

4

COMPARATIVE ANALYSIS OF PERTILITY,
INFANT AND CHILD MORTALITY IN SOMALI
AND AFFAR REGION

BY
TAMIRAT TESHOME

ADDIS ABABA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF STATISTICS

JUNE 1998

COMPARATIVE ANALYSIS OF PERTILITY,
INFANT AND CHILD MORTALITY IN SOMALI
AND AFFAR REGION

BY
TAMIRAT TESHOME



ADVISOR
ATO YILMA TEFERRA (M.SC)

A DISSERTATION SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE
B.SC DEGREE IN STATISTICS

ADDIS ABABA
JUNE 1998

ACKNOWLEDGMENT

I am greatly indebted to Ato Yelma Tefera for his valuable comments, guidance and moral support in the accomplishments of this paper. I am also grateful to W/t Rahel Tesfaye who helped me in the compilation of this manuscript.

I would like to express my gratitude to Central Statistical Authority (CSA) workers and to my friends for their in-expressibly stronger moral and material encouragements through out my works.

Finally my cordial tanks to my family who give me all sorts of assistances and moral support in the accomplishment of this project.

TAMIRAT TESHOME

TABLE OF CONTENTS

CHAPTER I	Background of the study	1
1.1	Introduction	1
1.2	Objective of the study	2
1.3	Statement of the problem	2
1.4	Organization of the study	2
CHAPTER II	Source and quality of data	3
2.1	Introduction	3
2.2	Source and limitation of data	3
2.3	Accuracy of data	4
CHAPTER III	Method of analysis	7
3.1	Introduction	7
3.2	Fertility	7
3.2.1	Definition of some terms and concepts	7
3.2.2	Measurement of fertility	9
3.2.2.1	Observed rates	9
3.2.2.2	Estimated rates	9
3.3	Mortality	10
3.3.1	Definition of some terms and concepts	13
3.3.2	Measurement of mortality	13
3.3.2.1	Observed rates	14
3.3.2.2	Estimated rates	14
CHAPTER IV	Results of the analysis	17
4.1	Introduction	17
4.1.1	Measurement of fertility	17
4.1.1.1	Observed fertility	17
4.1.1.2	Estimated fertility	23
4.2	Mortality	26
4.2.1	Measurement of mortality	26
4.2.1.1	Estimates of infant and child mortality	26
CHAPTER V	Conclusion and recommendation	32
APPENDIX		34
REFERENCES		39

List of tables

- Table 2.1. Value of whipple's index of urban and rural population of Somali region, 1997.
- Table 2.2. Value of whipple's index of urban and rural population of Affar region, 1996.
- Table 2.3. Value of age-sex accuracy index for Affar and Somali region in 1996, 1997 respectively.
- Table 4.1. Crude birth rate for Somali and Affar region.
- Table 4.2. General fertility Rate for Somali and Affar regions areas for Somali and Affar regions in 1997 and in 1996 respectively.
- Table 4.3. Age-specific fertility rate in rural and urban areas for Somali and Affar regions in 1997 and in 196 respectively.
-
- Table 4.4. The mean age of child bearing for Affar and Somali regions.
- Table 4.5. Total Fertility rates for Somali and Affar region in 1997 an in 1996 respectively.
- Table 4.6. Adjusted Fertility Rates for Somli region.
- Table 4.7. Adjusted Fertility Rates for Affar region.
- Table 4.8. Adjusted probability of dying, $q(x)$ and of surviving, $L(x)$ and reference period, $t(x)$ using west model for Somali region.
- Table 4.9. Adjusted probablity of dying, $q(x)$ and of surviving, $L(x)$ and reference period, $t(x)$ using west model for Affar region.

Chapter I

Background of the Study

1.1. Introduction

Demograph is a population science and its defined as the natural and Social history of human species or the mathematical knowledge of the population, and their general change and moral conditions. It is concerned with the size, stracture distribution and change of population.

The study that delas with the quantitative aspects of population of a community be it a village nation or the entire world is called Demographic Statistics. The statistic relate to social, economic and health characterstics, to geographic distribution; they may have reference to one point in time or to changes in course of time (shryock, 1976).

In this research, the major aim is to make comparative analysis of fertility level, infant and child mortality of Somali and Affar regions.

Somali region is located in South - eastern part of Ethiopia. Its neighbouring regions are Oromia from the east and Affar from the north - west. This region lies in the South - east low lands of Ethiopia with altitudes ranging from 400 - 1900 meter above sea level Generally its characterized by warm day and warm and windy night with an average temprature of 34⁰c. Somaligna is the official language in the region and other dialects are also common.

Somali regions consists of nine administrative zones, 44 weredas and 67 towns. The urban part of the region has 136 kebeles.

The 1994 field enumeration for Somali Region was found to have problems. Therefore, the field enumeration for Somali region was repeated from 11 September through 14 November 1997. According to this census the total population of the Somali region was found to be 3,439,860 of which 1,875,996 were male and 1,563,864 were females. This figure include both the areas covered in census and the area not covered in the census. The areas not covered during the census are all in rural areas and constitute 56,695 persons (CSA, 1998).

Affar region is located in the eastern part of Ethiopia. It's neighboring regions are Somali from east, Oromia from the Soth and Ahmara from the west. Most of part of this region is located in the Affar depression with altitude ranging from 215 - 2000 above see level. Generally these region is characterized by warm day and night with an average temperature of 40⁰c. Affarignal is the official language of the region and other diolects are also common.

The Affar region constists of five administrative zones, 29 weredas, and 28 towns. The rural part of the region has 326 farmars association, while the urban part has 32 kebeles.

The 1994 census for Affar region, like Somali region, have a problem of consistency. Because of this the field enumeration for Affar region was repeated from 2nd through 31st July 1996. According to this

census the total population of Affar region was found to be 1,106,383 of which 626,839 were males and 479,544 were females. This figure include both the areas covered by the census and not covered by the census. The areas not covered by the census were all in rural area (CSA, 1996).

1.2. Objective of the Study

The major objective of the study are:

- To estimate the level, pattern and trend of fertility and infant and child mortality of Somali and Affar region.
- To compare the level of fertility, infant and child mortality of Somali and Affar region.
- To compare the health status and the living standard of the population of the two regions by comparing infant and child mortality and fertility rates.
- To draw appropriate conclusions and recommendations on the basis of the results.

1.3. Statement of the problem

Today in developing countries, like Ethiopia, mortality and fertility play a dominant role in the development of a country. This is due to the fact that these two demographic measures have direct relationship to the growth of population. And also the results of analysis of fertility and mortality is important for planners, policy makers, administrators and researchers.

1.4. Organization of the study

The study consists of the following chapters.

- Chapter I: Deals with the background of the regions under study, the major objective of the study and the statement of the problem under study.
- Chapter II: Presents the sources and limitation of the data, assesses the quality of the data.
- Chapter III: This chapter gives definitions of same terms and concepts and clear note on measures of fertility and mortality.
- Chapter IV: Analyze fertility using the stated fertility and estimated infant and child mortality measures for the available data.
- Chapter V: This section gives conclusion and recommendation for the two regions.

Chapter II

Source and Quality of data

2.1 Introduction

This chapter deals with the source and limitation of data and also on checking the quality of data that are going to be analyzed .

2.2 Source and limitation of data.

The availability of data is very important for any research . The researchers must first know which kinds of data of he/she has to use (i.e. either primary or secondary)

In our study , we use secondary data from National census conducted by CSA on Somali region in 1997 and on Affar region in 1996 . The data used in the analysis are given in the appendix .

The data obtained from CSA for the two regions have problem in areas of coverage ; as far as Somali region is concerned , the rural part which is not covered by the census includes same woredas of Shinile , Fig. Gode and Afder zones (CSA , 1996). Concerning the Affar region the areas that were not covered during the census were one Fa in Dalul woreda and part of another fa in Ab Ala (CSA , 1997). However in order to have an approximate size of the total population of the region, an estimate of the population size of the uncovered areas were taken .

Besides , the morality and fertility figures were subjected to different errors during the census age of the respondents were registered incompleted years , sex misreporting , misreporting of events; that is , event of one year are shifted to another year (CSA , 1996 , 1997 report book)

2.3 Accuracy of the data

In most developing countries , like Ethiopia, it's difficult to obtain reliable data . The data which is collected by CSA , may contain different kinds of errors and this errors are coursed by different factors among those the main ones are the following .

i. Inaccuracy in Count

This includes coverage errors (i.e. over counting and under counting), and the other is the differential completeness of coverage of the two sex .

ii. Inaccuracy in reporting and recording

This includes the age misreporting and sex misreporting (i.e. attendance for one sex to be reported at the expense of the other).

To measure digit preference we can use whipple's index , and for the age sex misreporting the united nation index (UN Index) is going to be used .

a) Whipple's index

Whipple's index measures the relative preference of digits '0' and '5' while reporting age , in the age interval 23 to 62 . This index is denoted by IW and defined as

$$IW = \frac{P_{25} + P_{30} + \dots + P_{60}}{\sum_{x=23}^{62} P_x}$$

Where P_x : is the number of persons at age X . The rating of the quality of data for different value of whippe's index is given below.

<u>Quality of data</u>	<u>Whipple's index</u>
1. Highly accurate data	100 - 104.9
2. Fairly accurate data	105 - 109.9
3. Approximate data	110 - 124.9

4. Rough data 125 - 174.9
5. Very rough data 175 - 500

The indexes for rural and urban population of the Somali and Affar regions computed based on the data from the 1997 and the 1996 censuses respectively were given in .

Table 2.1 Value of whipple's index of urban and rural population of Somali region , 1997

Sex	Urban	Rural	Total
Male	299	269	243
Female	303	256	263
Both sexes	301	262	268

Table 2.2 Value of whiple's index of urban^{and} rural population of Affar region , 1996

Sex	Urban	Rural	Total
Male	258	232	235
Female	266	216	222
Both sexes	285	224	229

Generally , the whipple's indexes computed for the two regions shows high preference of the digits '0' and '5' while reporting age . This results also indicate age data of the reasons is grouped in to very rough data categories even though the data for rural areas look slightly better than the urban areas which is unusual .

b) UN AGE - SEX ACCURACY INDEX

The accuracy of the age - sex distribution of the two populations checked by employing the age - sex accuracy index developed by UN censuses age - sex data were described by the united Nation as accurate in accurate or highly in accurate depending on whether the UN index is under 20 , 20 to 40 , over 40 , respectively .

The steps to calculate the age - sex accuracy index are the following

Step 1 Compute the sex ratio (SRI)

$$S_{ri} = \frac{P_{i-}^m}{P_x^f} \times 100$$

Where i = age group

p_i^m = Male population in the i age group

p_i^f = Female population in the i age group

Step 2 Find the successive differences of SR

$$i-e S_{di} = S_{ri} - S_{ri}$$

Step 3 Find the age ration (ARI) for both sexes

$$A_{ri} = \frac{P_{i-}}{P_{total}} \times 100$$

Step 4 Compute the deviation of A.R from 100.

$$A_{di} = A_{ri} - 100$$

Step 5 The age - sex accuracy index is given by

$$I = \frac{3 \sum /S_{di}/}{n_1} + \frac{\sum /A_{di}^m/}{n_2} + \frac{\sum /A_{di}^f/}{n_2}$$

Where n_1 : number of S_D

n_2 : number of A_D

The age sex accuracy index computed for 5 year age groups of both the rural and urban areas of the two regions based on the 1996 and 1997 census respectively are given in Table 2.3

Table 2.3 Value of age - sex accuracy index for Affar and Somali region in 1996 , 1997 respectively

UNITED NATIONS INDEX

SECTOR	AFFAR	SOMALI
RURAL	76.1	85.3
URBAN	83.5	101.2
TOTAL	92.0	96.2

The UN age - sex accuracy index for urban / rural area of the two region indicates the age - sex data are grouped in to highly in accurate categories . However , compared to urban areas , the age data for rural areas look slightly better in both regions which is unusual .

CHAPTER III

METHODS OF ANALYSIS

3.1 Introduction

Fertility, mortality and migration are three major Components of population dynamics which determine the level of population growth. These three variables play important role in changing the size and stricture of the population of an area. For example births Contributes to increasing the number of infants; death drain out people at all ages, migration either infrates (in- migration) or deflates (out - migration) the size of the population of the area.

In this chapter the methods employees to achieve the objectives of the study will be discussed.

3.2 Fertility

It has been widely argued that among the three major dynamic elements of population aspect fertility form all important Component in the determination of demographic characteristics of the population.

3.2.1 Definition of Some Terms and Concepts

Here it's important to give some basic definitions of terms and concepts of fertility before we proceed to the analysis.

- Live Birth

It is defined as (Shyrock and Seigel, 1976) the complete explosion or extraction from it's mother of a product of conception, irrespective of the duration of pregnancy which after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of umbilical cord, of definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is detached.

3.2.2 Measurement of Fertility

Generally we distinguish, two different measurement of fertility rate.

3.2.2.1 Observed rates

Observed rates are measures computed from the actual data.

1. Crude birth rate (CBR)

It is defined as

$$CBR = B/P \times 1000$$

Where B: is the total number of births registered
during the calendar year

P: is the total population at the middle of the
year

Generally CBR indicates the contribution of fertility to growth rate directly

2. General fertility rate (GFR)

It's defined as

$$GFR = \frac{B}{P_{15-49}^f} \times 1000$$

Where B : is the number of birth registered during the year

P_{15-49}^f : mid year female population in 15-49 year of age

3. Age - Specific birth rate (ASBR)

It's given or defined by

$$f_a = \frac{B_a}{P_a} \times 1000$$

Where f_a : is fertility rate at age a of women.

B_a : is the number of live births to women at age a.

P_a^f : is female mid year population of age a , $15 \leq a \leq 49$

4. Mean Age Child bearing

It is defined as the mean age of mothers at the birth of their children. It's defined as

$$\bar{x} = \frac{\sum_{i=1}^7 x_i f_i}{\sum_{i=1}^7 f_i}$$

Where f_i : is age specific fertility rate

x_i : is the mid point of each age interval

5. Total fertility Late (TFR)

TFR refers to the number of children a woman is likely to produce at the end of her reproductive period. Given the current age schedule of fertility rates TFR is given by

$$TFR = 5 \sum_{i=1}^7 f_x$$

Where f_x : age specific fertility rate per the i^{th} age group

3.2.2.2 Estimated rates

Data on total number of Children everborn may be distorted by under reporting the number of children and in the classification of women in particular groups as well as by inclusion of still births of late fatal deaths among live-born children (Manual X). Hence estimation of fertility directly using census data results gives poor estimations. To adjust fertility for the underreporting of births indirect technician were employed.

The indirect estimation technique of fertility is based on children everborn. One of the techniques is the Brass fertility estimation procedure (P/F ratio method).

The Brass method (P/F ratio method)

This method attempts to adjust observed age specific fertility rates with always parities of children everborn to women in the age group 15-49. Parity is the total child bearing experience of women in the past and is given by

$$P(i) : \frac{CEB(i)}{P^f(i)} \quad f_n, \quad i = 1, 2, \dots, 7$$

Where $p^f(i)$: is female population in age group i

CBE (i) : is children everborn in the age group i

Before starting the procedures of the (p/F) ratio method, it is wise to have the assumptions.

1. Constant fertility in the recent past
2. Reasonable accuracy in the data, that is the data available are not subject to high age misreporting.
3. Births are uniformly distributed within a year
4. The fertility experience of those women who die is the same up to the age at death as that of those who survive.
5. Women at age Younger than 30 report children ever has (CEB) more accurately.

a) Data required

- i The number of children everborn for each 5- years age group of mother.
- ii The number of births in the year preceding the census for each five year age group of mother.
- iii The total number of Women in each year age group (irrespective of marital status);
- iv The total population if the birth rate is to be estimated.

b) Computational procedure

Functions are indexed by i or j where $ij=1$. for age group of women 15-49 and goes in this manual up to $ij = 7$ for age group 45-49

Steps to be followed.

Step 1 Calculate the average parities given by

$$P(i) = \frac{CEB(i)}{P_{(i)}^f} \quad i = 1, 2, \dots, 7$$

Where $CEB(i)$: is children ever born in age group i
 $P_{(i)}^f$: is female population in age group i

Step 2 Calculate

$$f(i) = \frac{B(i)}{P_{(i)}^f}, \quad i = 1, 2, \dots, 7$$

Where $f(i)$: is fertility rate of women in age group i

$B(i)$: is total birth given by women in age group i

$P_{(i)}^f$: female population in the age group i

Step 3 Compute the Completed fertility schedule

$\varnothing(i)$, which is given by

$$\varnothing(i) = 5 \left[\sum_{j=0}^i f(j) \right]$$

Step 4 Estimation of average parity equivalents for aperiod it's given by

$$F(i) = \varnothing(i-1) + a(i) f(i) + b(i) f(i) + c(i) \varnothing(7)$$

Where $F(i)$: Average parity equivalent

$\varnothing(i)$ cumulated fertility rate .

Where a, b and c are constants read from Manual X.

$F(7)$ were estimated by

$$F(7) = \varnothing(6) + a^* f(6) + b^* \times f(7)$$

Step 5 Calculation of fertility Schedule for conventional 5- year age group

$$f^+(i) = [1 - W(i-1)] f(i) + W(i) f(i-1) \quad ; \quad i = 1, 2, \dots, 6.$$

$$f^+(i) = [1 - W(i-1)] f(i) \quad ; \quad \text{for } i = 7$$

Where $f^+(i)$ is adjusted age fertility rate

$$W(i) = \frac{X(i) + Y(i) f(i) + Z(i) f(i+1)}{\phi(7)}$$

$$\phi(7)$$

No weighting factor ($w(i)$) is needed for $i=7$, since the child bearing is assumed to cease after age 50. But $f^+(7) = [1 - 1W(6)] f(7)$

Step 6: Adjustment of period fertility schedules. Here we first compute the P/F ratio for each age group. In order to compute the adjusted fertility Schedule we need to calculate the multiplying factor, denoted by K .

$$K = \frac{P_{20-24}^f}{P_{20-29}^f} \times \frac{P(2)}{F(2)} + \frac{P_{25-29}^f}{P_{20-29}^f} \times \frac{P(3)}{F(3)}$$

then the adjusted age Specific fertility rate i given by :

$$f^*(i) = K f^+(i)$$

3.3 Mortality

Mortality deals with death and represents the role of death in population change. One of the importance of analyses of mortality statistics in to know whether or not a population is growing (or diminishing) by Comparing births and deaths.

3.3.1 Definitions of Some terms and Concepts.

Death : is the permanent disappearance of all evidence of life at any time after live birth has taken place . This definition indicate that it excludes fetal deaths that is , deaths prior to birth . The events still birth , miss - carriages and abortions in popular , medical on legal usage are included in fetal death .

Still birth is often defined as late fetal death, say a fetal death of 20 or 28 completed weeks of pregnancy

Miss-carriage refers to Spontaneous or accidental terminations of fetal life occurring early in pregnancy. And also abortion is popularly used to refer to induced early deaths including both these which are legal and illegal.

- Expectation of life at birth (e^0) :- refers to the average number of years a newborn baby is expected to live if he / she is exposed throughout his/her life to the prevailing pattern of age specific death rate.

3.3.2 Measurement of Mortality

- Measures of mortality can be grouped into two classes.

3.3.2.1 Observed rate

- Observed rates are obtained from actual data

1. Crude Death Rate (CDR) it is defined as

$$CDR = \frac{D}{P} \times 1000 ;$$

Where D : is number of deaths in a year

P : mid year population

2. Age - Specific Death Rate (ASDR) : It's defined as

$$ASDR = \frac{{}_nD_a}{{}_nP_a} \times 1000$$

Where ${}_nD_a$: is the number of deaths between age a and (a+n)

${}_nP_a$: is number of persons aged between age a and (a+n)

3.3.2.2 Estimated rates

Child mortality is indicated by the proportions of Children everborn who have died. In order to estimate these mortality indexes the Trussell Variant of the Brass Indirect Technique (UN, 1993) was employed and the lowest family of the coal and Demand Model Life Tables were Selected as Standard Pattern of mortality.

Now, before Stating the Computational procedure its important to state the assumption that has been developed.

1. The risk of dying of a child is exclusively determined by the age of the child.
2. Recent year, fertility and Child hood mortality have remained Constant.

a) Data required

- i) The number of Children everborn, classified by sex and by year age group of mothers .
- ii) The number of Children Surviving (or the number dead) classified by sex and by five year age group of mother.
- iii) The total number at women (irrespective of Marital Status), classified by five - year age group.

b) Computational procedure

Step 1 : Calculate average parity per women

$$P(i) = \frac{CEB(i)}{FP(i)}$$

Where CEB(i) : is the number of Children ever -born in age group i.

FP(i) : is the total number of women in age group i.

Step 2 : Calculate the proportion of Children dead, D (i), for each age group of mother.

$$D(i) = \frac{CD(i)}{CEB(i)}$$

Where D(i) : is the number of Children deal reported by women in age group i.

Step 3 : Calculation of multipliers

$$K(i) = a(i) + b(i) \frac{p(1)}{p(2)} + C(i) \frac{p(2)}{p(3)}$$

Here, its assumed that the west family of Model is an adequate representation of mortality. The value of $a(i)$, $b(i)$ and $c(i)$ are given in Manual x.

Step 4 : Calculation of the probability of dying and Surviving.

$$q(i) = K(i) D(i)$$

The probability of Surviving can be Computed by

$$L(i) = 1 - q(i)$$

Step 5 : Calculation of the reference period.

$$t(i) = a(i) + b(i) \frac{p(1)}{p(2)} + c(i) \frac{p(2)}{p(3)}$$

Where $a(i)$, $b(i)$ and $c(i)$ are Constants obtained from Manual X.

CHAPTER IV

Result of Analysis

4.1. Introduction

This chapter presents the comparative results of fertility level, pattern and trends, as well as infant and child mortality for Affar and Somali regions using the 1996 and the 1997 census of Ethiopia, respectively. For this purpose results from direct and indirect techniques of analysis of fertility, infant and child mortality were used.

4.1.1. Measurement of Ferility

4.1.1.1. Observed Fertility

Based information on the number of births, the following measures of fertility were computed.

1. Crude birth rate

The crude birth rate for the two regions is summarized in Table 4.1. below.

Table 4.1. Crude birth rate for Somali and Affar regions

Somali				Affar		
Sector	No. of birth	Population	CBR	No. of birth	Population	CBR
Urban	11,118	492710	22.5	2,351	85,819	27.4
Rural	46,781	2947150	16.2	18,256	1,012,305	18.0
Total	57,899	3439860	17.1	20,607	1,098,184	18.8

The above table reveals, the crude birth rate for Somali region as a whole was 17.1 per 1000 population whereas 13.8 per 1000 population for Affar. This indicates that, in 1997 in Somali region and in 1996 in Affar region, 1000 persons would have a total of 17 and 19 children respectively.

Here rural areas of both regions relatively have lower births than urban areas. This is for from the expected results.

2. General Firtility Rates (GFR)

The GFR of the two regions is summerized in Table 4.2 below.

Table 4.2 General firtility Rate for Somali and Affar regions.

Somali				Affar		
Sector	No. of birth	Female population (15-49)	GFR	No. of birth	Female population (15-49)	GFR
Urban	11,118	106,056	104.8	2,351	23,842	98.6
Rural	46,781	568,728	82.3	18,256	208,509	87.6
Total	57,899	674,784	85.8	20,607	232,351	88.7

The above table shows the GFR's are 85.8 and 88.7 per 1000 women at their reproductive ages in Somali and Affar regions respectively. This indicate, achort of 1000 women of child bearing age would have 86 and 89 childeren in Somali and Affar egion respectively. This rate is higher in urban than in rural. Concerning to the regional comparisions, TFR of Affar region as a whole is higher than Somali region, but these rate for urban areas of Affar region is smaller than urban area of Somali region.

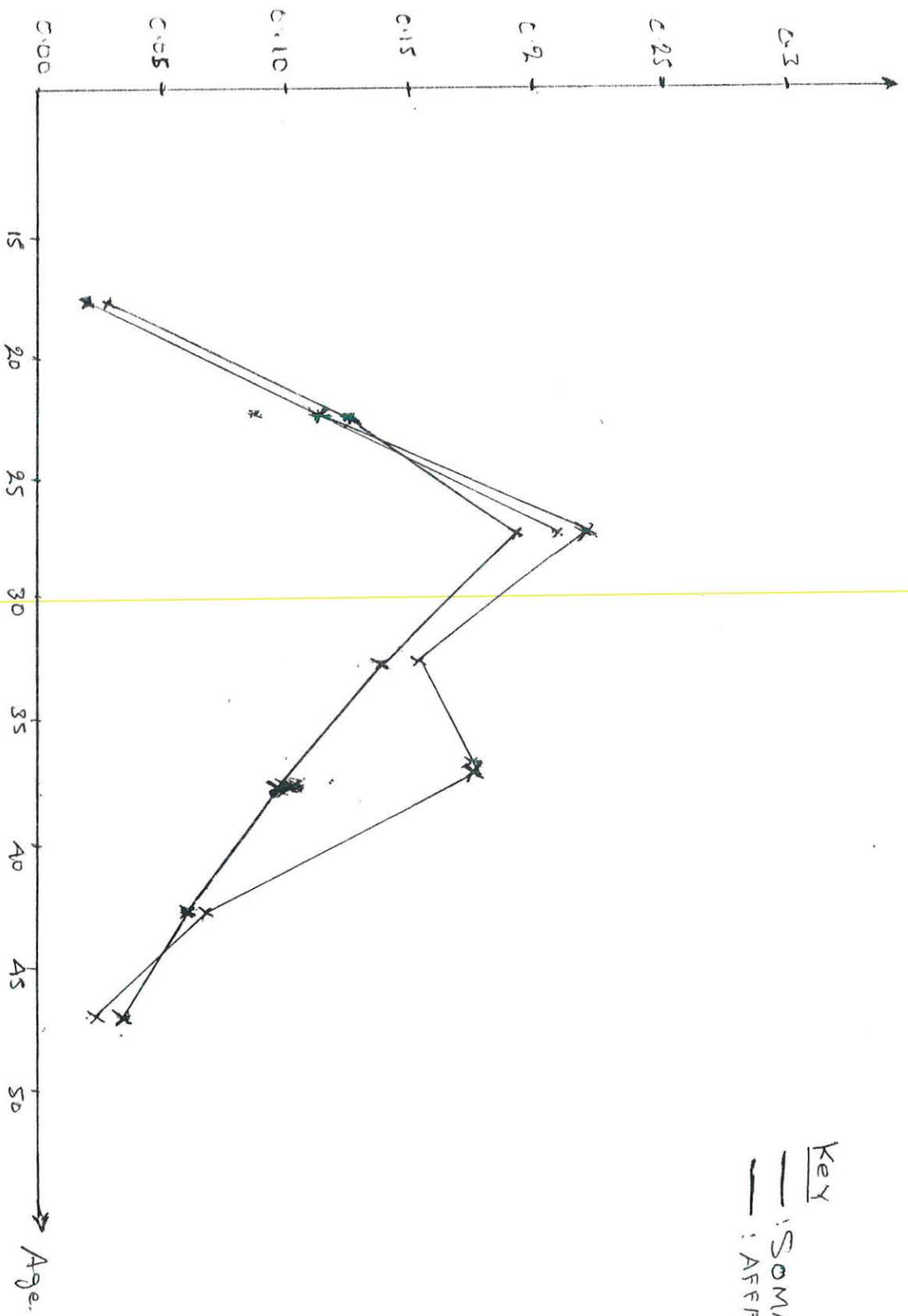
3. Age - Specific birth rate

Age-specific firtility rate for both rural and urban areas and for the two regions as a whole are given in Table 4.3. The rates are presented in Fig (4.1), Fig (4.2) and Fig (4.3) for urban, rural as well as for the two regions as a whole respectively. Fertility rates are high in all age-group excepting the youngest (15-49 years) and the oldest (45-49). In both regions highest and lowest age-specific fertility rate is obsrned in age-group (25-29) and (15-19) respectively. In comparisions high fertility rate is observed in Somali region. The observed pattern by age group holds true for both rural and urban areas.

Table 4.3. Age - Specific fertility rate in rural and urban areas for Somali and Affar regions in 1997 and in 1996 respectively.

Age group	Somali									Affar								
	Total			Urban			Rural			Total			Urban			Rural		
	No. of Women	Birth	ASFR	No. of Women	Birth	ASFR	No. of Women	Birth	ASFR	No. of Women	Birth	ASFR	No. of Women	Birth	ASFR	No. of Women	Birth Asfr	ASFR
15-19	170,033	2,430	0.014	27,467	329	0.012	142,566	2,101	0.015	49,865	758	0.015	4,905	110	0.023	44,960	647	0.014
20-24	111,705	10,808	0.097	18,821	2184	0.116	92,884	8,624	0.093	37,409	3,247	0.087	4,373	531	0.121	33,036	2,716	0.082
25-29	99,834	15,756	0.158	16,899	3,500	0.207	32,933	12,256	0.148	35,008	4,773	0.136	4,431	798	0.180	30,577	3,925	0.130
30-34	100,673	13,521	0.134	15,563	2,416	0.155	85,110	11,105	0.130	38,951	4,890	0.126	3,831	483	0.126	35,120	4,407	0.125
35-39	77,903	9,119	0.117	11,642	1,916	0.165	66,061	7,203	0.109	30,274	3,430	0.113	3,384	297	0.088	26,890	3,133	0.117
40-44	77,830	4,930	0.063	10,605	697	0.066	67,282	4,233	0.063	27,486	2,260	0.082	1,927	98	0.051	25,559	2,162	0.085
44-49	36,949	1,335	0.036	5,059	76	0.015	31,890	1,259	0.039	13,358	1,249	0.094	991	33	0.033	12,367	1,216	0.098

Fig 4-1 Age Specific Fertility Rate for Urban Area of Somali and Afar Regions



Key
 --- SOMALI
 — AFAR

Fig 4-2 Age Specific Fertility Rate for Somali and Afar regions

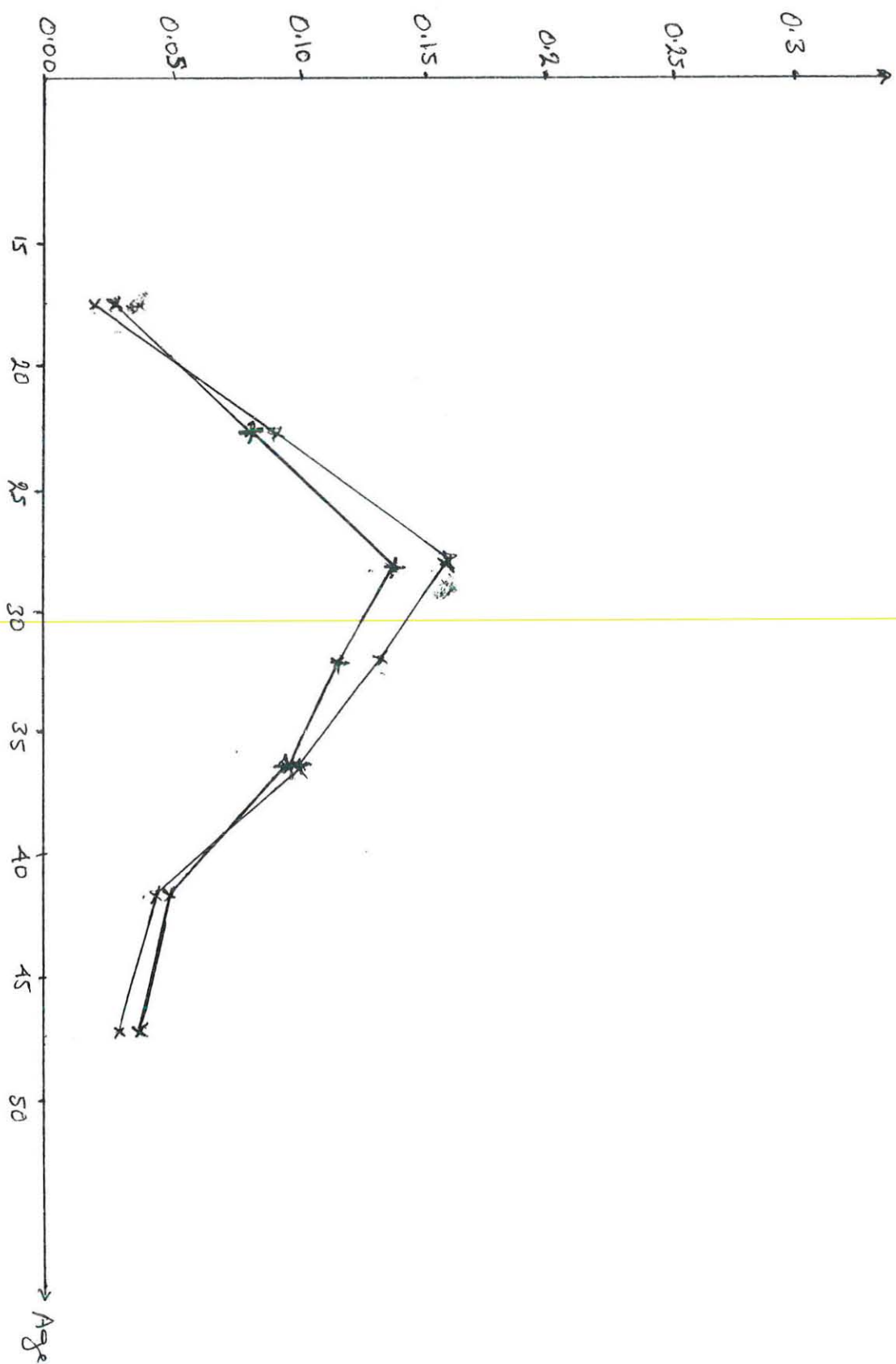
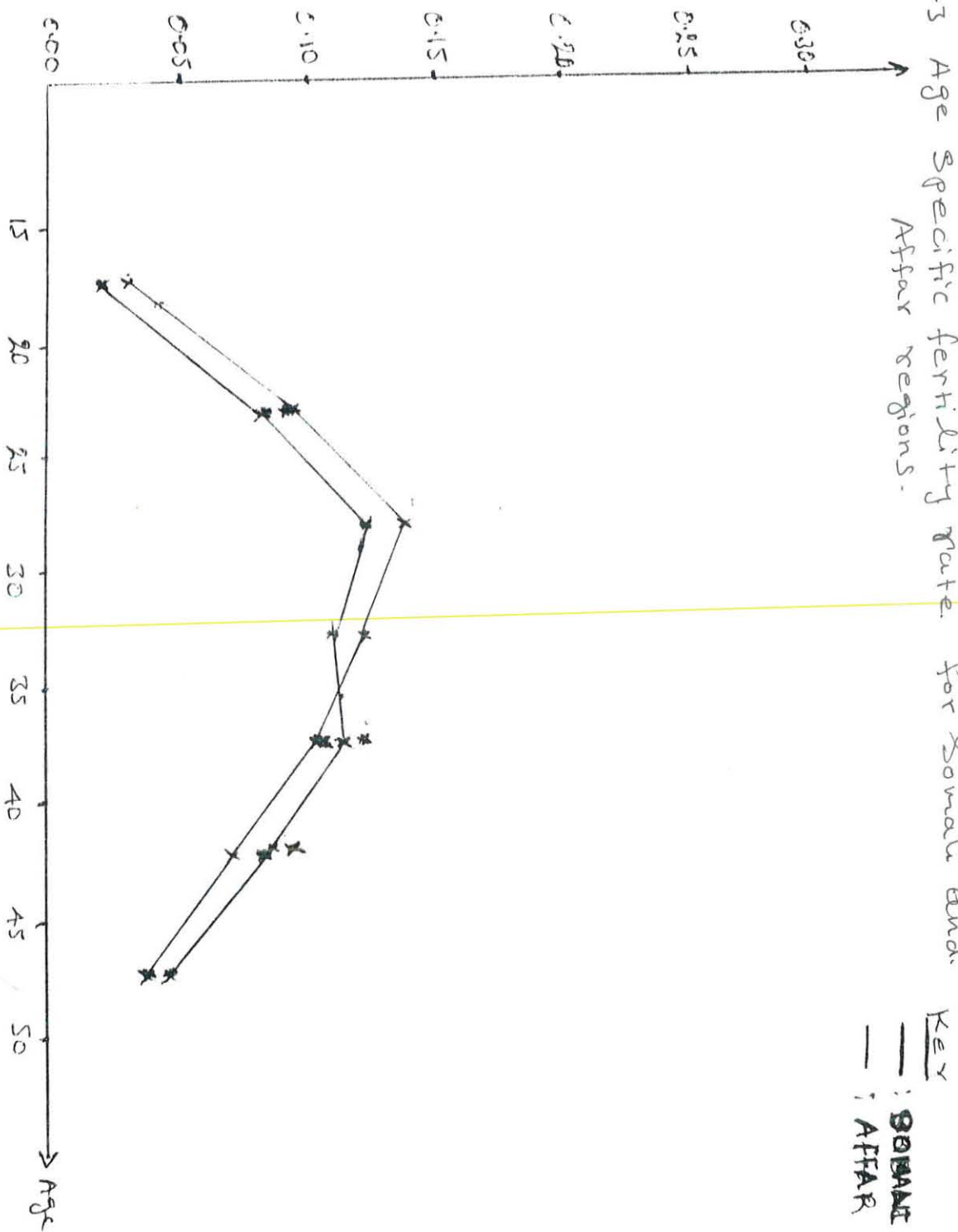


Fig 4-3 Age specific fertility rate for Somali and Affar regions.



4. Mean Age of child Bearing

Table 4.4 below summerizes the mean age-child bearing for the two regions.

Table 4.4. The mean age of child bearing for Affar and Somali regions.

Somali		Affar
Sector	Mean age child bearing	Mean age child bearing
Urban	31.596	26.898
Rural	34.187	34.382
Total	32.153	34.062

The above table shows the mean age of child bearing for Somali women (32.153) as a whole were smaller than Affare region women (34.062). The urban mean age of child bearing were smaller than rural in the two regions, but Affar urban women have their child at carlier ages than the Somali.

5. Total Fertility Rates

Table 4.5 below summerizes the Total Fertility Rate for Affar and Somali regions in 1996 and 1997 respectively.

Table 4.5 Total Fertility Rate for Somali and Affar region in 1997 and 1996 respectively.

Sector	TFR for Somali	TFR for Affar
Urban	3.7	3.1
Rural	3.0	3.3
Total	3.1	3.3

The total fertility rate for Somali and Affar regions were 3.1 and 3.3 respectively (see Table 4.3). The figure indicates that on average of 3 children were born by the women of both regions. The rates for rural areas is smaller than the urban area in Somali region but not for Affar region. In addition urban women of Somali region bear 4 children on average which was greater than theat observed for Affar women.

4.1.2. Estimated Fertility

Listing computational procedure given in Chapter III and data of the 1997 and 1996 census of Ethiopia the estimated feritility rates for Somali and Affar regions were computed. The result for Somali and Affar regions are summerized in Table 4.6 and Table 4.7, respectively.

The computed T.F.R reveals that firtility rate is high in Affar region than in Somali region. The figure of T.F.R for Affar region is 7.239 and that of Somali region is 6.408 which shows the extent of difference in the fertility rate between the two regions.

Table 4.6 Adusted Fertility Rates for Somali region

Age group	Index	Average parity P(i)	Reported ASFR f(i)	Cummulated fertility O(i)	Cummulated parity F(i)	P/F Ratio	Fertility Rate for combinat ional ft(i)	Adjusted f*(i) = Kf+(i)
15-19	1	0.00215	0.014	0.070	0.0198	0.1086	0.0806	0.0567
20-24	2	0.066	0.097	0.485	6.110	0.2368	0.1096	0.0772
25-29	3	1.1435	0.158	0.790	0.8215	1.2263	0.2185	0.1538
30-34	4	3.282	0.134	0.670	1.1885	2.7615	0.2049	0.1442
35-39	5	5.2617	0.117	0.585	0.6674	7.8839	0.0988	0.0696
40-44	6	6.4174	0.063	0.315	2.6586	2.4138	0.9616	0.6769
45-49	7	7.4174	0.036	0.180	2.3370	3.1740	0.1455	0.0024
TFR								34.69
Mean age child be aring								34.69

$$\begin{aligned} K &= \frac{P_{20-24}^f \times P(2)}{P_{20-29}^f \times F(2)} + \frac{P_{25-29}^f \times P(3)}{P_{20-29}^f \times F(3)} \\ &= \frac{111,705 \times 0.066}{211,539 \times 0.3210} + \frac{99,834 \times 1.435}{211,539 \times 0.8215} \\ &= 0.764 \end{aligned}$$

Table 4.7 Adjusted Fertility Rates for Afar region

Age group	Index	Average parity P(i)	Reported ASFR f(i)	Cummulated fertility O(i)	Cummulated parity F(i)	P/F Ratio	Fertility Rate for combinat ional ft(i)	Adjusted f*(i) = Kf+(i)
15-19	1	0.00267	0.015	0.075	0.0242	0.1103	0.1910	0.1331
20-24	2	0.0895	0.087	0.435	0.3711	0.2412	0.2264	0.1578
25-29	3	1.1641	0.136	0.680	0.9957	13.515 0	0.3864	0.2693
30-34	4	2.8499	0.126	0.630	1.0532	2.7012	0.4095	0.2825
35-39	5	4.3296	0.113	0.565	1.4025	3.0871	0.4584	0.3163
40-44	6	5.6839	0.082	0.410	1.3995	4.0614	0.3793	0.2617
45-49	7	6.4324	0.094	0.470	1.132	5.6823	0.2811	0.1959
TFR								7.239
Mean age child bearing								37.82

$$\begin{aligned} K &= \frac{P_{20-24}^f \times P(2)}{P_{20-29}^f \times F(2)} + \frac{P_{25-29}^f \times P(3)}{P_{20-29}^f \times F(3)} \\ &= \frac{37,409}{72,417} \times \frac{0.0895}{0.3711} + \frac{35,008}{72,417} \times \frac{1.1641}{0.9957} \\ &= 0.69 \end{aligned}$$

The 1996 and the 1997 census of Ethiopia for Affar and Somali regions respectively do not provide data on the number of children everborn for rural and urban areas. Hence we could not compute the adjusted fertility rates for urban and rural areas, for the regions separately.

4.2. Mortality

4.2.1. Measurement of Mortality

- the 1996 and the 1997 census of Ethiopia for Affar and Somali regions respectively do not provide data on the number of death, hence we could not concentrate on the observed death rates.

4.2.1.2. Estimates of infant and child mortality

The information on the level of mortality in these two regions comes from the estimated infant and child mortality. The estimated values of these two rates for Somali and Affar regions are summarized in Table 4.8 and Table 4.9, respectively.

The infant and child mortality rates which are calculated by Brass method help us to compare the mortality levels of Somali and Affar regions. These rates help us to understand the differences in the health status and living standard of the population of the two regions. The tables constructed using Brass method indicate that the probability of dying of children before reaching a certain age increases with increasing age of the child. Such increase in probability of dying may be due to the length of exposure of each child to the risk of dying.

As can be inferred $q(1)$ in the tables, the infant mortality rate is estimated to be 33 and 22 per 1000 live births in Somali and Affar regions, respectively. This indicates that infant mortality rates are high in Affar as compared to that of Somali. The tables also indicate that the probability of surviving of children for the Somali region is higher than the Affar region. Moreover, the survival and well-being of the child and mothers depends, to a great extent, on the quality and adequacy of health care services a mother receives during pregnancy and at a time of delivery.

Concerning regional comparison as a whole, it can be said that the population of the Somali region gain better health services and other facilities than the Affar region. Hence we expect relatively Somali people live better life than Affar people.

Table 4.9 Adjusted probability of dying, $P(t|x)$, and of surviving, $h(x)$, and reference period, $t(x)$ using weest model for Sexual

Region

Region				Average parity per woman				Proportion of children				Probability of dying, $q(x)$, and of surviving, $l(x)$					
Age Group	Index i	Average parity per woman			Dead Males (DC)	Females (DC)	Both (DC)	Males		Females		Both					
		Males (PC)	Females (PC)	Both (PC)				$q(x)$	$l(x)$	$q(x)$	$l(x)$	$q(x)$	$l(x)$				
15-19	1	0.04566	0.03041	0.0215	0.0637	0.1435	0.096	0.074	0.029	0.1048	0.8857	0.0326	0.9674				
20-24	2	0.65861	0.48491	0.086	0.0979	0.1062	0.1014	0.1073	0.8929	0.1131	0.8829	0.1041	0.8959				
25-29	3	1.15788	1.48493	1.1435	0.1079	0.1384	0.1211	0.1088	0.8919	0.1406	0.8594	0.1412	0.8588				
30-34	4	2.95211	1.30982	3.282	0.1207	0.1496	0.1334	0.1237	0.8763	0.1568	0.8432	0.1671	0.8309				
35-39	5	3.58033	2.83714	5.2617	0.1356	0.1494	0.1417	0.1463	0.8537	0.1620	0.8380	0.1828	0.8172				
40-44	6	4.18599	3.23119	6.4474	0.1654	0.1770	0.1705	0.1763	0.8947	0.1885	0.8115	0.2209	0.7791				
45-49	7	4.59801	3.74823	7.4174	0.1654	0.1860	0.1747	0.1788	0.8214	0.1938	0.8062	0.2268	0.7732				

Age	Parameter Estimate	Reference period, $t(x)$		
		Males	Females	Both
1	$q(1)$	0.3526	0.1658	2.5096
2	$q(2)$	1.8147	1.7303	2.8555
3	$q(3)$	4.2422	5.7135	2.6333
5	$q(5)$	7.3077	5.4687	3.1972
10	$q(10)$	10.7569	7.5927	2.6871
15	$q(15)$	4.2422	9.9299	9.671

Table 4.9 Adjusted probability of dying, $q(x)$, and of surviving, $l(x)$, and reference period, $t(x)$, using best model for African region

Age group	Index	Average parity per woman			Proportion of children dead			Probability of dying, $q(x)$ and of surviving, $l(x)$					
		Males	Females	Both	Males	Females	Both	Males			Females		
		$p(x)$	$p(x)$	$p(x)$	$p(x)$	$p(x)$	$p(x)$	$q(x)$	$l(x)$	$t(x)$	$q(x)$	$l(x)$	$t(x)$
05-14	1	0.057	0.033	0.00267	0.159	0.081	0.118	0.1846	0.8154	0.0994	0.9006	0.1917	0.8083
15-24	2	0.680	0.472	0.0875	0.115	0.165	0.141	0.1271	0.8729	0.1838	0.8162	0.1715	0.8285
25-34	3	1.585	1.256	0.0741	0.131	0.163	0.145	0.1294	0.8706	0.1926	0.8074	0.1715	0.8285
35-44	4	2.421	1.908	2.845	0.148	0.155	0.171	0.1492	0.8508	0.2016	0.7984	0.2068	0.7932
45-54	5	3.144	2.540	4.356	0.176	0.195	0.186	0.1871	0.8129	0.2122	0.7878	0.2355	0.7645
55-64	6	3.583	2.899	5.6839	0.196	0.207	0.201	0.2050	0.795	0.2170	0.783	0.2477	0.7523
65-74	7	3.837	2.351	6.9324	0.180	0.222	0.198	0.2345	0.765	0.2218	0.7782	0.2544	0.7456

Age group	parameter estimate	Reference period, $t(x)$	
		Males	Females
1	$q(x)$	0.8073	0.7355
2	$q(x)$	2.8916	2.2767
3	$q(x)$	3.5693	3.4255
4	$q(x)$	5.6477	5.4899
5	$q(x)$	3.0278	7.699
6	$q(x)$	10.6703	10.5243
7	$q(x)$	13.6173	13.4914

CHAPTER V

CONCLUSION AND RECOMMENDATION.

In most developing countries, like Ethiopia the populations size is growing very fast from time to time. This is because of the high fertility rate than mortality rate. The reason for high fertility rate in Ethiopia is that marriage is early and universal as indicated in most studies and there is a low level of use of contraceptive. Moreover, mortality rate is high in Ethiopia because the mortality of the pregnant women, particularly rural pregnant women depend on the assistance of non-medical personnel during delivery, this overwhelming dependence on non-dedicated supervision of deliveries is one of the major factors responsible for prevailing high infant mortality in Ethiopia, particularly in urban area.

From our analysis we observe that the fertility level in both regions is in general high, an average of nearly 6 and 7 children per women, for Somali and Affar regions, respectively. Even though fertility was high in both regions it was significantly higher in Affar than in Somali region. This was due to the effect that women in Affar exhibited slightly lower mean age of child bearing as compared to women in Somali. This is an indication of the variation between the two regions in service facilities such as education, health, accessibility of family planning services and extra.

Concerning the infant and child Mortality rate, it is higher in Affar region than Somali region. This could be due to the higher fertility rate, exhibited in the region, because of the number of parity increases, it makes it difficult for women to give the child the necessary materials that enable him to lead a healthy childhood. In addition the hot and arid climatic condition of the region could also account for higher infant and child mortality rate for Affar region.

The mortality rate for the children in both regions was high. Some of the reasons for this high child mortality could be :

- Inaccessibility to health facilities
- Lack of clean water
- Absence of modern feeding practices
- Use of traditional Medical practices

In general, a high infant mortality rate is usually associated with a poor economic Situation, reflected by unsanitary surroundings, litter or no public effect to control health conditions, inadequate medical care facilities. In addition the rate is negatively related with educational level of mothers. That is to say, children born to illiterate mothers encounter higher risk of infant Mortality.

Finally since the infant Mortality rate has been widely accepted as an indicator of the level of health in a community, the population of somali region lives a better life with a better health condition as compared to that of Affar region.

Recommendation

Based on the above conclusions , we recommend the following points:

- i. The public health policy should concentrate on preventive health care, immunization and should encourage poor people to develop the attitude of using modern medicine, personal hygiene and environmental sanitation system on a continuous and sustained basis.
- ii. Women Association of the region should give more emphasis to create awareness towards better child care and spacing that would raise the status of women by improving their financial status to enhance the quality of life of the family in particular and living standards in general .
- iii. The government of the regions of Affar and Somali, as well as the NGOS should have to focus on improving of the women's educational status of the regions for family planning and child care. Hence it is possible to reduce the infant and child mortality and fertility level of the regions.
- iv. The participation of religious leaders is important to convince that birth control or birth spacing is morally right to regulate fertility in order to improve the living standards and quality of life the people.

APPENDIX

Table 1.1 Women aged 15 - 49 years by age group , number of children born Somali region , 1997

	Total		Urban		Rural	
Age group	No. of women	No. of birth	No. of Women	No. of birth	No. of Women	No. of birth
Total	674,784	57899	106056	11118	568728	46781
15-19	170033	2430	27467	329	142566	2101
20-24	111705	10808	18821	2184	92884	8624
25-29	99834	15756	16899	3500	62935	12256
30-34	100673	13521	15563	2416	85110	11105
30-39	77703	9119	11642	1916	66061	7203
40-44	77887	4930	10605	697	67282	4233
45-49	36949	1335	5059	76	31890	1259

Table 1. 2 Children everborn and children surviving by age group of women for Somali region , 1997

		Both sex		Male		Female	
Age group	No. of women	children everborn	children surviving	children everborn	children surviving	children everborn	children surviving
Total	1024292	3079556	2561356	1714080	1439540	1365476	1121816
15-19	169809	12917	11682	7753	7259	5164	4423
20-24	111242	127208	114308	73265	66094	53943	48214
25-29	99508	326666	287094	184874	164920	141792	122174
30-34	100348	528003	457554	296237	260469	231766	197085
35-39	77489	497283	426810	277436	239812	219847	186998
40-44	77662	576033	477833	325092	271311	250941	206922
45-49	36906	305443	252081	167111	139479	138332	112602

Table 1.3 Women aged 15-49 years by age group, number of Children born for Affar region , 1996

Age group	Total		Urban		Rural	
	No. of women	No. of birth	No. of Women	No. of birth	No. of Women	No. of birth
Total	232,351	20,607	23842	2351	208509	18256
15-19	49865	758	4905	111	44960	647
20-24	37409	3247	4373	531	33036	2716
25-29	35008	4773	4431	798	30577	3975
30-34	38951	4890	3831	483	35120	4407
30-39	30274	3430	3384	297	26890	3133
40-44	27486	2260	1927	98	25559	2162
45-49	13358	1249	991	33	12367	1216

Table 1.4 Children everborn and Children Surviving by age group
of women for Affar region , 1996

	Both sex		Male			Female	
Age group	No. of Women	Children everborn	Children Surviving	Children everborn	Children Surviving	Children everborn	Children Surviving
Total	330,968	954964	764783	532891	432295	422073	332488
15-19	49697	4449	3925	2826	2433	1623	1492
20-24	37415	41247	35449	23581	20775	17666	14674
25-29	35008	99597	85172	55635	48360	43962	36812
30-39	38853	168221	139526	94064	80097	74157	59429
35-39	30336	172429	140340	95366	78581	77063	61759
40-49	27366	176030	140654	96689	77717	79341	62937
45-49	13358	91474	73340	52059	42695	39415	30645

REFERENCES

1. Central statistical Authority (CSA),December 1996,The 1994 Population and Housing Census of Ethiopia ,Volume 1 ,Addis Ababa.
 2. Central statistical Authority (CSA),February 1998 ,The 1994 Population and Housing Census of Ethiopia ,Volume 1 ,Addis Ababa .
 3. Guide lines on evaluating the inter_relationships among infant and child mortality socio_economic factors and fertility in africa, August 1995.
 4. Henry S.Shryock,Jacob S.Siegel and Associates,1976,The methods and materials of Demography.
 5. United Nations,Indirect techniques of Demographic Estimation.
 6. United Nations,Manual X ,Population studies No. 8, New york.
-

