limit fertility later on might help to reduce infant/child mortality that has non-negligible effect on fertility in the long run. Otherwise, contraceptive use at a later age to stop births might not bring about the desired effect as shorter inter-birth interval could lead to increased infant/child mortality that goes against the overall fertility reduction endeavours.

Similar to results obtained in the inter-birth interval analysis, no statistically significant difference in lifetime fertility is also observed among women belonging to different categories of wealth status and decision-making autonomy. Findings of the current study are not supportive of the Neo-Classical economic theory which states that there is a direct relationship between poverty and large family. The non-significant effect of wealth status on fertility could be due to considering child mortality as an independent predictor of fertility that could partly take care of the poverty effect. A possible explanation for non-significant effect of women's decision-making autonomy on lifetime fertility could, moreover, be attributed to Ethiopia's recent initiative on gender equality and empowerment that requires more time to break the 'age old' male dominance tradition.

Separate analysis of lifetime fertility for each of the regions has shown nearly similar results obtained at the national level. Socio-economic and demographic factors have almost the same effect across the regions in Ethiopia.

6.4 Trends in Desired Fertility

As the desire for additional children is an indicator of large family, the intention to limit births is often considered as a precondition for fertility decline (Bongaarts, 1997). The extent to which a given society desires to limit fertility has significant implications for family planning programs. It is often taken as another indicator of the demand for family planning services. Identifying women who intend to limit child bearing enables policy makers and program implementers to avoid unintended pregnancies and thus limit fertility.

Table 5. Trends and differentials in percentage of currently married women who do not want additional children, by background characteristics of respondents: EDHS 2000 and 2005

Explanatory variables	Percentage of women who do not want additional children			Change
	2000	2005	χ^2	
Region				
Tigray	26.4	29.3	1.203	
Afar	16.2	19.6	0.437	
Amhara	43.0	48.4	14.383***	+
Oromia	30.7	47.9	210.544***	+
Somali	11.2	11.1	0.002	
Benishangul Gumuz	33.3	42.0	1.575	
SNNP	26.0	38.5	72.693***	+
Gambella	28.6	45.2	1.732	
Harari	40.9	40.9	0.000	
Addis Ababa	47.5	49.5	0.188	
Dire Dawa	35.1	38.2	0.073	
Place of residence				
Urban	40.9	48.2	11.119**	+
Rural	31.6	42.3	198.740***	+
Respondents' education				
Illiterate	32.9	44.0	190.601***	+
Primary	29.7	39.9	28.714***	+
Secondary	36.7	36.8	0.001	
Respondents' age group				
15-24	11.1	18.9	58.528***	+
25-34	27.2	36.9	78.762***	+
35-49	56.9	68.5	88.483***	+
Total	32.7	42.9	201.638***	+

***=P<0.000

**=P<0.01

*=p< 0.05

According to results obtained from the 2000 and 2005 EDHS data, the proportion of women who want no additional children increased from 32.7 to 42.9 percent (table 5), and the difference is statistically significant. Though there is an increase in proportion of women who want no additional children among rural and urban residents and in all age cohorts, commendable difference in the intention to limit additional birth is only observed among women having no and primary level education and those living in Amhara, Oromia and SNNP regions. A statistically significant increase among women belonging to all age groups and living in rural as well as urban areas indicates that there is a potential for fertility decline if appropriate measures are taken to support those who want to limit their fertility through provision of family planning services and improving child survival status (see table 4).

No considerable change in the desire to limit additional birth is, however, observed among women living in the three urban dominant regions (Addis Ababa, Dire Dawa and Harari) and those attaining secondary and above

education (table 5), probably due to their relatively better access to family planning services. Much difference in the intention to limit fertility, during the interval between the two surveys, was also not observed among women living in the peripheral regions (Afar, Benishangul Gumuz and Gambella) may be due to their low level of actual fertility, which needs further investigation by administering special surveys and conducting qualitative studies. Exceptional in the current study is the very little intention to limit fertility, despite having large family sizes, among women residing in the Somali Region (see table 5).

6.5 Determinants of Fertility Intention in Ethiopia

According to the results of logistic regression models aimed at predicting determinants of fertility intention, age, number of surviving children, place of residence, educational attainment of the respondent, household wealth status and women's decision-making autonomy are found to be the major factors limiting fertility intention, that is, the desire to have additional child(ren). As indicated in table 6, women in their late reproductive age have two and half times higher intention to limit their fertility compared to those in their early child bearing ages. Women belonging to better off households also desire to limit their fertility compared to those living in the lowest stratum. An inverse relationship between the number of surviving children and intention to limit fertility is also exhibited among currently married women evidencing that at least two surviving children are required in the Ethiopian context to initiate planning for limiting fertility (table 6).

In spite of a continuous and consistent decline in fertility, women living in urban areas still intend to limit their fertility (table 6). Compared to their rural counterparts, urban women are 78 percent more likely to limit their fertility. If this prediction holds true, there is a possibility of further decline in urban fertility as compared to the rural one. Increased cost of living in urban areas that has direct impact on family wellbeing, which is not yet observed in rural areas, might be a contributory factor for the on-going intention to limit family size. Current contraceptive users are also found to limit their fertility by one and half times higher than those who are not using. This might hold true among women in their late reproductive ages as no statistically significant variation is observed among those in their early and peak reproductive ages.

Table 6. Logistic regression multivariate results predicting determinants of intention to limit additional child(ren) among currently married women: EDHS 2005

Variables	2005		
	B	SE	Exp (β)
Women's age			
15 – 24			1.00
25 – 34	-0.06	0.08	0.94
35 –49	0.94	0.09***	2.55
Region			
Tigray	-1.14	0.12***	0.32
Afar	-1.22	0.28***	0.30
Amhara			1.00
Oromia	0.09	0.08	1.09
Somali	-2.02	0.20***	0.13
Ben_Gumuz	0.09	0.26	1.09
SNNP	-0.54	0.09***	0.58
Gambella	0.30	0.43	1.35
Harari	-0.12	0.51	0.88
Addis Ababa	-0.41	0.20**	0.66
Dire Dawa	-0.43	0.42	0.65
Place of residence			
Rural			1.00
Urban	0.59	0.13***	1.78
Women's education			
Illiterate			1.00
Primary	-0.11	0.08	0.89
Secondary and above	-0.44	0.14**	0.64
Religion			
Orthodox			1.00
Protestant	-0.10	0.09	0.90
Muslim	-0.45	0.07***	0.64
Others	-0.08	0.14	0.92
Wealth index			
Poorest			1.00
Poor	0.11	0.083	1.12
Middle	0.32	0.084***	1.37
Richer	0.30	0.087**	1.36
Richest	0.32	0.111**	1.38
Women's decision-making autonomy			
Low			1.00
Medium	0.02	0.06	1.02

High	0.34	0.09***	1.41
Age at first marriage			
Before 18 years			1.00
18 years and later	-0.211	0.06**	0.81
Current contraceptive use			
Not using			1.00
Using	0.41	0.08***	1.51
Number of survival children			
No child	-1.34	0.14***	0.26
One child	-0.74	0.10***	0.48
Two children			1.00
Three children	0.29	0.09***	1.34
Four and more children	1.32	0.08***	3.73
Access to mass media			
No access			1.00
Infrequent access	0.04	0.06	1.04
Frequent access	0.00	0.09	1.00
Constant	-0.95	0.12	0.39
Number of cases	8 397		

Though statistically insignificant result is obtained for women having medium level of decision-making autonomy, a positive relationship between fertility intention and women's decision-making autonomy is observed in the current study (table 6). Women having high decision-making autonomy are found to be 41 percent more likely to limit additional child(ren) when compared to those who have low decision-making autonomy. High intention to limit fertility among women with higher decision-making autonomy indicates that there is an urgent need in implementing programs aimed at women's empowerment as it tends to reduce fertility in the long run.

When the Amhara Region is taken as a reference, most of the regions tend to have similar pattern of intention to limit additional child(ren) except Tigray, Afar, Somali, SNNP and Addis Ababa where the intention to limit fertility is significantly lower. In spite of having large family size, women living in Somali Region are 87 percent less likely to limit their fertility (OR=0.13, P<.001). Their plan is still to have more children, and the rational behind it needs further investigation. Women residing in Tigray Region that have similar fertility rate as those residing in Amhara Region, too, intend to continue having more children. Their intention to limit additional children is lower by 68 percent, and the difference is statistically significant (OR = 0.32, P < 0.001). Controlling for the effects of other variables, women living in Afar and SNNP regions that have the same level of lifetime fertility with that of Amhara women, wish to have more children as their intention to limit additional children

is lower by 70 percent and 42 percent, respectively (table 6). Due to the low fertility level observed at the moment, women living in Addis Ababa have not shown any intention to limit their fertility further (OR = 0.66, $P < .001$). Rather they have plans to have more children assuming that there would be improvement in living conditions as a result of provision of residential quarters, better employment opportunities, etc. No intention to limit additional birth is also documented among women having secondary and higher level education (OR = 0.64, $P < 0.001$) and those who got married late (OR = 0.81, $P < .01$) basically due to their prior arrangements to have fewer births.

As a whole, the intention to limit additional child(ren) tends to go hand in hand with the extent of unmet need for family planning. Women who reported high unmet need for family planning were also observed having high intention to limit fertility (data not shown here). On the basis of available evidences, it is possible to anticipate that meeting the unmet needs for family planning could reduce fertility further.

7. Discussions of Major Findings

Fertility has declined among some selected groups and regions of Ethiopia. Different factors ranging from modernization elements such as attainment of better education and residing in urban areas to traditional fertility control mechanisms are responsible for variation in fertility level in the country. Factors like kin support and pressure from extended family members, gender inequality and patriarchy, high infant and child mortality rates, early and universal marriage are responsible for high fertility both at national and regional levels. On the other hand, increased cost of living in urban areas and prolonged duration of breast-feeding as well as longer postpartum amenorrhea are factors inhibiting large family size.

Increased cost of raising children motivates couples to limit family size

According to Caldwell (1982), in societies where the cost of child rearing is shared between family members neither the poor nor the rich wish to limit family size. Here any attempt to control birth is socially disapproved for there is support in bringing up the child (Foster, 1975). Compulsory education is one of the important factors calling for increased costs of raising children (Van de Walle and Foster, 1990). Active participation of children in the schooling system reduces their contribution to household economy through participation in the production system. As education is not yet taken as a decisive and necessary condition for future life of children in rural Ethiopia, a greater proportion of rural parents have not yet developed the habit of sending their children to school though the trend is showing improvement recently. As most of the children are spending their childhood and adolescent age working on the farm land or looking after herds, there is little or no burden of raising children among rural families. With the exception of urban residents, a greater proportion of Ethiopian women in the reproductive age groups have not yet adopted modern birth control methods. The current contraceptive prevalence rate in rural Ethiopia is 10.9 vis-à-vis 46.7 percent in urban Ethiopia (CSA and ORC Macro, 2006) indicating that there are many initiatives to reduce fertility in urban communities than in rural villages.

Qualitative information collected to triangulate statistical findings also revealed that there are differences in the perception of cost of raising children among rural and urban residents of Ethiopia. According to the consensus reached at by most of the focus group discussion participants, high values traditionally attached to children are getting revised among urban residents of Ethiopia since the social system fails to carry on their expectations due to the dominance of the economy by secondary and tertiary sectors that limit the participation of children in the production process. An increase in the costs of living in urban Ethiopia is believed to reduce family size mainly through increasing the active participation of husbands in the joint decision on the desired family size. Contrary to this, husbands in rural areas exert more pressure on their wives to have additional children as they are assets than being liabilities.

Gender inequality and patriarchy tend to promote large family size

Culturally, men are in need of large family since they hold the major responsibility of ensuring the continuity of family lineage (Donadie and Tabutin, 1994). Their role in the reproductive system is also central as they have the upper hand in controlling the marriage market (i.e. have much freedom of mate selection) and wider scope of action than women. In addition, they are not the primary care givers to motivate limiting family size. According to qualitative information obtained from urban Ethiopia, there is a noticeable difference in couples' view on costs of raising children. For men, the major expense in raising children is education followed by food and clothing. For women, food is the major expense followed by clothing and education. Consequently, men are in need of large family since the cost of schooling is modest in Ethiopia and child education is not yet compulsory and nearly free at primary level (World Bank, 1998).

The patriarchal system in Ethiopia, which does not allow women to own property, also threatens their decision to control fertility. Qualitative data collected from different parts of the country revealed that for Ethiopian women divorce has a risk of losing the property acquired during the course of marriage. To minimize such a risk, most of them are obliged to have a large number of children not only to safeguard the marriage but also to maximize their access to resources in case the marriage dissolves by divorce. Although the Revised Family Code of Ethiopia (Federal Negarit Gazetta, 2000) gave courts the power to distribute property between husband and wife upon divorce, none of them are confident that this provision is executed accordingly unless they have children in that marriage. For the uneducated, unemployed and rural Ethiopian women, having more children in a given marriage is tantamount to having more access to property owned in that marriage.

Kin support is encouraging high fertility in Ethiopia

The extent to which resources are exchanged among extended family members and the degree to which kinship serve as risk insurance have a non-negligible effect on the level of fertility in Ethiopia. Qualitative information obtained from rural areas of most of the regions depicted that extended family members have the power to exert much pressure on Ethiopian women to bear as many children as they could. For instance, in the Somali and Afar regions, any attempt to terminate pregnancy or postpone the timing of pregnancy is tantamount to belittling the supremacy of a given clan. Clan leaders often wish to overcome conflicts over resources in their respective localities through fighting with other parties, than taking legal measures in which males play decisive roles. Thus, a woman that gives birth to more sons is often blessed as someone contributing much to the community's autonomy. On equal footing, most of the societies in SNNP, Gambella and Oromia regions are also encouraging women to have as many daughters as they could since members of the kin are benefiting from bride prices paid by grooms upon marriage.

According to the argument of neo-classical economists (Becker and Lewis, 1973), fertility never goes down unless parents feel that they lack adequate resources to provide their children with basic needs (i.e. not only food but also education, leisure time, etc.). Contrary to this, kin support appears to minimize the extent of such pressure on biological parents; it rather mitigates their demand for small family through adoption of birth control methods. Substantiating such findings, Makinwa-Adebusoye (1994) stated that the unique nature of African family system that distributes the responsibility of managing the costs and benefits of children among extended family members encourages couples to continue having large families than taking the initiative to minimize fertility to the economic well-being of a nuclear family that is responsible to look after its own children. One of the major reasons for high fertility norm in Ethiopia, therefore, is the structure of the family organization that ensures the spreading out of the costs of reproduction specifically through the practice of fostering.

Infant and child mortality still have active roles in resisting fertility decline

Evidences on demographic transition from Latin America have shown that the decline in childhood mortality is one of the essential conditions for a change in fertility (Guzman, 1994). Studies undertaken in Botswana and Zimbabwe (Berbieri, 1994) also revealed that a noticeable fall in fertility came after a sustained and steady fall in childhood mortality. Unlike this, results of the multivariate analysis have shown that child loss experience has significant effect on the level of lifetime fertility in Ethiopia both at national and regional levels (see table 4 and table A1 in the appendix). According to available evidence from the analysis of the 2005 EDHS data, the likelihood of having additional child is significantly higher among those who lost at least one child. Qualitative evidences also indicate that the possibility of losing some of the offspring before they grow up often forces couples to have more children to develop confidence for some to survive.

Attainment of secondary and above education appears to reduce fertility:

Theoretically, it is argued that education reduces fertility as it changes the outlook of women on the number of children to be born to her (Cochran and Farid, 1990). First of all, educated women try to trade off between quality and quantity of children. They often aspire to have small number of children that acquire training and skills in the modern labour market. The desire to invest more on each of the children motivates them to minimize the number of children to be born in their lifetime. Illiterate women, on the other hand, wish to have as many children as they could as they think some of the children would be successful by chance and would support them later on. The difference on the perceived costs of raising children among mothers by educational level has the capacity to bring about considerable variation in their motivations to limit family size. Secondly, education is likely to delay timing of marriage, increase a woman's awareness and motivation to adopt contraceptive methods besides improving her decision-making autonomy that enhances bargaining power on all aspects of marital life (Mhloyi, 1994).

As observed in the results of multivariate analysis, women receiving secondary education and above have lower risks of having additional children compared to those who have never been to school (see table 4 and table A2 in the appendix). According to qualitative information obtained through focus group discussions and key informants in different parts of Ethiopia, education reduces fertility not only by increasing a woman's ability and motivation to protect her rights through legal means but also by developing her capacity in supporting the family financially as well as socially. Moreover, it is indicated that education gives them the courage to withstand any pressure exerted from in-laws to have additional children or threats to dissolve the marriage in divorce if she resists having additional children. Far beyond this, educated and employed women have the courage of taking independent decisions such as using birth control methods without their husbands' consent after achieving an acceptable fertility level and family size.

Fertility in rural Ethiopia is accelerated by universal and early age at first marriage

As clearly indicated in demographic literature (Ascadi and John-Ascadi, 1990; Ocholla-Ayayo, 1991; Casterline 1994) the timing of family formation and marital stability have significant roles to play on the onset of fertility transition. In the absence of contraceptive use, early age at first marriage and stable marital life have significant effect on the duration of women's exposure to the risk of pregnancy. The higher the age at first marriage for the majority of women in reproductive age, the lower the marital fertility would be since the delay in age at first marriage has the potential to reduce lifetime fertility. Similarly, analysis of multivariate results for the 2005 EDHS (table 4) have shown that lifetime fertility reduces by 24 percent among those who got married after age 18 (as compared to those who entered into marital life earlier. Similar and consistent results have also been observed among women residing in different regions (see table A1 in the appendix). On the basis of these tangible evidences, it is possible to argue that in societies where contraceptive use is quite low and marriage is entered into early, universal as well as stable, women have large families as there is no means to curb the risk of pregnancy over longer interval.

There are exceptions to the arguments mentioned above, however. Despite the fact that early marriage is quite common (table 3), the fertility levels in Amhara and Tigray regions are modest. On the basis of information obtained from focus group discussions (FGDs), the fertility level of the two regions is partly affected by the consequences of "child marriage²" that has significant impact on marital stability and adolescent sterility or subfecundity. According to data given in table 3, panel 6, first marriage had not necessarily led to early birth both in Amhara and Tigray regions. The interval between first marriage and first birth is 45 months and 32

² Child marriage refers to marriages taking place before age 15 (i.e. before maturity) while early marriage in most of the cases refers to marriages taking place before age 18 but after puberty (see also Ascadi and Johnson-Ascadi, 1990).

months in Amhara and Tigray regions, respectively; whilst divorce rate of first marriage in both of the regions is quite high: 58.9 percent and 44.1 percent in the given order.

Traditional fertility control schemes such as longer duration of breast-feeding and postpartum amenorrhea in regulating fertility in some of the regions

In societies where contraceptive prevalence rate is low, the effects of prolonged breast-feeding and postpartum abstinence are not negligible (Bongaarts, Frank and Lesthaghe, 1990; Ocholla-Ayayo, 1991). Despite living under same condition (table 1), women living in the Afar Region tend to have a relatively lower fertility as compared to women in Somali region for they have a custom of breast-feeding their children intensively and frequently for a longer duration. Extensive breast-feeding with intensity has the power to extend the duration of postpartum amenorrhea and gives mothers a better chance of protecting themselves against pregnancy (Bongaarts, Frank and Lesthaghe, 1990). According to the qualitative data obtained through focus group discussion and key informant interviews conducted in the Somali and Afar regions, mothers in the Afar Region have the tradition of feeding their children with breast-milk while those in the Somali Region have the habit of providing newly born babies with supplementary food shortly after birth. Culturally an Afar mother is provided with nutritious food to let her give the child more breast-milk, whilst the Somalis provide the nutritious food to the children directly. For having different cultural practices on timing of breast-feeding, Afar and Somali women have different exposure to the risk of pregnancy, given the low contraceptive prevalence rate in both of the regions (table 1).

Qualitative information gathered from the Gambella and Benishangul Gumuz regions also show that women in these regions have low fertility mainly due to the effects of secondary sterility and the initiatives to regulate fertility using traditional herbs. These women have the liberty to practice sexual relations before marriage though premarital child bearing is not encouraged. In the view of the medical practitioners from Gambella Hospital, pathogenic diseases leading to secondary sterility are common in such peripheral regions due to wider practices of extramarital sexual relations where access to health services is limited.

Although some of the traditional Ethiopian societies have deeply rooted child spacing in their culture, modernization factors such as attainment of primary level education could erode these traditional practices through time. Unless effective and efficient family planning system is in place, fertility could show an increasing trend temporarily during this transitional era. The slight increase in fertility in some of the regions such as Oromia and Somali could be a signal for the breakdown of traditional norms and values such as prolonged duration of breast-feeding and postpartum amenorrhea as factors controlling the risk of pregnancy.

8. Summary and Conclusions

Fertility has shown a declining as well as stalling situations in Africa over the last two decades. Some of the sub-Saharan African countries such as Kenya and Ghana, Latin American countries like Peru and Colombia, and Asian countries like Bangladesh started fertility transition before the mid-1990s but stalled then after (Bongaarts, 2005). Fertility decline in these counties began to take place in the absence of fundamental economic development led by industrialization, as it happened in the Western World. Better education as well as employment opportunities, wider access to family planning information and services in urban centres coupled with economic difficulties is supposed to contribute to the decline in fertility. The onset of fertility transition in some pockets of African, Asian and Latin American countries (particularly in urban centres) in causes associated with economic hardship, political upheaval leading to psycho-social frustrations and depressions as well as crumbling of the kin support system, calls for the emergence of new thinking on the dimension of fertility transition in developing countries.

The purpose of this study is to assess determinants of lifetime and desired fertility that have implications for program review and implementation of population programs in Ethiopia. The study specifically aimed at assessing the extent of fertility decline (if any) in the country and examining factors responsible for the change in each of the regions and other pertinent variables that have significant implications for policy intervention. In order to assess the extent to which family planning programs are required, detailed analysis is also made on factors affecting fertility intention in the country.

Analysis of this study is based on the 2000 and 2005 Ethiopian Demographic and Health Survey data collected by the Central Statistical Agency and ORC Macro. Currently married women in the child-bearing age (i.e. 15-49) are used to fit multivariate results predicting determinants of lifetime fertility using Poisson distribution, and desired fertility using logistic regression models. Kaplan-Meier life table approaches have also been used to estimate median values of age at first marriage, age at first birth, interval between first marriage and birth as well as inter-birth intervals. Duration of breast-feeding, postpartum sexual amenorrhea and abstinence are also estimated using such approach, which is robust in including censored events as well.

Major findings of the study revealed that there is a slight change in fertility in Ethiopia as far as evidences obtained from the 2000 and 2005 EDHS data sets are concerned. Fertility has, of course, shown a tremendous decline among selected groups: highly educated, gainfully employed and urban residents. The decline does not only lack uniformity but also appear to be accompanied by a shift in timing of births. Available evidences suggest that there is a tendency of lagging child delivery towards the peak reproductive age group (for instance,

women who attained basic education), which tends to show a decline in fertility among the younger women but a slight increase in other age categories. In most of the cases, the decline in fertility in some of the categories appears to be diminished by an increase in other categories either due to shifting in timing of child delivery or the inconsistent response to fertility inhibition factors. Rural women, for instance, appear to maintain the high fertility norm while urban women tend to decrease their lifetime as well as desired fertility. Similar inconsistent trends and patterns have also been observed in most of the variables included in the model.

Significant variation in fertility levels and intention to regulate additional births has also been observed in the current study. Urban regions (Addis Ababa, Dire Dawa and Harari) tend to have lower fertility due to the socio-economic setting of their population. However, when major factors contributing to fertility decline such as place of residence and educational attainment of respondents are controlled, their lifetime fertility and intention to limit additional child tends to be similar to the situation in Amhara Region which was taken as a reference category. Currently married women residing in Addis Ababa rather tend to have more births suggesting that there might be an increase in fertility in the city if there would be improvement in standard of living.

Women residing in regions where traditional norms and values still appear to perpetuate high fertility, namely, Somali, Oromia and SNNP regions, have not shown any signal for fertility decline. Lifetime as well as current fertility is the highest in all of these regions (see figure 3 and table 4). Major reasons for high fertility in such regions are the prevalence of kin support system that does not only exert pressure in having more babies but also sharing the costs of child rearing. An additional factor fuelling high fertility in Oromia and SNNP regions is the high unmet need for family planning services in each of the regions³. Had it been possible to meet the demands for family planning in the two regions, fertility would have been reduced at least by two children. Simulation model developed by Sinding et al. (1994) suggests that increasing family planning services by about fifteen percent could reduce a total fertility rate by about one child. The key issue to regulate fertility in the said regions, therefore, partly tends towards providing effective and efficient family planning services in their rural settings irrespective of their geographic proximity to urban centres and/or access to main roads.

The significant effect of child mortality on fertility is an important issue that is worth giving top priority in the reproductive health programs of this country. According to results of the current study, ensuring the survival of each and every child born in this county could reduce fertility at least by 25 percent (table 4). It also has the advantage of reducing maternal morbidity and mortality since frequent and too close births have non-negligible effect on the wellbeing of mothers and children.

³ Unmet need for family planning is 47.9% and 38.5% of women residing in Oromia and SNNP regions, respectively (CSA and ORC Macro, 2006).

Despite reviewing religious doctrines and their implication on fertility and fertility regulation schemes, there is also a need to assess how each religious institution addresses procreation issues at the community level. Findings of the present study indicate signals for differential fertility behaviour among Protestants and Muslims living in the rural and urban areas. High fertility norm among the Protestants is a bit surprising given the liberal position of the Church in letting the use of family planning methods and limiting family size in congruence with modern life.

Issues for policy consideration:

In the Ethiopian context, education is not yet serving as the most important mode of inter-generational status transfer in all urban areas let alone in rural localities. Rural residents are still reliant on land for their source of livelihood, and family labour is still important to produce more. As the rural economy is still based on subsistence farming, no one is interested in the cost-benefit analysis of family labour. As long as low standard of living is accepted as a norm among rural Ethiopian families, no initiatives will also be taken to reduce fertility levels with the aspiration of going through social mobility ladder. The existing family structure is also against the move towards taking measures to reduce fertility in Ethiopia. The social obligation of elders to provide financial support to their younger siblings, for example, is another factor that encourages parents to maintain large family size. A radical change in fertility could, nonetheless, occur when the new generation begins to be self supportive and kin support ceases to operate. This would definitely happen as costs of raising children increase due to changes in the prevailing economic system (i.e. monetization of the economy) that heavily demands compulsory child education for future survival. In order to change rural Ethiopian parents' perception of values of children, child schooling needs to be compulsory through time so that costs of raising children are getting higher both in rural and urban places. The Government of Ethiopia shall thus adopt and enforce the policy of compulsory primary education for all besides encouraging females to go to schools through giving incentives and awards for those who are successful in their studies at all levels.

In addition to what is mentioned above, three scenarios must be fulfilled for fertility to decline rapidly throughout the nation: (a) the drastic change of couples' reproductive behaviour; (b) abolishment of early marriage and maintenance of the minimum age at first marriage in all of the regions; and (c) expansion of efficient and effective family planning services that are available and accessible to the entire population irrespective of their residence locations and socio-economic status.

Low fertility is totally unthinkable in scenarios where the costs of rearing children are shared, access to contraceptive methods remains very difficult and the initiative to regulate fertility is neither valued nor given social recognition. Modernization may not necessarily be a mandatory or obligatory condition to bring about decline in fertility but a favourable condition to accelerate the change in fertility rates. As observed from the analysis of national and regional data sets, a single variable cannot be responsible for fertility transition. The demographic, economic and social systems should operate together to bring about radical change in fertility. Even if economic advancement is attained, the likelihood of fertility decline might be far from reality as long as the social structure is intrinsically pronatalist. For instance, clan leaders in peripheral regions such as Afar, Somali, Gambella and Benishangul Gumuz, have the power to reject any person who tries to alter the high values attached to procreation. As a result, innovative and dynamic policies aimed at curbing large family size might face difficulties of implementing the population program in the short run though it is possible in the long run.

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Annex

Fig 1A: ASFR computed using births in the five years preceding the 2000 and 2005 EDHS in urban areas and

Fig 2A: ASFR computed using births in the three years preceding the 2000 and 2005 EDHS in urban areas

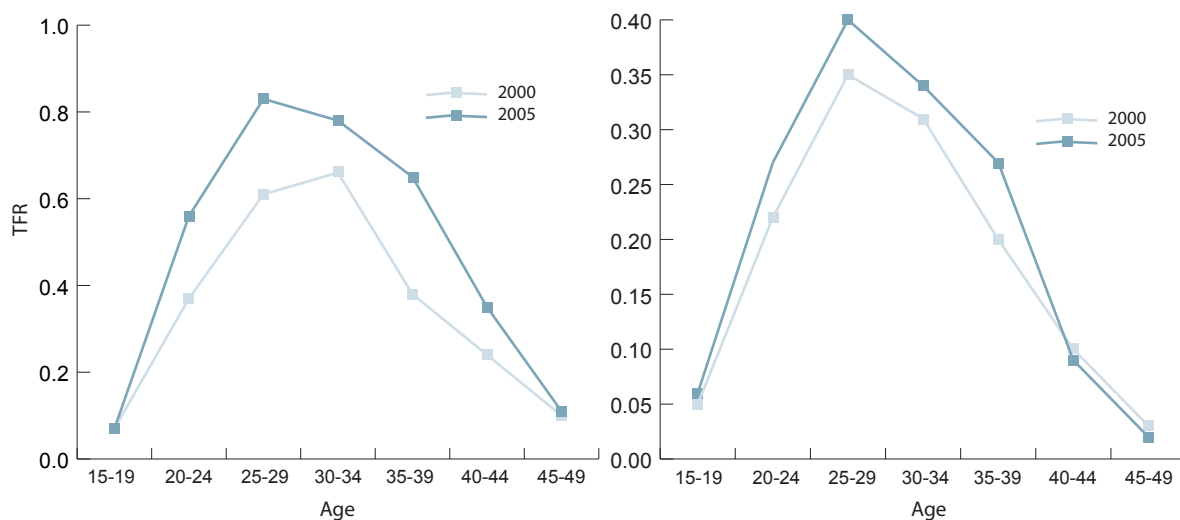


Fig 1B: ASFR computed using births in the five years preceding the 2000 and 2005 EDHS in rural areas and

Fig 2B: ASFR computed using births in the three years preceding the 2000 and 2005 EDHS in rural areas

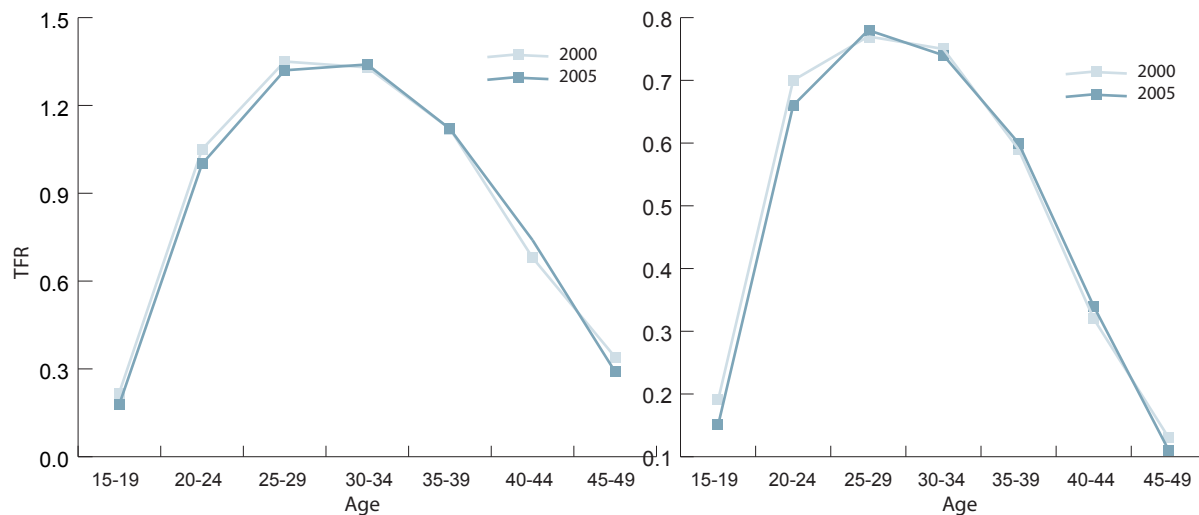


Fig 3A: ASFR computed using births in the five years preceding the 2000 and 2005 EDHS at national level and Fig 3B: ASFR computed using births in the three years preceding the 2000 and 2005 EDHS data at national level

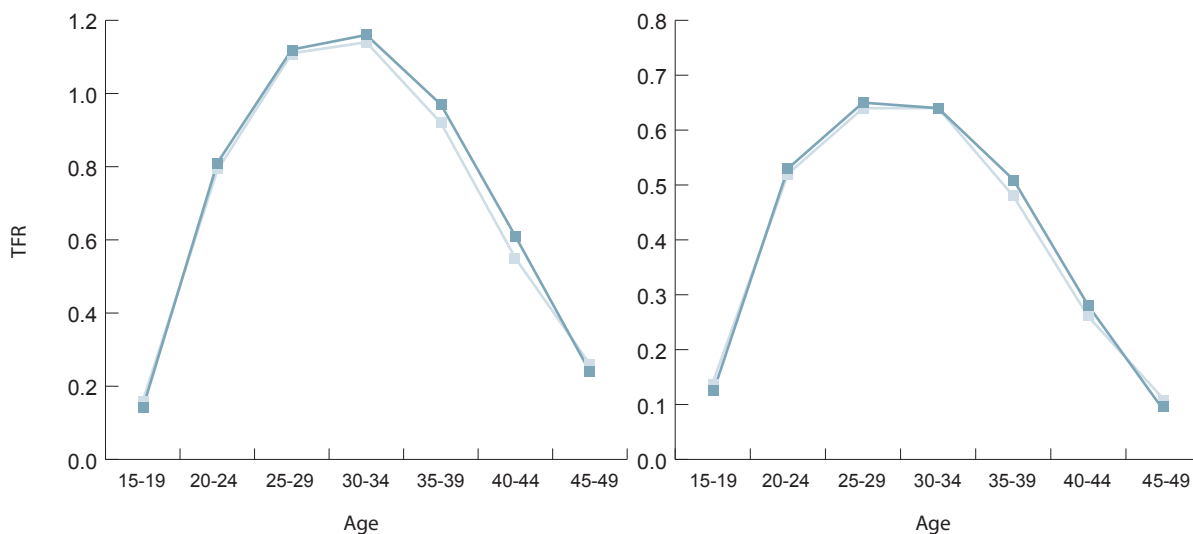


Table A1. Poisson regression analysis results predicting determinants of children ever born among currently married women, by region: EDHS 2005

Variables	Region										
	Amhara	Tigray	Afar	Oromia	Somali	Ben_Gumuz	SNNP	Gambella	Harari	Addis Ababa	Dire Dawa
Place of residence											
Rural (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Urban	0.80***	1.03	0.93	0.74***	1.00	0.82	0.92	0.96	0.75**	1.06	0.76**
Women's education											
Illiterate (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Primary	1.08*	0.96	1.23***	0.99	1.06	0.98	1.05	1.03	0.91	0.88	0.86
Secondary	0.90	0.75*	0.93	0.75***	0.88	0.68*	0.99	0.88	0.74**	0.82**	0.81**
Access to media											
No access (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Infrequent	1.01	0.97	0.90*	0.99	1.01	0.98	0.98	0.93	0.95	0.92	0.97
Frequent	1.03	0.91	0.80***	0.99	1.00	1.04	0.95	0.83*	0.88	0.85	0.76**
Women's occupation											
No work (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Agri worker	0.95	0.98	1.01	0.89***	0.64	1.00	1.05	0.80*	1.01	1.08	1.00
Non-agri worker	0.93	0.87**	1.01	0.94	1.02	0.92	0.99	0.95	0.90*	0.87**	0.92
Wealth index											

Poorest (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Poor	1.00	1.01	0.91	0.97	0.97	1.01	1.05	0.95	0.97	@	1.01
Medium	1.01	0.99	0.89	1.00	0.84	0.99	1.10*	0.87	1.06	@	1.03
Rich	1.05	1.03	0.99	0.97	1.04	0.98	1.13**	0.93	1.12	@	1.16
Richest	0.94	0.94	0.68*	0.98	0.90	1.10*	1.14**	0.78**	1.04		1.16
Child loss experience											
None (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
One child	1.52***	1.30***	1.45***	1.41***	1.40***	1.44***	1.44***	1.60***	1.53**	1.65***	1.62***
At least two	1.31***	1.17***	1.17***	1.20***	1.26***	1.15***	1.25***	1.38***	1.33***	1.42***	1.43***
Contraceptive use Never used (ref)											
Ever used	1.11***	1.04	0.96	1.13***	0.71*	1.00	1.07**	1.20**	1.18***	1.46***	1.12*
Age at first marriage											
Before 18 yrs	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18 and more	0.79**	0.79***	0.73***	0.77**	0.78***	0.74***	0.77***	0.71***	.77***	.74***	0.78***
Women's decision-making autonomy											
Low (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Medium	1.02	0.96	.992	1.02	1.06	0.99	0.99	0.96	1.09	0.94	1.06
High	1.00	0.86	.995	0.97	1.01	0.89	0.97	0.99	0.96	0.94	1.10
Age	1.29***	1.280	1.39***	1.29	1.28***	1.29***	1.29***	1.26***	1.27***	1.23***	1.28***
Age square	1.00**	1.00***	1.00***	1.00	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***	1.00***
(Intercept)	0.03***	0.03***	0.01***	0.04***	0.04***	0.03***	0.03***	0.05***	0.04**	0.09***	0.03***
Number of cases	1274	779	610	1453	501	628	1350	499	479	538	418

@ Too few cases to make reliable estimates.

NB: Religion is not controlled for there are dominance of a given religious affiliation in some of the regions.

Table A2. Logistic regression multivariate results predicting determinants of intention to limit additional child(ren) among currently married women, by region: EDHS 2005

Variables	Tigray	Afar	Amhara	Oromia	Somali	Ben-Gumuz	SNNP	Gambella	Harari	Addis Ababa	Dire Dawa
Woman's age											
15-24 (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
25-34	0.76	0.34*	0.68	1.08	1.82	1.51	1.07	0.63	1.02	0.73	1.56
35-49	3.17*	1.29	1.59	3.15***	10.11*	2.94**	2.72***	1.25	3.18**	2.65*	7.93***
Place of residence											
Rural (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Urban	1.08	0.68	3.09**	1.44	1.58	0.69	2.68**	0.57	1.25	0.52	1.07
Woman's education											
Illiterate (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Primary	0.87	1.59	0.92	0.93	0.55	1.55	0.88	1.21	1.48	0.98	1.22
Sec and above	4.78*	0.88	0.75	0.38**	0.41	0.86	0.71	1.41	0.96	0.79	1.56
Wealth index											
Poorest (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Poor	0.87	3.02**	0.92	1.34	0.62	1.20	1.11	2.69**	0.65	@	0.42
Middle	0.91	4.65***	1.14	1.37	1.28	2.54**	1.43	4.94***	0.68	@	1.39
Richer	1.07	7.12**	0.99	1.51*	1.46	1.71	1.58	4.03***	1.13	@	1.26
Richest	1.42	9.68**	0.94	1.84*	1.56	3.51**	1.47	4.71***	0.74	@	0.42
Woman's decision-making autonomy											
Low (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Medium	0.81	1.42	1.05	1.04	1.41	1.12	1.11	0.97	1.06	0.85	0.59
High	1.17	1.28	1.27	1.27	1.34	2.25*	1.49*	1.38	1.43	1.31	0.81
Age at first marriage											
Before 18 yrs (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18 years and later	0.91	1.44	0.88	0.78	0.67	0.75	0.82	0.70	0.97	0.77	0.64
Current FP use											
Not using (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Using	2.62*	6.11**	1.40	1.46	1.27	1.35	1.57*	1.48	1.04	0.87	1.24
Num of surv child											
No child	0.54	0.44	0.28***	0.18***	0.98	0.30*	0.66	0.29**	0.13***	0.05***	0.12**
One child	0.81	0.48	0.47**	0.44**	0.91	0.64	0.78	0.64	0.31**	0.17***	0.36*
Two children (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Three children	1.45	0.93	1.38	1.64**	0.72	2.22*	1.31	1.68	2.23*	1.00	1.60
Four and more	4.26*	1.33	4.57**	3.55**	1.08	3.02***	3.85*	3.00**	4.27***	3.85**	3.45**
Access to media											
No access (ref)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Infrequent access	0.95	1.08	1.18	1.26	0.44	1.08	1.16	1.22	1.03	0.76	0.59
Frequent access	0.58	0.30*	0.91	1.23	1.44	1.61	0.78	0.60	1.25	0.78	1.13
Constant	.09***	.11**	0.48**	0.24***	0.02***	0.13***	0.14***	0.28***	0.24*	.23**	0.53
Number of cases	798	616	1295	1468	508	632	1366	511	486	544	420

@ Too few cases to make reliable estimates.

NB: Religion is not controlled for there is dominance of a given religious affiliation in some of the regions.

