FERTILITY AND CHILD MORTALITY IN AGRICULTURAL HOUSEHOLDS OF RURAL ETHIOPIA: THE CASE OF ARSSI ADMINISTRATIVE REGION

By
Kebede Seleshi

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DECLARATION

Except where otherwise indicated
this thesis is my own work.

Kebede Seleshi

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ABSTRACT

This study has attempted to analyze levels, patterns and differentials of fertility, and child mortality in agricultural households of Arssi administrative region. The study population consisted of 2945 women aged 15 to 49 years, who were categorized according to the social and demographic aspects of their lives which were thought to have an effect on their fertility and mortality of their children.

It was found that fertility levels among farmers in rural Arssi region were very high. The analysis of fertility differentials indicated that 48 per cent of variation in fertility among women in Arssi was explained by the independent variables considered in the study with the exception of ethnicity. The Multiple Classification Analysis showed that ethnicity had no effect on fertility.

In Chapter Four, the results obtained using the Indirect Method of Analysis showed that the probability of Infant Mortality(oQ1) was exceedingly high when compared with the probability of Child Mortality(1Q4). This is thought to be related to the early age at which solid foods are introduced to infants. Also, the unavailability of medication in rural Arssi might be a possible explanation for the observed high Infant Mortality in the 1980 survey population. It is also shown that more Muslims than Christians, more Oromo women than Amhara women and more illiterate women than literate women experienced a high level of Infant and Child Mortality.

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CHAPTER 1

INTRODUCTION

1.1 Objectives and Organization of the Study

Fertility refers to the actual reproductive performance, and mortality to the cessation of life after being born alive. Together they constitute the major components of population change(Pollard et al, 1974). One of the objectives of this study is to provide basic fertility and mortality data for the agricultural population of Arssi administrative region in Ethiopia. Within the limitations of the data, an attempt is also made to examine fertility and child mortality differentials according to the socio-demographic background characteristics of the survey population.

The study is organized into five chapters. This chapter consists mainly of introductory background informations on Ethiopia and Arssi administrative region. The survey methodology of the data and their limitations are also covered. Chapter Two presents some socio-demographic background characteristics of the survey population. Chapter Three deals with fertility levels, patterns and differentials. Chapter Four is concerned with Infant and Child Mortality levels, patterns and differentials, and the study ends with a summary of the main findings and some conclusions.

1.2 The Geography of Ethiopia

Ethiopia, with an area of 1229.6 thousand square kilometres, is situated in the Northeastern part of Africa (Central Statistical Office, 1980a:22). As shown in Figure 1:1, it is bordered by Sudan, Kenya, Somalia, the Republic of Djibouti and the Red Sea.

Until 1974, the principal administrative divisions of Ethiopia were called provinces, subprovinces, districts, and subdistricts(Lipsky, 1962:28). However, as a consequence of the 1974 Rural Land Proclamation, some of these administrative divisions were renamed. In descending hierarchial order, the present administrative divisions are as follows: administrative regions, subregions, districts, and farmers' association areas(Central Statistical Office, 1980b:1).

At the time of the 1980 Rural Household Demographic Survey, the number of administrative regions was fourteen. However, the 1984 Population and Housing Preliminary Census Report(Central Statistical Office, 1984a:15) indicated a classification of sixteen due to the recent recognition of Addis Ababa and Asab as regions. According to this same source, the population reached 42 million in may of 1984, with males comprising 20.9 million and females 21.1 million. The rural was stated to be 37.7 million with a sex ratio of 101.

Ethiopia contains much human, climatic and landscape diversity. With reference to relief and geology, Woldemariam (1972:15) divided Ethiopia into three major physiographic regions: the Northwestern, the Southeastern and the Rift Valley. The first two of these three physiographic regions are characterized by their highlands and associated lowlands. According to the same source, more than 62 per cent of the total area of the country is in the regions defined as lowlands, with massifs accounting for nearly 18 per cent of the area and plateaus 20 per cent.

Hance(1970:92-93) stated that the Central Highlands are more densely populated than the excessively hot and dry lowlying portions of the country. Despite local variation, Ethiopia is categorized into three climatic zones: the temperate plateaux, the intermediate frost free zone and the hot lowlands(Last, 1982:148). The mean annual temperature

in the temperate plateaux is about 16 degree Celsius, in the frost free zone about 22 degree Celsius and in the hot lowlands at least 26 degree Celsius.

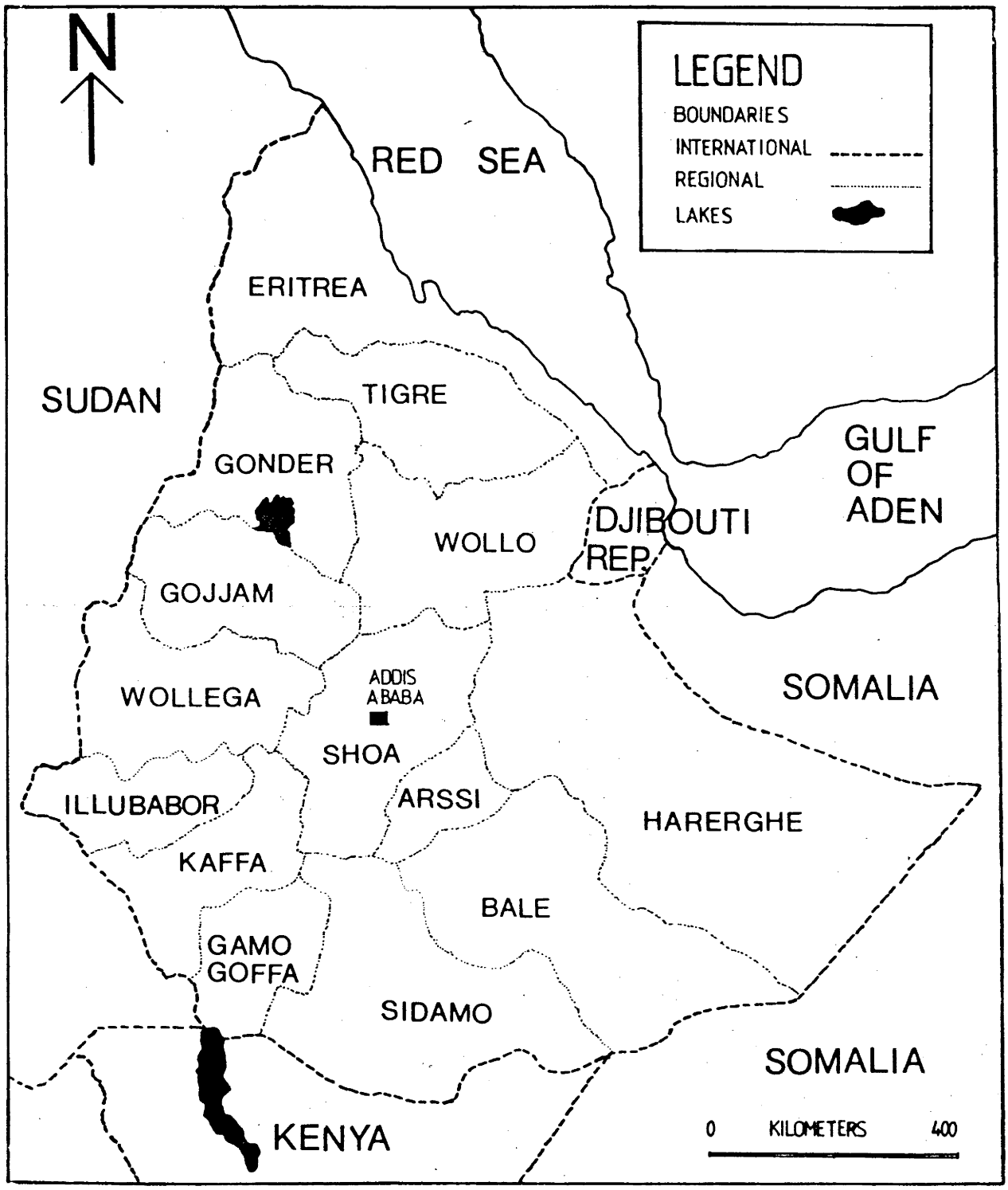
1.3 Description of Arssi Administrative Region

A large portion of Arssi lies in the Southeastern mountain range and a smaller section in the Rift Valley (Woldemariam, 1972). Bounded by Shoa, Sidamo, Bale and Hararghe, Arssi forms one of the administrative regions of Ethiopia. With an area of 24.6 thousand square kilometres, it consists of three subregions and 22 districts as shown in Figure 1:2.

According to the 1984 Census, the population of Arssi was 1.7 million as of may 1984(Central Statistical Office, 1984a:16). The rural population was 1.5 million with greater numbers of females than males being reported.

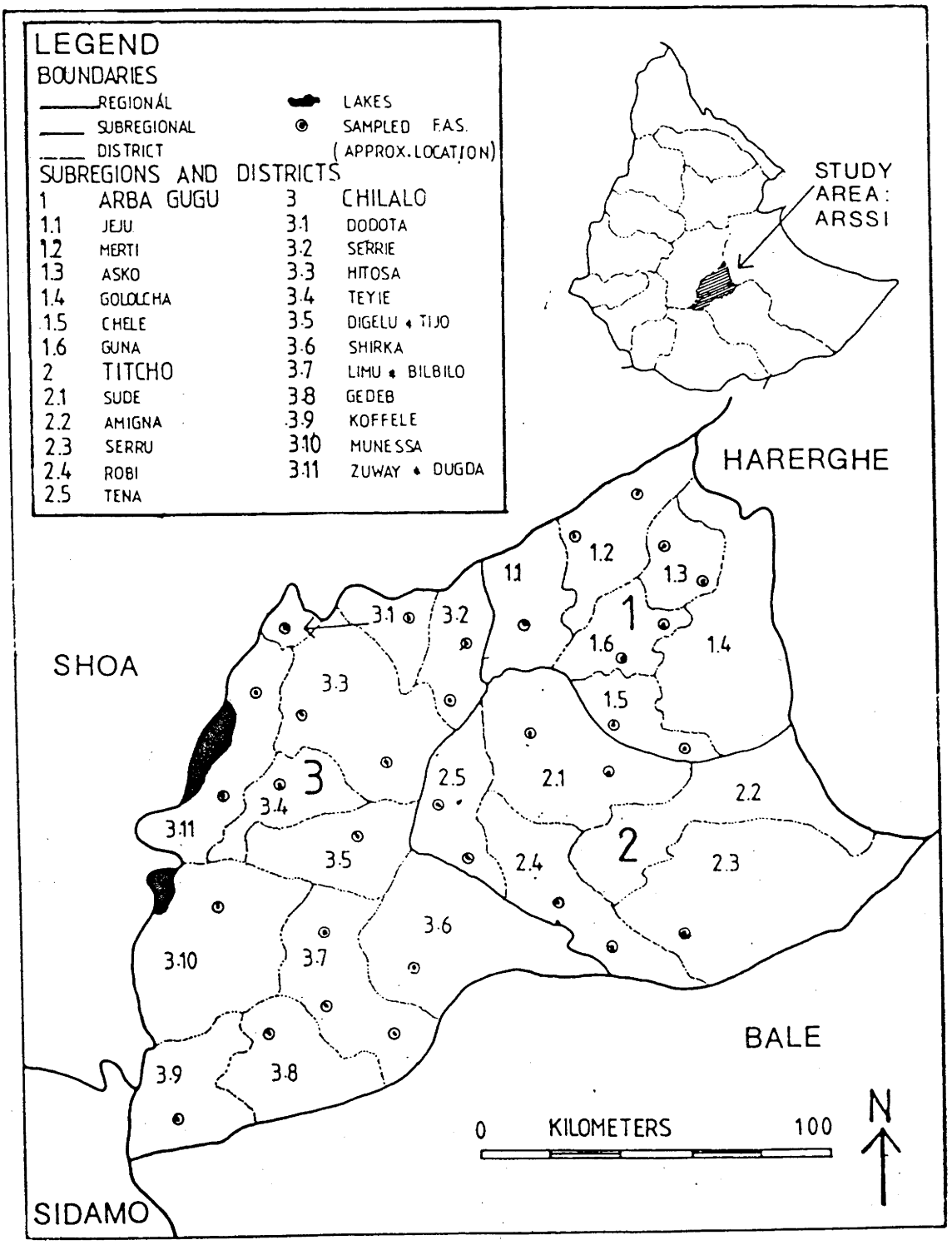
Due to the unavailablity of 1984 Census data, it is possible to give any description of the distribution pattern religio-ethnic groups within Arssi administrative region. In my opinion however, Oromo Muslims outnumber all other religio-ethnic groups within this region.

Figure 1-1: Map of Ethiopia



Source: Central Statistical Office(1984b).

Figure 1-2: Map of Arssi



Source: Central Statistical Office(1984b).

1.4 Source of Data

The main single source of data for this study is the 1980/81 Rural Household Demographic Survey data tape. The survey was conducted by the Central Statistical Office as part of the Integrated National Rural Household Survey for two consecutive years, 1980 and 1981; however only the 1980 information on Arssi region has been used for this analysis.

The chosen study population comprises all women aged between 14 and 50 years. A frequency distribution showed 2965 women within the Arssi region sample falling into this category. However, twenty cases were eliminated, four because of duplication and sixteen due to inconsistent entries. Hence, the population on which this study is based equals 2945 women of child-bearing age, 2493 of whom were currently married.

1.5 Survey Methodology and Field Organization

1.5.1 Samling Design

As part of an effort to form the basic sampling frame, the Central Statistical Office compiled a list of farmers' association areas during June and July of 1980. A farmers' association area is the smallest administrative unit in rural Ethiopia with an area of about 800 Hectares(Central Statistical Office, 1980b:1).

The list compiled by the Central Statistical Office comprised 18989 farmers' association areas in twelve of the sixteen administrative regions. From this frame, it was decided to select 500 farmers' association areas as primary sampling units(PSU's). The PSU's were selected without replacement, with probability proportional to size,

size being the number of farmers association areas. The selected five hundred PSU's amounted to 2.6 per cent of the total farmers' association areas and provided an average of 34 PSU's for each of the selected administrative regions.

The actual sampling was done in stages: firstly, stratification was done for each of the twelve administrative regions at subregional level. For each stratum, the PSU's were selected without replacement with probability proportional to the total number of farmers' association areas within each subregion(Central Statistical Office, 1980c).

At the last stage of sampling, a complete listing of all households in each of the PSU's was carried out. At the same time, land holders in each of the listed households were identified. From the identified list of land holders, one hundred households were selected in each of the selected PSU's. The selection of land holder was done with probability proportional to size, size being the number of land holders in each household. Non-agricultural households were excluded. All persons in the sampled agricultural households were eligible for the demographic enquiry(Central Statistical Office, 1980d).

1.5.2 Demographic Questionnaire

The questionnaire was designed by the Population and Social Statistics Division of the Central Statistical Office to secure basic demographic data about the rural agricultural population of Ethiopia. Because the demographic survey was planned to be carried out in two consecutive calendar years, 1980 and 1981, the questionnaire was divided into two parts. The first part, 1980, being the core of this study, is reproduced in Appendix A.

The main design consideration in the 1980 questionnaire was to include only those questions which would help estimate

National as well as regional population size and composition. It included various socio-demographic inquiries about the three components of population change: fertility, mortality and migration(Central Statistical Office, 1980d).

The questions on fertility were divided into two sections: life-time and current fertility. The total number of children ever born to each woman constituted life-time fertility and the number of births that occurred during the twelve months preceding the survey constituted current fertility. A three pronged approach to the question of life-time fertility was adopted by ascertaining the number of children living at home, the number of children living elsewhere, and the number of children who had died. The current fertility section comprised two sets of information: the number of births and the number of infant deaths during the twelve months preceding the survey. A special question on children living elsewhere was introduced because it was believed that many women would omit children who had grown up and left home.

1.5.3 Administrative Organization

Administrative organization refers to the manpower allocation and infra-structures utilized for the implementation and execution of the Rural Household Survey Programme. As mentioned earlier, the 1980 and 1981 Rural Demographic Survey was conducted by the Central Statistical Office(Ethiopia) as part of the Rural Integrated Household Survey Programme. The programme was designed to meet three principal objectives: firstly, to develop sample surveys which would yield compatible, inter-related and consistent socio-economic data; secondly, to achieve optimal allocation of scarce manpower and material resources; and thirdly, to develop an effective organizational structure(Central Statistical Office, 1980d:7).

The survey organization consisted essentially of four levels of personnel: the directing staff, the professional staff, the field and the office staff. The directing staff were assisted by a survey co-ordinating committee selected from the senior professional staff. The head of the Central Statistical Office through the survey co-ordinating committee controlled the policy formulation and general co-ordination of the survey.

The institutional framework of the survey was established in accordance with the twelve administrative regions. In each of these regions headquarters were established and headed by a regional co-ordinator whose prime responsibilities were to supervise and control all aspects of the survey and field operations. Under each regional co-ordinator, supervisors were assigned at subregional level and enumerators were permanently placed for the term of the project in each of the selected farmers' association areas, which in turn were responsible for the basic needs and well being of one enumerator. On the whole, heavy institutional involvement of governmental and mass organizations was anticipated to secure co-operation and minimize expenditure at all levels of the project(Central Statistical Office, 1980c).

1.5.4 Recruitment of Field Staff

The first training sessions were held at the Central Statistical Office in Addis Ababa and the participants were professionals, technicians and regional co-ordinators of the Central Statistical Office. Within the time allocated for the demographic survey, the co-ordinator of the Population and Social Statistics Divisions and his assistants gave training on the demographic questionnaire and prepared survey manuals. At the end of the training, practical demonstrations were held at a nearby farmers' association area. Problems identified in the field exercise were discussed and rectified.

The principal objective of this training was to provide trainers of supervisors and enumerators.

The second training sessions were held in each of the twelve regional capitals. Two staff members and the regional co-ordinator who had participated in the first training, conducted the training for supervisors and interviewers. All participants were thoroughly tested in field training and those showing ability in all aspects were then recruited as enumerators to be stationed in each selected farmers' association area. In the final stage of training, each supervisor again went through the survey procedures with his assigned enumerators. Throughout training strong emphasis was put on the following concepts and definitions because a proper understanding of them was considered essential for the success of the survey.

"' Household: Definitions based on arrangements made by persons individually or in groups(not necessarily related) for providing themselves with food or other essentials of living. A household may occupy a part or the whole of a housing unit or premises which are closely related and be a one person or multi-person household.

Agricultural Household: A household where at least one of the members owns an agricultural holding and makes major decisions regarding the utilization of its available resources.

Non-agricultural Household: A household where members are totally engaged in economic activities other than agriculture for their living.

Holder: A person who exercises management control over the operation of agricultural holdings, has technical and economical responsibility, and who makes major decision regarding the utilization of available resources. He may operate the holding directly as an owner or manager, and under the conditions of traditional

agriculture, may be regarded as the person who, with or without the help of others, operates the land or raises livestock in his own right, i.e. the person who decides what, when, and how to grow crops or raise livestock and have the right to determine the utilization of the products.
Holding: A holding is all the land which is used wholly or partly for agricultural production and is operated by one person alone, or with others, without regard to title, legal form, size or location. Livestock kept for agricultural purposes without agricultural land, also constitute a holding. Hence a holding may be with land only, with livestock only, and with land and livestock (Central Statistical Office, 1980c) ".

1.5.5 Enumeration

Soon after an enumerator was introduced and stationed in each sampled farmers' association area, a listing of all households within these areas was made. One hundred agricultural households were randomly selected in each of the sampled areas and demographic questionnaires for these were filled in. In addition to supervision by regional co-ordinators and supervisors, spot checks were undertaken during the actual enumeration by personnel from the head office to ensure that the inquiry was being carried out according to instructions. Finally, the completed demographic questionnaire were sent back to the head office in Addis through regional co-ordinators.

1.5.6 Data Processing

After the demographic questionnaires were completed and returned to the head office, a coding and editing manual was prepared. Coders and editors were assigned from the Central Statistical Office and a training programme was organized to

familiarize them with the survey and coding/editing manual (Central Statistical Office).

Four teams were formed, each headed by a supervisor. Each questionnaire was coded, edited and checked. Finally, all questionnaires verified by a supervisor as being accurate were passed on to be encoded and entered into the computer. Consistency checks were conducted by computer. Any entries found inconsistent were re-edited, and the final version was stored on tape ready for analysis.

1.6 Limitations of the Data

Other than those inherent in such data, the main limitation is the exlusion of important variables from the survey. As a consequence, differences in fertility between social groups cannot be analyzed to the required degree.

Another limiting factor is the coverage of the data. They do not cover the whole population of Arssi because the survey was designed to represent only persons in agricultural households. Even those people living in non-agricultural households, but who resided in farmers' association areas were not represented in the sample.

The most significant limitation, which should be mentioned, is that which is inherent in the data themselves. Female literacy is extremely low in Ethiopia and as vital registration is non-existent, there is a very real likelihood of age misreporting For practical purposes, this study assumes that the data quality is of an acceptable standard.

CHAPTER 2

SOCIO-DEMOGRAPHIC BACKGROUND CHARACTERISTICS

2.1 Introduction

The primary objective of this chapter is to present and discuss some of the socio-demographic background characteristics of the study population. As mentioned in Chapter One, the study population included all women of child-bearing age in agricultural households of Arssi administrative region as recorded in the 1980 Rural Demographic Survey.

The socio-demographic background characteristics which will be considered are age, religion, ethnic group, literacy, marital status and childlessness. The empirical relationship between these variables will be examined and some social and cultural informations pertinent to this study will also be included.

Although information about education and migration status was available from the 1980 Rural Household Demographic Survey Data, these variables were not included in this study for the following reasons. Firstly, very few women in the study population had formal education and secondly education was seen as a subset of literacy in the survey questionnaire. The responses on literacy questions also encompassed education. The question on migration status was omitted from this analysis because only a few women reported their place of birth as being outside of the region whilst the majority were indiginous to Arssi.

2.2 Age Structure

The age of respondents in the 1980 Rural Demographic Survey was collected by asking each adult member of the household the number of completed years which had elapsed at the time of his/her last birthday. Because of the lack of vital registration and the prevalence of illiteracy, some respondents did not know their age. In such cases, enumerators were instructed to help estimate their ages by using one of the following methods: the historical calendar method, the family history method, the cohort method or the community comparative method.

In Table 2.1, the single year age distribution of the female population of Arssi as recorded in the 1980 Demographic Survey is shown. This same information is represented graphically in Figure 2.1. As is apparent from the figure, this population reported ages ending in certain digits more frequently than others. This digital preference has been observed in many third world countries.

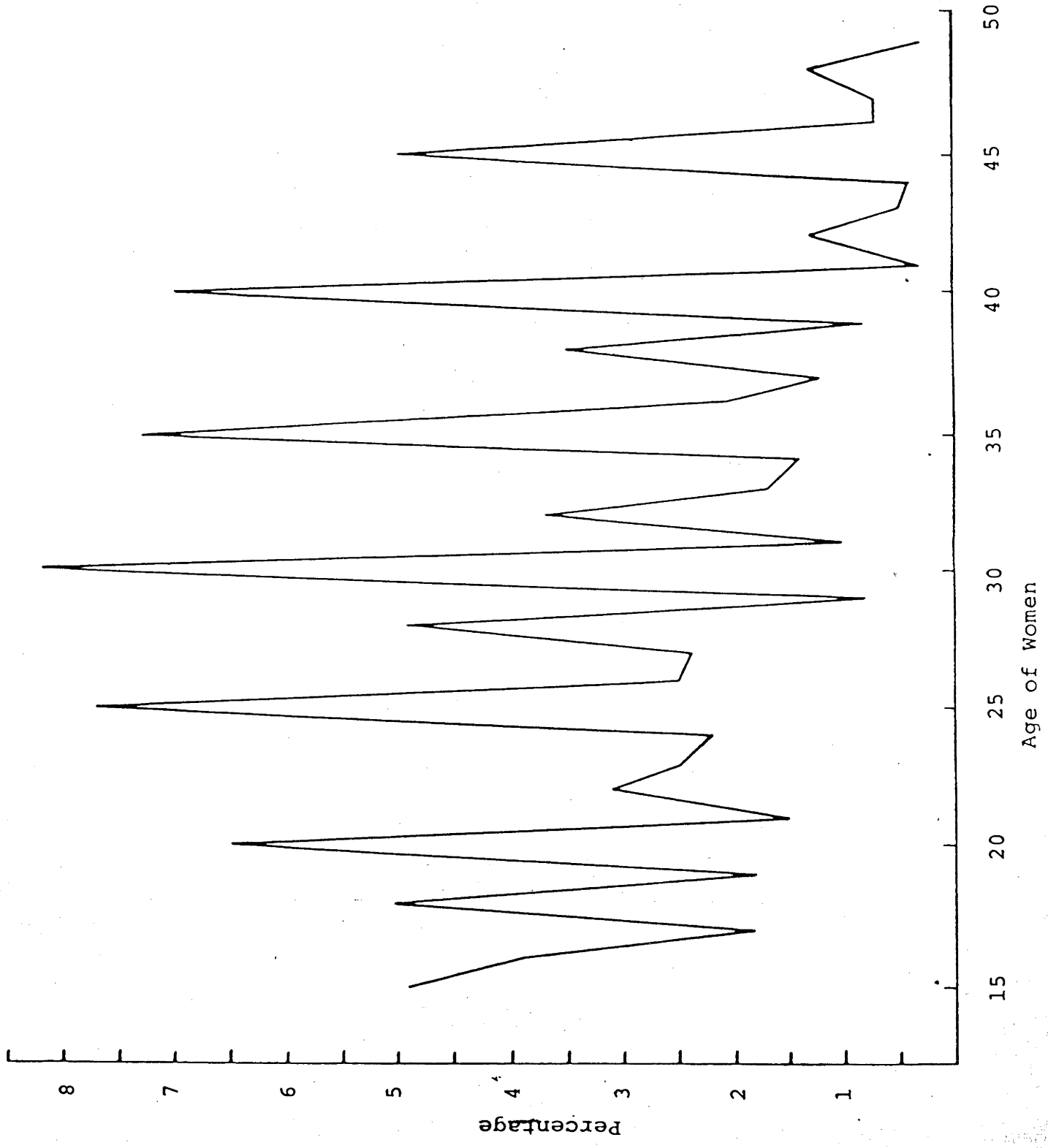
As the Figure shows, the common digital preference here is 0, 5 and even digits. Heaping of ages ending in 0 and 5 continues to age 45. On the whole, the figure appears to indicate that there was considerable transfer of women from younger to older ages, as well as from the oldest age group (above 35) to the middle ages(25-35). Age group 20-24 seems to have suffered a transfer of women to age group 25-29.

Table 2-1: Distribution of Women by Single Age, Arssi

Age	Distribution(%)
15	4.9(145)
16	3.9(115)
17	1.8(52)
18	5.0(146)
19	1.8(54)
20	6.5(190)
21	1.5(44)
22	3.1(91)
23	2.5(73)
24	2.2(65)
25	7.7(226)
26	2.5(74)
27	2.4(71)
28	4.9(144)
29	0.8(25)
30	8.2(242)
31	1.1(32)
32	3.7(109)
33	1.7(50)
34	1.4(40)
35	7.3(214)
36	2.1(61)
37	1.2(36)
38	3.5(103)
39	0.8(23)
40	7.0(206)
41	0.3(10)
42	1.3(38)
43	0.5(16)
44	0.4(12)
45	5.0(148)
46	0.7(20)
47	0.7(21)
48	1.3(39)
49	0.3(10)
Total	100.0(2945)

Note: Figures in Brackets are Numbers of Women.
Source: Subset of 1980 Rural Demographic Survey Data Tape.

Figure 2-1: Distribution of All Women by Ages, Arssi



2.3 Religion and Ethnic Group

According to Lipsky(1962), religion was not only an integral part of Ethiopian society but was also considered to be an important force which affected all aspects of attitude and morality. Legum(1969) also held the same view about religion in Ethiopia. They observed that Christianity and Islam mixed with traditional practices were the back-bone of Ethiopian culture. Though Christians exceed Muslims in number, the actual ratio of Christians to Muslims in each region varies. One reason for questions on religion being included in the 1980 demographic survey was to determine the number of Christian and Muslim followers so as to ascertain which religion predominated in each region(Central Statistical Office, 1980d). Of all women in the survey area, 60 per cent were Muslims and 40 per cent were Christians.

Another important variable which was included in the 1980 demographic survey was ethnicity. As Lipsky (1962:34-38) observed, the ethnic composition varies from one region to another and with over 100 ethnic groups Ethiopia has been called an " ethnic museum ". Over 90 ethnic groups were categorized and included in the 1980 Rural Household Demographic Survey. Of these classifications only two ethnic groups were indicated for Arssi region in the 1980 survey population for women of child bearing ages: Amhara and Oromo. Of the total women of child bearing ages about 81 per cent were Oromo and 19 per cent were Amhara.

When religion was cross-tabulated with ethnicity, four ethno-religious groups emerged: Amhara Christian, Oromo Christian, Amhara Muslim and Oromo Muslim. The Amhara Christians numbered 566, the Oromo Christians 608 and the Oromo Muslims 1767. The reported number of Amhara Muslims was only four and will be ignored in the analysis.

Table 2-2: Religion by Ethnic Group, Arssi

Religion	Ethnic Group		Total
	Amhara	Oromo	
Christian	19.2(566)	20.6(608)	39.9(1174)
Muslim	0.1(4)	60.0(1767)	60.1(1771)
Total	19.4(570)	80.6(2375)	100.0(2945)

Note: Figures in Brackets are Numbers of Women.
Source: Subset of 1980 Rural Demographic Survey Data Tape.

2.4 Literacy Status

For the purpose of the 1980 Demographic Survey, a literate person was defined as " one who was ten years of age or over with the ability to read and write a simple sentence in any language(Central Statistical Office, 1980d) ". The 1968/70 National Demographic Survey indicated that only 0.3 per cent of the total population of women in rural Arssi were literate (Central Statistical Office, 1974:11).

Of the total women of child-bearing age in the 1980 survey population, about 5 per cent were literate. This increase in female literacy could be accredited to the National Literacy Campaiagn started in 1975. In the 1980 Rural Demographic Survey, literate people were asked whether they had attained their literacy through the National Literacy Campaign. Their replies showed that of the 156 literate women in Arssi region, 86 learned to read and write through this campaign.

Since the responses on literacy status consisted of only two categories, viz. literate and illiterate women, the calculation of proportion of illiterate women could imply implicitely what proportion of women were literate. Therefore, with this in mind, the proportion of women in relation to each of the background variables is calculated and set out in Table

2.3. The calculation is carried out separately for two age cohorts, 15-29, 30-49 years old and for the total in each category.

As each of the categories in each variable encompass two characteristics, literate and illiterate women, they are classified as binomial populations and as such an estimation procedure of the difference between the parameters of each is applicable to ascertain the significance of the differences in illiteracy between them. Since the difference between the parameters of two binomial populations is normally distributed for a large sample the z-statistic for the difference between two proportions is employed. At 99 per cent level of confidence, significant difference in illiteracy is indicated between Christians and Muslims. The only groups found to have insignificant differences in illiteracy were Oromo Christians and Oromo Muslims in the 30-49 age groups.

Table 2-3: Proportion of Illiterate Women by Age and Socio-demographic Variable, Arssi

Age Group	Proportion Illiterate(%)		Z-Value	S@
	Christian	Muslim		
15 - 29	87.7(618)	94.5(897)	-4.53	0.01
30 - 49	96.8(556)	98.5(874)	-1.91	0.10
Total	92.0(1174)	96.5(1771)	-5.06	0.01
	Amhara	Oromo		
15 - 29	83.9(311)	93.8(1204)	-4.71	0.01
30 - 49	95.4(259)	98.4(1171)	-2.14	0.05
Total	89.1(570)	96.0(2375)	-5.07	0.01
	Oromo Christian	Oromo Muslim		
15 - 29	91.5(307)	94.5(897)	-1.70	0.10
30 - 49	98.0(301)	98.5(870)	-0.56	NS
Total	94.7(608)	96.5(1767)	-1.80	0.10

Table 2-3 (Continued.)

Age Group	Proportion Illiterate(%)		Z-Value	S@
	Amhara Christian	Oromo Christian		
15 - 29	83.9(311)	91.5(307)	-2.92	0.01
30 - 49	95.3(255)	98.0(301)	-1.80	0.10
Total	89.0(566)	94.7(608)	-3.56	0.01
	Amhara Christian	Oromo Muslim		
15 - 29	83.9(311)	94.5(897)	-5.05	0.01
30 - 49	95.3(255)	98.5(870)	-2.29	0.05
Total	89.0(566)	96.5(1767)	-5.36	0.01

Notes: The Numbers in Brackets are the Base for the Percentages.
S@ Level of Significance(Two Tailed Test).
NS Not Significant.

Source: Subset of 1980 Rural Demographic Survey Data Tape.

2.5 Marital Status

In the 1980 survey, marital status was classified into four categories: single, married, widowed and divorced. As set out in Table 2.4, about 9 per cent of all women in Arssi agricultural households were single, 85 per cent married, 4 per cent widowed and 3 per cent divorced. When marital status is seen in relation to age, the proportion of single and widowed women decreases with increasing age whereas the proportion of married women and divorced women showed no consistent pattern.

The proportion of married women among the study population is very high with a peak proportion at group 25-29. The proportion of divorcees was high at age group 45-49. There is no obvious explanation why the proportion of divorcees was high in the younger age groups and why the proportion of widowed was high in the 45-49 age group.

Table 2-4: Distribution of All Women by Age and Marital Status, Arssi

Age Group	Single (%)	Married (%)	Widowed (%)	Divorced (%)	Total (%)
15 - 19	43.0	52.0	0.6	4.5	100.0(512)
20 - 24	5.8	89.0	1.1	4.1	100.0(463)
25 - 29	1.5	95.6	1.9	1.1	100.0(540)
30 - 34	0.6	93.7	4.0	1.7	100.0(473)
35 - 39	0.0	94.5	4.8	0.7	100.0(437)
40 - 44	0.4	89.4	7.4	2.8	100.0(282)
45 - 49	0.0	80.3	17.2	2.5	100.0(238)
Total	8.8	84.7	4.1	2.5	100.0(2945)

Note: Figures in Brackets are Number of Women.
Source: Subset of 1980 Rural Demographic Survey Data Tape.

Although in the survey marital status was originally classified into four categories, in order to have sufficient numbers of cases, they were regrouped into two categories: single and ever-married women. This regrouping facilitates the use of the statistical technique mentioned in the literacy section.

In Table 2.5, the proportion of ever-married women in relation to each of the background variables is presented. As the Z-test shows, there are significant differences between each of the two categories with the exception of Amhara Christian and Oromo Christian in proportion of ever-married women at the indicated of confidence. In the 30-49 year age group, however, none of the categories show significant differences in proportion of ever-married women as shown in the Table.

Table 2-5: Proportion of Ever-Married Women by Socio-Demographic Variables, Arssi

Age Group	Proportion Ever-Married(%)		Z-Value	S@
	Christian	Muslim		
15 - 29	80.9(618)	84.7(897)	-1.90	0.10
30 - 49	99.6(556)	99.8(874)	-0.67	NS
Total	89.8(1174)	92.2(1771)	-2.40	0.02
	Amhara	Oromo		
15 - 29	80.7(311)	84.0(1204)	-1.65	0.10
30 - 49	99.6(259)	99.0(1171)	-1.20	NS
Total	89.3(570)	92.0(2375)	-2.00	0.05
	Oromo Christian	Oromo Muslim		
15 - 29	81.1(307)	84.7(897)	-1.95	0.10
30 - 49	99.7(301)	99.8(870)	0.00	NS
Total	90.3(608)	92.1(1767)	-2.00	0.05
	Amhara Christian	Oromo Christian		
15 - 29	80.7(311)	81.1(307)	-0.03	NS
30 - 49	99.6(255)	99.7(301)	0.00	NS
Total	89.2(566)	90.3(608)	0.59	NS
	Amhara Christian	Oromo Muslim		
15 - 29	80.7(311)	84.7(897)	-2.00	0.05
30 - 49	99.6(255)	99.8(870)	0.00	NS
Total	89.2(566)	92.1(1767)	-2.00	0.05
	Literate	Illiterate		
15 - 29	47.2(125)	86.4(1390)	-2.73	0.01
30 - 49	100.0(31)	99.7(1399)	0.50	NS
Total	57.7(156)	93.1(2789)	8.75	0.01

Notes: Figures in Brackets are the Base for the Percentages.
S@ Level of Significance(Two Tailed Test).
NS Not Significant

Source: Subset of 1980 Rural Demographic Survey Data Tape.

2.5.1 Singulate Mean Age at First Marriage

Table 2.6 shows the singulate mean age at first marriage by socio-demographic background characteristics of the 1980 survey population. As the calculated singulate mean age shows, age at first marriage was slightly higher for Christians and a little lower for Muslims than the overall singulate mean age at marriage. The mean age at first marriage was almost the same for both Amhara and Oromo women. Also, the expected trend

for both literate and illiterate was evident with the singulate mean age at marriage for literates substantially higher than those who were illiterates.

Table 2-6: Singulate Mean Age at First Marriage by Socio-Demographic Variables, Arssi

Socio-Demographic Variables	Singulate Mean Age at First Marriage in Years
Christian	17.7
Muslim	17.4
Amhara	17.9
Oromo	17.5
Oromo Christian	17.6
Oromo Muslim	17.4
Literate	20.5
Illiterate	17.3
Total	17.6

Source: Subset of 1980 Rural Demographic Survey Data Tape.

2.6 Childlessness

Although the percentage of childless women will vary from one age group to another, infertility is usually confined to women 30 years and over. The proportion of childlessness in relation to age, religion, ethnic group, literacy and marital status is presented in Table 2.7. Only ever-married are considered in this analysis because child birth is typically confined within the bounds of marriage.

As the Z-test indicates, the difference in proportion of childlessness is significant between literate and illiterate women at the level indicated in the Table. There is also significant difference in childlessness between currently married women, and widowed and divorced women.

Table 2-7: Proportion of Childless Women by Age and Socio-Demographic Variables, Arssi

Age Group	Proportion Childless(%)		Z-Value	S@
	Christian	Muslim		
15 - 29	17.4(500)	21.1(760)	-1.65	0.10
30 - 49	7.2(554)	1.9(872)	4.82	0.01
Total	12.0(1054)	10.8(1632)	0.85	NS
	Amhara	Oromo		
15 - 29	17.9(251)	20.0(1009)	-0.75	NS
30 - 49	7.4(258)	3.3(1168)	2.25	0.05
Total	12.6(509)	11.0(2177)	0.92	NS
	Oromo Christian	Oromo Muslim		
15 - 29	16.9(249)	21.1(760)	-1.33	NS
30 - 49	7.0(300)	2.0(868)	3.38	0.01
Total	11.5(549)	10.9(1628)	0.35	NS
	Amhara Christian	Oromo Christian		
15 - 29	17.9(251)	16.9(249)	0.29	NS
30 - 49	7.5(254)	7.0(300)	0.23	NS
Total	12.7(505)	11.5(549)	0.60	NS
	Amhara Christian	Oromo Muslim		
15 - 29	17.9(251)	21.1(760)	-1.14	NS
30 - 49	7.5(254)	2.0(868)	3.05	0.01
Total	12.7(505)	10.9(1628)	1.13	NS
	Literate	Illiterate		
15 - 29	27.1(59)	19.2(1201)	2.60	0.01
30 - 49	9.7(31)	3.9(1395)	0.97	NS
Total	21.1(90)	11.0(2596)	2.02	0.05
	Married	Widowed & Divorced		
15 - 29	18.3(1194)	42.4(66)	-4.00	0.01
30 - 49	3.8(1299)	6.3(127)	-1.25	NS
Total	10.8(2493)	18.7(193)	-2.60	0.01

Notes: The Numbers in Brackets are Ever-married Women and the Base for the Percentages.
S@ Significance level(Two Tailed Test).
NS Not Significant.

Source: Subset of 1980 Demographic Survey Data Tape.

2.7 Family Planning

The 1980 Rural Demographic Survey did not include any question on family planning. However, the following paragraph indicates that a low level of contraceptive prevalence can be expected in rural Ethiopia.

According to Chang(1974:344), resistance to family planning has been due to the religious atmosphere in Ethiopia. Gauther(1975:283-301) has mentioned that publicity concerning birth control was illegal. The government, however, allowed family planning to operate in private clinics and public health care centres on condition that it was combined with maternal and child care. In 1966 the Family Guidance Association started a family planning programme. Although, it did not have its own clinics, it managed to operate through some of the hospitals and institutions(Gauther, 1975:296).

During 1970-71 the Institute of Ethiopian Studies at Addis Ababa University undertook to measure the knowledge, attitudes and practice of family planning in Ethiopia(Chang, 1974:344-348). Although the type of contraception was not indicated in the study, it showed that the knowledge of contraception as a birth control method was 30 per cent in an urban area, 10 per cent in a rural area, and 14 per cent in a Muslim area. The rate of use of contraception was low; only 1 per cent of the urban population and 0.2 per cent of the rural and Muslim population reported the practice of contraception(Chang, 1974).

Governmental policy on the introduction of family planning in Ethiopia has been one of non-intervention. In 1981, however, the Government announced that it would integrate the activities of the Ministry of Health due to a concern for the health of mothers and young children(United Nations, 1982:42). The intention was to extend the activities of family planning to health centres and community health stations in collaboration

with the Family Guidance Association.

The Ethiopian Nutrition Institute, however, emphasized the need for a clear understanding of family planning programmes and their relationship with development, before introducing a family planning programme on a national scale (Ethiopian Nutrition Institute, 1972:11). In addition, it suggested that family planning practice should be part of a general increase in the standard of living through the provision of health, education, and a more equitable distribution of wealth(Ethiopian Nutrition Institute, 1972).

CHAPTER 3

FERTILITY LEVELS, PATTERNS AND DIFFERENTIALS

3.1 Introduction

The aim of this chapter is to examine current and life time fertility of women aged 15-49 years in Arssi administrative region. The first section deals with current fertility levels and patterns, and the remaining sections with fertility differentials in relation to the socio-demographic background characteristics of the study population. The mean number of children ever born to mothers and all women will be examined for each of the independent variables with mothers being defined as those who have given birth to at least one child. In the analysis of fertility differentials, cross-tabulation will be utilized to ascertain the preliminary relationship between mean number of children ever born and each of the socio-demographic characteristics of the study population.

Although variables such as duration of marriage and age at first marriage were not specifically included in the survey, they are inherent in the socio-demographic background variables. As mentioned in Chapter Two, the socio-demographic background variables for which information was available from the 1980 Rural Household Demographic Survey were age, religion, ethnic group, literacy and marital status. Using Multiple Classification Analysis, all findings which can be observed for each of the socio-demographic variables will be further examined and synthesized at the end of this chapter.

3.2 Fertility Data

As mentioned in Chapter One, the fertility analysis is based on responses obtained from each woman in the survey population on number of births during the year preceding the

survey and number of children ever born. The birth data are only used for estimating current fertility levels and patterns whereas data on children ever born is utilized for fertility differentials analysis. This is because the data on children ever born cover life time fertility performance and give an overall picture of fertility in agricultural households of Arssi region. The quality of reporting of these data in the survey will be examined in the following sections.

3.2.1 Reporting of Births

As is the case in many developing countries, birth data are prone to be misreported in Ethiopia. Some of the reasons which make them evident for these to happen are the low level of literacy, the non-existence vital registration and traditional customs.

Using the ratio of males to females at birth, the internal consistency of birth reporting can be tested. The nature of this ratio gives some indication as to whether there is any differential reporting of births by sex. A tendency not to report male births in rural Ethiopia is to be expected due to the traditional beliefs. The application of the following technique, therefore, seems appropriate to determine the extent of selective male under-reporting.

Since the 1980 Rural Demographic Survey was based on sampling techniques, it is safe to assume that the number of births will fall within the binomial probability distribution. Based on the number of reported births, the probability of being born a male or female is calculated. The probability of a male birth is 0.485 and a female birth 0.515. As this binomial distribution could be approximated to a normal probability distribution the following working equations for interval estimation could thus be applied.

$$\text{Lower bound} = p - 1.96\sqrt{(pq)/n}$$

$$\text{Upper bound} = p + 1.96\sqrt{(pq)/n}$$

Where $p = 0.485$, $q = 0.515$, n = number of births

The bounds for the true sex ratios are presented in Table 3.1. On examination it can be seen that at 95 per cent level of confidence, the observed sex ratio of 94 for current births lies between the upper and lower bounds. This indicates an insignificant level of selective under-reporting. This same result would also be seen if the sex ratio of 105 was applied. The only exceptions to this are seen in the 20-24 and 30-34 year age groups, where observed sex ratios fall outside the given boundaries.

Table 3-1: Sex Ratio at Birth and Total Number of Births by Age of Mother, Arssi

Age Group	Total Births	Sex Ratio at Birth		
		Bound		Observed
		Lower	Upper	
15 - 19	69	0.58	1.52	0.82
20 - 24	134	0.85	1.05	0.79
25 - 29	181	0.70	1.26	1.11
30 - 34	139	0.84	1.05	1.14
35 - 39	122	0.66	1.35	0.91
40 - 49	66	0.57	1.54	0.71
Total	711	0.81	1.09	0.94

Source: Subset of 1980 Rural Demographic Survey Data Tape

3.2.2 Reporting of Children Ever Born

One fact about women's age and fertility is that the mean number of children ever born increases with the mother's age.

Appendix B shows that this observation is true except for the last age group where there is a slight decline in the mean number of children ever born. This most probably indicates that there is misreporting of children in this age group. This kind of misreporting usually occurs because of memory lapse due to age(Brass et al, 1968).

On examining Appendix B, Brass's P/F shows a consistent decline with increasing age of women. The high P/F ratios seen in the younger age groups may be attributable to under-reporting of current births, possibly due to the misperception of the reference period by these women and the low P/F ratio in the older age groups may suggest misreporting due to memory decay. This tchnique is basically a comparison of current and life time fertility, whereby if current birth and child reporting are good enough the P/F ratio is close to 1(Brass, 1975:11 - 23).

3.3 Fertility Levels and Patterns

Measures used in this study are the General Fertility Rate, Age Specific Fertility Rates. The results of these measures are summarized in Table 3.2. The Indices of fertility measures devised by Coale are also included(Coale, 1967; Linger, 1974: 27 - 28) and shown in Appendix C.

Age Specific Fertility Rates peak at age group 25-29. A Total Fertility Rate of 7.9 and a General Fertility Rate of 241 per 1000 women with a mean age fertility schedule of 31 years is obtained for the study population. Coale's Index of Overall Fertility(If) is 0.62 which implies that the fertility of all women in Arssi region achieves 62 per cent of the standard population(Hutterite level). The Index of Marital Fertility(Ig) is 0.70 whereas the Index of Non-marital Fertility(Ih) is 0.09 as shown in Appendix C. For rural Egypt the Index of Overall Fertility(If) in 1976 was 0.51, the Index of Marital Fertility(Ig) 0.71 and the Index of proportion

married was 0.71(Committee on Population and Demography, 1982: 67).

The high Total Fertility Rate of 7.9 may be attributed to the absence of contraception and the high value placed on children in this society. Based on the 1980 Rural Demographic Survey data, the adjusted levels of fertility for the twelve administrative regions were a Total Fertility of 6.9, a General Fertility Rate of 211, and a mean age fertility schedule of 29.2 years(United Nations, 1984:109). Similarly, high fertility has been recorded for neighbouring countries. Based on the 1973 Sudanese Census, a Total Fertility Rate of 6.8 was recorded for Sudan(United Nations, 1979:204). Bauni(1984:11) reported a Total Fertility Rate of 7.9 for Kenya in 1979.

Table 3-2: Observed and Adjusted Age Specific Fertility Rates of All Women.

Age Group	Age Specific Fertility Rates		
	Arssi@		Twelve Regions@@
	Observed	Adjusted	Adjusted
15 - 19	0.135	0.154	0.126
20 - 24	0.290	0.324	0.273
25 - 29	0.335	0.352	0.299
30 - 34	0.294	0.307	0.264
35 - 39	0.279	0.288	0.225
40 - 44	0.179	0.163	0.125
45 - 49	0.076	0.069	0.065
Total	7.9	8.3	6.9

Note: TFR - Total Fertility Rate

Sources: @ Subset of 1980 Rural Demographic Survey Data Tape
@@ United Nations(1984:109).

3.4 Fertility and Age

It is common knowledge that as the age of women increases so does the mean number of children ever born. The only exception seen in the present data is in the age group 45-49 where there is a slight decrease. This decline may be attributed to a deficiency in the data which could be caused as a result of age and birth misreporting or longer periods of postpartum non-susceptibility. Lower fertility in the past may also be a factor.

When only mothers are considered the relationship between increase in age and increase in mean children ever born remains consistent. This observation therefore implies that the decline in the mean number of children ever born in the 45-49 age group can more probably be attributed to a large percentage of childless women rather than data limitaions. For all women, the mean number of children ever born is 3.8 per women. The mean number of children ever born for women with at least one child in the age group 45-49, which is commonly called the completed family size, is 7.3(Table 3.3).

3.5 Fertility and Sex of Child

In rural Ethiopia children were a highly valued part of society and high fertility increased a woman's social standing (Chang, 1974:345). Male children were especially desirable as sons were expected to take over as head of the household when the father died, as protector of his land and provider for his family. As old age pensions were non-existent in Ethiopia children played a very important role in old age support, and sons were again thought to be more able to fulfil this obligation(Lipsky, 1962).

In Table 3.3, it is shown that the mean number of female children ever born when mothers only are considred is 11 per

cent less than that of male children. This observation is also true with a 9 per cent difference when all women in the study population are considered.

Table 3-3: Mean Number of Children Ever Born to Mothers and All Women by Sex of Child, Arssi

Age Group	Mean Children Ever Born		
	Male	Female	Both Sexes
	All Women		
15 - 19	0.2(512)	0.2(512)	0.4(512)
20 - 24	0.9(463)	0.9(463)	1.8(463)
25 - 29	1.7(540)	1.6(540)	3.3(540)
30 - 34	2.4(473)	2.3(473)	4.7(473)
35 - 39	3.2(437)	2.9(437)	6.1(437)
40 - 44	3.7(282)	3.3(282)	7.0(282)
45 - 49	3.7(238)	3.1(238)	6.8(238)
Total	2.0(2945)	1.8(2945)	3.8(2945)
	Mothers		
15 - 19	0.7(140)	0.7(140)	1.5(140)
20 - 24	1.2(375)	1.1(375)	2.2(375)
25 - 29	1.8(500)	1.7(500)	3.6(500)
30 - 34	2.5(449)	2.4(449)	4.9(449)
35 - 39	3.3(423)	3.0(423)	6.3(423)
40 - 44	3.8(275)	3.4(275)	7.2(275)
45 - 49	4.0(223)	3.3(223)	7.3(223)
Total	2.5(2385)	2.3(2385)	4.7(2385)

Note: Figures in Brackets are Number of Women and Mothers.
Source: Subset of 1980 Rural Demographic Survey Data Tape

3.6 Fertility and Religion

In the study of fertility differentials by religion three hypotheses have been put forward. The characteristics hypothesis sees religion as a factor in socio-economic, education, occupation, income, urban/rural residence and social mobility differences. The particularized theology hypothesis makes the assumption that religion itself has a significant impact on fertility through religious teachings and beliefs about birth control and family size. Finally, the minority group hypothesis states that in any one place the predominant religious group will have a higher fertility than those religious groups which are in the minority(Lucas et al, 1980:83-84).

As illustrated in Chapter Two there are significant differences in literacy between Christians and Muslims in Arssi region. Because of these the characteristics hypothesis seems applicable to this study. It is hardly possible to gauge the impact that the particularized theology hypothesis and the minority group hypothesis would have on fertility in this region since no information was gathered on these in the survey.

As shown in the Table the observed mean number of children ever born was 17 per cent lower for Christians than Muslims and this percentage difference reduced to eleven per cent when the effects of childlessness were removed. As mentioned in Chapter Two, Christians were more literate and less ever-married than the Muslims. These may therefore be contributing factors to the observed difference in fertility.

Table 3-4: Mean Number of Children Ever Born to Mothers and All Women by Age and Religion, Arssi

Age Group	Mean Children Ever Born	
	Christian	Muslim
	All Women	
15 - 19	0.4(224)	0.4(288)
20 - 24	1.9(211)	1.8(252)
25 - 29	3.4(183)	3.3(357)
30 - 34	4.4(182)	4.8(291)
35 - 39	5.9(164)	6.2(273)
40 - 44	6.2(113)	7.5(169)
45 - 49	5.2(97)	7.8(141)
Total	3.5(1174)	4.1(1771)
	Mothers	
15 - 19	1.3(64)	1.6(76)
20 - 24	2.3(175)	2.2(200)
25 - 29	3.5(175)	3.6(325)
30 - 34	4.8(168)	5.0(281)
35 - 39	6.3(154)	6.3(269)
40 - 44	6.5(108)	7.6(167)
45 - 49	6.2(84)	8.0(139)
Total	4.4(928)	4.9(1457)

Note: Figures in Brackets are Numbers of Women and Mothers.
Source: Subset of 1980 Rural Demographic Survey Data Tape

3.7 Fertility and Ethnic Group

Based on the 1948 and 1958 censuses, Blacker(1962) established the existence of fertility differentials between ethnic groups in Zanzibar. In the Sudan, Henin(1968:147-164) based on the 1955/56 sample census, reported fertility differentials between the agricultural population and pastoral nomads who were thought to be ethnically different. In another study of nomads and rain-cultivators in the Sudan, the incidence of childlessness was higher among the nomads(Henin, 1969:171-198).

Studies in the United Republic of Cameroon in the 1960's showed differences in fertility patterns between Bamileke, Kirdi, and the Bassa on one hand and Dakweri, Fang-Bati and Moslem Fulani on the other. Fertility was reported to be high in the first group of tribes and much lower in the second group(United Nations, 1979:238-242). According to this same source studies conducted in Uganda showed significant fertility differences between Eteso and Banyankole. Furthermore, Ghananian tribes were grouped into three broad fertility categories: high fertility tribes, moderately high fertility tribes and low fertility tribes(Gaisie, 1975:339-345). Significant fertility differentials among nine tribes in Tanzania were identified using data from the 1973 National Demographic Survey(United Nations, 1979:238-242). According to this same publication, fertility differentials among ethnic groups were attributed to a prevalence of disease.

In Table 3.5, it is apparent that the mean number of children ever born to Amhara increased up to age group 35-39 and then declined. Possible explanations for this decline in the final two age groups are misreporting of children due to memory lapse and the traditional custom of not reporting male births. In contrast, the mean number of children ever born to Oromo women consistently increased with age. This implies more accurate reporting of children ever born.

When the observed mean number of children ever born to each ethnic group is compared, the fertility of Oromo women was 15 per cent higher than the fertility of Amhara women. This percentage difference reduced to 12 when only women with at least one child were considered.

Table 3-5: Mean Number of Children Ever Born to Mothers and All Women by Age and Ethnic Group, Arssi

Age Group	Mean Children Ever Born	
	Amhara	Oromo
	All Women	
15 - 19	0.3(108)	0.4(404)
20 - 24	1.9(104)	1.8(359)
25 - 29	3.2(99)	3.3(441)
30 - 34	4.2(82)	4.8(391)
35 - 39	6.6(85)	6.0(352)
40 - 44	5.9(48)	7.2(234)
45 - 49	4.6(44)	7.3(194)
Total	3.4(570)	3.9(2375)
	Mothers	
15 - 19	1.2(27)	1.5(113)
20 - 24	2.3(87)	2.2(288)
25 - 29	3.4(92)	3.6(408)
30 - 34	4.6(75)	5.0(374)
35 - 39	6.7(83)	6.2(340)
40 - 44	6.2(46)	7.4(229)
45 - 49	5.7(35)	7.6(188)
Total	4.3(445)	4.8(1940)

Note: Figures in Brackets are Number of Women and Mothers.
Source: Subset of 1980 Rural Demographic Survey Data Tape

3.8 Fertility, Religion and Ethnic Group

As mentioned in Chapter Two, the study population was mainly composed of Amhara Christians, Oromo Christians and Oromo Muslims. From Table 3.6 it can be seen that the Amhara Christians had lower fertility in comparison to the Oromo Christians and the Oromo Muslims. When the effect of childlessness was removed, the difference in the mean fertility between Amhara Christians and Oromo Christians virtually disappeared. However, there was a marginal difference in mean number of children between Amhara Christian mothers and Oromo Muslim mothers. The same observation is true between Oromo Christian mothers and Oromo Muslim mothers. These differences may imply that religion has a stronger impact than ethnicity. Possible explanations, other than those mentioned in Chpter Two, may be the Infant and Child Mortality Rate differences among Christians and Muslims which will be discussed in more detail in Chapter 4.

Table 3-6: Mean Number of Children Ever Born to Mothers and All Women by Age, Religion and Ethnic Group, Arssi

Age Group	Mean Children Ever Born		
	Amhara Christian	Oromo Christian	Oromo Muslim
	All Women		
15 - 19	0.3(108)	0.4(116)	0.4(288)
20 - 24	1.9(104)	1.9(107)	1.8(252)
25 - 29	3.2(99)	3.6(84)	3.3(357)
30 - 34	4.3(81)	4.5(101)	4.8(290)
35 - 39	6.6(85)	5.2(79)	6.2(273)
40 - 44	5.9(46)	6.4(67)	7.5(167)
45 - 49	4.6(43)	6.0(54)	7.9(140)
Total	3.4(566)	3.6(608)	4.1(1767)
	Mothers		
15 - 19	1.2(27)	1.3(37)	1.8(76)
20 - 24	2.3(87)	2.3(88)	2.2(200)
25 - 29	3.4(92)	3.6(83)	3.6(325)
30 - 34	4.7(74)	4.9(94)	5.0(280)
35 - 39	4.7(83)	5.8(71)	6.3(269)
40 - 44	6.1(44)	6.7(64)	7.6(165)
45 - 49	5.8(34)	6.5(50)	8.0(138)
Total	4.5(441)	4.5(487)	4.9(1453)

Note: Figures in Brackets are Number of Women and Mothers.
Source: Subset of 1980 Rural Demographic Survey Data Tape

3.9 Fertility and Literacy

As women with formal education have been shown in the 1980 survey for rural Arssi region to be few in number, an attempt was made instead to compare fertility and literacy. As shown in Table 3.7 the differences in mean fertility, measured by the observed mean number of children ever born, between the literate women and the illiterate women were substantial. At each age group, the illiterate women consistently registered higher mean fertility than the literate women.

The fact that most of the literate women were in the younger age groups, single and more prone to the influences of modernization are possible explanatory factors for the fertility difference shown between literate and illiterate women. Also, as shown in Chapter Two, variations in age at first marriage may be a cause of this difference. In addition, since the National Literacy Campaign was intended to be the first step toward mass education the prospect of the onset of fertility decline seems feasible in the not too distant future. Mass education as the major determinant of the onset of fertility decline was established by Caldwell(1980) using data from Nigeria.

Table 3-7: Mean Number of Children Ever Born to Mothers and All Women by Age and Literacy, Arssi

Age Group	Mean Children Ever Born			
	Literate		Illiterate	
	Mothers	All	Mothers	All
15 - 19	1.6(12)	0.2(80)	1.4(128)	0.4(432)
20 - 24	1.7(18)	1.1(28)	2.3(357)	1.9(435)
25 - 29	3.6(14)	3.0(17)	3.6(486)	3.3(523)
30 - 34	4.1(12)	4.1(12)	4.9(437)	4.9(461)
35 - 39	4.7(10)	4.7(10)	6.3(413)	6.1(427)
40 - 44	4.8(4)	3.2(6)	7.2(271)	7.1(276)
45 - 49	3.0(2)	2.0(3)	7.3(221)	6.9(235)
Total	3.1(72)	1.4(156)	4.8(2313)	4.0(2789)

Note: Figures in Brackets are Number of Women and Mothers.
Source: Subset of 1980 Rural Demographic Survey Data Tape

3.10 Fertility and Marital Status

Marital status can be divided into two categories: widowed and divorced women, and currently married women. This division is made so as to increase the validity of the results by increasing the numbers of cases in each category.

In rural Ethiopia, children born out of wedlock are not acknowledged. Child bearing therefore is confined within the bounds of marriage. As a consequence those women who are divorced and widowed have a depressing effect on fertility because of their marriage disruption. Other factors which lower fertility are older age at first marriage and the proportion of single women in each age group.

The fertility differentials between the two groups can be seen in Table 3.8. There is a marginal difference of 2 per cent in favour of currently married women. When marital status is considered for women who have at least one child, the first group of women are seen to have a 6 per cent higher mean number of children than those who are currently married.

Table 3-8: Mean Number of Children Ever Born to Mothers and All Women by Age and Marital Status, Arssi

Age Group	Mean Children Ever Born			
	Widowed & Divorced		Currently Married	
	Mothers	All	Mothers	All
15 - 19	1.3(7)	0.4(26)	1.5(132)	0.7(266)
20 - 24	2.1(15)	1.3(24)	2.3(359)	2.0(412)
25 - 29	2.9(16)	2.9(16)	3.6(484)	3.4(516)
30 - 34	4.6(25)	4.3(27)	4.9(424)	4.7(443)
35 - 39	5.4(23)	5.2(24)	6.3(400)	6.1(413)
40 - 44	5.5(26)	5.0(29)	7.3(248)	7.2(252)
45 - 49	6.8(45)	6.6(47)	7.4(178)	6.9(191)
Total	5.0(157)	4.1(193)	4.7(2225)	4.2(2493)

Note: Figures in Brackets are Number of Women and Mothers.
Source: Subset of 1980 Rural Demographic Survey Data Tape

3.11 Multiple Classification Analysis of Fertility Differentials

Multiple Classification Analysis examines the relationship between dependent and independent variables. The effects of each independent variable on the dependent variable are added, and the total effect of all independent variables on the dependent variable can be seen. This technique is used when the sample size is large, when the relationship between the dependent and independent variables(Andrew et al, 1973).

To obtain observed and adjusted deviations of each category in each independent variable from the grand mean, Multiple Classification Analysis is employed. The Eta value explains the gross effect of each independent variable, whereas the Beta value describes the net effect or order of importance of each independent variable, whereas the Beta value describes the net effect or order of importance of each independent variable. The adjusted multiple R squared value indicates by what percentage fertility differentials are explained by the independent variables taken into consideration.

The dependent variable used in this study is the number of children ever born to all women in the 1980 survey population for Arssi administrative region. The independent variables are religion, ethnic group, literacy and marital status. Age is considered as a covariate. The results of the Multiple Classification Analysis are presented in Table 3.9. As indicated by the Eta values, in gross terms, fertility is more affected by marital status,literacy, religion than by ethnicity.

The Beta value of 'marital status' is the highest which means that marital status has a strong effect on fertility when all the independent variables and age are taken into account. The Beta value of ethnicity is nil, this implies that ethnicity has no effect on fertility when all the independent variables and age are taken into account. This finding disproves the observation made earlier in this chapter about the existence of

fertility differentials between the two ethnic groups. The adjusted multiple R squared value is 0.48, this implies that 48 per cent of the variation in fertility can be explained by the independent variables and the covariate mentioned. Further investigation of the adjusted values of variables in each category shows that the fertility of Christians is 11 per cent lower than that of Muslims and the fertility of illiterate women is 9 per cent higher than those who are literate.

Table 3-9: Multiple Classification Analysis of Fertility Differentials for All Women, Arssi

Variable/Category	N	Deviation From the Grand Mean	
		Unadjusted	Adjusted
Religion	(Eta = 0.09		Beta = 0.05)
Christian	1174	-0.35	-0.23
Muslim	1771	0.23	0.15
Ethnic Group	(Eta = 0.06		Beta = 0.00)
Amhara	570	-0.44	-0.02
Oromo	2375	0.11	0.00
Literacy	(Eta = 0.17		Beta = 0.02)
Literate	156	-2.41	-0.35
Illiterate	2789	0.14	0.02
Marital Status	(Eta = 0.35		Beta = 0.11)
Single	259	-3.80	-1.00
Married	2493	0.38	0.16
Widowed & Divorced	193	0.22	-0.73

Grand Mean = 3.83

Adjusted Multiple R Squared = 0.48

Source: Subset of 1980 Rural Demographic Survey Data Tape

CHAPTER 4

INFANT AND CHILDHOOD MORTALITY LEVELS, PATTERNS AND DIFFERENTIALS

4.1 Introduction

The purpose of this Chapter is to explore levels and patterns of Infant and Childhood Mortality. More specifically age, religion, ethnic group, literacy and marital status will be taken independently, and the effect that each has on Infant and Child Mortality will be examined.

As mentioned in Chapter One, two types of mortality data were collected in the 1980 Rural Demographic Survey: number of infant deaths occurring during the year preceding the survey and total number of child deaths that occurred throughout the child bearing years of each woman. While data on child death is most frequently affected by ommission, infant death data is affected by both ommission and misperception of the reference period. Due to this and the non-existence of vital registration in the region the data on child death is utilized in this study to estimate Infant and Child Mortality using an indirect method of analysis.

4.2 Mortality Data

To prove the validity of the data the proportion of child deaths should consistently increase with mother's age. The only exceptions to this are when the sample size is small or in cases of natural catastrophe. In such instances, fluctuation may occur even if the data are accurate. However, in the absence of these causes, fluctuation indicates unreliability of the data (Sembajwe, 1981:32). As can be seen in Table 4.1, the pattern of these data follows that which is necessary to establish its validity.

Table 4-1: Proportion of Children Dead by Age Group of Mothers, Arssi

Age Group	Proportion of Children Dead(%)
15 - 19	16.3(203)
20 - 24	20.7(841)
25 - 29	22.1(1780)
30 - 34	22.2(2207)
35 - 39	23.6(2659)
40 - 44	26.6(1969)
45 - 49	30.3(1625)
Total	24.2(11284)

Note: Figures in Brackets are Number of Children Ever Born.
Source: Subset of 1980 Rural Demographic Survey Data Tape

4.3 Infant and Child Mortality Levels and Patterns

Based on the 1968/70 Second Round National Demographic Survey, the adjusted Infant Mortality Rate for rural Ethiopia was 155 per 1000 births with Child Mortality estimated as 247 per 1000 children(Central Statistical Office, 1974:71). The total number of reported infant deaths during the year preceding the 1980 survey when divided by the total number of births occurring during the same year gave an Infant Death Rate of 172 per 1000 live births. At 95 per cent level of confidence, the sample Infant Death Rate varies from a low of 144 deaths to a high of 200.

Using data on children ever born, child death and life table functions, the probabilities of dying between time of birth and exact ages one, two, three and five can be determined. The method employed here is Trussell's variation of Brass's technique and the working equations are set out as follows.

$$oQ(i) = K(i) \cdot D(i)$$

Where,

oQ(i) = The probability of Childhood Mortality in each age.

D(i) = The proportion of children dead in each age group of mothers.

K(i) = The appropriate multiplier for each i such that

$$K(i) = A(i) + B(i) \cdot P(1)/P(2) + C(i) \cdot P(2)/P(3)$$

Where,

P(i) = The observed mean number of children ever born for age group i. The Coefficients A(i), B(i) and C(i) were estimated using regression procedure and model life tables(United Nations, 1983:75-81).

The regression coefficients to be used in estimating the adjustment factors, K(i), for the Trussell variant is taken from Manual X, Table 47(United Nations, 1983:77). It is also assumed that the West mortality model would apply since Infant Mortality in Ethiopia is exceedingly high.

The number of years before the survey to which the estimate of Child Mortality(oQx) refers is called the time refernece period and can be calculated using the following equation.

$$t(x) = A(i) + B(i) \cdot P(1)/P(2) + C(i) \cdot P(2)/P(3)$$

Where the coefficients A(i), B(i) and C(i) were taken from Table 48, page 78 of Manual X. The West mortality model was selected for this purpose. The mortality levels associated with the oQx estimates for both sexes is derived from the West model life table by interpolating between the values of Table 238, Manual X, page 271. The life table is chosen on the criteria of sex ratio at birth of 105. For interpolation purposes 1(x) values were obtained from the relationship $1(x) = 1 - oQ(x)$. Using this method, Table 4.2 was produced. An examination of the levels displayed in the Table shows that the estimate of Infant and Child Mortality is fairly constant implying that the trend of Child Mortality has shown no significant change over a period of time.

Table 4-2: Estimated Value of Child Mortality Using West Model Life Table and Trussell Equation, Arssi

Age Group of Mothers	Proportion of Children Dead(D(i))	Trussell Multiplier (K(i))	Age (x)	Estimated Mortality (oQ(x))	West Mortality Level	t(x)@
15 - 19	0.1626(203)	0.9729	1	0.1582	11.1	1.21
20 - 24	0.2069(841)	0.9937	2	0.2056	10.7	2.68
25 - 29	0.2208(1780)	0.9688	3	0.2139	11.2	4.79
30 - 34	0.2220(2207)	0.9878	5	0.2193	11.8	7.22
P(1)/P(2)		0.2183				
P(2)/P(3)		0.5510				

Notes: Figures in Brackets are Number of Children Ever Born.
@ Reference Period(Number of Years Prior to the Survey).
Source: Subset of 1980 Rural Demographic Survey Data Tape

For each of the mortality estimates and reference periods, the Infant Mortality(oQ1) and the Child Mortality(1Q4) could be calculated using the relationship 1(x) = 1 - Q(x), 4Q1=1-1(5)/1(1 and by interpolating between the values of Table 238, Manual X (United Nations, 1983:271). The Infant and Child Mortality in Table 4.3 have been obtained using this method. As can be seen the ratio of Child Mortality Estimate to Infant Mortality Estimat was high and constant. Since each Infant and Child Mortality Estimate refers to different time points, the constant ratio may imply that the preventable conditions affecting Childhood mortality in Arssi showed no significant improvement. Also, Infant Mortality is shown to be higher than Child Mortality.

Table 4-3: Infant and Child Mortality Rates Per 1000 Live Births, Arssi

x	1(x)	West Mortality Level	oQ(1)	1Q(4)	1Q(4)/oQ(1)
1	842	11.1	158	93	0.59
2	794	10.7	164	97	0.59
3	786	11.2	156	92	0.59
5	781	11.8	147	87	0.58

Source: Subset of 1980 Rural Demographic Survey Data Tape

4.4 Infant and Child Mortality by Sex of Child

As is evident from Table 4.4 the difference in Infant and Child Mortality between male and female children is minimal and insignificant. The trend in male Infant and Child Mortality estimate ranges from 184 to 227. On examination of the mortality levels shown for male children, it is seen that the Infant and Child Mortality is fairly constant. This same trend is apparent for female children with the exception of age group 20-24. This dip in the levels may be attributed to the data limitation.

Table 4-4: Infant and Child Mortality by Sex of Child, Arssi

Age Group of Mothers	Proportion of Children Dead (D(i))	Trussell Multiplier (K(i))	Age (x)	Mortality Estimate Per 1000 (oQ(x))	West Mortality Level (ML(x))
		Male			
15 - 19	0.1818(99)	1.0132	1	184	10.3
20 - 24	0.1991(437)	0.9993	2	199	11.6
25 - 29	0.2293(916)	0.9546	3	219	11.5
30 - 34	0.2311(1125)	0.9823	5	227	12.0
P(1)/P(2)		0.2049			
P(2)/P(3)		0.5564			
		Female			
15 - 19	0.1442(104)	0.9292	1	134	11.8
20 - 24	0.2154(404)	0.9872	2	213	9.7
25 - 29	0.2118(864)	0.9605	3	203	11.1
30 - 34	0.2126(1082)	0.9935	5	211	11.7
P(1)/P(2)		0.2328			
P(2)/P(3)		0.5454			

Note: Figures in Brackets are Number of Children Ever Born.
Source: Subset of 1980 Rural Demographic Survey Data Tape

4.5 Infant and Child Mortality by Religion

In Table 4.5, the trend in Infant and Child Mortality is shown, and it is apparent that Christian women experience fewer Infant and Child deaths than Muslim women at each age. As the socio-economic conditions and lack of medical facilities in rural Ethiopia affect both Christians and Muslims alike, a possible explanation for the significant Infant and Child Mortality differences between the two groups may be their differences in literacy rates. Five per cent of Christian mothers were literate whereas the figure for Muslims was two per cent. This higher rate of literacy among Christian women could result in a better knowledge of child care, nutrition and sanitation thus raising child life expectancy. Religion itself is not thought to have any direct effect on Infant or Childhood Mortality(United Nations, 1979:457).

As shown in the Table, the level of Infant and Child Mortality for Christian women drops from a level of 17 to 12.5 at which point it increases again. A possible explanation for the unusually low Infant Mortality estimate for women in 15-19 age group may be due to the small number of cases reported in the survey. The level of Infant and Child Mortality for Muslim women, on the other hand, increases marginally from level 8.7 to level 10.1; the difference between the highest and the lowest level could be considered insignificant, therefore, implying a relatively constant trend in Infant and Child Mortality for Muslim women.

Table 4-5: Infant and Child Mortality by Religion, Arssi

Age Group of Mothers	Proportion of Children Dead (D(i))	Trussel Multiplier (K(i))	Age (x)	Mortality Estimate Per 1000 (oQ(x))	West Mortality Level (ML(x))
		Christian			
15 - 19	0.0741(81)	1.0551	1	78	17.0
20 - 24	0.1704(399)	1.0050	2	171	12.5
25 - 29	0.1545(615)	0.9528	3	147	14.4
30 - 34	0.1534(802)	0.9764	5	150	14.9
P(1)/P(2)		0.1912			
P(2)/P(3)		0.5627			
		Muslim			
15 - 19	0.2213(122)	0.8997	1	199	8.7
20 - 24	0.2398(442)	0.9846	2	236	9.3
25 - 29	0.2558(1165)	0.9640	3	247	9.7
30 - 34	0.2612(1405)	0.9989	5	261	10.1
P(1)/P(2)		0.2415			
P(2)/P(3)		0.5375			

Note: Figures in Brackets are Number of Children Ever Born.
Source: Subset of 1980 Rural Demographic Survey Data Tape

4.6 Infant and Child Mortality by Ethnic Group

As shown in Table 4.6, Amhara women had a lower Infant and Child Mortality than Oromo women. The probability of Child Mortality from birth to age one, two, three and five was 140 per cent, 61 per cent, 175 per cent and 107 per cent higher for Oromo women than Amhara women. These significant differentials in Infant and Child Mortality between the two ethnic groups may be attributed to factors inherent in ethnicity rather than ethnicity itself. Six per cent of Amhara mothers were literate whereas the figure for Oromo mothers was 2 per cent. One of these factors is that, due to a higher rate of literacy,

Amhara women were usually more informed and were more likely to seek medical help when a child was sick. Oromo women, on the other hand, tended to use traditional cures which, in many cases, aggravated the condition. Relatively speaking, the attitudes toward sanitation, nutrition and child care followed a more traditional pattern among the Oromo. In Amhara society, the probability of Infant Mortality from birth to age one was lowest for women aged 15-19 who were usually more literate and accepting of Western child care methods.

Table 4-6: Infant and Child Mortality by Ethnic Group, Arssi

Age Group of Mothers	Proportion of Children Dead (D(i))	Trussell Multiplier (K(i))	Age (x)	Mortality Estimate Per 1000 (oQ(x))	West Mortality Level (ML(x))
		Amhara			
15 - 19	0.0606(33)	1.1563	1	70	17.8
20 - 24	0.1378(196)	1.0128	2	140	14.4
25 - 29	0.0921(315)	0.9400	3	87	17.9
30 - 34	0.1210(347)	0.9570	5	116	16.7
P(1)/P(2)		0.1622			
P(2)/P(3)		0.5923			
		Oromo			
15 - 19	0.1824(170)	0.9220	1	168	10.5
20 - 24	0.2279(645)	0.9877	2	225	9.8
25 - 29	0.2485(1465)	0.9625	3	239	10.0
30 - 34	0.2409(1860)	0.9957	5	240	10.9
P(1)/P(2)		0.2342			
P(2)/P(3)		0.5409			

Note: Figures in Brackets are Number of Children Ever Born.
Source: Subset of 1980 Rural Demographic Survey Data Tape

4.7 Infant and Child Mortality by Religion and Ethnic Group

Table 4.7 shows the trends in Infant and Child Mortality for Amhara Christians, Oromo Christians and Oromo Muslims. When Amhara Christians and Oromo Muslims are compared, the Oromo Muslim trend of Infant and Child Mortality was higher than that of the Amhara Christians, and when Oromo Muslims and Oromo Christians are compared the trend in Infant and Child Mortality was higher for Oromo Muslims than Oromo Christians. This pattern was seen to increase consistently with mothers age. It would appear that the Amharas were affected solely by religion, whereas the Oromo Christians were affected by both religion and ethnic group. This was apparent when it was seen that their Infant and Child Mortality rate was much closer to that of the Oromo Muslims than that of the Amhara Christians.

Table 4-7: Infant and Child Mortality by Religion and Ethnic Group, Arssi

Age Group of Mothers	Proportion of Children Dead (D(i))	Trussell Multiplier (K(i))	Age (x)	Mortality Estimate Per 1000 (oQ(x))	West Mortality Level (ML(x))
		Amhara Christian			
15 - 19	0.0606(33)	1.1481	1	70	17.8
20 - 24	0.1378(196)	1.0117	2	139	14.2
25 - 29	0.0921(315)	0.9405	3	87	17.9
30 - 34	0.1214(346)	0.9580	5	116	16.7
P(1)/P(2)		0.1649			
P(2)/P(3)		0.5912			
		Oromo Christian			
15 - 19	0.0833(48)	0.9651	1	80	16.9
20 - 24	0.2020(203)	0.9999	2	202	10.9
25 - 29	0.2200(300)	0.9658	3	213	11.3
30 - 34	0.1776(456)	0.9951	5	177	13.6
P(1)/P(2)		0.2158			
P(2)/P(3)		0.5322			
		Oromo Muslim			
15 - 19	0.2213(122)	0.9032	1	200	8.6
20 - 24	0.2398(442)	0.9856	2	236	9.3
25 - 29	0.2558(1165)	0.9642	3	247	9.7
30 - 34	0.2614(1404)	0.9989	5	261	10.1
P(1)/P(2)		0.2400			
P(2)/P(3)		0.5368			

4.8 Infant and Child Mortality by Literacy

In Table 4.8 the highest Infant and Child Mortality estimate is shown for mothers who are literate and aged 30-34. It could only be assumed that this high estimate is attributable to data limitations. With the exception of this age group, the trend in Infant and Child Mortality is lower for literate women than illiterate women. The probability of Infant Mortality from birth to age one was 353 per cent higher for illiterates than those who were literates, 93 per cent higher from birth to age two, and 112 per cent from birth to age three. One of the main reasons for the significant differentials between the two groups is that literacy lowers Infant and Child Mortality by increasing knowledge of nutrition and hygiene.

Table 4-8: Infant and Child Mortality by Literacy, Arssi

Age group of Mothers	Proportion of Children Dead (D(i))	Trussell Multiplier (K(i))	Age (x)	Mortality Estimate Per 1000 (oQ(x))	West Mortality Level (ML(x))
		Literate			
15 - 19	0.0714(19)	0.8076	1	34	21.3
20 - 24	0.1000(30)	1.0415	2	107	16.2
25 - 29	0.0980(51)	1.0503	3	102	17.0
30 - 34	0.3000(49)	1.0721	5	350	6.8
P(1)/P(2)		0.2243			
P(2)/P(3)		0.3567			
		Illiterate			
15 - 19	0.1693(184)	0.9462	1	154	11.3
20 - 24	0.2109(811)	0.9837	2	206	10.8
25 - 29	0.2244(179)	0.9650	3	216	11.1
30 - 34	0.2206(2158)	0.9861	5	217	11.9
P(1)/P(2)		0.2312			
P(2)/P(3)		0.5619			

Note: Figures in Brackets are Number of Children Ever Born.
Source: Subset of 1980 Rural Demographic Survey Data Tape

4.9 Infant and Child Mortality by Marital Status

In Table 4.9 the trend in probability of Infant and Child Mortality is shown to be lower for widowed and divorced women. This may possibly be due to the small number of cases, or the fact that if a woman was left without a husband and no income the youngest and weakest of her children would probably be the first to die from lack of nutrition and proper care. For currently married women the trend in probability of Infant and Child Mortality is constant with the exception of the first age group. Apart from those reasons already mentioned, i.e. nutrition and sanitation, another possible explanation for this could be environmental factors such as childhood diseases and accidents that affect the child as it grows older.

Table 4-9: Infant and Child Mortality by Marital Status, Arssi

Age Group of Mothers	Proportion of Children Dead (D(i))	Trussell Multiplier (K(i))	Age (x)	Mortality Estimate Per 1000 (oQ(x))	West Mortality Level (ML(x))
		Widowed & Divorced			
15 - 19	-	-	1	-	-
20 - 24	0.3125(32)	0.9968	2	312	6.9
25 - 29	0.3192(47)	0.9991	3	319	6.2
30 - 34	0.2414(116)	1.0389	5	251	10.5
P(1)/P(2)		0.2597			
P(2)/P(3)		0.4539			
		Currently Married			
15 - 19	0.1658(193)	0.5874	1	97	15.5
20 - 24	0.2030(808)	0.9032	2	183	11.4
25 - 29	0.2181(1733)	0.9463	3	206	11.5
30 - 34	0.2207(2093)	1.0091	5	223	11.4
P(1)/P(2)		0.3700			
P(2)/P(3)		0.5840			

Note: Figures in Brackets are Number of Children Ever Born.
Source: Subset of 1980 Rural Demographic Survey Data Tape

CHAPTER 5

SUMMARY AND CONCLUSIONS

The focal points of this study have been fertility and child mortality differentials in Arssi administrative region based on the 1980 Rural Demographic Survey. The study population was all women aged 15-49 years from comparable social and economic backgrounds. Being either Christian or Muslim, most were currently married and lived traditional lives in an agricultural community where a high degree of illiteracy was prevalent. The two ethnic groups were Amhara and Oromo and within each the most important influence was religion. In this society, fertility was believed to be a blessing from God and the procreation of many children was therefore highly desirable.

The analysis of current fertility levels showed an adjusted Total Fertility Rate of 8, and an observed General Fertility Rate of 241 births per 1000 women whereas the Coale's Index of Overall Fertility(If) was 0.62. Muslims were found to have higher fertility than Christians. This mentioned fertility differential is probably due to the existing differences in childlessness, literacy, ethnic composition, marriage pattern and child mortality between the religion groups. Also, the observed differentials might have been caused by the data quality.

Initially, fertility differences were observed between the Amhara and Oromo ethnic group. However, these ethnic fertility differentials were negated when the other social and demographic variables were controlled in the Multiple Classification Analysis.

Significant fertility differentials were found between literate and illiterate women. These differentials were attributed to differences in attitudes to modern influences between literates and illiterates. A further analysis of

fertility differentials by marital status showed that currently married women had higher fertility than widowed and divorced women.

The Multiple Classification Analysis which was conducted to determine the degree of impact each independent variable had on children ever born showed that marital status, religion and literacy had the greatest effect. Ethnic group, when adjusted by all considered variables, was found to have no effect on the dependent variable. In all, 48 per cent of the observed fertility differentials were explained by the variables included in the Multiple Classification Analysis.

The recent value of Infant Mortality(oQ1) for the study population was estimated to be 158 per 1000 births whereas for Child Mortality(1Q4) the estimate was 93 per 1000 births. The analysis to determine the existence of Infant and Child Mortality differentials by sex of child indicated no significant difference.

Muslims were found to have consistently higher Infant and Child Mortality than Christians. The most probable explanation for this observation was the literacy rate differences between the two religions. There were also significant differences in Infant and Child Mortality between the Amharas and Oromos, with Oromos having the highest mortality.

When religion and ethnic group were controlled the Amhara Christians were found to have the lowest Infant and Child Mortality compared to Oromo Christians and Oromo Muslims. The highest rate was for Oromo Muslims. These Infant and Child Mortality rates showed that literate women experienced less Child Mortality than those who were illiterate.

As Muslims had the highest fertility, and mortality rates for infants and children, the identification of this correlation may prove useful for future government policies. The high

fertility of Muslims may have been influenced by a desire to replace the dead or shorter birth intervals resulting from an infant death. Thus, a higher survival rate of children by improved awareness of health and child care may actually have a depressing effect on their fertility.

The very significant fertility and mortality differences between literate and illiterate women in this population, also give scope for government intervention. If the ongoing literacy campaign is intensified so as to educate people on a mass scale, the fertility and mortality patterns of rural Ethiopia would certainly show a downward trend.

Being the first demographic study to have been carried out for Arssi administrative region, it is more of an exploratory investigation rather than an in-depth analysis. It is limited in as much as it could only cover agricultural households and one of the administrative regions over one survey year. As levels and patterns may vary between regions at any point in time, and trends over a period of time, a comparative study would have been more enlightening. Although the relevant data was availabe, time and space did not permit this type of analysis. Therefore, further studies will be required to show an overall picture of fertility and mortality in rural Ethiopia. Perhaps the first step toward this would be a comparison between the first and second rounds of the 1980 and 1981 Rural Household Demographic Survey.

For a more comprehensive analysis of fertility differentials information on age at first marriage, lactation, history of birth intervals, spontaneous or induced abortions and the practice of sexual abstinence would be necessary. As these intermediate variables were lacking in present data, their direct effects on fertility could not be established. Their effects, however, could be seen indirectly through the independent variables of which they are an intrinsic part.

Appendix A
Demographic Questionnaire

CONFIDENTIAL
ONLY FOR
STATISTICAL USE

CENTRAL STATISTICAL OFFICE

DEMOGRAPHIC SURVEY

QUESTIONNAIRE

1980

JOB ID

1	2	3
2	0	1

1- REGION			2- AWRAJA			3- WEREDA		
	4	5		6	7		8	9

4- FARMERS ASSOCIATION				5- SERIAL NUMBER OF THE SAMPLED HOUSEHOLD			
	10	11	12		13	14	15

ROUND	DESIGNATION	NAME	SIGNATURE	DATE
I	ENUMERATOR			
	SUPERVISOR			
II	ENUMERATOR			
	SUPERVISOR			

6	7	8	9	10	11	12		13	14	15	16	17	18	19	20	21	22	23	24								25			
SERIAL NUMBER	FULL NAME OF THE HOUSEHOLD MEMBERS (i.e. NAMES OF USUAL MEMBERS AND VISITORS)	RESIDENT STATUS	RELATIONSHIP OF THIS PERSON TO THE HEAD OF HOUSEHOLD	SEX MALE = 1 FEMALE = 2	AGE	DISABILITY		MARITAL STATUS	RELIGION	ETHNIC GROUP	PLACE OF BIRTH 1 SAME PLACE 2 OUTSIDE SAME PLACE, WITHIN AWRAJA 3 OUTSIDE AWRAJA WITHIN REGION 4 OUT OF REGION 5 ABROAD	LENGTH OF CONTINOUS RESIDENCE	LITERACY	LITERATE THROUGH NATIONAL LITERACY CAMPAIGN	SCHOOL ATTENDANCE	HIGHEST GRADE COMPLETED	IS FATHER ALIVE ?	IS MOTHER ALIVE ?	ALL WOMEN 10 YEARS AND OVER								BIRTH IN THE LAST 12 MONTHS			
																			NUMBER OF CHILDREN											
																			CHILDREN LIVING AT HOME				CHILDREN LIVING ELSEWHERE		CHILDREN DEAD		NOW LIVING		DEAD	
						YES = 1 NO = 2	IF YES TYPE												M		F		M	F	M	F	M	F	M	F
16 17 18		19	20	21	22 23	24	25	26	27	28 29	30	31	32	33	34	35	36 37	38	39	40 41		42 43		44 45		46 47		48	49	50	51
1 0 1																														
1 0 2																														
1 0 3																														
1 0 4																														
1 0 5																														
1 0 6																														
1 0 7																														
1 0 8																														
1 0 9																														
1 1 0																														

6	17	18	NAME OF DECEASED	SEX 19	AGE 20	AGE 21
	7	1				
	7	2				
	7	3				

DEATH IN HOUSEHOLD LAST YEAR

1 = RESIDENT PRESENT
2 = RESIDENT ABSENT
3 = VISITOR

0 = TOTAL BLINDNESS
1 = PARTIAL BLINDNESS
2 = TOTAL DEAFNESS
3 = PARTIAL DEAFNESS
4 = AMPUTATION OF ARM
5 = AMPUTATION OF LEG
6 = LEPROSY
7 = CRIPPLED
8 = MENTAL ILLNESS
9 = OTHERS

1 = SINGLE
2 = MARRIED
3 = WIDOWED
4 = DIVORCED

1 = CHRISTIAN
2 = MOSLEM
3 = OTHER

00 = LESS THAN 1 YEAR
01 = 1 YEAR
10 = 10 YEARS & OVER
11 = ALWAYS / SINCE BIRTH

1 = LITERATE
2 = READ ONLY
3 = ILLITERATE

1 = YES
2 = NO

1 = NOW
2 = PAST
3 = NEVER

1 = YES
2 = NO
3 = DO NOT KNOW

Appendix B

Brass's Ratios and Adjusted Age Specific Fertility Rates, Arssi

Age Group	f(i)	Q(i)	F(i)	P(i)	P(i)/F(i)	W(i)	f'(i)	f"(i)
15-19	0.135	-	0.313	0.396	1.298	0.041	0.147	0.154
20-24	0.289	0.675	1.511	1.816	1.208	0.096	0.309	0.324
25-29	0.335	2.120	3.137	3.296	1.050	0.110	0.335	0.352
30-34	0.294	3.795	4.716	4.666	0.999	0.108	0.292	0.307
35-39	0.279	5.265	6.178	6.085	0.994	0.145	0.274	0.288
40-44	0.170	6.660	7.269	6.982	0.980	0.131	0.155	0.163
45-49	0.076	7.510	7.857	6.828	0.876		0.066	0.069
TFR	7.9						7.9	8.3

Where,

f(i) Denotes Reported Age Specific Fertility Rates

Q(i) Cumulative Total Fertility Rates.

F(i) Adjusted cumulative Total Fertility Rate.

P(i) Mean Number of Children Ever Born to Women in each Age.

W(i) Adjustment Factors to Conventional Age Groups.

f'(i) Reported Fertility for Conventional Age Groups.

f"(i) Adjusted Fertility Rate($f''(i) = 1.05.f'(i)$).

The F(i) values are calculated using the B.4 equation coefficient in the first panel of Table 7, page 34, Manual X. and the weighting factor W(i) is calculated using the B.6 equation coefficient in Table 8(United Nations, 1983).

Source: Subset of 1980 Rural Demographic Survey Data Tape

Appendix C

Calculation of Coale's Indices

Age Group of Women (1)	Number of Women" All (2)	Number of Women" Married (3)	Standard@ Fertility Schedule(4)	Expected Births All (2).(4)	Expected Births Married (3).(4)
15 - 19	512	266	0.300	154	80
20 - 24	463	412	0.550	255	227
25 - 29	540	516	0.502	271	259
30 - 34	473	443	0.447	211	198
35 - 39	437	413	0.406	177	168
40 - 44	282	252	0.222	63	56
45 - 49	238	191	0.061	15	12
Total expected births				1146	1000
Total actual births				711	700

Index of Overall Fertility(If) = 711/1146 = 0.62
Index of Marital Fertility(Ig) = 700/1000 = 0.70
Index of Proportion Married(Im) = 1000/1146 = 0.87
Index of Non-marital Fertility(Ih) = (If-Ig.Im)/(1-Im) = 0.08

Sources:" Subset of 1980 Rural Demographic Survey Data Tape
@ Linger(1974:27-28).

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