

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

LEVELS AND DETERMINANTS OF FERTILITY IN ADDIS ABABA

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Levels and Determinants of Fertility in
Addis Ababa

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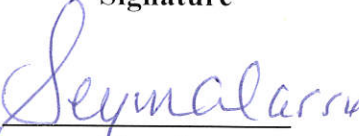
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DEDICATION

This piecework is dedicated to my mother W/o Taitu Haile for her encouragement, love and prayers to reach this goal.

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I wish to express my sincere gratitude to my sponsor, Disaster Prevention and Preparedness Commission (DPPC) for sponsoring my study, which would be undoubtedly impossible otherwise.

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ABSTRACT

Addis Ababa, the capital city and the most urbanized center in Ethiopia, has experienced a TFR level of 1.8 births per woman in the year 1994 that never experienced by any other city of developing country. As such an attempt is made by CSA to investigate the real level of fertility and it is reported that the plausible estimate of TFR for Addis Ababa for 1994 was 2.14 births per woman. The present thesis is therefore designed to (i) re-estimate the levels of fertility for Addis Ababa for the recent past using appropriate indirect techniques and to reconfirm the fertility decline reported by CSA; and (ii) determine the important demographic, socio-economic and proximate determinants of fertility for a change in fertility of Addis Ababa during the 1990 and 1995.

The study uses the data on fertility of 1990 NFFS and 1995 FSOUAA, conducted by CSA. The study concludes that the estimate made by CSA of 2.14 births per woman is quite acceptable. The present study provided a plausible estimate of 2.2 births per woman as an alternative estimate of TFR for the period of 1989-94. This estimate is arrived at using Rele's (1987) refined methodology. The study also provided a time series of TFRs, model ASFRs, starting from 1974-79 to 1998.

The study is said to be unique in the sense that for the first time an attempt is made in this thesis to provide Bongaarts indices, indirectly, for the time periods of 1974-79, 1979-84, 1984-89, 1989-94 and also for 1998, for Addis Ababa, from the simple information on TFRs. Further using the index values it is successfully shown that fertility has declined overtime to a great extent mainly due to the affect of marriage followed by a less extent of contraceptive use.

The study finally concludes that although marriage pattern is playing a great role in the decline of fertility of the recent past, the role played by contraceptive use cannot be neglected. However, as its impact is observed to be low when compared to the impact of marriage, it is recommended to improve the effect of contraceptives by means of advising women in reproductive ages to use contraceptives to limit births, instead of postponing further. The study also recommends making use of services of the voluntary organizations for demographic causes, such as reducing mortality.

CHAPTER ONE

INTRODUCTION

1.1 Statement of the Problem

Among the major regions in the world, fertility in sub-Saharan Africa remains the highest. However, a study made by Kirk and Pillet (1998:17) concludes “an assessment of fertility trends has uncovered evidence of an initial fertility decline in two-thirds of the countries of sub-Saharan Africa that had conducted a DHS before mid-1995.”

Although it is evident that, the countries in Europe experienced a decline in their fertility mainly due to a wide variety of socioeconomic conditions, it is not clear whether the same socioeconomic development lead to a faster decline of fertility in Latin America during 1950s to 1970s. It is however, seen that the fertility declines in the present developing countries of Asia and Africa is being characterized by “an active role of many governments and non-governmental organizations in promoting family planning, and the recent availability of efficient methods of contraception.” (Kirk and Pillet, 1998:8).

Like other developing countries, in Ethiopia also non-governmental organizations (NGOs) played a pivotal role in the drafting of the national population policy. The National Office of Population stresses the need of NGOs involvement by stating that “Involving non-governmental organization in reaching the lowest and remotest strata of society is indispensable for the effective and meaningful implementation of the National Population Policy of Ethiopia.” (NOP, 1998:3).

The active involvement of the present government and several national and international NGOs in promoting the population policy, especially Family Planning /

Reproductive Health (FP/RH) issues in the recent past must have played a great role in an increase of the contraceptive prevalence rate. As a result, a decline in the fertility rates of the nation, especially of the urban areas with a great extent is observed. Thus, it is of interest to study the relative role of contraception for a fertility decline in the urban area of Addis Ababa, where contraceptive prevalence is observed to be very high in the recent past.

Ethiopia adopted a population policy for the first time in April 1993. When the population policy was adopted the contraceptive prevalence rate was only 4%; total fertility rate was almost eight children per woman. However, Negussie (1999:5-6) states that “in the area of reproductive health/family planning tangible results have been obtained since the adoption of the policy. The CPR has now increased to almost 10% in Ethiopia as a whole. The TFR of Ethiopia is gone down to 6.4% (from 7.7%)”.

Family Guidance Association of Ethiopia (FGAE) is the only NGO that has been involved in population activities of Ethiopia for more than 30 years and played a crucial role in the implementation of the national policy since 1993. According to the National Office of Population (NOP) (1999:41) now there are “a number of International and local NGOs in Ethiopia that complement government efforts in the implementation of the National Population Policy and programme of Action of the International Conference on Population and Development (ICPD).”

Recent censuses clearly shows that Ethiopia, the third populous country in Africa has also experienced a decline in its fertility from 1984 to 1994. The declines are observed to be much higher in urban areas as compared to the rural areas (Sisay, 1998). For instance, fertility in Ethiopia as a whole declined by 10.4 percent from 7.52 births per woman in 1984 to 6.74 births per woman in 1994. During 1984 and 1994, the urban fertility declined by 29 percent from a level of 6.33 to a level of 4.50. Fertility of rural areas declined by only 11

percent from a level of 8.08 to a level of 7.19. Thus, fertility not only seems to be varied from urban to rural areas but also seems to have declined significantly in urban areas compared to rural areas.

Sisay (1998:23) observes that “one of the possible reasons, among others, is the significant rise in contraceptive use in urban areas. For instance, in Addis Ababa, contraceptive use among married women of reproductive age (15-49 years) increased from 32.8 per cent in 1990 to 41.6 per cent in 1995. Data from the Ministry of Health indicates that between 1990 and 1997, the contraceptive prevalence rate in Ethiopia increased by more than one-half, rising from 4.4 per cent to 9.8 per cent.” Furthermore, adjusted fertility estimates from the 1994 census result shows high variation by region, from 2.14 in Addis Ababa to 7.26 in Oromiya.

Thus, the crux of the problem here that the level fertility of Addis Ababa is very low in the nation and also for a city in a developing countries according to CSA. Hence, it is of interest to study its levels in the recent past and to investigate its determinants for observed levels of fertility.

1.2 Review of relevant literature

This section presents a review of the relevant literature on the background variables and the proximate variables considered for the present study.

1.2.1 Education

Education had been found to be an important socio-cultural factor in determining fertility. Increased level of education is hypothesized to have inverse relation with fertility. It

affects fertility by increasing age at first marriage and by changing the attitude of a person to ignore traditions favoring large family size (CSA, 1993). In most parts of the world, the role of education in fertility decline is highly significant. For instance, in Botswana and Zimbabwe significant decline of fertility took place mainly due to the better education distribution (Thomas & Muvandi, 1994).

1.2.2 Child Mortality

Infant and child mortality is observed to be one of the important factors that affect fertility. Mortality can increase fertility in three ways. First, there is biological effect exercised through the cutting off lactation and consequently shortening of birth interval to the following child. Secondly, there may be replacement effect to the child that has died. Thirdly, a conscious protection or insurance effect may operate; whereby women will have more children in areas of high mortality because they expect that some of their children will die (WFS, 1983:12).

1.2.3 Work Status

The female labour force participation has also certain influence on fertility. It is commonly hypothesized that the female labour participation has negative impact on fertility (Yohannes, 1994:21; Betemariam 1991:15). The relationship is shown convincingly in the developed countries (Kasarda, 1986 as cited in Betemariam, 1991:15). However, the evidence from developing countries regarding female labour force participation on fertility is rather inconclusive (Rodrigues and Cleland, 1990 cited in Yohannes 1994:22). For instance, in

Addis Ababa, Alemseghed (1989) had found no fertility differences between the fertility of women who are employed and those who are not. One of the possible reasons especially in Africa and other developing countries is that the opportunity cost of children is so low (Yohannes, 1994:22). Many families have other household members such as sisters grandmothers and older children, who can assist them in child caring.

1.2.4 Migration Status

Theoretically, migration has disruptive effect on fertility. The extent of migrants and non-migrants differential will also vary by duration of residence since, whatever disruptive effects migration may have, it is likely to dissipate over time (Goldstein and Goldstein 1982:134). In a study made by Oberai and Singh (1983) on Punjab State of India, it is found that urban natives have lower fertility than urban migrants. Ekanem (1982) study on Nigeria also states that urban migrants have higher fertility than the natives.

1.2.5 Ethnicity

Since ethnicity is related to culture, there are some ethnic groups, which favor high family size as prestige. In Ethiopia, for instance, Amhara women have lower fertility as compared with others (Yohannes, 1994; CSA, 1993). In the 1990 National Family and Fertility Survey, it is also observed that among the ethnic groups considered, the Sidama women were the most fertile followed by Welayta, Gedeo, Oromo, Hadiya, Kembata and Gurage (CSA, 1993:144). In Addis Ababa, Abdulahi (1988) has found out that, the Gurage have the highest fertility followed by the Tigre, Oromo and Amhara. Seyoum (1990) has also

showed Dorze ethnic has highest fertility followed by Hadere, Welayita and Gurage respectively. Thus, ethnicity would have some effect on fertility.

1.2.6 Religion

The differences between religious groups in their norms and beliefs regarding procreation may have an influence on fertility behavior. For instance, there has been a rejection of any artificial interference in the natural process of conception and birth by most pronatalist religions. Catholic is well known in this regard that any attempt to use contraception is sinful and condemned by its followers. According to Kammeyer and Ginn (1986) Catholics have had higher fertility rates than Protestants and Jews. In case of Ethiopia, according to Abdulahli (1988), Muslims have higher fertility than Christians.

1.2.7 Marriage

Nuptiality is one of the important proximate determinants of fertility. Various studies show that fertility tends to be high in those populations where marriage is early and universal. Conversely, fertility tends to be low in those populations marriage is late. In these populations proportion of women remaining single at the end of their reproductive years is observed to be high. In Ethiopia marriage has been early and universal, by age 30 over 95 percent of all women are found to be ever married, which indicates the fact that fertility is very high (Assefa 1992:8).

1.2.8 Contraception

Several studies show that fertility tends to be low where contraception use is very high. Kirk and Pillet (1998:17) in their study of fertility levels, trends and differentials in sub-Saharan Africa conclude that “ A comparison of the proximate determinants of fertility between the countries where the fertility transition is more advanced and those where it is delayed indicates that contraceptive use is by far the most important factor accounting for cross-country differences.” Kizito et al. (1991:19) in their study of fertility transition in Kenya also conclude, “contraceptive use was the most important determinant of aggregate fertility decline.”

1.2.9 Postpartum Infecundability

Another proximate determinant of fertility is duration of postpartum infecundability. This is the duration immediately following childbirth during which a woman remains infecund until normal pattern of ovulation is restored. The duration is affected by the duration of breast-feeding and postpartum abstinence. Breast-feeding has important contraceptive effect by increasing ovulatory interval. This effect is usually known as lactation infecundability or lactational amenorrhoea. The length of lactation period is extended depending on the intensity and frequency of breast-feeding. The contribution of Breast-feeding in reducing fertility is recognized as one of the main determinants of fertility (Bongaarts, 1978).

However, as modernization and education increase, the prolonged breast-feeding is less practiced. According to the WFS report, there is a sharp decline in length of lactation

among mothers with seven or more years of schooling, but the difference between those with no schooling, one to three years and four to six years is often more modest (WFS, 1983:5). In general, breast-feeding practices can serve efficiently as family planning program by lengthening the duration of lactational amenorrhoea.

1.2.10 Induced Abortion

According to Bongaarts (1978) induced abortion is also considered to be one of the important inhibitors of fertility. However, in Ethiopia induced abortion is very rare because of its disapproval by the culture of the community at large. These days the use of induced abortion is becoming increasingly common in urban areas as some studies show. However, it is less likely to get accurate and complete information about it.

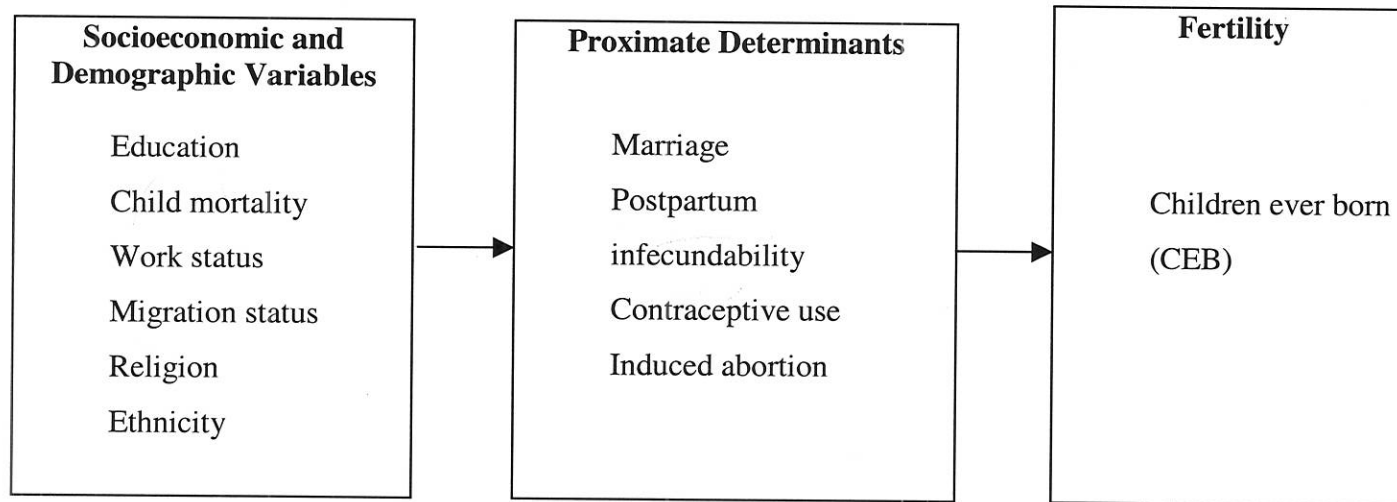
1.3 The Conceptual Framework

A number of studies made in the past clearly show that fertility is affected by various biological, behavioral, socio-economic, cultural and other factors. Davis and Blake (1956) for the first time developed a macro-level theoretical framework that shows the interrelationship between socio-economic variables, biological and behavioral factors or the proximate determinants of fertility. According to Davis and Blake (1956) any social, economic, or cultural factor must operate through one or more of these biological and behavioral variables in order to act upon fertility. Bongaarts (1978) developed a simple mathematical model to quantify the effect of the key proximate determinants that have direct influence on fertility. Bongaarts and Potter (1983) further showed that 96 percent of the variation in fertility can be

explained by the four variables namely marriage, contraception, induced abortion and postpartum infecundability.

The theoretical framework used in the present study, given in Figure I below, is proposed based on the studies made by Davis and Blake (1956) and Bongaarts (1978). It is shown in the figure that socio-economic and other factors affect the ultimate dependent variable fertility only and only through the proximate determinants of fertility. The Figure further shows the list of socio-economic, demographic variables; and the proximate determinants considered in the present thesis. Selection of the proximate and the socio-economic, etc., variables for the present study for the two time periods of 1990 and 1995 is made based on the data availability for the two time periods and also based on the review of the literature presented in the previous section.

Figure I. A theoretical Framework showing selected socioeconomic, demographic variables and proximate determinants affecting fertility



1.4 Objectives of The Study

1.4.1 General objectives

The general objective of the present study is to reestablish the fact that fertility has really declined to the lowest level in Addis Ababa in the recent past. And further to find out the most important factors responsible for the change in fertility of Addis Ababa during the period 1990 as well as 1995.

1.4.2 Specific Objectives

- 1) To estimate the levels of fertility for Addis Ababa for the recent past using appropriate indirect techniques and to reconfirm the fertility decline reported by CSA;
- 2) To determine the important demographic, socio-economic and proximate determinants of fertility for a change in fertility of Addis Ababa during the 1990 and 1995. And further to see whether there is a change in the importance of the variables over from 1990 to 1995.

1.5 Hypotheses

Based on the review of the literature and the objectives stated above, the following hypotheses may be tested:

1. The increased level of contraception has an inverse relationship with fertility.
2. With increase in age at marriage there would be a decline in fertility.

1.6 Significance of the Study

The 1994 population and housing census result revealed that the reported level of fertility TFR of urban Addis Ababa was 1.8 children per woman (CSA, 1999:195). This level of fertility was considered to be very low for any city in any developing country. Consequently, attempts were made by CSA to reestablish the fact that fertility has declined to the lowest level by estimating TFR by indirect techniques using children ever born (CEB). Further, studies made in the recent past claim that use of contraception has played a major role in the decline of fertility of Addis Ababa to the lowest levels ever observed in a city of a developing country.

The present study gains its importance since an attempt would be made

- (i) to reestablish the fact that fertility has declined genuinely, by means of applying indirect techniques to estimate fertility indirectly using the age-sex distribution of population, which is not yet attempted by CSA;
- (ii) to understand the important factors that are responsible for a decline in fertility of Addis Ababa by means of applying sophisticated statistical techniques to the data

provided by the CSA, which is not yet attempted neither by CSA nor by any other researcher. Additionally, it provides useful information about the levels trends as well as determinants of fertility and also could initiate further research using time series data to understand the subject thoroughly.

Therefore, the findings of this study have a great importance from policy point of view and in understanding the fertility changes that are taking place in the other similar urban centers in Ethiopia.

1.7 Organization of the study

The present thesis consists of seven chapters. Chapter one is intended to give an idea about the statement of the problem, a review of relevant literature, the conceptual frame work, objectives and hypotheses of the study, significance and organization of the study. Chapter two presents the data and its quality and a brief overview of methods of analysis used in the present study. Chapter three deals with the profile of Addis Ababa, the study area; and the background characteristics of the study population.

Chapter four presents the levels and trends in fertility of urban Addis Ababa obtained by applying Rele's refined estimation procedure and the model estimates of ASFRs arrived at from the Arriaga's model ASFRs. Chapter five presents the differentials in fertility of urban Addis Ababa. Chapter six, the main chapter in the thesis, presents the socio-economic determinants of fertility and the indirect estimation of the proximate determinants of fertility. The final chapter seven is intended for the summary of the main findings and conclusions of the study. This chapter also presents the policy recommendations.

CHAPTER TWO

DATA AND METHODS

2.1 Sources of data

The study mainly uses data derived from two surveys (i) 'The 1990 National Family and Fertility Survey' (NFFS) (CSA, 1993) and (ii) the 'Fertility Survey of Urban Addis Ababa-1995'. (FSOUAA) (CSA, 1997). Both surveys were conducted by the Central Statistical Authority and are sufficiently similar to construct comparable variables that can be used to study the determinants of fertility for the two time points of 1990 and 1995. Some technical details of the above surveys are provided in the following section.

2.2 Design of the Surveys

2.2.1 The 1990 National Family and Fertility Survey

This survey was conducted in the year 1990 and according to CSA (1993:5) it was the "first of a series of similar surveys to be conducted at regular intervals of five years." The main objectives of the survey were: (i) to obtain reliable information on the current level of fertility, mortality and contraceptive use", and "(ii) to collect information on variations in fertility, infant / child mortality and contraceptive use by geographical domain, socio-economic status and other characteristics. The survey divided the country into two urban and six rural domains and it utilized 'a multi-stage stratified design and self-weighting within domains.'" (CSA, 1993). However, the survey initially planned to interview 14,680 women

aged 15-49, but finally interviewed only 9,104 eligible women due to several reasons. In the case of Addis Ababa, the urban domain I, the survey planned to cover 2150 eligible women, but only 1551 eligible women were interviewed.

2.2.2. The 1995 Fertility Survey of Urban Addis Ababa

This survey was conducted in 1995 and its main objective was to evaluate the results of 1994 Population and Housing Census. According to CSA (1997:2), the specific objectives were “ (i) to determine a plausible level of fertility for Urban Addis Ababa; (ii) to gauge the effect of the various proximate determinants of fertility.” The survey design adopted was a two-stage stratified sample design. While Weredas were used as strata, enumeration areas were used as primary sampling units. Here also the ultimate sampling unit was the conventional household. The survey interviewed 2,339 women in their reproductive ages and used a woman’s questionnaire for this purpose.

While both surveys are basically fertility surveys one was conducted at the national level and the other was conducted only for the city of Addis Ababa. It is to be noted that in the NFFS, Addis Ababa was considered as one urban domain, as such it facilitated the present study.

2.3 Data quality

In this section an attempt is made to evaluate the quality of data collected in the two surveys of NFFS and FSOUAA. As the estimates of fertility and mortality are seriously

affected by the misreporting of information on age of women 15-49 years, births and deaths records, it is therefore very essential to assess the data quality of these three variables.

2.3.1 Evaluation of age data

We may evaluate the age data by using the following ways: (i) examine the distribution of women by single years of age; (ii) compute and study the Myer's summary index values that gives the extent of digit preference or non-preference of each of the digits between 0 and 9. For convenience single year age distribution of women for ages 15-49 years of both 1990 NFFS and 1995 FSOUAA are presented in Table 2.1 and the percentage distribution of women aged 15-49 by single years of age, for 1990 and 1995 are graphed and given in Figure 2.1

Whenever there is no age misreporting, and abnormal migration and mortality, it is expected that the age distribution of the population under consideration decrease smoothly as age increases. On the other hand, Myers' index value ranges between 0 and 90 which indicate that the higher the quality of age data, the lower value of Myers' index.

Table 2.1 Single years age distribution of women aged 15-49 years, urban Addis Ababa, 1990 and 1995.

Age group	1990		1995	
	Number	Percent	Number	Percent
15	54	3.5	115	4.9
16	100	6.4	132	5.7
17	76	4.9	114	4.9
18	108	7.0	190	8.1
19	78	5.0	116	5.0
20	88	5.7	120	5.1
21	39	2.5	101	4.3
22	59	3.8	110	4.7
23	47	3.0	92	3.9
24	54	3.5	71	3.0
25	66	4.3	102	4.4
26	34	2.2	59	2.5
27	30	1.9	77	3.3
28	74	4.8	64	2.7
29	23	1.5	54	2.3
30	73	4.7	77	3.3
31	21	1.4	36	1.5
32	46	3.0	49	2.1
33	33	2.1	54	2.3
34	39	2.5	59	2.5
35	83	5.4	68	2.9
36	28	1.8	38	1.6
37	29	1.9	55	2.4
38	44	2.8	70	3.0
39	19	1.2	43	1.8
40	62	4.0	51	2.2
41	6	0.4	28	1.2
42	31	2.0	33	1.4
43	12	0.8	19	0.8
44	7	0.5	26	1.1
45	32	2.1	47	2.0
46	11	0.7	23	1.0
47	17	1.1	19	0.8
48	22	1.4	14	0.6
49	6	0.4	10	0.4
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

Table 2.2 Myers' Index of Terminal Digit Preference for the Study Population aged 20-49, urban Addis Ababa, 1990 and 1995

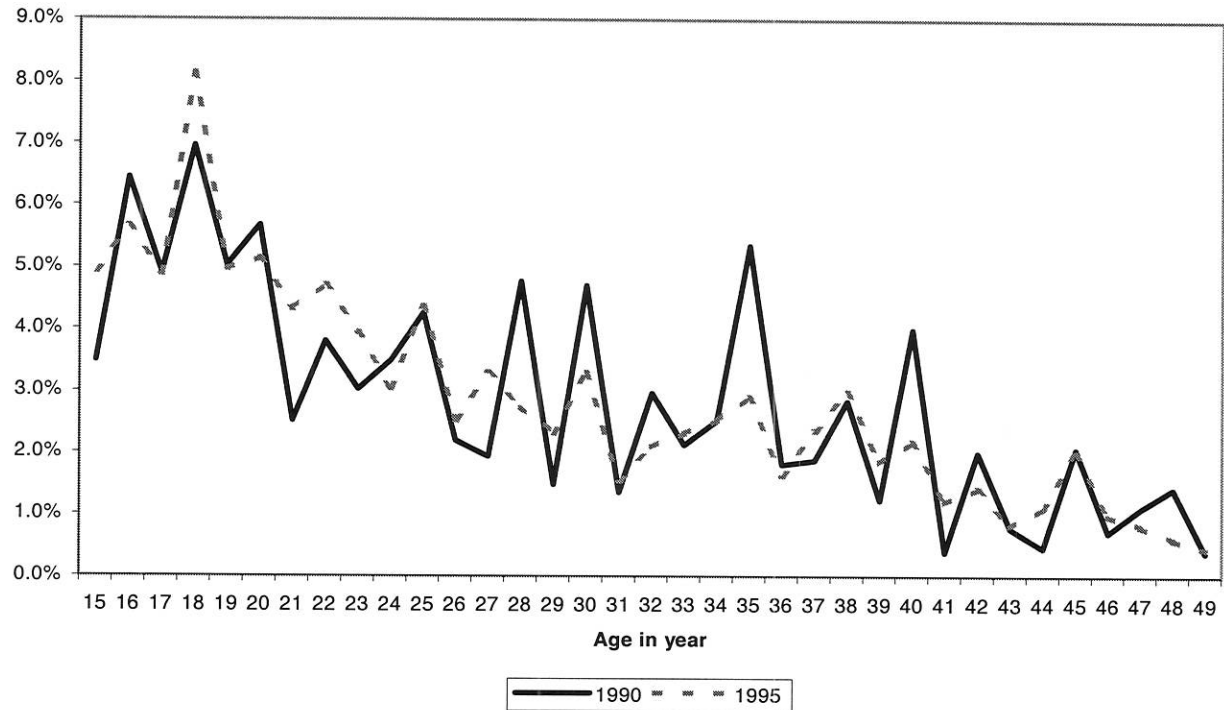
Digit	1990	1995
	Deviation from 10	Deviation from 10
0	6.4	1.4
1	-6.0	-3.2
2	0.8	-0.7
3	-2.7	-1.1
4	-1.7	-0.2
5	7.6	4.3
6	-2.8	1.7
7	-2.0	1.0
8	5.1	-1.5
9	-4.5	1.3
Summary index	19.9	8.2

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

Table 2.2 presents the Myers' summary index of terminal digit preference for women aged 20-49 for 1990 NFFS and 1995 FSOUAA surveys. The important conclusions that can be drawn from Table 2.1, Figure 2.1 and Table 2.2 are as follows:

- (i) The quality of age data reported in 1995 FSOUAA, is far better when compared with the 1990 NFFS reported age data. The low value of Myers' index noted for 1995 FSOUAA when compared with that of 1990 NFFS the quality of age data has improved.
- (ii) Single year age distribution data for both 1990 and 1995 surveys gives the indication that age data is certainly distorted by the digit preferences. Age heaping can be clearly seen at ages ending in digits of 0, 5 and 8 in both 1990 and 1995 surveys (see Table 2.2).

Figure 2.1 Single age distribution of women aged 15-49 in 1990 NFFS and 1990 FS



2.3.2 Evaluation of fertility data

Examination of mean parities for women aged 15-49 may give an idea about the quality of retrospective data. Total number of children a woman actually had may be under reported due to recall lapse. If there is no omission of children, mean parities are expected to increase with the increasing age of women. Table 2.3 clearly reveals that there is an increase in the mean parity values of both 1990 and 1995 surveys with an increase in age of women.

Table 2.3 Mean number of children ever born (MNCEB) of women aged 15-49 by five year age group.

Age group	1990 NFFS	1995 FS
15-19	0.0409	0.0300
20-24	0.6132	0.2773
25-29	2.0000	1.3792
30-34	3.7264	3.0109
35-39	4.2857	4.2993
40-44	5.1525	4.9873
45-49	5.7273	5.8761
Total	2.2044	1.7556
Total cases	1551	2336

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

2.3.3 Evaluation of mortality data

One way of evaluating the quality of mortality data reported in surveys is by examining the sex-ratio of children ever born (CEB) and the proportion of children dead, by mothers' age group. The calculated values of the above two indicators are given in Table 2.4 for both 1990 and 1995 surveys. The sex-ratios of CEB are expected to be within 102 to 107 range and the proportion of dead children are expected to increase with an increase in the age of mother. Deviation from the above-expected trend may indicate the effect of sampling error,

omission of children dead or age shifting of mothers from one age groups to another. An observation of Table 2.4 shows that the age specific sex ratio of CEB, both 1990 and 1995 data look erratic. Regarding, the proportion of dead children, the quality of data reporting looks to be better in 1995 as compared with 1990. However, one may notice an unusual decline in proportion dead children of 30-34 age group in 1995. The overall impression is that there seems to be an improvement in the quality of data of 1995 survey when compared with the 1990 survey.

Table 2.4 Sex ratio: (Males per 100 females) of Children Ever Born (CEB) and proportion dead children by five-year age group of women, urban Addis Ababa, 1990 and 1995

Age group	Sex ratio of CEB		Proportion dead children	
	1990	1995	1990	1995
15-19	112.5	66.7	0.117	0.050
20-24	120.0	110.8	0.068	0.080
25-29	93.2	98.0	0.066	0.108
30-34	117.6	110.2	0.090	0.083
35-39	116.9	97.3	0.101	0.111
40-44	104.0	89.1	0.143	0.157
45-49	102.4	101.8	0.200	0.169
Total	103.4	99.2		

Source: Computed by the author from the 1990 NFES and 1995 FS data of Addis Ababa.

2.4 Methods of analysis

As explained in the above section as a first step the data on single years of age, fertility and mortality were put to different tests for verifying their quality. Rele's refined methodology (see Rele, 1987) is used in estimating the total fertility rates (TFR) for the time periods of 1974-79, 1979-84, 1984-89 and 1989-94. This indirect method of estimating fertility level requires only information on child-women ratios and a rough estimate of life expectancy to the time periods mentioned above. This technique will provide series of

estimates of fertility level using population structure, which is different approach to that of CSA in deriving plausible estimate of fertility level for urban Addis Ababa. Thus, it is felt that this is an appropriate technique for arriving at a plausible estimate of TFR. Further when the age-sex distribution of the population is available for at least two census periods Rele's method succeeds in providing a time series of plausible estimates of TFR or any other fertility measure such as crude birth rate (CBR) and Gross reproductive rate (GRR).

As age, as well as other socio-economic, demographic and cultural variables affects the fertility level of any society, an attempt is also made to test the effect of these variables on fertility (children ever born) per ever married women using the bivariate analysis. The techniques of multiple classification analysis (MCA) and the ANOVA test is also used to find the significance of the background variables considered in explain variation between groups. In the MCA analysis age is taken as the covariate.

An application of multiple regression analysis is also applied to understand the affect of each of the background variables, by controlling other variables, on fertility (children ever born) for ever-married women. Various multivariate techniques can be used in understanding the affect of the independent variables on fertility. However, for this purpose, since the dependent variable (CEB) is continuous and the independent variables are both categorical and interval scale, Ordinary Least Square (OLS) regression technique is appropriate in the present study.

Finally, in order to understand the affect of proximate variables on fertility, an attempt is made in the thesis to derive indirectly the proximate variables that affect fertility namely the index of marriage (C_m), the index of contraception (C_c) and the index of postpartum infecundability (C_i) from the only information on TFRs. As a first step after deriving the TFRs from the application of the Rele's method to the child women ratio age-sex data of

1984 and 1994 censuses, a set of model ASFRs corresponding to the TFRs arrived at by Rele's method are derived from the application of Arriaga's model (Bogue, 1993). These ASFRs are then utilized to arrive at the childbearing indices of age at first birth (AFB), age at last birth (ALB) and the reproductive life span (RLS) using the life table technique suggested by Murthy (1996).

Finally, using the childbearing indices and the procedure suggested by El-Khorazaty (1992), the proximate determinants of fertility are obtained. Thus from the simple information of TFRs an attempt is made in this thesis to derive the proximate determinants of fertility for urban Addis Ababa for the time periods of 1974-79, 1979-84, 1984-89, 1989-94 and also for the 1998. Further, an attempt is also made to study the effect of the proximate determinants on the decline of TFR from 1974-79 to 1998 of urban Addis Ababa based on the simple procedure provided by El-Khorazaty (1992). The procedure suggested by El-Khorazaty corresponds the child-bearing indices with the Bongaarts indices for an understanding of the effect of proximate variables on the fertility variable TFR. Thus the present thesis uses a number of multivariate and indirect techniques in understanding the fertility levels and determinants of urban Addis Ababa over time.

2.5 Limitations of the data

The quality of age data has improved from 1990 to 1995 survey, however, the fertility and mortality data seems to be affected by data reporting error.

CHAPTER THREE

A PROFILE OF ADDIS ABABA AND CHARACTERISTICS OF THE STUDY POPULATION

3.1 A profile of Addis Ababa

Addis Ababa is the capital of the nation and largest metropolitan center a little more than a century old. The city, located at the heart of the country, was founded in 1880 by Emperor Menelik II on the top of Entoto mountain and latter moved down to Finfine (current center of the city) in 1987 (CSA 1979:1).

Geographically, Addis Ababa lies 9.02 degrees latitude north of the equator and 38.04 degrees longitude east of the Greenwich. The city has an altitude of 2408-meters above sea level, which ranges from 3000 meter at its head Entoto to 2200 meters at its foot (CSA, 1979:1). The climate of the city ranges from an average maximum of 21.7 to a minimum of 10.7 degrees centigrade.

The demographic data collection in Addis Ababa has a history of four decades in the country in general, and in the capital in particular, with the establishment of the Central Statistical Office (CSO) in 1960 (CSA, 1993). The first census was made in 1961 followed by 1967, 1984, 1994 censuses. Besides, between 1967 and 1984 two important surveys, the Addis Ababa Manpower and Housing Sample Survey (CSA, 1976) and the Demographic Sample Survey of Addis Ababa (CSA, 1979) were also undertaken. In the recent past CSA has also conducted two important surveys namely, the 1990 national Family and Fertility Survey (CSA, 1993) and 1995 urban Addis Ababa fertility survey (CSA, 1997). As a result,

Addis Ababa has relatively abundant demographic information as compared with any other urban center in the nation.

The population size has grown from 443,728 in 1961, 683,530 in 1967, 1,167,315 in 1978, to 1,423,111 in 1984 (CSA, 1999:5) with growth rates of 7.2, 4.9, 3.3 and 3.95 percent between 1961-1967, 1967-1978, 1978-1984, and 1984-1994 respectively. The population of Addis Ababa according to the 1994 census was 2,112,737 (CSA, 1999). Specially, the growth rate between 1984 and 1994 (3.95%) was considered very much higher than the national one (2.9%). Thus, the population has increased by 689,626, which is 48.5 percent of the population in 1984. Such population increase was attributable to reclassification / boundary changes, natural increase and internal migration. In the past, migrants consistently dominated the proportion of population in Addis Ababa until 1984. However, by 1994 the contribution of non-migrants has grown up to 53.3 percent as compared to 46.4 percent of migrants (CSA, 1999:161).

About 93 percent of the population are belonging to four ethnic groups namely Amhara (48.3%), Oromo (19.6%), Gurage (17.5%) and Tigraways (7.7%) (CSA, 1999). The 1994 census reports the religious composition of the population as Orthodox Christian (82%), Catholic and Protestant (4.7%) and Muslim (12.7%). Regarding the marriage pattern of the population it is unique where the proportion of single is dominant, more than half (60.3%) of age 10 and over were single followed by 29.4 percent married and the remaining 10 % are divorced and widowed (CSA, 1999:23). In Addis Ababa the life expectancy of both sexes is observed to be 63.3 year in 1984 while it declined by five years in 1994 census.

With regard to the other socio-economic characteristics, for instance the CSA (CSA, 1997:1) shows that unemployment of youth less than age 30 years constitutes 75 percent of total unemployment in the city (CSA, 1997:1). The pattern of education, based on the 1994

census show that more than 80 % of the population have been exposed to formal education (CSA, 1999:50).

3.2. Demographic, Socio-economic and Cultural characteristics of the respondents

A profile of the urban Addis Ababa with respect to the demographic, cultural, socio-economic characteristics of women of reproductive ages interviewed successfully in the two surveys of 1990 NFFS and 1995 FSOUAA is presented in this section. A study of the background characteristics of the women aged 15-49 is important as they are expected to have an effect on fertility, mortality and migration of the individual women under study.

3.2.1 Age distribution

The age distribution of women aged 15-49 by age group in the 1990 NFFS and 1995 FSOUAA is presented in table 3.2.1. As expected with an increasing age there is a decrease in the number of women. Further, it is observed that there is an increase in the proportion of women in the age group 15-19, 20-24 and 25-29 of the 1995 FSOUAA when compared with the 1990 NFFS.

Table 3.2.1 Five year age distribution of respondents, Urban Addis Ababa, 1990 and 1995

Women age	1990		1995	
	Number	Percent	Number	Percent
15-19	416	26.82	667	28.55
20-24	287	18.50	494	21.15
25-29	227	14.64	356	15.24
30-34	212	13.67	275	11.77
35-39	203	13.09	274	11.73
40-44	118	7.61	157	6.72
45-49	88	5.67	113	4.84
Total	1551	100.00	2336	100.00

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa

3.2.2 Ethnicity

Table 3.2.2 gives the distribution of respondents by their ethnic background. The table reveals that the city of Addis Ababa is dominated with four major ethnic groups of Amara, Oromo, Gurage, and Tigraway. Both in 1990 and 1995 surveys Amara constitute the single largest group. While Oromo occupy the second position, Gurages and Tigraways occupy the third and fourth position respectively. According to their percentage distribution the rank order of the ethnicity remains the same both in 1990 and 1995 surveys.

Table 3.2.2 Distributions of respondents by ethnicity, Urban Addis Ababa, 1990 and 1995

Ethnicity	1990		1995	
	Number	Percent	Number	Percent
Amhara	877	56.5	1218	52.1
Oromo	300	19.3	427	18.3
Gurage	164	10.6	400	17.1
Tigraway	154	9.9	212	9.1
Others	56	3.6	79	3.4
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.3 Religion

The religious composition of the women aged 15-49 interviewed in both the 1990 and 1995 surveys is given in Table 3.2.3. It reveals that the majority of women are Orthodox Christians, followed by Muslims and other Christians (protestant and Catholics). Only half of one percent of total respondents in the sample constitutes the category of “other religion” which includes other religion and Atheist. Virtually, there is no difference in the percent distribution of the religious composition of the population from 1990 and 1995 survey period. However, Orthodox Christians are over represented in the samples of both 1990 and 1995 surveys.

Table 3.2.3 Distributions of respondents by religious affiliation, urban Addis Ababa, 1990 and 1995

Religion	1990		1995	
	Number	Percent	Number	Percent
Orthodox Christian	1351	87.1	1984	84.9
Other Christians	95	6.1	160	6.8
Muslim	97	6.3	180	7.7
Other	8	0.5	12	0.5
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.4 Migration status

Data on migration status, place of birth and duration of residence are presented in Table 3.2.4(a), Table 3.2.4(b) & Table 3.2.4(c) respectively. The table 3.2.4 (a) reveals that, in the 1995 FSOUAA, while 58 % are migrants the rest are a non-migrant. In the 1990 NFFS, about 55 % are observed to be migrants to the city of Addis Ababa. In case of duration of

residence status (see table 3.2.4(b)) in 5-9 years category the percent observed to be low compared with other duration categories both in 1990 and 1995 surveys. Place of birth information given in Table 3.2.4(c), indicates that respondents from the rural area constitute more than other urban born respondents. In general, it is observed that migrants constitute more than 55% of the respondents in both surveys.

Table 3.2.4 (a) Distribution of respondents by migration status, Urban Addis Ababa, 1990 and 1995

Migration status	1990		1995	
	Number	Percent	Number	Percent
Migrant	856	55.2	1353	57.9
Non migrant	695	44.8	983	42.1
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

Table 3.2.4 (b) Distribution of respondents by duration of residence, Urban Addis Ababa, 1990 and 1995

Duration of Residence	1990		1995	
	Number	Percent	Number	Percent
0-4 years	154	9.9	314	13.4
5-9 years	139	9.0	253	10.8
10+ years	550	35.5	781	33.4
Since birth	695	44.8	984	42.1
Not stated	13	0.8	4	0.2
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

Table 3.2.4 (c) Distribution of respondents by place of birth, Urban Addis Ababa, 1990 and 1995

Place of birth	1990		1995	
	Number	Percent	Number	Percent
Rural	612	39.5	981	42.0
Other urban	241	15.5	371	15.9
Non-migrant	698	45.0	984	42.1
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.5 Work status

In both surveys of 1990 as well as 1995, work status of women is categorized as, working, not working and not stated. It is indicated from the Table 3.2.5 that about 65 percent of 1990 respondent women are not working while this figure declines by 10 percent in 1995. The table also reveals that in the 1995 working women are increased by 10 percent compared to the 1990.

Table 3.2.5 Distribution of respondents by their work status, Urban Addis Ababa, 1990 and 1995

Work status	1990		1995	
	Number	Percent	Number	Percent
Working	550	35.5	1054	45.1
Not working	1000	64.5	1279	54.8
Not stated	1	0.1	3	0.1
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.6 Education

Schooling can directly affect the life time fertility by delaying age at marriage and onset of child bearing. It is believed that educated women have less number of children than their uneducated counterparts. Hence, examining the level of education of the study population is significantly important in understanding their fertility behavior. Table 3.2.6(a) and 3.2.6(b) presents educational level of respondents and their husbands, which is classified into five groups. The division is made into primary level of (1-6 years schooling), junior secondary (7-8 years

schooling), senior secondary (9-12 years schooling), university or other higher (above 12 years schooling). Lastly, no formal education category includes literacy program, non-formal education (in the church and mosques) and those who have no education at all (illiterate).

It is observed in the table 3.2.6 (a) that women in the primary school level declined by about 7% from 1990 to 1995 while women in the higher education (university or other higher) increased by double (from 3.6% to 7.3%) in the 1990 to 1995. Women in the 'no formal schooling' level increased slightly by about 1.3 % in the respective surveys. This table further gives the clear indication that there is an improvement in the educational levels of respondents especially at the university level from 1990 to 1995.

Table 3.2.6 (a) Distribution respondents by educational status, Urban Addis Ababa, 1990 and 1995

Educational level	1990		1995	
	Number	Percent	Number	Percent
Primary	425	27.4	460	19.7
Junior secondary	212	13.7	325	13.9
Senior high school	513	33.1	831	35.6
University ./ other higher	56	3.6	170	7.3
No formal schooling	345	22.2	549	23.5
Not stated	0	0.0	1	0.0
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.6 (b) Distribution of the ever-married women by husbands' level of education, Urban Addis Ababa, 1990 and 1995

Husbands' level of education	1990		1995	
	Number	Percent	Number	Percent
Primary	251	28.4	241	21.8
Junior secondary	90	10.2	161	14.5
Senior high school	215	24.3	296	26.7
Univer./ other higher	85	9.6	164	14.8
No formal schooling	242	27.4	238	21.5
Not stated	1	0.1	8	0.7
Total	884	100.0	1108	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

Data on the educational level of husbands' of the respondents is provided in Table 3.2.6(b). An overview of the figures reveals that there is an improvement even in the educational levels of husbands of the respondents at the junior, senior and university levels.

3.2.7 Marital status

In both 1990 and 1995 surveys, current marital status data was collected for five different categories namely never married, currently married, living with a man, widowed and divorced. However, to facilitate comparison "living with a man" was combined with currently married. From the data given in Table 3.2.7 it is indicated that between 1990 and 1995, while the proportion single increased from 43 to 53 percent, the currently married declined from about 41 to about 30 percent. The proportion widowed increased by two percent, the proportion divorced/separated remained the same between the two periods of 1990 and 1995.

In 1995, more than half of the women in their reproductive ages remained single, while only 30 percent are reported to be currently married. The dissolved number of marriage (divorced, separated & widowed) accounts for only about 17 percent in 1995. The change in marital status is significant over two-time period. In general, the table reveals that the proportion of single increased as expense of currently married. This could be an indication of delayed marriage, which may directly affect the fertility of the city.

Table 3.2.7 Distribution of respondents by marital status, Urban Addis Ababa, 1990 and 1995

Marital status	1990		1995	
	Number	Percent	Number	Percent
Single	667	43.0	1228	52.6
Currently Married	628	40.5	688	29.5
Widowed	71	4.6	157	6.7
Divorced/ separated	185	11.9	263	11.3
Total	1551	100.0	2336	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.8 Age at first marriage

Age at first marriage information, in 1990 and 1995 surveys, was collected for all ever-married women. Table 3.2.8 shows the percentage distribution of ever married women in the reproductive ages of 15-49 years by age at first marriage categorized into six groups. Table 3.2.8 reveals that in 1990, while there were about 65 percent of ever-married women who had married before age of 18 years, in 1995 the above proportion declined slightly and was noted to be about 62 percent. On the other hand, women married 18 and above constitute about 32 percent in 1990 while 35 percent in the 1995. The increase of 3 percent contributed by those women who were married 20 year and above. Generally, the table reveals that there is slight increase in age at first marriage. But the proportion of women who do not state their age at first marriage remained constant (i.e. 3 percent), from 1990 to 1995 survey.

Table 3.2.8 Distribution of ever-married women by age at first marriage, Urban Addis Ababa, 1990 and 1995

Age at First Marriage	1990		1995	
	Number	Percent	Number	Percent
Less than 15 years	292	33.0	353	31.9
15-17 years	281	31.8	334	30.1
18-19 years	110	12.4	138	12.5
20-21 years	79	8.9	107	9.7
22+ years	95	10.7	140	12.6
Not stated	27	3.1	36	3.2
Total	884	100.0	1108	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

Singulate mean age first marriage (SMAM), computed indirectly from the information on proportion never married, is observed to be increased by exactly 2 points from a level of 24.5 years in 1990 to 26.5 years in 1995. (See CSA, 1997:32).

3.2.9 Marriage stability



From the information on number of marriages or unions a woman ever has contacted, the stability of first marriage can be verified. By stable marriage, it meant that those women who are currently married and still living with their first husband up to the date of the survey. From Table 3.2.9 it is seen that in both 1990 and 1995, while about 50 percent of first marriages were observed to be dissolved or unstable, the remaining were observed to be intact. The table also reveals that there is a 3 percent increase in the status of 'unstable marriage' (dissolution of first marriage) from 1990 to 1995.

Table 3.2.9 Distribution of ever-married women by marriage stability status, Urban Addis Ababa, 1990 and 1995

Marital stability	1990		1995	
	Number	Percent	Number	Percent
Stable marriage	434	49.1	512	46.2
Unstable marriage	450	50.9	596	53.8
Total	884	100.0	1108	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.10 Child mortality

Table 3.2.10 presents the percentage distribution of ever-married women in reproductive ages by their child mortality experience. It is noticed that virtually there is no change in the percentage contribution of the child mortality categories, from 1990 to 1995 surveys. For instance, 71 percent of women, in the two surveys, are observed to have experienced no child death.

Table 3.2.10 Distribution of ever-married women by their child mortality experiences, Urban Addis Ababa, 1990 and 1995.

Child mortality	1990		1995	
	Number	Percent	Number	Percent
No child dead	631	71.4	785	70.8
One child dead	168	19.0	207	18.7
More than one	85	9.6	116	10.5
Total	884	100.0	1108	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.11 Contraception

In this study, the ever use of contraceptive is considered. Since current use of contraceptive may not influence the life time fertility it would be reasonable to consider the ever use of contraceptive to see its effect on retrospective fertility (children ever born).

Table 3.2.11 gives percentage distribution of ever-married women by their contraceptive use. It is observed from the table that there is about 15 percent increase in the ever use of contraception by the ever married women from 1990 to 1995 survey period. In contrast, the never users have decreased by 16 percent from 1990 to 1995. When we consider ever use of modern methods, it increased by 10 percent, while ever use of traditional methods increased only by 5 percent between the two surveys periods. Overall there seems to be a tremendous progress in the use of contraception from 1990 to 1995.

Table 3.2.11 Distribution of ever-married women by contraceptive use, Urban Addis Ababa, 1990 and 1995

Contraceptive use	1990		1995	
	Number	Percent	Number	Percent
Ever use	407	46.7	681	61.5
Never use	477	54.0	419	37.8
Not stated	0	0.0	8	0.7
Total	884	100.0	1108	100.0
Type of contraceptive method				
Modern method	276	31.2	455	41.1
Traditional method	130	14.7	226	20.4
Non-users	477	54.0	410	37.8
Not stated	1	0.1	8	7.0
Total	884	100.0	1108	100.0

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

3.2.12 Postpartum infecundability

In both 1990 as well as 1995 survey the information on postpartum infecundability, i.e., the period immediately after the child birth that the woman is protected from conception, was measured in terms of duration of amenorrhea period, breast feeding and postpartum abstinence periods. All three are measured in months. Table 3.2.12 gives the information about all the three indicators mentioned above for the women in reproductive ages for the two survey periods. The table reveals that there is a 3 months increase in the abstinence period from a level of about 4 months from 1990 to about 7 months in 1995. Length of breast-feeding also seems to be increased by about 3 months from 1990 to 1995. The increase in amenorrhea period from 1990 to 1995 seems to be only one month.

However, the women's educational levels, women's work status and other factors may play an important role for the variations in the mean duration of amenorrhea period. Also it is to be noted here that according to CSA (1997:74) two different methods (prevalence / incidence or simple average method) were employed in deriving the mean duration of breast feeding and duration of amenorrhoea that may have some variation on the reported figures of 1990 and 1995 surveys (see CSA, 1993:166).

Table 3.2.12 Mean length of postpartum infecundability of women age 15-49, Urban Addis Ababa, 1990 and 1995

Average Length (in month)	1990	1995
Abstinence	3.53	6.58
Amenorrhea	10.15	11.01
Breastfeeding	18.54	21.08

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

CHAPTER FOUR

FERTILITY LEVELS AND TRENDS IN URBAN ADDIS ABABA.

Addis Ababa, the most urbanized capital city in Ethiopia experienced a considerable decline in its TFR from a level of 3.98 in 1967 to a level of 1.8 in 1994 (See Table 4.1). According to CSA (1997:1) “this rate was considered to be very low for a city in a developing country”. An attempt was therefore made by CSA in its ‘1995 Fertility Survey of Urban Addis Ababa’, firstly to evaluate the 1994 census result of fertility and secondly to provide a plausible new estimate of the TFR for the urban Addis Ababa. Several indirect techniques such as Brass P/F ratio technique, Brass Arriaga technique, Brass Relational Gompertz Model, were used to get an indirect estimation of TFR for the recent period of 1994-1995. The main data required to apply these techniques is the ‘number of children ever born by age of women.’

Table 4.1 Reported fertility rates 1967-98

Year	1967	1978	1984	1990	1994	1995	1998
Reported TFR	3.98	3.81	3.23	2.61	1.8	1.74	1.76

Source: CSA, 1999:201; CSA, 1997: 40; CSA, 1999: 235

Brass P/F ratio method and Brass Relational Gompertz techniques assume that fertility has been constant in the past. However, findings of 1990 NFFS and the findings from the 1995 FSOUAA indicate that urban Addis Ababa has been experiencing a decline in its fertility in the recent past, and the TFR estimates arrived at by applying the above two methods cannot be considered as plausible. Using the results of the 1984 and 1994 censuses,

and the Arriaga technique that overcomes the drawback, i.e., the assumption of constant fertility in the past, of the P/F ratio method, the CSA (1997:50) finally came to the conclusion that “the TFR for a woman in Addis Ababa is 2.14.”

4.1 Indirect estimation of TFR from the age-sex distribution of population

The intention in the present section of the thesis is (i) to provide plausible estimates of TFR not only for the present period but also for the past few years, (ii) to provide the model estimates of ASFRs corresponding to the TFRs arrived at in (i) above. To reach the first goal the Rele’s refined technique (Rele, 1987) was applied to the census age distribution data of 1984 and 1994 censuses. According to Rele (1987:514) “The method does not assume the population to be stable, quasi-stable, or closed to migration.” Rele (1976) has shown that there exists a linear relationship between the child-woman ratio (CWR) and the gross reproduction rate (GRR) at any given level of mortality.

Rele (1988:33) further provided the regression coefficients to estimate TFR from CWR at fixed levels of life expectancy at birth (e_0) (see appendix I). Using the CWRs, a rough estimate of life expectancy at birth, and the coefficients provided by Rele we may estimate TFR without much effort. To estimate TFR for different time periods, we may require two types of CWRs. Dividing children aged 0-4 by women 15-49 gives the CWR1. Dividing children aged 5-9 by women aged 20-54 gives the CWR2. According to Rele (1987:515), “The fertility estimates generated from CWR1 refer to the period up to five years before the census, while those generated from CWR2 refer to the period five to ten years before the census. The values of life expectancy at birth used for the purpose of generating the estimates should refer to the corresponding periods. With the use of several decadal of

censuses, it is thus possible to build up a historical series of fertility estimates referring to successive quinquennial intervals.”

However, it is noted that the quality of the age-sex distribution of the census data may affect the estimated TFRs. To get rid of this problem Rele (1987) proposed a refined methodology (see appendix I) and details of the methodology with an application to India was given in his paper. Rele (1987:515) states that “this easy-to-work with refined method requires two or more successive censuses preferably at about ten-year intervals; it yields serial estimates of fertility at five-year periods and has minimal data requirements.” Thus, using the age-sex distribution of population of 1984 and 1994 censuses of urban Addis Ababa, the life expectancy figures of 58.4 and 63.3 that refer to 1994 and 1984 censuses respectively and the refined methodology given in Rele (1987) an attempt is made here to provide the TFR estimates corresponding to the periods of 1974-79, 1979-84, 1984-89 and 1989-94.

The details of the assumptions made, and the preliminary estimates of TFR arrived at by applying Rele’s original method and the final estimates of TFR arrived at by applying Rele’s refined methodology are presented in Table 4.2. Figure 4.1 shows the preliminary and final estimates of the TFR based on reported (unsmoothed) census age-sex distributions for urban Addis Ababa, 1974-1994. It is seen from Table 4.2 and Figure 4.1 that the plausible estimate of TFR arrived at by applying Rele’s refined methodology is 2.22 for the period 1989-94. This estimate of the TFR is observed to be very close to the estimate of TFR that is 2.14 for 1994 arrived at by Arriaga’s modification to Brass P/F technique, suggested as plausible estimate by CSA (CSA, 1997:50).

Table 4.2 Estimation of the total fertility rates (TFR) of Addis Ababa from 1974-1994 based on the unsmoothed age-sex distribution of 1984 and 1994 censuses

Period	Life expectancy at birth (e_0)	CWR1	CWR2	Preliminary estimates (TFR)	Final estimated (TFR)
1974-79	63.3*		0.7580	5.585	5.2515
1979-84	63.3	0.4902		3.575	4.1969
1984-89	58.4**		0.4414	3.342	3.1656
1989-94	58.4	0.2595		1.932	2.2201

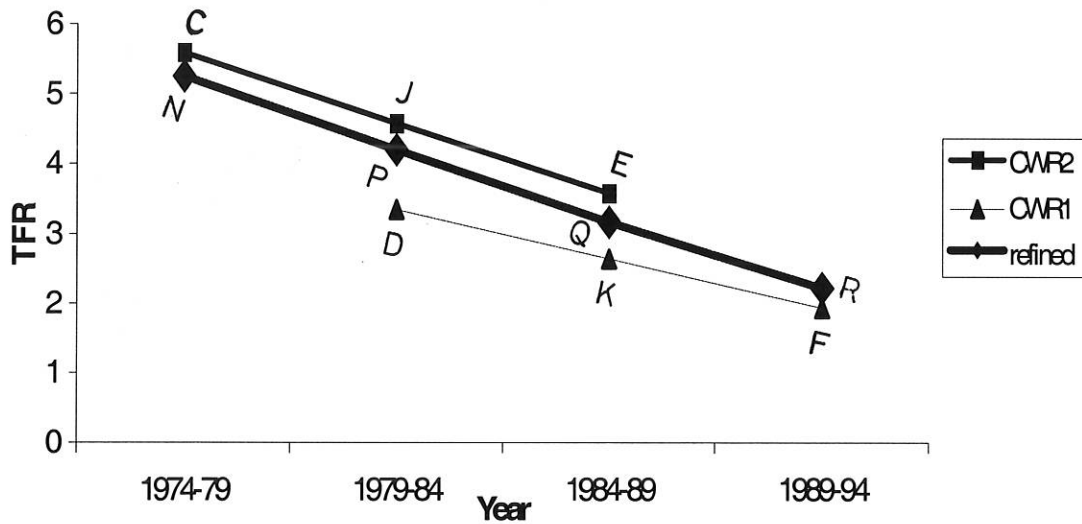
Source: Computed from the 1984 census (CSA, 1987) and 1994 census (CSA, 1999)

* Assumption is made no much change from 1974 to 1984.

** Assumption is made no much change from 1984 to 1994.

Source: table 4.2

Figure 4.1 Pele's refined estimates of TFR



4.2. Estimation of model ASFRs from the TFRs

Given a TFR we may arrive at ‘the most appropriate schedules of ASFR that may be anticipated.’ by using the Arriaga’s “ASFRPATT MODEL” of ASFRs that are typical of specified levels of TFR (See Bogue et al., 1993: 11-53). In the absence of reliable ASFRs, the ASFRs that are derived using Arriaga’s procedure may give an idea about the age patterns of fertility. While Table 4.3 presents the estimated ASFRs corresponding to the TFRs of 1974-79, 1979-84, 1984-89 and 1989-94 and also for 1998, Figure 4.2 gives an idea about the typical age patterns that may be prevailing in urban Addis Ababa during the periods of 1974-79 to 1989-94 and 1998.

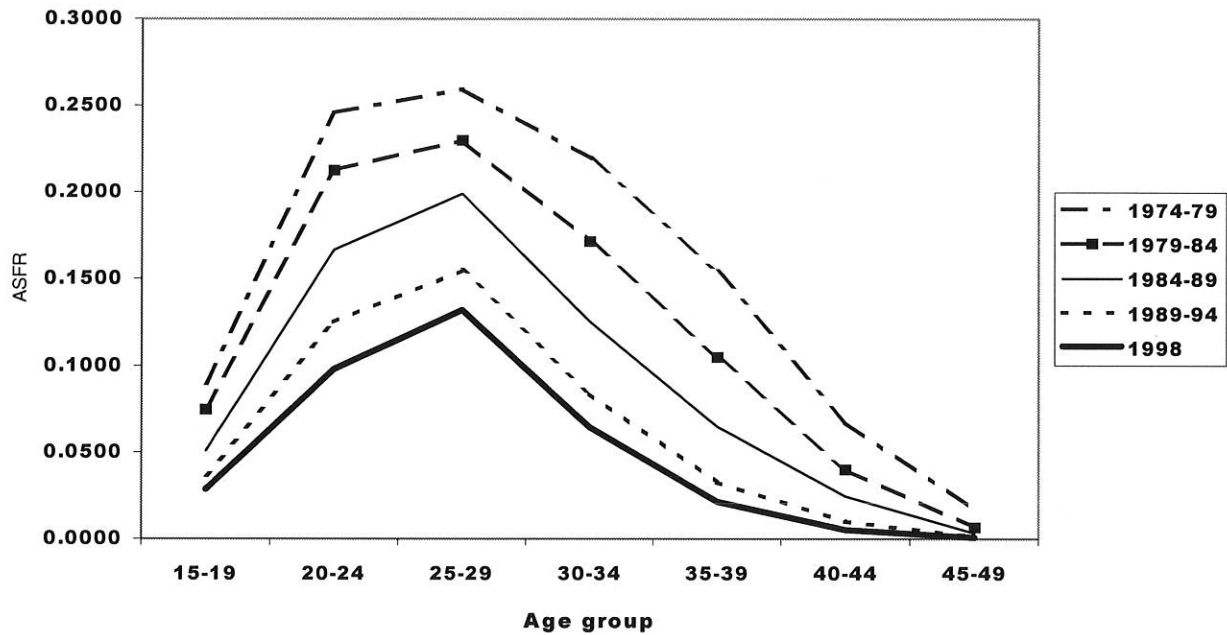
Table 4.3 Estimates of model ASFRs, Urban Addis Ababa, 1974-79 to 1998

Age group	1974-79	1979-84	1984-89	1989-94	1998
15-19	0.0895	0.0747	0.0509	0.0368	0.0287
20-24	0.2458	0.2127	0.1664	0.1247	0.0979
25-29	0.2594	0.2298	0.1989	0.1547	0.1318
30-34	0.2195	0.1715	0.1252	0.0839	0.0645
35-39	0.1542	0.1049	0.0650	0.0327	0.0214
40-44	0.0676	0.0399	0.0247	0.0098	0.0052
45-49	0.0169	0.0067	0.0030	0.0013	0.0007
TFR	5.26	4.20	3.17	2.22	1.75

* TFR =1.75 is taken from the 1998 Nutrition Survey conducted by CSA (CSA, 1999).

Source: Computed from Arriaga’s “ASFR PATT MODEL “

Figure 4.2 Model age specific fertility rates, Urban Addis Ababa, 1974-79 to 1998



From the Table 4.3 and Figure 4.2 it is observed that; (i) fertility has declined at each age group from the 1974-79 to 1998. (ii) While the fertility curves of 1974-79 and 1979-84 indicates that fertility has concentrated in the age groups of 20-24 and 25-29, the fertility curves of 1984-89, 1989-94 and 1998 gives the indication that fertility has concentrated at the ages of 25-29. The recent fertility curves may show the impact of marriage and contraception for a decline in fertility of Addis Ababa in the recent past.

CHAPTER FIVE

FERTILITY DIFFERENTIALS

Earlier, several studies have shown that fertility varies by the demographic, social, economic and cultural background of the respondents. Thus it is intended in this section to study the fertility differentials of the respondents using the children ever born (CEB) data and their background characteristics for the years 1990 and 1995.

In the following sub-sections mean parity (i.e. mean number of children ever born, (MNCEB) of women would be studied using the MCA results by their background characteristics.

5.1 Ethnicity and fertility

Ethnicity could use as the proxy indicator for indicating the difference in culture and traditions, which is ultimately reflected on their reproductive behavior of individual women. There is observed difference in fertility in many parts of the countries specially developing countries (CSA, 1997). In most cases, the difference could be explained, due to diverse socio-economic environment such as exposure to education, employment etc.

Table 5.1 presents the results of the MCA, where CEB data of the respondent is used as the dependent variable and the ethnic background of the respondent is used as the independent variable. Table 5.1 reveals that the mean parity has varied greatly among the different ethnic groups. For instance in 1990, it has varied from 5.38 children per woman for Gurage ethnic group to 3.39 children per woman for Amara ethnic group. Similarly, in the 1995 Gurage deserves the highest (4.76 and 4.78 children) compared to Amhara (3.30 and

3.33 children) before and after adjustment for age of mother. This consistency after adjusting age of the women in 1995 and 1990 would make the Gurage to have highest fertility as compared with others. Mean parity of women has declined by about one child from 1990 to 1995 in the ethnic group of “others” only.

Table 5.1 Results of MCA for the relationship between the variables (MNCEB) and ethnicity, controlling for age, Urban Addis Ababa, 1990 and 1995

Ethnicity	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
Amhara	489	3.31	3.39	567	3.30	3.33
Oromo	184	4.13	3.91	226	3.53	3.55
Tigraway	89	3.80	3.77	110	3.58	3.43
Gurage	92	5.26	5.38	169	4.76	4.78
Others	30	5.07	4.84	36	4.03	3.82
	Eta = .25 R ² = .06		Beta= .23 Gm = 3.79	Eta = .18 R ² = .033		Beta= .18 Gm =3.62

Gm = grand mean

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS of data urban Addis Ababa.

5.2 Religion and fertility

Religion could affect fertility through the reflection of differences in religious beliefs and practices that can affect their reproductive performance. Many studies document the variation of the fertility of different religious affiliation. For instance, in the 1990 national family and fertility survey, it is observed that traditional followers have highest fertility followed by Muslims (CSA, 1993). Table 5.2 presents the MCA results of the respondents' parity by the background variable religion. A result of adjusted mean parity, adjusted for covariate age, reveals that, in 1990, mean parity of women varied from 4.7 children per woman for Muslims to 3.7 children per woman for Orthodox Christians. However in 1995, mean parity of women varied from 4.5 children per woman for Muslims to 3.3 children per

woman for Other Christians. In general, other Christians seem to have experienced more declines in their fertility when compared to other religious groups.

Table 5.2 Results of MCA for the relationship between the variables (MNCEB) and religion, controlling for age, Urban Addis Ababa, 1990 and 1995

Religion	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
Orthodox Christian	786	3.73	3.70	961	3.56	3.56
Other Christians	34	4.02	4.19	57	3.31	3.28
Muslim	62	4.34	4.67	87	4.47	4.49
	Eta =.07 R ² = .005	Beta= .10 Gm = 3.79		Eta = .09 R ² = .008	Beta= .09 Gm =3.62	

Gm = grand mean; R²

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS of data urban Addis Ababa.

5.3 Education and fertility

Studies relating fertility and education have consistently pointed out education as an important factor in accounting for fertility difference within populations. It usually favors small family size by changing the attitudes towards smaller family norms and styles of child rearing (WFS, 1987). Consequently, it would be costly to parents in time and money due to their demand of child quality. So, it is hypothesized to have negative relation with fertility. In the table 5.3 (a), it is observed there is an inverse relation between maternal education and fertility.

After adjusting for covariate age, the mean parity of women in the 'No formal education' and '7 and above years of schooling' have changed considerably, thus indicating the age affect on fertility of women (See Table 5.3 (a)). Interestingly, and as expected, women with 7 and above years of schooling displayed a low fertility when compared to other

categories and also their fertility seems to have declined from 1990 to 1995, while the fertility of other groups remained virtually unchanged during the same period of 1990 to 1995.

Table 5.3(a) Results of MCA for the relationship between the variables (MNCEB) and women education, controlling for age, Urban Addis Ababa, 1990 and 1995

Women Education	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
1-6 years of schooling	321	3.73	3.81	277	3.73	3.80
7+ years of schooling	247	3.00	3.60	403	2.57	3.17
No formal schooling	315	4.48	3.91	419	4.61	3.92
	Eta =.22 R ² =.056		Beta=.05 Gm =3.79	Eta = .31 R ² = .121		Beta=.13 Gm =3.64

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

Table 5.3(b) Results of MCA for the relationship between the variables (MNCEB) and spouse education, controlling for age, Urban Addis Ababa, 1990 and 1995

Husband Education	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
1-6 years of schooling	251	4.17	4.15	241	4.70	4.25
7+ years of schooling	478	3.36	3.54	753	3.18	3.43
No formal schooling	154	4.50	3.98	105	4.54	3.75
	Eta =.18 R ² = .056		Beta=.10 Gm =3.79	Eta =.24 R ² =.121		Beta=.12 Gm =3.64

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

Table 5.3(b) displays the mean parity of respondents by the background of their husband's educational level. Table 5.3(b) reveals that from 1990 to 1995 there is no consistent fertility decline in the categories of education considered. Further mean parity of women by educational background of husband shows little higher parity when compared with educational background of women themselves.

5.4 Child mortality and fertility

Table 5.4 reveals that respondent women varied to a great extent in their mean parity levels when studied by their child mortality experience. Virtually the decline in mean parity is negligible from 1990 to 1995. An observation of the table reveals that women with “no child dead” experienced the lowest mean parity, when compared to women with “more than one child dead”. This confirms the fact that mortality has a great impact on the fertility of women of the study area and there seems to be a need to take special efforts to control child mortality further. Thus child mortality observed to have a positive effect on fertility. Similar findings are also observed in Abdulahi (1988) and Yohannes (1994).

Table 5.4 Results of MCA for the relationship between the variables (MNCEB) and child mortality , controlling for age, Urban Addis Ababa, 1990 and 1995

Number of children dead	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
No dead	631	3.00	3.19	785	2.76	3.02
One dead	168	5.15	4.83	207	4.94	4.44
More than one dead	85	7.00	6.21	116	7.11	6.19
	Eta = .50 R ² = .25		Beta= .38 Gm = 3.79	Eta = .52 R ² = .273		Beta= .37 Gm = 3.62

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

5.5. Women’s work status and fertility

Various studies have made towards the relationship between women employment and fertility. However, this relationship between them is not a simple inverse rather ambiguous (WFS, 1983:294). WFS (1987) further point out that many empirical works has been carried

out in developing countries relating fertility and employment and the negative relation is widely supported from most empirical studies (WFS, 1987:114-47). In the 1990 and 1995 fertility surveys of Addis Ababa, the relationship between fertility and work status is found to be inversely related.

From Table 5.5 it is seen that mean parity of respondents has also decline from 1990 to 1995. Further, those women who are currently working have experienced less mean parity compared to those not currently working. Thus work status also has observed to show a negative impact on fertility.

Table 5.5 Results of MCA for the relationship between the variables (MNCEB) and women work status , controlling for age, Urban Addis Ababa, 1990 and 1995

Women work status	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
Currently working	364	3.35	3.39	576	3.33	3.22
Curr.not working	519	4.10	4.07	529	3.94	4.05
	Eta =.14 R ² = .019		Beta=.13 Gm = 3.79	Eta = .11 R ² = .012		Beta= .15 Gm =3.62

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

5.6 Marital stability and fertility

As expected, one may see from Table 5.6 that those women with “stable” marriage have more number of children than those women with “unstable” marriage. This is due to the fact that those who are in the stable marriage status would expose for stable sexual intercourse which increase the risk pregnancy than those with unstable marriage status. Thus, marital stability has a positive effect on fertility.

Table 5.6 Results of MCA for the relationship between the variables (MNCEB) and marital stability , controlling for age, Urban Addis Ababa, 1990 and 1995

Marital stability	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
Stable marriage	434	4.08	4.46	512	3.95	4.10
Unstable marriage	450	3.51	3.14	596	3.34	3.21
	Eta =.11 R ² = .011	Beta= .25 Gm =3.79		Eta =.11 R ² = .012	Beta= .16 Gm = 3.62	

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

5.7 Age at first marriage and fertility

Age at first marriage in any society will influence the ultimately the life time fertility. The early procreation / exposure to stable sexual practices, the more the probability of producing more children. In other words, those women staying in longer with in marriage in their reproductive life (15-49) are more likely to have higher number of children as compared to those joining in the latter age. This fact is also reflected in both fertility surveys of 1990 and 1995.

An observation of Table 5.7 reveals that age at marriage has played a great role in controlling the fertility of Addis Ababa. As it is indicated from this table, the least mean parity of women of 2.62 observed for the category “22+ years”. From the table, it is clearly seen that as age at first marriage increases, fertility decreases in both 1990 and 1995 after and before adjustment. However, the women under age 15 did not show the higher mean parity compared with the next age group (15-17). This might be due to reporting error (probably due to memory lapse) usually these women may belong to the old age group who were married

earlier. Furthermore, the mean parity of women from 1990 to 1995 is also decreases in all age groups.

Table 5.7 Results of MCA for the relationship between the variables (MNCEB) and age at first marriage, controlling for age, Urban Addis Ababa, 1990 and 1995

Age at fist marriage	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
Less than 15 years	292	3.99	3.83	353	3.91	3.68
15-17 years	281	4.33	4.36	334	4.41	4.32
18-19 years	110	3.66	3.64	138	3.40	3.68
20-21 years	79	3.12	3.34	107	2.65	3.11
22+ years	95	2.36	2.62	140	1.81	2.00
	Eta =.23 R ² =.29	Beta=.20 Gm =3.80		Eta =.31 R ² =.384	Beta=.26 Gm =3.60	

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

5.8 Place of birth and fertility

The place of birth has an effect on fertility due to traditional way of life acquired during childhood ages. For instance, urban women from rural origin may favor large family size than the urban origin women. On the other hand, urban origin women are familiar to urban mode of life and have better access and awareness so that they would ultimately control their fertility. Thus this will result to fertility differentials.

Table 5.8 reveals that women born in rural areas have higher fertility when compared to women born in “other urban” and “non-migrant” categories. The table shows that ‘other urban’ migrants have less fertility than the non-migrants.

One of the possible reason might be those women who came from other urban areas might be better educated so that their demand for better social mobility than the natives or

they might have unstable life due to problem of housing and other facilities. Thus, they are more likely to have smaller family size compared to non-migrants. Comparing the two surveys, it is observed that there is decline in the mean parity of women from 1990 to 1995.

Table 5.8 Results of MCA for the relationship between the variables (MNCEB) and place of birth, controlling for age, Urban Addis Ababa, 1990 and 1995

Place of birth	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
Rural migrant	489	4.00	3.88	667	3.84	3.65
Other urban migrant	147	4.48	3.65	195	3.15	3.36
Non-migrant	248	3.56	3.70	246	3.40	3.50
	Eta =.09 R ² =.008	Beta=.04 Gm =3.79		Eta =.10 R ² =.01	Beta=.04 Gm =3.62	

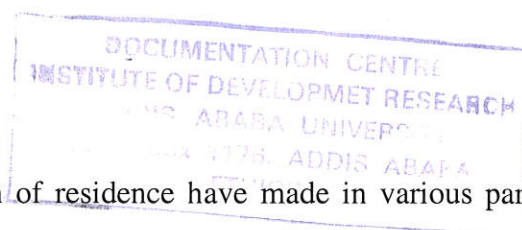
Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

5.9 Duration of residence and fertility



Studies relating fertility and duration of residence have made in various part of the world. The effect disruption immediately after migration would decrease the fertility which will disappeared through time (Goldstein and Goldstein, 1982). In this study it is observed that the effect became apparent and those migrants below ten years of duration have the less mean parity than the non-migrants. As time goes, the effect of disruption would be disappeared i.e. the fertility of migrants living more than 10 years have increased gradually and would be higher than the non-migrants.

Table 5.9 presents the MCA results of respondent women's parity by their duration of stay in Addis Ababa. Table 5.9 reveals that those women who stayed more than 10 years have higher mean parity when compared to those who stayed only for 0-4 and 5-9 years. Mean parity of women does not seem to decline consistently in all groups from 1990 to 1995.

Table 5.9 Results of MCA for the relationship between the variables (MNCEB) and duration of migration, controlling for age, Urban Addis Ababa, 1990 and 1995

Duration of residence	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
0-4 years	74	2.41	3.39	123	1.54	2.95
5-9 years	75	2.64	3.36	105	2.42	3.35
10+ years	482	4.32	3.99	632	4.28	3.74
since birth	245	3.58	3.72	247	3.43	3.72
	Eta =.25 R ² =.061	Beta=.09 Gm = 3.81		Eta =.33 R ² = .112	Beta= .09 Gm =3.61	

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

5.10 Contraceptive use and fertility

Contraceptive use is one the powerful method to regulate fertility. Thus the relation between contraceptive and fertility is clearly known to be inverse. In the case of this study attempt is made to consider the ever use of contraceptive by the respondents. Ever use of contraceptive method refers to use of a method at any time with out any distinction on current or past use. This analysis could give emphasis on what proportion of women have had exposure to contraceptive method at least once for regulating their fertility. Therefore, ever use of contraceptive method was considered for ever-married women to see its effect on their fertility (children ever born). Similar, consideration was also made by Ogawa (1980) on his study of the Fiji's fertility.

Table 5.10 presents the mean parity of women by their use of contraceptives. The results of the MCA analysis, after adjusting for covariate age, seems to indicate that age has an impact on the use of contraceptives. Furthermore, the mean parity of “ever user of contraceptive women” was observed to be more than the women who “never use the

contraceptives.” However, there is a slight decline in mean parity of ever users from 1990 to 1995.

Table 5.10 Results of MCA for the relationship between the variables (MNCEB) and contraceptive use , controlling for age, Urban Addis Ababa, 1990 and 1995

Duration of residence	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
Ever use	407	3.92	4.14	681	3.79	3.92
Never use	477	3.68	3.49	419	3.37	3.16
	Eta = .04 R ² =.002	Beta=.12 Gm = 3.79		Eta =.07 R ² =.005	Beta=.13 Gm =3.63	

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

The result of this table is not only unusual but also quite perplexing. And it seems there is a need to give special explanation for this as it is normally seen that contraceptive use is usually expected to affect fertility negatively but not positively. Ogawa (1980) also came up with very similar result (see Ogawa, 1983:130).

A review of the literature clearly shows that use of contraceptive methods has increased overtime in Addis Ababa and it is well reflected when measured by the indicator contraceptive prevalence rate (CPR). However, the present analysis shows that use of contraceptives is related to the parity of women positively.

We may offer the following points or reasons for the unexpected result:

- (i) probably women respondents who are using contraceptives may be more reproductive than those who do not use them,
- (ii) probably the respondents may be using contraceptives more for spacing of births rather than to avert further births. The majority of ever users used family planning for spacing. For instance, in 1995 pills and condom from the modern and periodic abstinence from the traditional method were widely used. But, permanent method

(female or male sterilization) is rarely used. This might probably substantiate the above assertion that ever users were used contraceptives for spacing than for limiting (see CSA, 1997:92-93).

- (iii) Probably the respondents who use contraceptives might have already reached their goal of desired number of children,
- (iv) In connection with the Fiji example, Ogawa (1980:130) states that “It appears that unless the desired family size becomes substantially smaller and contraceptives are used for family limitation purposes, the use of contraceptives will not be inversely related to cumulative fertility.” For example, in 1995, 25 percent of those women who are currently married and had already 6 or children desired for additional children. Similarly, sixty percent of currently married women having two children (at replacement level) demanded for more children. Probably, this may be an indication that the desired number of children looks higher. In other words, the desired number of children may not be substantially smaller (see, CSA 1997:122). Further Owaga (1980:130) stated that “caution should be exercised with regard to the measurement of this predictor.”

Consequently, the relationship between (retrospective fertility) children ever born and ever use of contraceptives may not necessarily indicate negative relation due to the various reasons.

However, in 1990 Abdulahi, et al. (1994:31) observed that “delayed marriage has the largest fertility inhibiting effect among the three proximate determinants in determining the current fertility level of urban areas including Addis Ababa.” Their study uses the 1990 NFFS data, which is a part of the present study. By keeping all the above points in view it

seems appropriate not to consider contraceptive use as a variable affecting fertility in the multivariate analysis discussed in the next chapter.

5.11 Duration of Ammenorrhoea and fertility

Postpartum infecundability is one of the proximate determinants of fertility. The average length of duration of ammenorrhoea is considered in the last closed birth interval.

In the table 5.11, it is indicated that what ever the duration period of amenorrhoea, mean parity of women remained almost same during 1990. No systematic pattern observed between fertility the duration of amenorrhoea. In the 1995, the mean parity of women period “7-12 months” is observed to be more than for the other two categories. Further, there is a slight decline in the mean parity of women from 1990 to 1995.

Table 5.11 Results of MCA for the relationship between the variables (MNCEB) and duration of ammenorrhoea, controlling for age, Urban Addis Ababa, 1990 and 1995

Duration of amenorrhea	1990			1995		
	Number of cases	Unadjusted Mean	Adjusted Mean *	Number of cases	Unadjusted Mean	Adjusted Mean *
0-6 months	306	3.65	4.72	342	3.59	3.59
7-12 months	202	4.90	4.90	184	4.10	4.18
13+ months	159	4.67	4.67	208	3.95	3.75
	Eta =.05 R ² =.002	Beta=.01 Gm = 4.73		Eta =.09 R ² =.009	Beta= .10 Gm =3.82	

Gm = grand mean;

Unadjusted mean = grand mean + unadjusted deviation.

Adjusted mean = grand mean + adjusted deviation

Source: Computed by the author from the 1990 NFFS and 1995 FS data of urban Addis Ababa.

5.12 Analysis of Variance (ANOVA)

In the above section, attempt is made to see the relationship between the background variables and fertility of ever-married women in the reproductive age group (15-49) only controlling their age. However, to get some insight about their significance in explaining the

difference between groups, the statistical test ANOVA is applied and the result of the test is presented in Table 5.12. As it is indicated in the table, religion, postpartum infecundability (duration of amenorrhoea) and contraceptive use are not significant to explain the variation in both 1990 and 1995 surveys.

Table 5.12 Mean Sum Of Squares Between Groups (MSSB) and their significant levels (F pro.) for different background variables from analysis variance :1990 and 1995

Background variables	1990		1995	
	MSSB	Sign. F	MSSB	Sign. F
Ethnicity	95.938	0.0000	71.495	0.0000
Religion	12.356	0.1792*	35.78	0.0103
women educational level	146.787	0.0000	418.63	0.0000
Husband educational level	100.86	0.0000	258.84	0.0000
Mortality experience	193.424	0.0000	1182.4	0.0000
Duration of migration	167.26	0.0000	341.51	0.0000
Place of birth	24.34	0.012	42.436	0.0000
marital stability	50.197	0.0000	135.8	0.0000
age at marriage	118.785	0.0000	358.81	0.0000
work status	120.497	0.0000	102.44	0.0003
Contraceptive use	12.837	0.1816*	46.5	0.0148
Mean duration of Amenorrhea	4.234	0.4653*	18.60	0.0416

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa

* insignificant at five percent level of significance .

CHAPTER SIX

DETERMINANTS OF FERTILITY

This chapter is divided into two main sections. The first section will examine the joint effect of selected socio-economic variables considering them all at a time using the Ordinary Least Square (OLS) regression method. The second section will investigate the effect of proximate determinants toward fertility decline in Addis Ababa using the model ASFRs obtained in chapter four. In this section different indirect techniques are employed to estimate the Bongaart indices.

6.1 Socio-economic determinants of fertility: A multivariate analysis

Under this section an attempt has been made to find out the impact of selected background variables namely child mortality, age at first marriage, duration of residence, educational level of respondents and work status of women on the dependent variable children ever born for ever-married women. Selection of the background variables for this study is made based on: (i) the bivariate analysis presented in the previous chapter and the ANOVA test made on selected background variables (See Table 5.12); and (ii) the review of literature and thought given to the policy implications.

The general OLS regression model used is given by:

$$Y_i = b_0 + b_1 x_{i1} + b_2 x_{i2} + \dots + b_k x_{ik} + e_i$$

where, b_k = regression coefficient of each independent variable,

x_{ik} = independent variable

e_i = random error term

k = number of independent variables, and

$i = 1, 2, \dots, n$.

The OLS regression model was applied to the data matrix of the 1990 and 1995 surveys. Out of the independent variables age at first marriage and child mortality (number of dead children) are used, as continuous variables (interval scale), while all other variables are categorical by creating dummy variables to capture the effect of each category.

An observation of the Table 6.1 reveals that:

Table 6. 1 Summary of the multiple regression analysis of the children ever born for ever married women as dependent variable.

Independent Variables	1990			1995		
	B	Beta	Sign T	B	Beta	Sign T
Child Mortality	1.4605	0.4702	.0000	1.5330	0.4536	.0000
Age at marriage	-0.0398	-0.0628	.0384	-0.0480	-0.0829	.0029
DURATION OF RESIDENCE						
Since birth	RC			RC		
0-4 years	-1.4016	-0.1453	.0000	-1.8429	-0.2077	.0000
5-9 years	-0.7895	-0.0808	.0088	-1.0936	-0.1152	.0000
10+ years	0.4534	0.0838	.0132	0.1435	0.0254	.4305*
Maternal education						
No formal schooling	Rc					
1-6 years schooling	-0.3662	-0.0654	.0465	-0.2491	-0.0388	.1598*
7+ years schooling	-0.4813	-0.0807	.0240	-0.7325	-0.1264	.0001
Work status						
Not working	RC	RC				
Currently working	-0.5763	-0.1055	.0002	-0.6055	-0.1081	.0000
Constant	4.2435		.0000	4.5927		.0000
R ²	0.3329		.0000	.3839		.0000
Adj. R ²	0.3267			.3792		
Standard error	2.2107			2.2052		

Source: Computed by the author from the 1990 NFFS and 1995 FS data of Addis Ababa.

RC : Reference categories

* insignificant at five percent level of significance .

Both in 1990 as well as 1995 all the independent variables considered in the regression models are observed to correlate with fertility in the expected direction.

The regression result indicates that mortality of children (number of dead) has showed a positive relation with fertility. The B-value indicates that for every death of a child, there would be 1.46 and 1.53 children increase in 1990 and 1995 respectively. This result shows that there is a significant positive relationship between them that is also consistent with the bivariate result. In due course, the effect of child mortality would increase fertility (i.e. number of children ever born) which explain the variation more than 45 percent. Similar relationship was also observed in Yohannes (1994) and Abdulahi (1988).

One of the proximate determinant, age at first marriage has also strong negative relationship with fertility. As age at first marriage increase, the reproductive lifetime of women would be shortened, ultimately it would influence the lifetime fertility. Comparing the two surveys, for every year increase in age at marriage will decline fertility by 0.04 and 0.05 children for 1990 and 1995 respectively. The B-values in both surveys are statistically significant indicate that age at marriage strongly influence fertility negatively. The MCA result in the bivariate analysis has also come up with similar relation ship. Therefore, this will validate the hypotheses that increased in age at marriage could decline the life time fertility of the city.

Maternal education, is also other significant negative predicator of the model in both successive surveys. In the table 6.1 for instance, those women who are attending 7 and more years of schooling have 0.48 and 0.73 less number of children than those with no schooling women in 1990 and 1995 respectively. The variation explained in the model is 8 per cent in 1990 and 12 per cent in 1995 respectively.

The other socio-economic determinant of fertility observed in the analysis is the work status of women. The negative association between work status and fertility would reinforce the inverse relation. The effect of this variable is stronger in the 1995 than 1990. For instance, in 1990 women who are currently working have 0.57 while in 1995 0.60 less number of children compared to non-working women. This would substantiate the assertion that working women have less number of children than not working counterparts. The nature of relationship between work status and fertility according to WFS (1987), could vary across countries. Nevertheless, it is observed that in some countries irrespective of the type of work, a negative relationship with fertility was found (WFS, 1987:257). Hence, this result is very consistent to the WFS findings.

The migration status considered in the model was the duration of residence that is categorized into duration (0-4, 5-9, 10 and above years and reside since birth). In the model, recent migrants have less fertility than the non-migrant and the B-coefficients are statistically significant in both surveys. The short duration of residence has shown the negative relationship with fertility. For instance in the table 6.1, it is observed that those who reside less than 5 years have 1.4 and 1.8 less number of children than the non-migrants (lived since birth) in the respective surveys of 1990 and 1995. Similarly, women lived 5-9 years have also 0.8 and 1.1 less number of children compared to the non-migrants in 1990 and 1995 respectively. Interestingly, this finding proves the disruptive effect migration on fertility hypothesize by Goldstein and Goldstein (1982). Gradually, according to the Goldstein and Goldstein (1982), this effect will disappear over time, which is clearly observed in this study.

Regarding the order of importance of the predictor variables, child mortality, duration of residence, work status, maternal education and age at first marriage explain the model in

that order in 1990 while only the order of work status and education will interchange in the case of the 1995.

When the difference between the beta coefficients of 1990 and 1995 periods are considered for understanding the order of importance of variables, it is seen and understood that, the order of importance of the variables are as follows: duration of residence of the respondent (0-4 years), literacy level of the respondent (7+ years of schooling), duration of residence of the respondent (5-9 years), age at first marriage, child mortality and work status of women. Thus among all the independent variables literacy of the respondent (7+ years of schooling) is observed to be the second most important variable next to duration of residence that affects fertility.

Various studies have also supported the above findings for instance, regarding the effect of women's schooling and education on fertility UNFPA (1999:7) states that "Women who have been to school understand that proper care for children includes support for their education. The more education women have, the more education their children are likely to have. Educated mothers are more likely to invest in the health of their children and use information and services to protect their children's health."

Writing about the population growth and fertility control, Nobel Laureate Amartya Sen in his new book *Development As Freedom*, argues that " Women's empowerment, including female education, job opportunities and property rights, as well as other form of social change, are key instruments for reducing fertility rates-the number of children a woman bears-and slowing population growth." (Matter extracted from POPULI, 1999:5).

In due course, with an increase in the educational levels of females there would ultimately be a more decline in mortality of children, an improvement in the work status of

women and an increase in the age at marriage of women. Eventually, it results more decline in fertility levels of any population.

6.2 Proximate determinants of fertility

In section of the analysis, an effort is made to see the effect of proximate determinants of fertility. Specially, one of the major proximate determinants of fertility contraceptive use did not show the expected relationship with fertility (children ever born). Therefore, further attempt would be made to analyze its effect and other proximate determinants such as marriage pattern and postpartum infecundability using the current fertility, which was estimated using the Rele's method in chapter four. On the other hand, direct estimation of the effect of the Bongaarts' indices from the survey data has limitation due to no birth recorded a year before the survey in the age group 40-44 and 45-49 in the 1995 unlike the 1990. As result computation of indices become difficult due to incomplete birth data in 1995 survey.

Hence, in this section an attempt is made to find out the role of the Bongaarts indices C_m , C_c and C_i for a decline in TFR of Urban Addis Ababa during 1974 to 1998. As a first step Bongaarts indices C_m , C_c and C_i are estimated, for the time periods of 1974-79, 1979-84, 1984-89, 1989-94 and 1998, indirectly from the information on model estimates of ASFRs given in Table 4.3 of Chapter four. In the second step, the indices were examined for their role in the decline of fertility with the help of the procedure suggested by El-Khorazaty (1992).

Given a schedule of ASFRs one may derive the childbearing indices of mean age at first birth or simply age at first birth (AFB), mean age at last birth or simply age at last birth (ALB), and the mean reproductive life span or simply reproductive life span (RLS) indirectly

by using a life table approach suggested by Sivamurthy (1987). This procedure was further modified by Murthy (1996). However, one may also use the approach suggested by Horne, et al. (1990). Here, for its simplicity, the model suggested by Murthy (1996) is used in deriving the childbearing indices of AFB, ALB and RLS. All the above three procedures as a matter of fact produce almost the same values for the indices.

Once the childbearing indices are available, the Bongaarts indices can be derived indirectly from the childbearing indices, using the correspondence model suggested by El-Khorazaty (See, El-Khorazaty, 1992:77). For convenience the application of the life table approach to the 1974-79 ASFR data and the derivation of childbearing indices and the Bongaarts indices for urban Addis Ababa are given as illustration, along with the required formulae in appendix II.

Table 6.2.1 presents the trends in childbearing and Bongaarts indices over time for Urban Addis Ababa. Figure 6.2(a) and Figure 6.2(b) presents the above indices as line graphs. From the figures and the table we can see that the indices follow a specific pattern in their movement overtime.

Table 6.2.1 TFR, Child bearing indices and Bongaarts indices, Urban Addis Ababa, 1974-79 to 1998

Period	AFB (Years)	ALB (years)	RLS (years)	Cm	Cc	Ci	TFR
1974-79	22	38	16	0.70	0.86	0.73	5.26
1979-84	22	35	13	0.62	0.82	0.71	4.20
1984-89	23	33	10	0.53	0.79	0.71	3.17
1989-94	24	31	7	0.44	0.76	0.70	2.22
1998	25	30	5	0.39	0.74	0.70	1.75

Note: AFB: Age at first birth; ALB: Age at last birth; RLS: Reproductive life span ; Cm: Index of marriage; Cc: Index of contraception; Ci: Index of postpartum infecundability; TFR: Total fertility rate.

El-Khorazaty (1992:77) states that “contraceptive practice is the major fertility-inhibiting factor among women who stop childbearing before age 35 years.” Bongaarts and Potter (1983) have shown that “the TFR decreases with the decrease in C_m and C_c and the increase in C_i .” Similar to Bongaarts indices, the childbearing indices are observed to change in a particular direction with a decline in TFR. El-Khorazaty (1997:73) observed that “The TFR decreases with the decrease in the PALB and PRLS and the increase in the PAFB.”

It is interesting to see from Table 6.2.1 and Figures 6.2 (a) and 6.2(b) that while AFB is increasing in its value over time from 1974-79 to 1998, ALB and RLS are declining during the same time period. Similar way while C_m and C_c are declining from 1974-79 to 1998, C_i declined slightly or remained the same without much change during the same time period.

Interestingly the C_m , C_c and C_i values of 0.46, 0.70 and 0.71 arrived at by Abdulahi et al., (1994) using the 1990 NFFS data for Addis Ababa seem to be closer to the estimated values of C_m , C_c and C_i of 0.44, 0.76 and 0.70 arrived at in this study using the model estimates of ASFR and the childbearing indices given in Table 6.2.1. As a result, Abdulahi et al., (1994:31) conclude that “delayed marriage has the largest fertility inhibiting effect among the three proximate determinants in determining the current fertility level of urban areas including Addis Ababa.” which is consistent with this finding.

It is seen from Table 6.2.1, in the period 1989-94, that the estimated AFB is 24 years and the estimated ALB is 31 years. A table 6.2.2 summarizes the key fertility inhibiting factors responsible for the reduction from the theoretical total fecundity rate (TF) to the achieved TFR for each AFB / ALB combination is given below. This table is reproduced from El-Khorazaty (1992:77) for convenience.

**Figure 6.2 (a) Estimated child bearing indices, urban Addis Ababa
1974-79 to 1998**

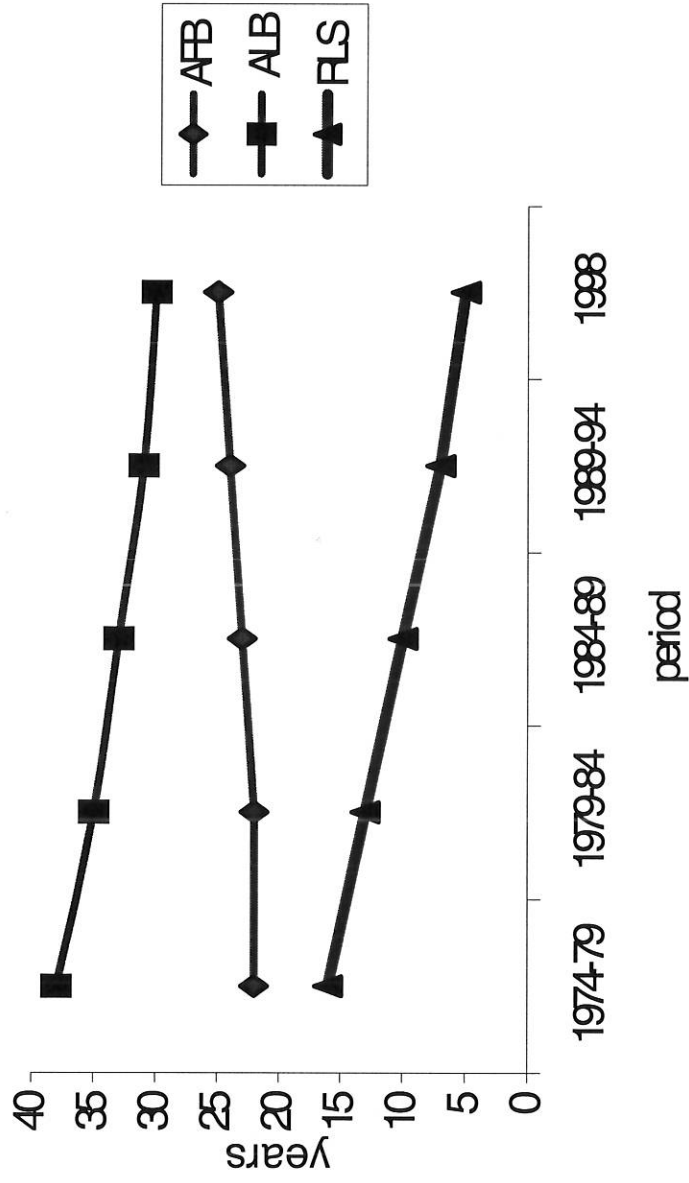


Figure 6.2(b) Estimated Bongaart indexes, Urban Addis Ababa, 1974-79 to 1998

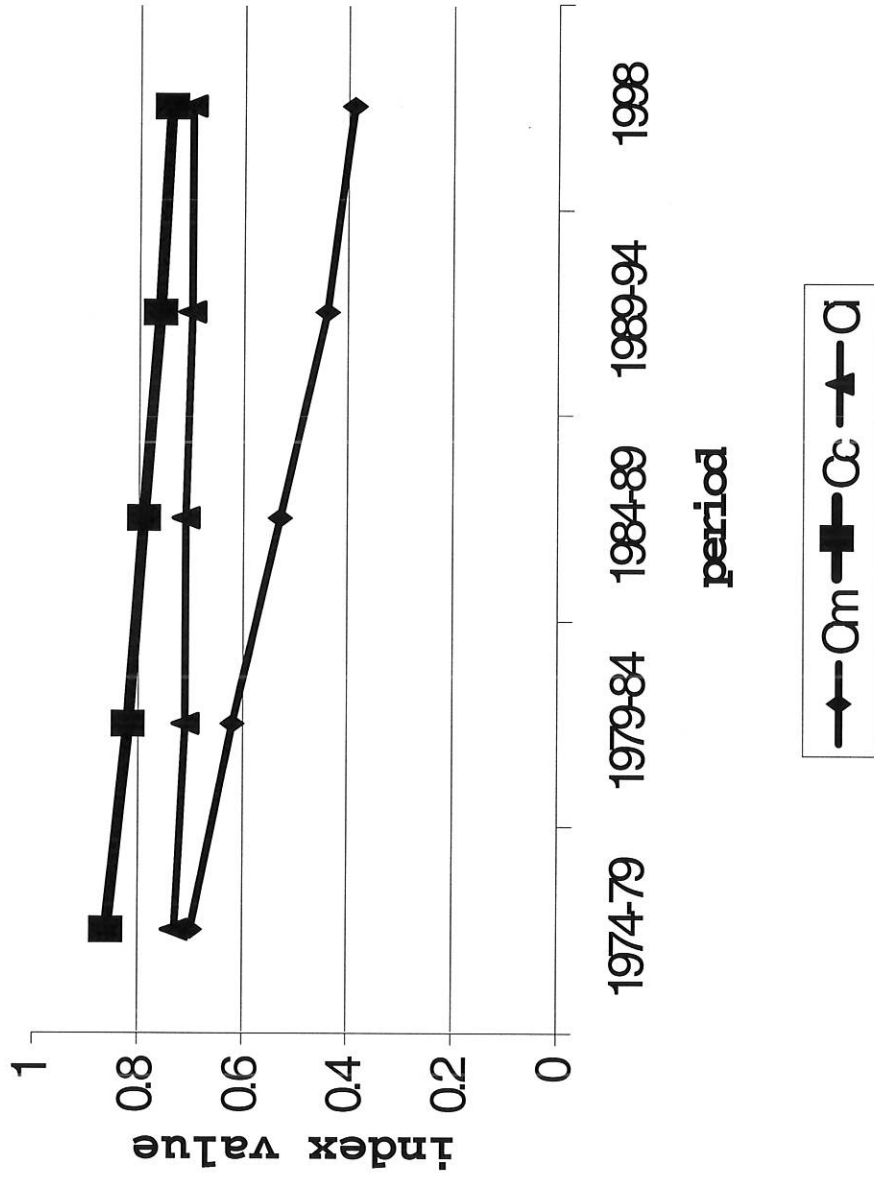


Table 6.2.2 summary table relating childbearing indices with Bongaarts indices

Child bearing indices	AFB (<22 YRS.)	AFB (22-23 YRS.)	AFB (24 + YRS.)
ALB (<35 YRS.)	Contraception	Contraception	Contraception
ALB (35-39 YRS.)	Infecundability	Marriage	Marriage
ALB (40 + YRS.)	Infecundability	Infecundability	Marriage

Source: El- Khourazaty (1992:77)

A comparison of the values of AFB, ALB and RLS given in Table 6.2.1 for urban Addis Ababa with that of the above table may reveal that:

- (1) During 1974-79 and 1979-84, marriage has played a great role for a faster decline in fertility of urban Addis Ababa,
- (2) During 1984-89, 1989-94 and 1998, definitely contraceptive use has played a great role for a faster decline in fertility of urban Addis Ababa,
- (3) However, the role of marriage for a decline in fertility of urban Addis Ababa even in 1998 is dominant and its role is far above the role being played by contraception and infecundability (see table 6.2.1)
- (4) An observation of Table 6.2.1 clearly shows that the role of infecundability in inhibiting fertility remained the same over time, probably due to the reasons that women who are educated and employed may not breast feed their children as frequently as the child requires.

Even in 1998, contraception is observed to have only 26 percent contribution for the decline in fertility of urban Addis Ababa. So the government has to take further action to make contraceptive use more popular and affective in order to bring down fertility further.

This particular exercise on childbearing indices and Bongaarts indices seems to prove the hypothesis made in the present study that age at marriage and contraceptive use have played great role for the fertility decline in urban Addis Ababa.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary

Ethiopia is one of the developing countries in Africa, experiencing a fertility decline in the recent past. Its fertility has declined by 10.4 percent from a level of 7.5 births per woman in 1984 to 6.7 births per woman in 1994. Like other developing countries, Ethiopia has also adopted a population policy in the year 1993 mainly in order to reduce its high fertility level. Recent studies made to understand the fertility declines in Ethiopia clearly shows that its fertility varied by regions. Furthermore, according to some studies, use of contraceptives has also increased to a considerable extent. Like other countries in fertility transition, even in Ethiopia the fertility was observed to vary by urban and rural areas and it was also noticed that urban fertility is lower than the rural fertility of many of its regions.

Addis Ababa, the capital city of the nation and also the most urbanized city, experienced a TFR level of 1.8 children per woman in 1994. According to CSA (1997:1) "This rate was considered to be very low for a city in a developing country." To reconfirm the above rate CSA conducted a special fertility survey for only Addis Ababa and after an investigative study the plausible estimate was declared to be 2.14 births per woman.

Keeping the above points and also the importance of the subject in mind, in the this thesis an attempt has been made to reinvestigate the levels of fertility of Addis Ababa as a first point. Secondly an attempt has also been made to find out the important determinants for fertility decline in Addis Ababa during the period of 1990 to 1995. It was hypothesized in the

thesis that contraception and age at first marriage are inversely related to fertility and lead to the decline in fertility.

The required data for the present study was taken from 'the 1990 National Family and Fertility Survey (NFFS) and the 1995 'Fertility Survey of Urban Addis Ababa (FSOUAA). Both surveys were conducted by the Central Statistical Authority and were sufficiently similar to allow the construction of comparable variables that could be used to study the determinants of fertility for the two time points of 1990 and 1995.

Chapter one in the thesis was devoted in presenting the essentials of the thesis. Namely, the statement of the problem, review of the literature, the conceptual framework, the objectives and hypotheses, the significance of the study and the organization of the study were treated. In chapter two an attempt was made to provide detail description about the data sources and an investigation was also made regarding the quality of data related to age, fertility and mortality. It was found that data of both 1990 NFFS and 1995 FSOUAA are of acceptable quality. However, there could be certain data reporting problems that are common for any data collected from a survey or census.

In chapter three, after presenting the profile of Addis Ababa city in general, further attempt was also made to present a profile the respondent women in the reproductive ages with respect to the demographic, social, cultural, economic characteristics interviewed successfully in the two surveys of 1990 NFFS and 1995 FSOUAA. It was seen from this chapter that there is great variation in the socio-economic and other conditions of the respondents of both 1990 and 1995 surveys.

Chapter four gives some of the important findings of the study. It is devoted to re-estimate and understand the fertility levels and trends in Addis Ababa over time. Using Rele's refined methodology TFR levels of Addis Ababa were estimated for the time periods of 1974-

79, 1979-84, 1984-89 and 1989-94; and the final estimates of TFR for the given time periods were observed to be 5.3, 4.2, 3.2 and 2.2 respectively. The TFR estimate of 2.2 children per woman in 1989-94 was observed to be very close to the TFR estimate of 2.1 suggested as plausible by CSA (1997:50). Thus one may consider the TFR of 2.2 children per women for the period 1989-94 as another plausible estimate. In the following section of this chapter an attempt was also made to provide a set of model ASFRs that correspond to the TFRs estimated by Rele's method. Using the ASFRs from 1974-79 to 1998 one would get a better picture of the fertility transition-taking place in Addis Ababa over time. It was seen that fertility has declined in every age group over time. The declines are observed to be much higher in the middle age groups of 20-24 to 35-39. The typical shape of the fertility curves observed for the periods of 1984-89 and 1998 seem to indicate the extensive use of contraceptives in the society.

Chapter five presented the differentials in fertility of the respondents women of Addis Ababa for 1990 and 1995. The results of the MCA showed great variation in fertility of women from one background characteristic to another such as ethnicity, religion, etc. Contrary to expectation contraceptive use was observed to have related with fertility (children ever born) positively. Ever users of contraceptives were observed to have higher fertility than the never-users of contraceptive (see Table 5.10). A number of reasons were provided in order to justify the unexpected relationship. It seems to be appropriate to quote here the reason given by Ogawa in connection with the Fiji example. Ogawa (1980:130) states that " It appears that unless the desired family size becomes substantially smaller and contraceptives are used for family limitation purposes, the use of contraceptives will not be inversely related to cumulative fertility." Further Owaga (1980:130) stated that "caution should be exercised with regard to the measurement of this indicator." Further the ANOVA test carried out to

find the important variables that explain the variation between different socio-economic groups. However, contraceptive use was not statistically significant in explaining variation of fertility (children ever born) for ever-married women in both 1990 and 1995 surveys. As such the variable use of contraceptives was discarded from the multivariate analysis of determinants of fertility. However, an attempt was made to analyze the important effect of contraception by studying the Bongaarts indices over time.

The results of multivariate analysis of selected socio-economic factors that affect fertility; and the proximate determinants of fertility were presented in chapter six. Among the independent variables considered in the multivariate analysis of 1990 and 1995 survey data, the variable respondent women's schooling level (7+ years) is observed to be the second most important variable that affects fertility. Other variables that were found to show their significant impact on fertility were child mortality, women work status, and duration residence.

In the last section of this chapter, in order to understand the contribution of the Bongaarts indices of C_m , C_c and C_i , to a fertility decline in Addis Ababa over time, an attempt was made to derive the Bongaarts indices indirectly from a simple set of TFRs. While C_m and C_c were observed to be declining over time from 1974-79 to 1998, C_i was seen to have remained comparatively constant over the same period. Even the indices of childbearing calculated indirectly from the life table approach also seemed to move in the expected direction with a decline in fertility over time. It is clear-cut from the findings of this section that marriage followed by contraception have played a great role for a decline in fertility of Addis Ababa over time. While the contribution of the index C_m was seen to be above sixty percent, the contribution of the indexes of contraception (C_c) and postpartum infecundability (C_i) are observed to be half of the contribution of C_m .

It is concluded from this study that while marriage pattern is contributing a great extent to the decline of fertility in Addis Ababa, the contribution of contraception is seen to be comparatively less. However, the contraceptive prevalence rate was observed to have increased to a considerable extent in the recent past. The socio-economic variables such as educational level and work status of respondent women contribute significantly for a decline of fertility of Addis Ababa during the recent period of 1990 to 1995.

7.2 Conclusion

The study concludes that, (i) the plausible estimate of fertility for Addis Ababa for the time period of 1989-94 is 2.2 births per woman. This rate is observed to be very close to the plausible estimate provided by CSA of 2.14 for 1994. (ii) Fertility in Addis Ababa is seen to have declined more due to the effect of marriage pattern when compared with contraceptive use. However, use of contraceptives seems to be started affecting fertility only recently, that is from the 1990s.

7.3 Recommendations

Based on the above research findings, the following suggestions may be recommended from a policy point of view:

1. It is observed that majority of the young women did not use contraceptives to limit their fertility, instead only for spacing purpose. Therefore, this may happen only when their desired number of children is reduced. So a number of incentives may be

introduced in the population policies to attract the women in the young ages to reduce their desired number of children which would ultimately reduce fertility further.

2. The study indicates that women married at latter age finally would have less number of children. Thus, increasing age at marriage could be one of the possible strategies for reducing fertility in the national scale. Further awareness and mass education is required for advocating the strategy beyond the paper work probably through educating of the public and creating employment opportunity for females.
3. The increasing trend of child mortality ultimately affects the fertility pattern. The study revealed that there is a strong positive relationship between them. As one possible approach to reduce high fertility in the country could be increase childcare management. This effort could secure the livelihood children, which could conversely reduce fertility gradually. To this effect, the role and support of voluntary organizations (NGOs) need to be sought to reduce the child mortality levels and to increase the use of contraceptives. Particularly, Maternal and Child Health services need to be strengthened.
4. The study also revealed that the work status and level of education have a negative impact on fertility. Women need to be encouraged to participate in labor force and educational system, which could have real impact on fertility decline. In due course, status of women needs to be improved by means of providing better education and Job opportunities.
5. Using the Bongaart indices attempt is also made to show the impact of the proximate variables. In this case, the role of contraceptive affects fertility next to marriage, therefore, it is important to encourage the younger generation to practice contraceptives since its impact for the older is very minimal.
6. Mass media facilities may be a better source to promote women's causes, to reduce mortality and to promote contraceptive use. So policies need to give more emphasis to

the information, education and communication (IEC) that would give more opportunity for dissemination of required information for the public at large.

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Appendix I

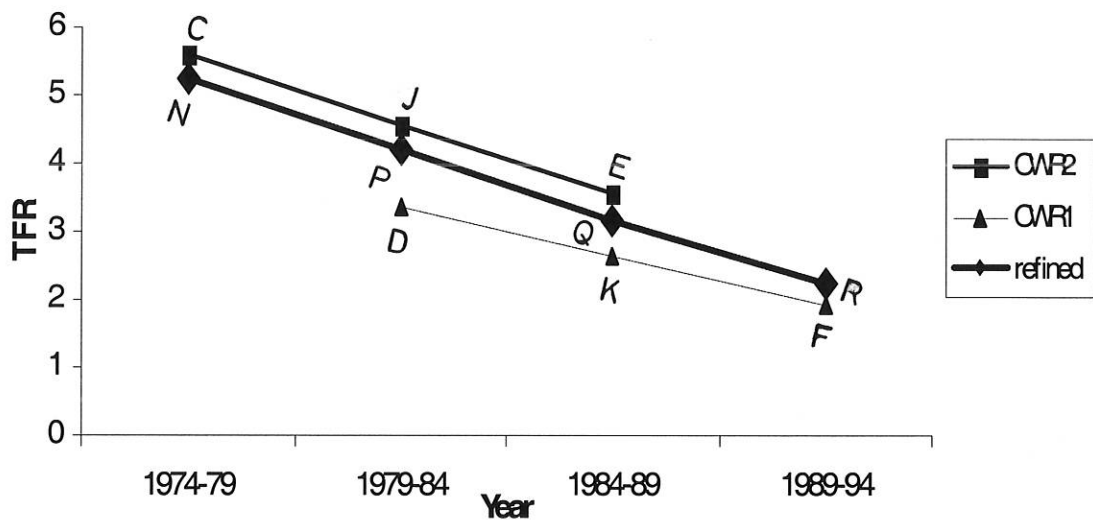
Coefficients of estimates of Total fertility rates (TFR) from child women ratio (CWR)

Types of Child women ratio	Coefficients*	e_0					
		20	30	40	50	60	70
C(0-4)/W(15-49)	a	0.1121	0.0582	0.0264	-0.0121	-0.0373	-0.0633
	b	9.7744	8.8751	8.3265	7.19109	7.5087	7.1399
C(5-9)/W(20-54)	a	0.0502	0.0217	0.0043	-0.0226	-0.0463	-0.0707
	b	11.2158	9.5116	8.6637	8.0934	7.5879	7.1383

Source: Rele 1988 p. 33 Table no. 1

* "Note: The estimates of the total fertility rate is obtained by $Y = a + bx$ for given e_0 , here Y is the total fertility rate and X is the child-women ratio (per women) C= child; W =women." (Rele 1988:33).

Figure 4.1 Rele's refined estimates of TFR



Technical notes (imitating Rele's 1987, 517-418) the preliminary estimates of the TFR from the reported unsmoothed age sex distribution are shown in figure 4.2 points C, D, E, F. These points represent two levels and trends shown by D,F, and C, E depending upon the estimates or based on children aged 0-4 and 5-9. The refinement is simply a means to combine these two levels and trends of fertility using suitable weight. The weight used in the present case to

combine the estimates of TFR obtained at two levels or 0.3 and 0.7. These are suggested by Rele (1987:517) for India and are obtained from the comparison of child women ratios based on unsmoothed and smoothed age-sex distribution of India, namely 1961, 1971 and 1981. The assumption made in the present study is that the weights suggested by Rele (1987:517) are quite applicable even to derive refined TFR estimates for urban Addis Ababa following Rele (1987) the TFR estimates to points corresponding to the points J, K, P, Q in the figure 4.2 are obtained using the formula;

$$J = 0.5(C+E), \quad K = 0.5(D+F), \quad P = 0.3D + 0.7J, \quad Q = 0.3K + 0.7E .$$

The formula used to estimate the end value N and R are; $N = C(P/J)$ and $R = F (Q/K)$. Thus the points N, P, Q, R are the final estimates and represent the level and trends of estimated TFR for urban Addis Ababa during the last two decades.

Appendix II

Computation of child-bearing indices using life table approach, Urban Addis Ababa, 1974-79

X	${}_5f_x$	${}_5a_x$	${}_5D_x$	l_x	${}_5L_x$	l'_x	${}_5L'_x$
15	0.08950	2.50103	0.63429	100000	408611	419	2700
20	0.24580	2.17621	0.27523	63429	187333	661	8219
25	0.25940	2.14787	0.25519	17458	50204	2401	31995
30	0.21950	2.23101	0.31816	4455	13864	9410	102885
35	0.15420	2.36706	0.45265	1417	5044	29575	242033
40	0.06760	2.54707	0.71081	642	2753	65337	391888
45	0.01690	2.65250	0.91919	456	2194	91919	478564
50				419		100000	
Sum	1.051				670003		1258282.8

Source: Life Table approach suggested by Murthy (1996) for estimating childbearing indices of MAFB, MALB and MRLS.

Definition of different columns in the non-reproductive life table

- i. x = The initial age of the age interval $(x, x+5)$ where x is the initial age and 5 is the width of the interval.
- ii. ${}_5f_x$ = Specific fertility rate for the age interval $(x, x+5)$;
- iii. ${}_5p_x$ = Probability that a women will not have a birth in the age interval $(x, x+5)$;
- iv. l_x = Number of childless women at age x in a life table with radix (Starting population) of 100,000 childless women;
- v. ${}_5L_x$ = Years stayed by women childless between age x and $x+5$;
- vi. l'_x = Number of women who have last birth at age x in a life table with radix (Starting population) of ultimate number of women not reproducing, i.e. l_{50} ;
- vii. ${}_5L'_x$ = Years stayed by women who have a last birth between age x and age $x+5$;
- viii. ${}_5a_x$ = Average number of years stayed non-reproductive in the age interval $(x, x+5)$ by those giving birth during that age interval.

Note: formula for computing above life table columns;

1) x = age of women

2) ${}_5f_x$ = Age specific fertility rate

3) ${}_5a_x = 5 + (1/{}_5f_x) - (5/(1-{}_5p_x))$.

4) ${}_5p_x = 1 - [{}_5f_x / (0.2 + (0.4625) {}_5f_x + (0.4167) ({}_5f_x)^2)]$

5) $l_{15} = 100,000$; $l_{x+5} = l_x * {}_5P_x$

6) ${}_5L_x = {}_5a_x * l_x + (5 - {}_5a_x) * l_{x+5}$

7) $l'_{15} = l_{50}$; $l'_{x+5} = l'_x + {}_5b'_x$

$${}_5b'_x = l_{15} * (1 - {}_5P_x) * {}_5P_{x+5} * {}_5P_{x+10} * {}_5P_{x+15} * {}_5P_{x+20} * {}_5P_{x+25} * {}_5P_{x+30}$$

8) ${}_5L'_x = {}_5a_x * l'_x + (5 - {}_5a_x) * l'_{x+5}$

Formula used in derivation of selected indices for the life table column

9) $MAFB = (15 * l_{15} + \sum {}_5L_x - 50 * l_{50}) / (l_{15} - l_{50}) = 21.58$

10) $MALB = (15 * l'_{15} + \sum {}_5L'_x - 50 * l'_{50}) / (l'_{15} - l'_{50}) = 37.512$

11) $MRLS = MALB - MAFB = 15.9$

where $MAFB$ = Mean age at first birth

$MALB$ = Mean age at last birth

$MRLS$ = Mean reproductive life span (years)

Computation of Bongaarts indices using the formula suggested by EL-Khorazaty (1992)

11) $C_m = (0.00044) * MAFB + (0.00935) * MALB + (0.02120) * MRLS = 0.698$

12) $C_c = (-0.16726) * MAFB + (0.19374) * MALB + (-0.17578) * MRLS = 0.858$

13) $C_i = (0.10295) * MAFB + (-0.07639) * MALB + (0.08595) * MRLS = 0.726$

DECLARATION

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



Asfaw Yitna W/ Michael

AAU,

June, 2000.

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Advisor

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Signature

18/6/2000

Date