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FACTORS AFFECTING DEMAND FOR MATERNAL HEALTH SERVICES: ANTENATAL CARE CASE STUDY IN ASELLA TOWN

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FACTORS AFFECTING DEMAND FOR MATERNAL HEALTH SERVICES: ANTENATAL CARE CASE STUDY IN ASELLA TOWN

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Factors Affecting Demand for Maternal Health Services: Antenatal Care Case Study in Assela Town

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ABSTRACT

The purpose of this paper is to identify and determine the effects of access variables, economic variables, quality variables, and characteristics of households that affect demand for maternal health services, particularly antenatal care services. In doing this the paper reviewed studies on factors affecting demand for health services and models of demand for health care services used by different scholars are also discussed.

The paper analyzed the determinant factors in two stages. In the first stage, logit model was used to determine factors influencing the probability of attending or not attending antenatal care. In the second stage, a reduced form demand model for health services formulated by Berhman and Deolalikar (1991), and Pitt and Rosenzweig (1986) with some modification was used to identify and determine factors governing demand for antenatal health care services in Asella town using a cross sectional data of 214 respondents.

The results obtained show that household income and education of mothers were the major factors that influence probability of visiting antenatal clinic. The findings of the study also indicated that gestation period of first antenatal visit, income of household, quality of antenatal care services are among major factors that determine demand for antenatal care services. It was observed that gestation period of first antenatal visit had a reducing effect on demand of this care while income of household, quality of health education and health services increase the use of antenatal care services.

DEFINITION OF MEDICAL TERMS

NEONATAL DEATH - is death prior to the 28th day of life.

MORBIDITY - the proportion of sickness or of specific disease in a geographical locality.

ECTOPIC PREGNANCY - a pregnancy occurring elsewhere other than in the cavity of the uterus.

HYPERTENSIVE - marked by an increased blood pressure, denoting a person suffering from high blood pressure.

TETANUS - a disease marked by painful tonic muscular contractions caused by the neuron tropic toxin acting upon the central nervous system.

TOXOID - a toxin that has been treated so as to destroy its toxic property but retain its antigenicity.

NEONATORUM TETANUS - a form of tetanus affecting new born infants, usually due to infection through the open end of the severed umbilical cord.

MATERNAL MORTALITY RATE - the number of maternal deaths divided by the number of reproductive age.

ECLAMPSIA - a form of toxemia (a condition of illness due to a presence in the bloodstream of toxins) of pregnancy, characterized by convulsions, albuminuria (presence of albumin in urine), and hypertension.

PUERPERAL SEPSIS - an infection that is mainly caused by genital tract infection and by using unwashed hands or unsterilized instruments during delivery.

HELMINTH - an intestinal parasite.

DUODENITIS - inflammation of the duodenum (the first division of the small intestine, about 25 cm or 12 finger breaths).

RHEUMATISM - an indefinite term applied to various conditions with pain or other symptoms which are of articular origin or related to other elements of the musculoskeletal system.

GENERAL FERTILITY RATE- ratio of the number of live births in a period to the number of person years lived by women of child bearing ages during the period.

TOTAL FERTILITY RATE- the average number of children that would be born per woman if all women lived to the end of their child bearing years and meanwhile bore children according to a given set of age specific fertility rate.

CHAPTER I

INTRODUCTION

1.1 STATEMENT OF THE PROBLEM

Pregnancy aggravates many diseases. To mention a few, infectious diseases like tuberculosis and malaria may be more severe during pregnancy with serious health problems to both the mother and child. Screening identifies such complications and helps to stop them turning into emergencies. It is more costly to treat such illnesses once a mother or child gets sick. For this reason antenatal care has been advocated for as a form of preventive medicine (Njaramba, 1994).

Moreover, anaemia that is a major problem if not detected early, could easily lead to death. In anaemic women even a small blood loss associated with normal delivery can result in death. The existence of anaemia due to failure to receive early and regular antenatal care makes administration of iron less effective. Regular screening is needed since women with more than mild anaemia need additional treatment. Under-utilization of antenatal care, therefore, leads to a higher risk of this fatal disease.

Undetected sexually transmitted diseases (STD), can also lead to several problems. STD can give rise to sepsis as well as ectopic pregnancy. They also have a major impact on the fetus and can lead to blindness, retardation or death. One of the key element of antenatal care is education on the importance of screening for STD (Njaramba, 1994).

Women with signs of hypertensive disorders need close supervision during the later stages of pregnancy. The most effective way of diagnosing hypertensive disorders of pregnancy is to measure blood pressure and test for proteinuria (level of protein in urine) and oedema regularly. This can be assured through regular antenatal care (Njaramba, 1994).

Generally, any woman could be at risk of developing complications during pregnancy and childbirth. The only sure way of detecting these problems is to go to clinic for antenatal care at an early gestation period and to have regular examinations.

These imply that modern antenatal care services play an important role in reducing maternal mortality rate and ensuring health of the new born baby and mother. Despite its importance there is no detailed study of antenatal care services utilization undertaken in Ethiopia.

The country is categorized among countries with high maternal mortality. According to the World Health Organization (1997), every minute of every day, at least a woman dies in the world of causes related to pregnancy, child birth and abortion. About 99% of these deaths occur in developing countries. The number of this death rate ranges from less than 5 in some European counties to over 1000 in some of the world's developing counties. The increasing number of a country's population contributes to the growth of this figure since the number of pregnancy increases with the size of population (WHO, 1997).

Although maternal mortality rate does not capture all deaths related to pregnancy, it provides some insights about women's death and their access to health care, adequacy of the health status, and their economic standing. It is highest in regions where few women receive basic maternity care, including prenatal, delivery and postnatal care.

According to population Reference Bureau (WHO, 1997) maternal deaths per 100000 live births in Africa are the highest (880). Ethiopia is the 4th highest (1400) of all counties in Africa. This might be due to low antenatal care utilization. The under-utilization of modern antenatal health care has several implications to the rational health care policy.

Thus, in this study the researcher aims at providing some evidence that could be useful in the revision of rational antenatal health care policy.

1.2 OBJECTIVES OF THE STUDY

The general objective of this study is to analyze the major factors that affect the demand for maternal health care in Asella town. The specific objectives of the study are to determine:

1 the pattern of utilization of antenatal care in Asella.
2 the factors that influence the level of utilization of antenatal care.
3 Based on the empirical finding in (1), and (2) it also attempts to deduce policy recommendations for a rational utilization of antenatal health care.

1.3 SIGNIFICANCE OF THE STUDY

The findings of this study on the factors affecting the demand for maternal health care services may contribute some information and analysis in the revision of policies aimed at promotion of the health status of Ethiopian women. It may benefit governmental organizations and non governmental organizations involved in promoting maternal health. Specifically, the result of the study can assist policy makers in rational planning for the provision of maternal and child health care which are among the main objectives of the country's primary health care.

1.4 SCOPE AND LIMITATIONS OF THE STUDY

This is a micro level study limited to Asella town. Moreover, it was based on only about 214 randomly selected mothers from specified area. On the other hand, Ethiopia has a wide variation in cultural and socio-economic condition. Therefore it is difficult to make generalizations from studies made in such small area.

While dealing with household survey study, precision of data is always a problem. The major limitation of this study is also inaccuracies in relying on respondents view (eg. there could be problem of recalling important issues). This might have affected the validity and accuracy of empirical results.

Beyond the principal objective, family planning, delivery care, and postnatal care are the most important maternal health services intervention. However, the paper would not go into the detail discussion of all these aspects.

The remaining of the paper is organized as follows: Chapter Two presents background information on health services in Ethiopia and Arsi zone. Chapter Three reviews the theoretical and empirical evidence of previous studies on the demand for health services. Chapter Four presents the methodology employed. Chapter Five deals with description of survey result and econometric analyses of factors affecting demand for antenatal health care services. Finally, concluding remarks and policy implication of the study are presented.

CHAPTER II

HEALTH SERVICES IN ETHIOPIA AND ARSI

2.1 THE IMPORTANCE OF HEALTH CARE SERVICES IN HUMAN RESOURCE AND ECONOMIC DEVELOPMENT

Health services are the most important intervention in the development of human resource. The level of heath may affect the productivity of farm or firm inputs without having direct productivity effect. It might also directly affect the quality of labor supplied (Pitt and Rosenzweig, 1995:155).

Moreover, many scholars concluded that productive investment in health contributes positively to the development of the economy (Hammer and Berman (1995:20), Frenk (1995:344, 352), and Peter and Berman (1995:13,30)).

Frenk (1995:344) postulated the positive relationship between health and the economic development as:

> **Productive investment in equitable, efficient and high quality health services has a positive effect on all economic activity, because it raises the quality of human capital, improves productivity and competitivity, creates jobs, encourages scientific research, and stimulates, technological innovation (Frenk, 1995:344).**

Besides, good health services have a contribution in decreasing income inequalities by producing an important transfer of income and can alleviate poverty by reducing poverty producing factors (such as when certain diseases have large impact on family income). This makes health care an essential element in the fight against poverty (Hammer and Berman, 1995:39-40).

Frenk (1995:352) also defined health as "both a cause and consequence of development". This is to say that indicators of developmental level such as education, housing, employment, public safety etc. have an impact on health. On the other hand, health care has contribution to overall development of a society.

In addition to its contribution to the development of the society, important improvement in health services is an instrument for assuring sustainability of development (Peter and Berman, 1995:18).

However, unproductive health investment has a negative effect on the economy, because it increases inflation, reduces productivity and competitivity, gives rise to inequalities and diverts funds from better social use (Frenk, 1995:344).

There is also consensus that there are positive externalities (situations where the consumer is not the sole beneficiary of something he/she purchases) in the health sector. That is, treating many infectious diseases involves externalities because treating the infectious reduces the risk of transmission (Christopher and Murray, 1995:129).

Thus, in developing countries like Ethiopia where preventable communicable diseases (eg. malaria) are still endemic and the potential to prevent these diseases with medical care have considerably high return (in terms of potential for its saving life, prolonging it, and improving its quality), improvement in health services plays important role in development of societies (Chernichovsky 1995:108).

2.2 HEALTH SERVICES IN ETHIOPIA

Ethiopia has the most acute health problem in the world. According to the Ministry of Finance, Ethiopian Social Sector Review (1996) only 50% of the episodes of illness were receiving treatment, including traditional health. This figure is much lower relative to other developing countries like Kenya (70%). This failure to seek treatment at the beginning of illness causes

illness episodes in the country to be more severe than they otherwise would be. Another problem in the health sector is insufficient resource to health facility. These could be some of the factors for prevalence of high mortality and morbidity rates in the country. According to the Ministry of Finance (1996:53) health facilities are only accessible to minority of the population.

> **Most health facilities reach only minority of their intended population. Besides, the structures inherited from the past are unsatisfactory for the improvement of health (Ministry of Finance, 1996:53).**

Most of the health facilities belong to the state with sizable participation of private and non governmental organizations. The non-governmental organizations own 8% and 19% while private sectors own 1% and 11% of hospital and health stations respectively (Ministry of Finance, Ethiopia Social Sector Review, 1996). Table 1 shows the existing health facilities and their accessibility.

Table 1

Ownership and accessibility of health facilities.

Type of facilities	Number of health facilities				Health facilities to population ratio	WHO standard
	TOTAL	MOH	NGO	Private		
Hospital	85	77	7	1	-	
Hospital bed	9675	7379	2296		1: 5,678	1 : 3,000
Health Center	187	177	10		1: 300,000	1: 100,000
Health Station	2470	1726	482	262	1: 25000	1: 10,000

Source:- Ministry of Health, Health and Health Related Indicators (1995:9)

It can be seen from the above table that health facilities to population ratios are very low in comparison to World Health Organization (WHO) standard. This might have several implications. It could indicate the gap between supply and demand for health services. As suggested by Abdulhamid (1994:263), the reason for this discrepancy is the increasing demand for health services. Factors like high population growth, hereditary factors, low nutritional status and general living conditions of the people are responsible for the increase in demand over time. This gap between demand and supply would also partly influence mortality and morbidity rates.

Despite the gap between supply and demand for health services being wide and the development of health facilities is at its infant stage, the government of Ethiopia has defined its main objective in the health care sector to be the provision of a comprehensive and integrated primary health care in health institutions at community level, including both preventive and essential curative care. The diseases targeted are general communicable and cheaply treatable ones (Ministry of Finance, 1996)

According to the Ministry of Finance, Social Sector Review (1996:88) the potential health service coverage was only 45% in 1995 for population living within a 10 kms radius around a health facility in Ethiopia. The real coverage by operational health care structure is even lower. Table 2 shows the real health service coverage with comparison of other African countries.

Table 2

Ethiopia health services coverage with comparison of some African countries.

country	real coverage of operational health
Ethiopia	25-30%
Zaire	26%
Uganda	49%
Sudan	51%
Kenya	77%

Source:- Ministry of Finance, Ethiopian Social Sector Review (1996:88)

The health sector has two main problems with regard to utilization of health services. One of these problems is that the usage of health facilities is not uniform for all income groups. Data from household survey presented in Table 3 depict this reality.

Table 3

The distribution of people using health facilities according to their income groups from Ethiopian household survey

Use of	Population quintile of real adjusted consumption			
	Bottom	Lower Middle	Upper Middle	Upper
Nearest Hospital	11.5	24.7	31.6	32.2
Nearest Clinic	28	25.2	31.6	32.2
Pharmacy	34.1	22.4	25.9	17.6

Source:-Ministry of Finance, Ethiopian Social Sector Review (1996:81)

From Table 3 it can be seen that the nearest clinics are used slightly more by the poor while hospitals server upper income groups.

The second problem is that all people do not have equal access to health care; urban population has more access than rural population. This can be observed from Table 4.

Table 4

The distribution of health agents by regions.

Region	Total health manpower	
	Number of health workers	Inhabitant per health workers
Oromia	5258	3629
Amhara	4248	3416
Addis Ababa	2722	858
Hareri	286	603
Dire dawa	260	462
Ethiopia	18186	3132

Source: Ministry of Finance, Ethiopia Social Sector Review (1996: 91)

The table shows that more urbanized regions (Addis Ababa, Hareri, and Dire dawa) have more access than other region.

2.3 MATERNAL HEALTH SERVICES IN ETHIOPIA

Mothers, like any other segment of the population, face common illnesses and deadly diseases. In addition, most mothers suffer and die because of pregnancy and child birth related factors (Starrs cited in Melaku, 1996:1). Ethiopian women have a very low literacy rate (21%). They also have very high fertility rate (7.7) and a low contraceptive prevalence rate (7%) (Ministry of Health, 1996:13). These factors hinder the development of a nation, as the development of any nation depends on the status of the health of mothers and children. In developing countries like Ethiopia, where mothers and children constitute large proportion of the population (70%) the health of mothers and that of children are very essential. In addition mothers are the informal providers of health care in the economic, social and cultural life of a country. Thus, providing mothers with adequate health services is very essential. In other words, improving maternal health would enable the mothers to be in a better position to perform their roles more effectively (Ministry of Health, Ethiopian Safe Motherhood Needs Assessment, 1996)

Currently, there are new policies and strategies that have placed more emphasis on improving family health with particular focus on mothers and children in Ethiopia. In an attempt to improve this the government of Ethiopia has designed policies and strategies to expand the availability of quality maternal health care. In line with these policies, the Ministry of Health has already started rationalizing the health service system of the country so as to promote it by strengthening health facilities, optimizing accessibility, accelerating utilization and maintaining the quality of health services. This is based on the premise that most mothers' health problems are public health and community problems (Ministry of Health, Ethiopian Safe Motherhood Needs Assessment, 1996).

The Ethiopian government is also committed to respond to the productive health needs of women through the development of an integrated action plan at the national level, and regional "mother-baby package" plan implementation in the country. The minimum package of interventions includes: antenatal care; clean and safe mother and baby; recognition, early detection and management of obstetric complications; postnatal care; family planning; and STD

diagnosis and management. This strategy is expected to bring about much improvement in the existing services and reduce the prevailing gaps in the country.

The numbers and timing of visits are considered to be important in preventing pregnancy complications. The health of pregnant women would be improved if effective prenatal care were available to all. One of the main objectives of antenatal care is to screen for signs of illness or other complications that may occur during pregnancy. According to Ministry of Health (1996:25), attending this care regularly during pregnancy would have the following advantages: it provides available opportunity for assessing the progress of the pregnancy, diagnosing and treating morbidity (such as anaemia, hypertension and sexually transmitted diseases (STDS)), for information and education activities, and to make a contact with the health system in anticipation of any complications of the pregnancy.

Antenatal care also helps maintain the health of both mother and fetus during pregnancy. The essential elements of antenatal care include some tasks that should be performed at least once during pregnancy and those that occur per visit. At the first visit tasks to be performed include: history taking and measurements, tetanus immunization, provision of ferrous sulphate tablets for anaemia, blood pressure measurement and urinalysis, testing for syphilis and appropriate treatment, measurement of symphysis-fundus (measuring the progress of pregnancy) height of the mother. These are followed by the next visit: blood pressure measurement, measuring the symphysis-fundus height and tetanus immunization (Ministry of Health, Ethiopian Safe Motherhood Needs Assessment, 1996:25)

For effective antenatal care, mothers need to start attending antenatal clinic at an early gestation period and have regular antenatal visits. This enables education efforts to begin early, and provides an opportunity to diagnose and treat problems before they are complicated. In Ethiopia, the antenatal visit starts late. Table 5 of 551 sample survey of health facilities conducted by Ministry of Health reflect this reality.

Table 5

Timing of first antenatal care visit by facility type

Timing of first antenatal visit	Facility type			
	Health Station	Health Canter	Hospital	Total
Less than 3 months	12%	6%	8%	9%
3-6 months	39%	47%	47%	45%
6 months or more	49%	46%	43%	46%
Number of client records sampled	179	178	194	551

Source:- Ministry of Health Ethiopian Safe Motherhood Needs Assessment(1996:26)

Data in the Table 5 show that almost 50% of antenatal clients wait until third trimester before they come to a clinic and only 9% visit the clinic during the first trimester.

According to Njaramba (1994), a woman having complication, and happens to go for antenatal care during the later months of her pregnancy is not likely to receive effective care, especially if the complication has turned into an emergency. Early intervention is, therefore, more effective than treating the complications that have already turned into emergencies.

Regular antenatal care visit has been advocated as a pregnancy complication can arise at any stage during pregnancy. Once a problem is identified, it needs to be followed actively until the child is born to ensure that both the child and the mother are safe (Njaramba, 994).

Delivery or obstetric care is another maternal health intervention. It is the care expectant women receive during labor to ensure safe birth. In Ethiopia, normal delivery care is provided in communities by traditional birth attendants and others; and in health facilities by health workers (Ministry of Health, Ethiopian Safe Motherhood Needs Assessment, 1996).

Attending antenatal care clinic provides a good opportunity for the mothers to be well informed in this area of delivery. According to some (Njaramba, 1994) studies a significant proportion of women develop unexpected complications during delivery even when they had adequate antenatal care. The accessibility of good obstetric services that can be afforded by most Ethiopian woman are, therefore, a critical issue in addition to proper antenatal care.

Family planning plays a major role in the health of the mother and the child. It basically consists the right of persons to determine the number and spacing of their children in free, informed and in a responsible manner. Out of the 585,000 maternal deaths every year in the world, abortion takes a very high percentage. Family planning can prevent many of these deaths by enabling women to bear children during the healthiest time for themselves and their children (Shane, 1997:1). It was estimated that family planning can prevent more than 25% of all maternal deaths by allowing women to delay motherhood; prevent unintended pregnancies and unsafe abortions; protect themselves from sexually transmitted diseases (STD) and stop child bearing when they have reached their reproductive goals (Shane, 1997:1).

Family planning is also an essential component of the effort to improve child survival. It is estimated that the live of millions of infants and children can be saved every year by spacing births at least two years apart (Shane, 1997:1-2).

In developing countries like Ethiopia, where maternal health services are not fully utilized, there are implications related to this under-utilization. Under-utilization of antenatal care could result in abortion or even death in case of eclampsia and haemorrhagia if the problems are not detected early and treated in good time. Once a woman develops eclampsia a possible solution is to have premature birth that could lead to undesirable low birth weight or it could lead to infant death (Njaramba, 1994).

2.4 UTILIZATION OF MATERNAL HEALTH SERVICES

The utilization rate of health programs for maternal infantile care, family planning and immunization is low in Ethiopia as indicated in Table 6.

Table 6

The Utilization rate of health programs of Ethiopia for mothers and children by year

Indicator	Years			
	1986	1989	1992	1995
Immunization of children BTP_3 (diphtheria, tetanus, whooping cough)	7%	26%	13%	37%
Immunization of mothers TT_2 (Tetanus toxoid)	5.2%	24.3%	9%	16%
Antenatal care	6.5%	20%	16%	20.7%
Deliveries	6.5%	9%	5%	7%
Children Care	9.1%	12%	-	-
Family Planning	-	2%	4%	7%

Source:- Ministry of Finance, Ethiopian Social Sector Review (1996:92)

From the table it can be noted that the utilization rate has dropped between 1989 and 1992 dramatically, after having progressively increased between 1986 and 1989. The dropping of utilization rate may be explained by war and economic crisis of that period.

According to the Ministry of Finance (1996) and Ministry of Health (1996) the number of deliveries in facilities is extremely low relative to expected number of births in catchment area.

Table 7

Institutional delivery coverage rate by region

Region	Institutional delivery coverage rate
14 (Addis Ababa)	17.17%
1 (Tigray)	3.24%
3 (Amhara)	21.32%
4 (Oromia)	2.78%
5 (Somalia)	3.47%
7 (South Ethiopia Nation and National)	1.40%
12 (Gambella)	30.96%
13 (Harari)	4%
15 (Dire Dawa)	15.89%

Source:- **Ministry of Health, Ethiopian Safe Motherhood Needs Assessment (996:82)**

The overall delivery coverage rate was estimated to be 4.47% and only less than 40% of clients received education and information about the place of delivery, the benefits of delivery in the health facilities, action to take in case of a complication, family planning, STDS and HIV. This indicates that large numbers of women are delivering at home (Ministry of Health, Ethiopian Safe Motherhood Needs Assessment, 1996).

The other point to be considered in maternal health care utilization is postnatal care. Postnatal care is the care given to women after giving birth. The women are advised to go back to the clinic where they obtained obstetric services, or any other nearest clinic for a check-up after 42 days. In Ethiopia, the overall rate of postnatal coverage is very low (Ministry of Health, 1996). Postnatal coverage estimated from sample survey of 474 clients conducted by Ministry of Health is presented in Table 8 depicts this fact.

Table 8

Client recall of attendance at post natal check up after last pregnancy

Region	Postnatal coverage rate
14 (Addis Ababa)	35%
1 (Tigray)	21%
3 (Amhara)	19%
4 (Oromia)	15%
5 (Somalia)	15%
12 (Gambella)	31%
7 (South Ethiopia Nation and Nationality)	11%
13 (Harari)	33%
15 (Dire Dawa)	0%
Total	18%
Number of Clients Sampled	474

Source:- Ministry of Health, Ethiopia Safe Motherhood Needs Assessment (1996:44)

Table 8 reveals that the overall postnatal coverage for sampled number of clients of 474 is only 18%, and appears to vary widely among regions.

2.5 MATERNAL MORTALITY IN ETHIOPIA

Maternal mortality is defined as death of a woman while pregnant or within 42 days of termination of pregnancy (WHO cited in Njaramba, 1994). It has been expressed as a rate per 1000 or 100,000 live births.

According to the Ministry of Health (1992:12) maternal mortality rate in Ethiopia was estimated to be 600 - 1000 for every 100,000. However, currently there is no detailed study undertaken except that the Ministry of Health has estimated maternal death from sample survey of delivery records. Table 9 shows the estimated maternal deaths in health facilities sampled from delivery records.

Table 9

Maternal deaths in health facilities sampled from delivery records registers distributed by regions.

Region	Maternal deaths	
	Number of maternal deaths	Maternal deaths per 1000 live births
14 (Addis Ababa)	18	256
1 (Tigray)	12	703
3 (Amhara)	26	764
4 (Oromia)	16	303
5 (Somalia)	6	729
7 (South Ethiopia Nation Nationality)	108	3095
12 (Gambella)	4	765
13 (Harari)	8	1758
15 (Dire dawa)	36	2015

Source:- Ministry of Health, Ethiopia Safe Motherhood Needs Assessment (1996:98)

The data in the table shows that there is high relative to maternal mortality rate in developed countries. It also shows existence of large variation this rate among regions. This variation can be explained by uneven distribution of health facilities among regions.

There is also variation of maternal mortality rate among different types of health facilities. Table 10 depicts this fact.

Table 10

Maternal, Neonatal and prenatal deaths, and still birth in health facilities from delivery registers records distributed by facility type

Indicator	Facility Types							
	health Station		Health Center		Hospital		All facilities	
	number	rate	number	rate	number	rate	number	rate
Maternal death ***	15	403	6	130	213	1326	234	959
Total still births **	15	4	108	228	979	57.5	1102	43.2
Neonatal deaths **	7	1.9	9	1.9	106	6.6	122	5.0
Prenatal death **	22	5.9	117	24.7	1085	63.7	1224	48.2

** = rates per 1000 live births

*** = rates per 100,000 live births

Source:- Ministry of Health, Ethiopian Safe Motherhood Needs Assessment (1996:81)

The data in the above table show that the highest number of deaths was recorded in hospitals, where the maternal mortality ratio was 1,326 per 100,000 live births and the prenatal death ratio was 6,370 per 100,000 live births. This was because expectant mothers who have been identified as showing pregnancy complications are referred to hospital from other health facilities.

The major causes of maternal mortality in Ethiopia are illegal abortions and poor management of abortion related complications such as haemorrhagia, anaemia, obstructed labor, and puerperal sepsis. Assessment of causes of maternal illness conducted in two hospitals reviewed that more than 40% maternal deaths in hospitals occurred because of illicit abortion (Ministry of Health, Ethiopian Safe Motherhood Needs Assessment, 1996).

Maternal age is also among factors that affect maternal mortality. Very young mothers (less than 19) and relatively older mothers (35 and above) experience high mortality risk compared to those mothers in the intermediate age groups (Melaku, 1996:37).

2.6 HEALTH SERVICES IN ARSI

There is no detail study undertaken on health care services utilization of Arsi zone. Regarding health institutions, assuming that health facilities provide services for whole population of Arsi zone, the ratio of hospitals, health centers and health stations to the number of residents are 1:1170000, 1:260296 and 1:22100 respectively. Most of the health stations, 81%, belong to Oromia Health Bureau and the rest to non governmental organizations and the private sectors (Oromia Health Bureau, 1997).

The quality of health services provided at a particular health facility are directly related to the level of qualification and the number of health workers. The following table shows distribution of health workers of Arsi zone by level of health qualification over four years.

Table 11

Man power composition of Arsi zone Health Facilities

qualification of health workers of Arsi Zone Health Department	years			
	1993\1994	1994\95	1995\96	1996\97
Physicians of all types	36	33	33	40
Nurses of all types	118	120	123	115
Pharmacists and pharmacy technicians	17	12	11	10
Sanitarians	11	9	10	15
Health assistants	383	363	353	373
Laboratory technicians	27	14	14	13
X-ray technicians	5	4	4	3

Source:-Report papers of Oromia health Bureau [1993\94:29, 1994\95:45, 1995\96:34, 1996\97:39]

From the table it can be noted that the number of professionals fluctuated over time. The number of laboratory technicians, X-ray technicians, pharmacists and pharmacy technicians decreased over the four years. This may be due to the quitting of the health workers because of less payment by the Ministry than non governmental organizations and the private sector.

2.7 MATERNAL HEALTH SERVICES IN ARSI ZONE

Table 12 shows that all antenatal, postnatal and delivery coverage have been increasing over the four years. Antenatal coverage has been improving at higher rate than others. The possible explanation for higher postnatal coverage than delivery may be mothers who gave birth at home also attended care given after birth at health facility.

Table 12

Maternal health service coverage from 1993/94 to 1996/1997

YEARS	MATERNAL HEALTH		
	ANTENATAL	POSTNATAL	DELIVERY
1993\1994	28.423%	6.03%	5.54%
1994\1995	29.55%	6.68%	6.847%
1995\1996	34.53%	6.877%	5.996%
1996\1997	35.927%	6.896%	6.359%

Source:-report papers of health department of Arsi zone; Oromia health Bureau[1996\97:32 and others].

There are various diseases that are common to all segments of population in Arsi zone. The following table gives insight of these diseases.

Table 13

Common diseases identified 1997 in Arsi zone

TYPES OF DISEASES	Percentage of diseases identified in 1997
Respiratory infection	10
Dysentery of all form	7
All helminths	6
Infection of skin and subcutaneous tissue	5
Diseases of eyes	4
Infectious and parasitic diseases	4
Bronchopneumonia	4
Chronic Bronchitis	3
Gastritis and duodenitis	3
Venereal diseases	3
Pulmonary TB	3
Malaria of all types	3
Ill defined causes of morbidity and mortality	3
Muscular rheumatism and rheumatism	3
Diseases of tooth and gums	2
Others	37

Source:-**Report Papers of Health Department of Arsi; Oromia Health Bureau (1996\97:32)**

Table 13. reveals that the proportion of people who were suffering from diseases like respiratory infection, malaria etc. which are more likely to be aggravated during pregnancy were relatively high.

CHAPTER III

LITERATURE REVIEW

3.1 REVIEW OF LITERATURE RELATED TO FACTORS AFFECTING DEMAND FOR HEALTH SERVICES

Factors affecting demand for health care services and the level of utilization are useful policy instruments. Most studies reviewed on this subject show that quality variables, household characteristics, economic variables and access variables are the most important ones that influence willingness to pay for health services. In this section an attempt is made to review relevant studies with particular reference to these variables.

QUALITY VARIABLES

The effect of quality of health care on demand and choice of treatment is of major interest to policy makers in developing countries. However, it is difficult to measure quality of health care services of providers. There is also a discrepancy between the population's perception of quality and quality as defined by medical personnel. With regard to medical definition Lavy and Germain (1994:11) proposed five groups of quality measures: availability of essential drugs, number of medical staff, availability of a functioning laboratory (all the three are used to provide prenatal, postnatal and child monitoring services), availability of electricity and running water provision.

The researchers found that four of these variables: availability of drugs, personnel, infrastructure, operating room, and their services had a significantly large positive effect on demand for health care services. This indicates that households take into account various dimensions of quality of health care providers in making their choice.

Bitran and Mcinnes (1993:30) reported that the availability of pharmaceutical supplies, appearance of the premises and qualification of the choice of providers affects the preference of health care utilizer. Similarly, Mwabu et-al (1993:839-840) used type and availability of some basic drugs in the health facilities as proxies for quality of health services. Although the effects of these variables are statistically insignificant, the researchers indicated that the variables are positively correlated with demand for health services.

Birdsall and Chuhan (as cited in Behrman and Deolalikar (991:662)), also reported that there was a significant effect of quality variables.

Economic Variables

One of the economic variables is price charged at health facilities. It is possible to hypothesize given the same service an individual prefers to pay less rather than more to get services from a particular health facility. This implies that prices charged for health services have a reducing effect on utilization of health services. However, there are two conflicting messages about significance of its effect in developing countries. Some researchers (such as Akin and others, Schwartz, Akin and Popkin, Bridsall and Chuhan, Heller all cited in Gertler and van der Gaag, 1990:60) suggested that prices are statistically insignificant, and hence are not important determinant of utilization of medical care. Others, on other hand, (such as Mwabu, Alderman and Gertler, and Cretin and others as cited in Gertler and van der Gaag, 1990:60) argue that prices are important. In addition, Gertler and Van der Gaag (1990 : 77) estimated the model of medical provider choice for Peru and Co^te d'ivoire and they reported that prices are important determinants of utilization in the sample. The researchers also examined the negative effect of prices on demand for health services and concluded that this effect depended on economic status of individuals and countries. In other words, if the poor are more price sensitive than the rich individuals, then user fees will reduce the utilization by the poor more than by the rich (Gertler and van der Gaag, 1990:59,61). If so, it is expected to be less important in developed

countries than developing countries since income levels are substantially higher and medical insurance is universally prevalent in industrial countries.

Behrman and Deolalikar (1991:661) reviewed studies that used cash prices for using a facility as a determinant of a household decision to use medical services and its choice of medical practitioner. Abdulhamid (1994:270) also hypothesized price of health care services as an important factor affecting demand for health care services in Ethiopia.

The second important economic variable other than price is household income. In order to examine the impact of household income on choice of providers Bitran and Mcinnes (1993:21) categorized population of Santo Domingo and San Salvador cities into different income quintile. Household income was found out to be an important variable in determining the demand for health services. The researchers reported that the public sector health services had clients from the poorest income groups while the wealthiest avoid the public sector.

Mwabu et-al (1993:852) found out that the income of an individual has positive effect on the choice of health care providers. The estimated result of the researchers was statistically significant.

In Ethiopia, Abdulhamid (1994:270) used income level of population to define the demand function for health care services. Similarly, Behrman and Deolalikar (1991 : 661) reviewed studies that used income as an important factor affecting household decision to use medical care services.

Income elasticity of demand for health care services can serve policy makers as a good indicator about demand responses by different income groups. If the variation of health care demands by income class is high (elastic), the fee charged at public facilities may lead to an undesirable large decrease in demand by low income households. Therefore, income elasticity of demand provides essential information about nature of health services.

The quantity of health services that people are willing to obtain is also affected by insurance coverage as economic effect. It has been suggested that because of absence of insurance markets certain illnesses are not treated in the private sector. Thus for large health gains, insurance is desired and public action to assure it would improve health facility substantially (Hammer and Berman, 1995:52, and Bitran and Mcinnes, 1993:28).

Characteristic of household

Education is one of characteristics that determines the quantity of health services that people are willing to get. Abdulhamid (1994:270) defined a simplified demand function for health care services in which education status affects the demand for health care services through disease prevalence and incidence. Bitran and Mcinnes (1993:34) suggested another possible indirect impact of education in addition to the above:

> **There are two alternative hypothesis about the impact of education on demand for health services. The first hypothesis is that more educated people are more aware of existence of treatment options as well as of the benefits that treatment can have on their health status. As, a result, they are more likely to seek care when ill. An alternative hypothesis is that the more educated have milder health problems because they consume more preventive care, have higher incomes and better living conditions and so on. As, a result more educated people are less likely to seek care when ill.**

An empirical finding revealed that preference of private sector increases as the level of education increases. In line with this finding, Lavy and Germain (1993:15) reported that better educated heads of households tend to favour health care at private facilities. As cited in Behrman and Deolalikar (1991:661), Blau and Akin et-al (19985) used education as a determinant variable in explaining demand for health services.

Studies have also shown that age is another important characteristic of an individual that explains the demand for health services. One of these findings is stated by Bitran and Mcinnes (1993:30) that:

> **when there is health problem, infants and the young may be more frequent users of care because of their greater susceptibility to complications arising from weaker immune system.**

Consistent to this argument, Lavy and Germain (1993:15) have shown that age has a significant negative effect on both the private health users and public health services users. This result suggests that the probability of seeking medical care decreases with age. One possible explanation for this pattern of utilization of medical care over life span may be derived from human capital theory. Households may prefer to invest scarce resources in the health of members for whom the return is higher. For the same improvement in health, the economic return measured by household income, is higher for investing in the younger (more productive members of a household) than for investing in the elderly (Gertler and var der Gaag, 1990:84).

Evidence has also shown that the age of mothers is associated with maternal mortality rate. Shane (1997:2) suggested that:

> **The risk of dying due to pregnancy and child birth related causes is very high for adolescent girls. Maternal mortality rates for women ages 15-19 are twice as high as for women in their 20's. Young adolescent girls face the greatest health risks from pregnancy and child birth.**

Similarly, Behrman and Deolalikar (1991:661) reviewed the findings of Blau which used age of mother in estimation of demand function for health services. In addition the researcher used formal and informal wage of mothers. The researcher found out that a mother's predicted formal sector wage rate has a significant positive effect on child health and the informal sector wage rate does not to have any significant effect.

The employment category and the number of children a woman has given birth to are important determinants of demand for antenatal care. Women who are permanently employed have higher level of utilization of health services than casual workers and housewives. And the number of visits a mother makes to the antenatal clinic is adversely affected by the number of children she gave birth to (Njaramba, 1994).

Furthermore, it was hypothesized that the probability of seeking care could be influenced by health condition of individuals. Gertler and van der Gaag (1990:64) documented that severe illness is positively correlated with the demand for medical care.

Gertler and var der Gaag (1990:71) also suggested that the utilization of health care services varies with the number of children in the household, sex and family composition.

Access Variables

Waiting time is one of access variables that determines the choice of health care provider. For a given price, people prefer to wait less time to see a particular provider. Bitran and Mcinnes (1993:20) suggested that although private providers price is higher, more people choose private care than Ministry of Health providers, because, private providers have shorter waiting time.

Cash prices charged at health facilities do not ration health services market in most developing countries, where the price of government run facilities are small or in many cases zero. In such countries, rather opportunity cost of waiting time and travel time are expected to ration the market (Gertler van der Gaag, 1990:62).

Other important access variable is the distance between health facility and home. Although the effect is statistically insignificant Mwabu et-al (1993:852) have reported that longer distance from health facility has a negative impact on choice of health care providers. In line with this empirical result Lavy and Germain (1993:14) indicated that the effect of distance on demand for health services is highly negative, and significantly different from zero suggesting that the probability of seeking professional care would significantly increase if health care were more accessible. The researchers interpreted this distance as price arising from the cost of transportation and opportunity cost of travel time.

Akin et-al as cited in Behrman and Deolalikar (1991:661) used the transport time and cost in reaching the health facility as one element affecting willingness to pay for medical care services.

Study conducted on users of the outpatient departments of New York municipal hospitals also revealed that non monetary factors (distances and travel time) discourage demand for medical services where free care is available (Acton cited in Njaramba, 1994:23).

In addition, Gertler and van der Gaag (1990:70) included waiting time and opportunity cost of travel time in utility maximization to derive an equation for a reduced form of demand for health services.

3.2 REVIEW OF SPECIFIC LITERATURE ON HEALTH CARE DEMAND MODEL AND METHODOLOGY

To formulate theoretical model for demand function Lavy and Quigley (1993) assumed that consumers derive utility from their health status, H a numeraire good, X and leisure, L:

(3.1) $\mathbf{U = U\,(H,X,L)}$ by substituting observable elements into a direct utility function, they defined indirect utility function as:

(3.2) $\mathbf{U[H(T,N;A),\ Y\text{-}P(T,N;A),L\text{-}M(T,N)]}$

Where, A is severity of illness, health capital and so on; T is the quality of medical care chosen; N is intensity of medical care; Y is consumer income; L is fixed non-work time spent on leisure; M(•) is time expenditure function and P(•) is hedonic price.

Based on the indirect utility the researchers analyzed the intensity of treatment, the choice of kind or quality of treatment, the choice between professional consultation and self treatment using nested logit regression analysis. The analysis was based upon the behavior of a cross

section of 5,000 households who reported that a member had been ill or injured during the previous four weeks in 1987 Ghana living standards survey.

They found that the hedonic price available affected the number of consultations chosen and the intensity of treatment. The results also show that individuals with serious illnesses or injuries are more likely to choose greater intensity treatment. The choice among the kinds of treatment, for those seeking professional consultation, was found to be significantly related to the estimated price for the first visit professional consultation. Self treatment was highly responsive to household income.

Lavy and Germain (1994) conducted a study to determine the role of quality and cost in choices of health care services. In order to develop an empirical model for health demand function Lavy and Germain specified a functional form for conditional utility function and the distributions of the stochastic variables. They assume utility function to be Cobb-Douglas:

(3.3) $$U_j (X_h, X_c) = [Q^n_j \text{ x } (X_H + (m^n_j)] ^{\alpha} X^{1-\alpha}{}_c$$

Where Q^n_j is the quality factor of provider J expected by household n (equal to marginal product of health expenditure); m_j^n is the fixed cost of being treated by provider j which include the cost of travel and the opportunity cost of time; and X_H are expenditures on health.

The researchers specified Nested Multinomial logit model to examine the impact of several hypothetical policy decisions on health care demand and the choice between private and public care based on the average characteristics of the individuals and facilities in the sample.

The data used for the study was obtained from the 1989 Ghanian living Standards survey. The survey was conducted at Community level and consists of 15,000 individuals in 3,200 households comprising 200 clusters.

Quality variables which were analyzed included availability of drugs, personnel, infrastructure, operating room and their services; price factors such as distance to facility and price of consultation; and characteristics of household which included monthly per capita expenditure, age, schooling, sex, facility chosen, and category of employment.

From the analysis of individual coefficients the researchers were able to conclude that the individuals sex and level of education did not have significant effect on the choice of health care. Age was found to have significant negative effect both in the private and public alternatives. Better educated heads of households tended to favour health care at private facilities. The effect of distance was also found to be negative and significant. All the quality factors have significant, and large positive effect except the existence of an operating theater.

Bitran and Mcinne developed a similar econometric model to analyze the choice of health care provider and decision to seek care for Santo Domingo and El Salvador. The researches assumed individuals derived satisfaction, or utility from their health status and from the consumption of non health good and services; and derived disutility from the time spent obtaining health care. Individuals were assumed to make their choices with the aim of maximizing their utility.

Accordingly, the researchers expressed the utility function for individual (i) of obtaining care from provider (j) as:

(3.4) $\mathbf{Utility_{ij} = f(price_{ij}, Travel_{ij}, income_i, Age_i, sex_i, education_i, symptom_i, socec_i)}$

Where price is the providers' price for a visit; Travel is travel time to the provider; socsec is the person's social security beneficiary status, and the other variables are additional individual characteristics. From this utility maximization, the researchers derived probability of seeking care and probability of choosing providers as follows:

(3.5) $\mathit{Probseek_i} = \mathbf{fun\ (A \bullet price_i + B \bullet Travel_i + C \bullet income_i + d \bullet Age_i + f \bullet education_i + g \bullet symptom_i + h \bullet Socsec_i)}$

(3.6) $Probchoose_j = \mathbf{fun}\ (\alpha \bullet price_{ij} + \beta \bullet Travel_{ij} + \Gamma \bullet income_i + \delta \bullet Age_i + sex_i + V \bullet education_i + K \bullet symptom_i + \lambda \bullet socsec_i)$

Using these probabilities they derived demand for health care from provider (j) during time period T for specific group of people or for entire population (I) as follows:

(3.7) $\mathbf{Demand}\ I_{jT} = \mathbf{Population}_{IT} \bullet \mathbf{ILLNESS\ OR\ INJURY\ OF\ INCIDENCE\ I\ IN\ T} \bullet \mathbf{Probseek}\ I_{jT} \bullet \mathbf{Probchoose}\ I_{jT}$

Where $POPULATION_{IT}$ is the number of people in I in the time period T, and where the incidence of illnesses and injures is expressed for time period T. The coefficients were estimated using a nested logit model.

The El Salvador demand for health services study for 1989, was based upon a country wide household survey of 2,885 dwellers representing 13,896. Santo Domingo sample consisted of 2,537 households accounting for 11,565 out of a total population of 1,820,000. In addition samples of both regions were probabilistic, stratified, and of unequal clusters.

From the analysis it was found that age, illness and accident affected the probability of seeking care significantly with a positive effect. Age and education determined the probability of seeking care in Santo Domingo. Age, sex and education were found to have a significant effect on the probability of seeking care in El Salvador. Education had a significant positive effect in choosing health facilities belonging to the Ministry of Health and prices have a large positive effect in choosing any provider. The researchers did not include any quality variables in the model of choice of health care provider.

Behrman and Deolalikar (1993) also developed a reduced form demand for health care from household maximizing a single preference function (a joint utility function) subject to a set of constraints.

The purpose of the researchers was to identify determinants of available empirical estimates of health, nutrition, mortality and health care and their impact on labor productivity and fertility to fit into a household decision making framework. They assumed utility function to be:

(3.8) $\mathbf{U= U\,(H^i, C^p, C^i, T^i_L, E^{i/c}, S,\xi)\ i = 1\ ...I}$

Where H_i is the health if household member (i); C^i is the consumption of household member (i), with superscript P referring to household pure public good; T^i_L is the leisure time of household member (i); $E^{i/c}$ is the education of household member i; S is the number of surviving children; ξ are taste norms and I is number of individuals in the household. This preference function was maximized subject to two constraints, given assets and prices. The first set of constrains is a set of production functions. These production functions, in turn can be sub divided into three categories; First that produces health and nutrition, second in which health and nutrition affect other out comes ones and third in which health and nutrition do not enter. The researchers presented the first two categories as follows:

a) production functions determining health and nutrient intake:

(3.9) $\mathbf{H^i= H(N^i,C^i,C^p,I,E^i,E^m,T_L{}^i,T_H{}^m,T_H{}^i,\eta^i, \Omega)}$ **and**

(3.10) $\mathbf{N^i = N(C^i,E^m,T^m_H, \Omega)}$

Where N^i the nutrient intake of the ith individual; E^i is the education of the ith individual (with the superscript m referring the person often the mother or wife who makes critical health related decisions and implementing them within household); T^i_H is the time of the ith individual devoted to health related procedures; η^i is the endowment of ith individual; Ω is the endowment of the household firm/farm and

b. Production functions with health and nutrients as inputs. There are two types of relevant labor market or income generation production functions; the wage (P^i_L) of the ith individual:

(3.11) $P^i_L = P_L(H^i, E^i, N^i, \eta^i, \theta)$

Where θ refers to community characteristics including but not limited to labor market conditions; and the household firm/farm production function:

(3.12) $Y^h = Y(H^i, N^i, E^i, T_F^i, \eta^i, K, A, L^*, \Omega)$ $i = 1,... I$

Where Y^L is the household firm/farm product; K is the capital stock (including land) part of which may be owned by the household (K^h) and the rest of which may be rented (K^*); T^i_F is the time of the ith household member spent on household firm/farm production; A are the intermediate inputs used in firm/farm production; L^* is the effective hired labor used in firm/farm production. Health and nutrition also may enter into the production function for births (B):

(3.13) $B^{mf} = B(H^m, H^f, N^m, N^f, \eta^m, \eta^f, C_c, E^m, E^f, \xi)$

Where C_c is contraceptive use or other birth control efforts and superscript m and f refer to the mother and to the father respectively.

The second set of constraints are the time and income (full income) constraint that can be combined into a full-income constraint:

(3.14) $\sum P_L^i T^i_w + R + P_y Y^h - PA - P_L^* L^* - \sum P^i_L T^i_F - dK^h - rK^* + \sum T^i P^i_L = P_c C + P_F C_F + \sum P_E E^i + \sum P_L^i (T^i - T^i_F - T_H^i - T_E^i)$

Where r is the rental rate on hired capital; d is the depreciation rate on capital; T^i is the total time; T^i_w is the labor market work time of the ith individual; T^i_E is the school time of the ith child; R is transfers minus taxes (assumed to be lump sum for simplicity) and p_j is refers to different prices. Under the assumption that the underlying functions have desirable properties so

that an internal maximum is obtained, the constrained maximization of preferences leads to reduced form of demand as function of exogenous variables:

(3.15)

$$H^i = f(P_c, P_F, P_E, P^{*L}, P_A, P_Y, \gamma, \eta, P_k, E^{c/d}, \theta, \xi, R, K^h, \Sigma d)$$

Some of limitations of this model are:

a. Analysis at aggregated household level may not be very informative about each individual in the household because different individuals in the same household may be affected differently by an exogenous change in price or endowments.

b. Empirically, it is difficult, if not impossible to include the full range of relevant prices.

Pitt and Rosenzweig (1986) used a sample size of 2,347 households from Indonesia to determine how food price changes and how health program interventions affect health, nutritional status, and profits of households. To analyze the relationship they assumed a farmer derive utility from his or her health level, H, consumption of the produced good commodity, X(at level X^c), and purchased food commodity Y, and from leisure, L such that:

(3.16) $\mathbf{U = U(H_i, X^c_i, Y, L)}$

The level of health was assumed to be influenced by the levels of X^c and Y consumed, a health input (medical services which yields no direct utility), the farmers work time and by environmental factors and individual health endowment.

The searchers assumed that households maximized utility function subject to health production function and income constraint of household in which health of individual assumed to have both direct (on number of working hours) and indirect (on productivity) effect on household production.

Accordingly, the reduced form demand equation derived from the above utility maximization was:

(3.17) $\mathbf{H= D^{H} (P_x, P_y, w,\pi, \mu)}$

Where p_x is price of produced food commodity; P_y is price of purchased food commodity; π is profit; w is market wage rate; and μ is individual health endowment. Pitt and Rosenzweig employed two stage tobit and tobit model to estimate household illness/health production function. Data used to estimate the specified model were taken from the April to June 1978 sub round of the national socio economic survey in Indonesia.

Variables included in the model were itemized household consumption and expenditure, water source, drinking water treatment, education, labor supply, age and education. The researcher reported that the sign of the coefficients were nearly the same for the two models, however, level of significance were highly affected by the choice of the models. For example age, rivers water and some consumed items have significant effect for two stage tobit while they were insignificant in case of tobit model. Most items consumed, age and river water were found to have negative effect.

The limitation of this study was that the illness production function estimated is based on aggregated household level data (not individually specified) by assuming that the relationship between individual consumption and health was in fixed proportion and was the same for all individuals. However, this assumption does not seem to be realistic.

Abdulhamid (1994), postulated demand function for health care service as:

(3.18) Demand = $\mathbf{f(X_1, X_2, X_3, X_4, X_5)}$

Where X_1 is diseases prevalence and incidence which is assumed to be influenced by climate and other natural factors, nutritional status of the population, genetic factors, educational status

of the population, and level of environmental and personal hygiene; X_2 is price of health care services as a function cost of production of services and production efficiency; X_3 is income level of the population as function of gross national product, income distribution and employment rates; X_4 is availability of services as function of government decision and policies, profitability and other factors such as establishing of health facilities by religious missions and receiving grants; and X_5 is population numbers.

In estimating this model we need to have time series data which is difficult or impossible to find for some of the variables in the model. Another difficulty in the model is that demand analysis may not be informative for each individual in the household since the model is formulated for aggregated households.

Gertler and Van der Gaag (1990) modeled the demand function for a health provider from utility maximization, in which utility was assumed to be a function of quality of medical care (quality as parametric function of its observable determinants), monetary prices opportunity cost of time and consumption of other goods.

They estimated a model (of medical care provider choice) to obtain price elasticities of demand so as to be able to investigate the implications for cost recovery, utilization, and welfare of various users fee policies using nested multinomial logit regression analysis. The researches estimated the model for Co^te d'Ivoire using the sample which included 49 villages with 1,030 adults and 769 children under the age of 16 who experienced illness in four weeks preceding the survey. For Peru the researchers used a sample size of 1,254 adults and 969 children under age of 16 from 98 villages. They obtained data from the 1985 Co^te d'Ivoire living standard survey and the 1985-86 Peruvian living standard survey.

Variables used in the model were age, consumption, number of health days, educational status, the number of other adults and the number of children in the household. They estimated the model by dividing the sample in to two age groups (adults and children) for patients who used both hospitals and clinics. They found that consumption and its square were significantly

different from zero for the two countries. The coefficient of consumption was positive while the coefficient of its square was negative. They also reported that number of health days had significant decreasing effect on choice of health providers for co^te d'Ivoire. They found that education strongly influenced the decisions Peruvian took on whether to seek medical care or not and that more educated individuals chose higher quality options. Age was found to have strong negative effect on demand for health care for Co^te d'ivoire. The result in both countries revealed that the price elasticity of demand fell with income, so that relatively poor individuals were affected more by fee charged at health facilities than were rich individuals. The implication for this is willingness to pay for medical care increases with income.

Mwabu el al (1993) focused on the quality of medical care in choice of medical treatment. To examine the effect of quality the researchers developed model of health care demand from indirect conditional utility function whose elements were observable and were variables of interest to policy makers.

Accordingly, they specified the probability P_{ij} that individual (i) sought treatment from health facility j as:

(3.19) $$P_{ij} = \exp(\beta' Q_{ij} + \alpha_j s_i) / \sum \exp(\beta' Q_{ik} + \alpha_k S_i)$$

Where Q_{ij} is a vector of genetic attributes (in log form) that individual (i) faces in facility j; S_i is a vector of characteristics (in log form) specific to individual i be estimated.

To estimate the model the researchers collected data on 315 households with 1,721 individuals form Kenya during the period between January 1980 and April 1981 using a stratified randomized survey procedure. These data were of two types: (1) data from a population based survey on utilization of health services; and (2) data obtained from survey of health facilities on availability of drugs, types of health personnel, conditions of medical equipment, and fees charged for medical services.

Variables included in the model were user fee, distance, existence of different types of drugs, logarithm of number of days in last 180 days that a health facility did not have malaria drugs; logarithm of the number of days in the last 180 days that a health facility did not have aspirin drugs; number of health workers in a health facility education of household members, annual cash income of the household interacted with government health facility, sex of household member and its interaction with other variables. The researchers found that broad availability of drugs in a medical facility was positively related to medical care use. They also found that health care demand was decreasing with user fees and distance from its provider, but increasing with income.

CHAPTER IV

METHODOLOGY

4.1 THE DATA

DATA SOURCE AND COLLECTION METHODOLOGY

Primary data was collected in Asella town for this study by administering a questionnaire to mothers who had at least a child aged less than five years old. The questionnaire was structured in a manner that made possible to gather data about the following demographic, and socio economic attributes of the mother in the sampled household namely, education status of the mother and/or household head, age of the mother, marital status, number of children the mothers delivered, total number of visits for antenatal care, waiting time to get treatment, total fee paid for treatment per visit, distance from facility attended, and the nearest facility being attended, household consumption per month, household total income, employment category of the mother, formal and informal wage of the mother, and family size of the household.

Moreover, respondents were asked their perception of the quality of treatment they received and the behavior of the medical staff. The questionnaire was prepared in English and later translated into Amharic. It was structured in such a way that the above attributes were categorized into four parts. Part one consisted of questions on the mothers' knowledge of antenatal care; part two consisted of questions designed to elicit information on characteristics of health facilities visited; part three consisted of demographic and social characteristics of the women; and in the final part, questions on the consumption and expenditure behavior of the household were asked.

The field work for the data collection took a period of one month. Before commencing the actual field work 15 enumerators with high school education (grade twelve) were selected. These interviewers were given training on the purpose of the study and all the questions were discussed prior to the actual field work to avoid misunderstanding.

SAMPLING PROCEDURE

Sampling framework included all the households in Asella town. The total population of the town is estimated to be 47,391 and the total number of mothers is found to be 11,699 which is about 24.7% of the total population (estimated from census report of 1994).

Sampling procedure for the study area was also designed to generate a sample that included all individuals in the various socio-economic groups in the town. Two stage random sampling method was adopted. In the first stage, seven kebeles of the town were randomly selected from a total of fourteen (see Cochran, 1977:274,292). The total number of targeted mothers (mothers who were expected to attend antenatal clinic) was 5% of the total population (estimated from census report of 1994).

In the 2nd stage, a random sample of 18% of the total households with targeted mothers were chosen from each selected kebele. After identifying the first household, every 10th household was interviewed until the expected sample size was visited in each kebele. This gave a sample size of 214 households.

JUSTIFICATION FOR THE SELECTION OF STUDY AREA

Arsi, a zone of Oromia region is selected for this study for the following reasons.
First, Arsi zone, is classified among zones with high total fertility rate (5.8) (see appendix four). Under such situation women face the risk of maternal death if there is under utilization of maternal health services Melaku (1996:37). Hence, study on demand for maternal health services may be helpful to find out the level of maternal health services utilization in the region.

Second, Asella town is one of zonal towns that have experienced an influx of new residents from other parts of the country (see appendix two and three). This makes the inhabitants of the town heterogeneous in terms of socio-cultural aspects.

Thirdly, no study on demand for health services has been done in this town.

4.2. THE MODEL

THEORETICAL FRAMEWORK OF THE MODEL

The level of maternal health service and maternal mortality rate in Ethiopia was investigated in Chapter Two. It was found that, relative to other developing and developed countries maternal mortality is very high. This could be due to low antenatal health care coverage. In this section the theoretical model and the functional form used for estimation of the relationship of demand for antenatal care with the explanatory variables are presented. Demand for antenatal care in this study is assumed to be represented by the number of visits to antenatal clinic.

THE THEORETICAL MODEL

Health outcomes can be modeled as a function of nutrition intake, education, individual endowment (genetic make-up), household size, time devoted to health related procedure and household endowment these characteristics are considered as inputs in a household health production (Behrman and Deolalikar, 1991).

From the health production and utility functions of a household a reduced form that expresses health demand as a function of exogenous factors can be obtained (Berhman and Deolalikar, 1991, and Pitt and Rosenzweig, 1986). In the next section the derivation of the reduced form will be outlined.

Reduced Form of Demand for Health Services

The reduced form of demand function for health services can be derived from a simple model of household behavior in which the household is assumed to maximize utility subject to budget and production constraints. Accordingly, the micro economic problem the household face is to maximize the following utility function:

(4.1) **Max U = U(H, X^c, X^l, V)** Subject to budget constraint (time and income) and production function

Where **H** = health status

X^c= consumption of good

X^l= leisure time

V = vectors of other factors that affect household utility (eg. number of surviving children).

Mother is one of the n family members whose health status, consumption good, leisure time etc. enter into the household utility function. Thus, the utility maximization problem can be stated as follows:

(4.2) **Maximize** $U = U(H^m, X^{cm}, X^{lm}, V^m)$ subject to equation 4.3 and 4.6

(4.3) $H^m = h^m(X^{cm}, \delta^m, l^m_f, N, u^m)$ (Function of Health status for mother)

(4.4) $Q = F(L^m, L^*, H^m, O)$ (Production function)

(4.5) $L^m_f = G_m(l^m_f, H^m)$ (The time mother worked)

(4.6) $P_\delta \delta + P_x X^c = \pi + \sum w^i L^i_f = I$ i =1,2....n (Income constraint)

Where δ = health input (eg. the quality of medical care)

N = Number of visits.

u = environmental factors and individual's health endowment

I = income of household

L^* = hired labor and other household labor input other than mother.

$\mathbf{L_f}$ = worked time, $\mathbf{l_f}$ = Total work time available and $\mathbf{L^i}$ = is efficiency of labor input

O = vectors of other factors that affect production

W = wage rate

Q = output

$\pi = P_qQ\text{-}WL$ = profit

$\mathbf{X^c} = \sum \mathbf{x^{ci}}$ $\delta = \sum \delta^i$ for i =1,2 ...n

$\mathbf{P_\delta}$, P_q and $\mathbf{P_x}$ are prices of δ, Q and $\mathbf{X^c}$ respectively and the superscript m refers to mother. The first order condition, derived from utility maximization (equation 2) subject to equation 3 (health production function) and equation 6 (budget) constraints for the intra household allocation of say good x between mother (person m) and person k is:

(4.7)

$$\frac{\frac{\partial U}{\partial x_m}+\frac{\partial U}{\partial H^m}\frac{\partial h_m}{\partial x_m}}{\frac{\partial U}{\partial x_k}+\frac{\partial U}{\partial H^k}\frac{\partial h_K}{\partial x_k}}=\frac{P_x-W_m\frac{\partial G_m}{\partial H^m}\frac{\partial h_m}{\partial x_m}}{P_x-W_k\frac{\partial G_k}{\partial H^k}\frac{\partial h_k}{\partial x_k}}$$

(Modified from Pitt and Rosenzweig 1995:162)

As can be seen from equation (7) the allocation of resource for mother will depend on:

a. how the household values the health and consumption of mother ($\mathbf{U_{hm}}$, $\mathbf{U_{xm}}$)

b. how the relationship between health and consumption (health technology) and between productivity and health (G_i) of mother differ from other members and

c. how the pecuniary return to investment in the health of mother (W_m) differ from others (see Pitt and Rosenzweig, 1995:162).

Under the assumption that an internal maximum obtained for the underlying function, the constrained maximization of preference leads to the following reduced form demand equation for maternal health services

(4.8) $HD^m = D(P_q, P_{xc}, P_\delta, \pi, W, u)$

However, because of absence of time series data (prices of consumption good), and some cross sectional data (mothers' health asset and other environmental factors) it was impossible to estimate the above reduced form of demand function. Thus empirical model was developed with some modification. Moreover, the perception of mothers regarding quality of services was used instead of their ability to see a doctor or nurse as a measure of quality of health care services.

EMPIRICAL SPECIFICATION OF THE MODEL

Two models were employed to examine the determinants of the demand for antenatal care. First, a logit model was specified to pinpoint factors affecting the probability of seeking antenatal care.

Second, a simple linear demand model was adopted to investigate factors influencing the demand for antenatal care. Proxies were also used to represent variables in the theoretical model. Accordingly, number of visits was used to proxy demand for antenatal care.

THE LOGIT MODEL

In order to analyze the effect of explanatory variables on the probability of attending antenatal clinic and not attending, logit model is adopted. Accordingly, logit model is derived as follows:

y_i = 1 if the mother attended antenatal clinic
0 otherwise

The observed values of y_i are just realization of a binomial process with probabilities P_i = prob[y_i=1] and 1-P_i = prob [y_i=0] and varying depending on values of explanatory variables. Hence, the likelihood function is:

(4.9)

$$L = \prod_{i=1}^{n} (1 - p_i)^{1-y_i} P_i^{y_i}$$

Under the assumption that cumulative distribution of random error of equation of $\mathbf{y_i = ß'x_i + \gamma_i}$ is the logistic, the model formulated as:

(4.10)

$$P_i = 1 - F(-\beta' x_i) = \frac{\exp(\beta' x_i)}{1 + \exp(\beta' x_i)} \textit{(See - Maddala, 1983)}$$

Where $\mathbf{y_i = b_o + b_1}$*DDIST* $\mathbf{+ b_2}$*LHHCON* $\mathbf{+ b_3}$*XAGE* $\mathbf{+ b_3}$*ED* $\mathbf{+ b_4}$*XWO* $\mathbf{+ b_5}$*XMS* $\mathbf{+ \gamma_i}$

F = is function of cumulative distribution.

P_i = probability of attending antenatal clinic.

Demand Function

The demand equation for mothers who attended clinic is specified as:

(4.11) $\mathbf{Dan = a_o + a_1}$*XP* $\mathbf{+ a_2}$*XWT* $\mathbf{+ a_3}$*XAGE* $\mathbf{+ a_4}$*XWO* $\mathbf{+ a_5}$*QUAL* $\mathbf{+ a_6}$*LECT* $\mathbf{+}$
$\mathbf{a_7}$*ILL* $\mathbf{+ a_8}$*XGP* $\mathbf{+ a_9}$*HHCON* $\mathbf{+ a_{10}}$*XTT* $\mathbf{+ a_{11}}$*ED* $\mathbf{+ a_{12}}$*EDDUF* $\mathbf{+ a_{13}}$*XMS* $\mathbf{+ \in}$

Where e is random error term and other variables.

DEPENDENT VARIABLES

Dan = is a measure of antenatal care (number of visits)

$\mathbf{y_i}$ = dummy for use of antenatal care (1 for mothers who attended antenatal clinic 0 otherwise)

INDEPENDENT VARIABLES

XC = is the number of children the mother has given birth.

XP = is the expenditure (cash) on the health care.

LECT = quality of health education to capture the perceived quality of antenatal care.

XWT = is waiting time.

XMS = is marital status of the woman .

XAGE = is age of woman during survey period .

DIST = is distance from home to the health facility attended.

DDIST = is distance from home to the nearest health facility.

XFS = is family size.

XWO = is employment category of the mother.

ED = is education level of the mother.

HHCON = is household income.

XTT = is return travel time in minutes.

QUAL = is perceived quality of the treatment received.

XTC = is transport cost in Birr.

XGP = is gestation period or month of pregnancy when the expectant mother first visited antenatal clinic.

EDDUF = is education level of head of the household.

INW = is informal wage of the mother.

DESCRIPTION AND EXPECTED RELATIONSHIP BETWEEN EXPLAINED AND EXPLANATORY VARIABLES

Number of visits - is used to measure antenatal care utilization, namely, the number of visits to modern health facilities. For healthy pregnancy, mothers are recommended to visit antenatal clinic monthly until the seven month. Then after, they are expected to visit every fortnight until the 36th weeks of pregnancy. Finally, they are advised to visit weekly until they give birth. Thus, number of visits for a normal pregnancy is 11 to 13 visits.

The number of children the mother has given birth to - might make mothers reluctant visit to antenatal clinic. On the other hand, multiparity affects health of pregnant mothers negatively and hence it may motivate them to visit antenatal clinic. Thus, the coefficient is expected to be ambiguous.

Prices - represents the total monetary cost for each antenatal care visit. Price is expected to be negatively related to health care utilization.

Lecture assessment - lecture assessment is designed to capture the perceived quality of antenatal health education given on various issues of maternal health. It is a dummy variable equaling one if lecture assessment is excellent, very good or good, zero otherwise. It is expected to have positive sign.

Waiting time - captures the total time spent waiting for treatment in the health facility in minutes. It is expected to have negative relationship.

Marital status - it is treated as a dummy variable equaling one if the woman is married, zero otherwise. The sign of the coefficient is ambiguous a priori.

Age of the woman - is age of mother during survey period. The expected sign of the coefficient is ambiguous.

Distance - is the distance from home to the facility attended and the nearest health facility. A priori the expected effect is negative.

Family size - includes the total number of household member during survey period. A priori the expected sign of the coefficient is ambiguous.

Employment category of the mother - a dummy variable equaling one if the mother is employed permanently, zero otherwise. The expected sign of coefficient is positive.

The education status of the mother - a dummy variable equaling one if the mother's education is grade seven and above, zero otherwise. Education is expected to have a positive relationship with demand for antenatal care.

Household income - captures the monthly income of the household in Birr. Income was calculated as the average monthly value of total household consumption. It is less sensitive to temporary fluctuations (such as the seasonality of work), and also it includes the value of home production. It has a positive demand effect on use of antenatal care.

Travel time in minutes - represents the total time taken to go for attendance of antenatal care. It is negatively related to health care utilization.

Perceived quality of the treatment received - is a dummy variable equaling one if quality of service is considered to be excellent, very good or good, zero otherwise. It is expected to have a positive effect on the use of antenatal care.

Transport cost - is cost of transportation for a round trip in Birr. Its coefficient is expected to be negative.

Gestation period - is the number of months of pregnancy when the expectant mother first visited antenatal clinic. It is expected to have a negative effect on the number of visits a mother makes to a health facility.

Educational status of head of the household - is treated as a dummy variable equaling one if education level of head of the household is grade nine and above, zero otherwise. Its coefficient is expected to be positive.

Income of the mothers from Informal sector - is the wage that a woman earned from informal employment sectors. It is expected to have positive sign.

CHAPTER V

RESULTS, ANALYSES AND DISCUSSIONS

5.1. DESCRIPTION OF SURVEY RESULTS

This section presents results on the level of antenatal health care utilization using descriptive statistics of the variables that are thought to influence demand for antenatal care. It also presents results of the analysis on the relationship between various attributes and demand for antenatal care.

The pattern of antenatal health care utilization shows that none of the interviewed mothers attended antenatal care at private or non governmental health organization facilities. The possible reason for this may be antenatal care services was not available at these health institutions, and the government health facilities provide antenatal care services free of charge, except for some prescribed drugs.

The survey results show 37% of the mothers attended antenatal care for the last child at Asella hospital, and the rest received the services at Asella health center and other government health facilities.

Although Arsi health department believes that all mothers in the town attend antenatal care, however, 6.1% of respondents reported that they did not. Some of these women said that they did not feel pain. Even some mentioned that they were not aware of the use of antenatal care. Some 40% of sampled mothers visited antenatal clinic for the first time within 3 months of pregnancy, 44% during 3 to 6 months, 7% during 6 to 7 months and 3% after 7 months of pregnancy.

Mothers visited 6 times during gestation period on the average. This is very low even for a normal pregnancy because a woman with a healthy pregnancy is expected to visit antenatal clinic 11 to 13 times.

Table 14(a)

Descriptive statistics of categorized variables

Variables	Descriptions		Mean	Standard deviation	Minimum	Maximum
	Categories	%				
Age of mothers	below 19 years	1.4	29.44	5.53	17	48
	20-25 years	26.6				
	26-29 years	25.2				
	30-35 years	32.2				
	36 and above	14.5				
Educational status of mothers	illiterate	12.15	8.145	4.225	0	14(12+2)
	grade one to six	18.22				
	grade seven to eight	18.7				
	grade nine to twelve	43				
	greater than grade twelve	7.9				
Educational status of household head	illiterate	6.5	10.29	3.958	0	16
	grade one to six	10.3				
	grade seven to eight	9.3				
	grade nine to twelve	46.7				
	greater than grade twelve	27.1				
Number of visits	Not visiting	6.1	6.42	5.51	0	13
	Visiting	93.9				
Gestation period	Less than 3 months	26.9	3.4	1.642	1	8
	3-6 months	61.2				
	6 and above	11.9				
Wage of mothers	From formal sectors		387.9	136.67	105	600
	From informal sectors		120.3	92.53	12	300

Table 14(b)

Description of statistics for dummy variables

variables	description	
	Category	percentage
Employment category of mothers	Not employed	77.1
	employed	22.9
Marital status of mothers	Married	91.6
	Non married	8.4
Health condition of pregnancy	Problematic	22.9
	Normal	77.1

Table 14(c)

Description of statistics for non categorized variables

Variables	Mean	Standard deviation	Minimum	Maximum
Waiting time in hour	1:51	1.27	0:05	8
Transport cost	0.95	0.866	0	3
Family size	5.78	2.328	2	20
Household income	549.4	360.752	43	4023
Number of children a mother gave birth	4	2.254	1	13

Source:-Household survey of Asella town.

As it can be seen from Table 14(a), only 26.9% mothers started attending antenatal clinic before three months of pregnancy. To add risky conditions to the situation, 11.9% of interviewed mothers responded that they began visiting after 6 months of pregnancies. It is medically advisable that mothers with problematic pregnancy should not be late in attending antenatal care, because it could be difficult to care for the fetus and the pregnant mothers.

It is possible that educational background of the mother and the household head influence the use of antenatal care and late in commencing visit to antenatal clinic. The descriptive statistics

in Table 14(a) shows that the average educational status of mothers by levels of schooling was found to be 8.145. On the other hand, about 12.1% of them were found to be illiterate.

Table 15 shows the effect of mothers educational levels on gestation period of antenatal visit.

Table 15

Educational levels of mothers and Gestation period

Educational level of mothers	Gestation period								
	1	2	3	4	5	6	7 and above	total	
								Number	%
Grade 6 and below	5	10	18	10	3	6	4	56	27.9
grade 7 and above	20	19	48	33	11	6	8	145	72.1

source:- household survey of Asella town.

Table 15 depicts that large proportion of mothers with educational background of grade seven and above started visiting antenatal clinic during early times of pregnancy. Mantel-Haelnszel test for linear association also showed that the variables were linearly related at 1% level of significance. Educational status might also affect the potential for antenatal care seeking, and level of utilization.

Table 16

Educational levels of mothers and number of visits

Educational levels of mothers	Antenatal visits												
	Attendance				Number of visits for attending								Ratio of attending to not attending
	Not attending		Attending		2	3	4	5	6	7	8	9	10 and above	
	Number	%	Number	%										
Grade 6 and below	9	4	56	26.2	1	5	4	4	15	7	8	11	1	6.22
Grade 7 and above	4	2	145	67.8	4	3	8	10	32	32	25	23	8	36.25

Source:-**household of survey of Asella town**

Table 16 depicts that mothers who were grade seven and above had more visits. Mantel-Haelnszel test for linear association also revealed that the linear relationship between these variables were statistically significant at 1% level of significance. Furthermore, it can be seen that the ratio of those attending antenatal clinic to those not attending was higher for mothers with higher educational background. This implies that educational levels higher than grade six would enable mothers to seek antenatal care and attend proper number of visits. This is because higher education might enable them to understand the positive effect of antenatal care.

The average waiting time was an hour and 50 minutes. This implies that an expectant mothers would wait long time in queue to get the services. The explanation for this might be mothers who should get antenatal care services were many in the town. Government health facilities also provided the services to mothers who were outside the town. The average travel time was 17 minutes which could discourage expectant mothers to visit antenatal clinic. The average transport cost for round trip was also not low (about 1 Birr).

Moreover, the health condition of a pregnant mother could affect the probability of seeking antenatal clinic: a woman with a problem may be more prone to attend the clinic or otherwise.

From table 14 (b) it can be seen that 22% of mothers reported that they had problems during pregnancy. This can also be observed from the following table.

Table 17

Health condition of pregnant mothers and antenatal care attendance.

	Not Attending Antenatal care		Attending Antenatal care		Ratio of the Attending to Not Attending
	Number	%	Number	%	
Healthy pregnancy	12	5.6	153	71.5	12.75
Problematic pregnancy	1	0.5	48	22.4	48

Source:- household survey of Asella town

This table reveals that the ratio of mothers attending antenatal clinic to the not attending is higher for problematic pregnancies, implying that a mother with a problem may seek help more than one without a problem. However, Mantel-Haelnszel test for linear association does not support the linear relationship between these variables at 10% level of significance.

The Probability of seeking antenatal care can also be affected by income level of the household. The following table indicates the effect of household income on probability of seeking antenatal care.

Table 18

Household income and attending antenatal clinic

Household Income in Birr	Not Attending Antenatal		Attending Antenatal		Ratio of the Attending to Not Attending
	Number	%	Number	%	
250 and below	4	2	19	8.87	4.5
251-500	4	2	78	36.4	19.5
501-750	4	2	66	30.8	16.5
751 and above	1	0.5	38	17.8	38

Source:-Household survey of Asella town.

The data in table 18 depict that the ratio of attending antenatal clinic to not attending was higher for higher income groups, indicating that the probability of seeking antenatal care is influenced by household income. Chi-square test also support the linear relationship between these variables at 10% level of significance.

Furthermore, the intensity of the use of antenatal care would be affected by household income. The following table shows the household income against number of visits.

Table 19

Household income and number of visits

Household income in Birr	Number of visits										
	2	3	4	5	6	7	8	9	10 and above	Total	
										Number	%
250 and below	-	1	1	3	3	6	-	5	-	19	9.5
251-500	3	3	5	5	21	14	15	12	-	78	38.8
501-750	1	4	4	3	16	13	14	6	5	66	32.8
751 and above	1	-	2	3	7	6	4	11	4	38	18.9

Source:- **Household survey of Asella town.**

The data in this table reveal that higher visit numbers are associated with the higher income groups. This implies that proper number of visits were only attended by relatively higher income individuals. Chi-square test also support the linear association of these variables at 10% level of significance.

Moreover, mothers were asked to rate the quality of health education given during antenatal visit and health services provided. Since relation between pregnant mothers attended antenatal clinic and health workers, and the services they received is indicator of the quality of antenatal care provided. Accordingly, 90.7% and 67.8% of mothers responded that these services were

acceptable while 9.3% and 32.2% replied health education and health care the services were unacceptable respectively.

Furthermore, two nurses, (one from Asella health center and another from Asella hospital) who were working in the mother and child health (MCH) unit were interviewed about the availability of basic maternity equipment and drugs in their respective institutions. They reported that some essential maternity equipment were not available to provide proper maternal health services. Asella Health Station suffers from the lack oxygen cylinder (with related apparatus), equipment to measure haemoglobin, clinical thermometer and Asella hospital did not have oxygen cylinder and clinical oral thermometer. However, the health workers mentioned that most of basic drugs for maternity care were available. In addition, the health worker from Asella health center explained that the facility had serious shortage of health professionals even to make use the existence health facility, especially in MCH unit that mothers who had been attending antenatal clinic could not get proper antenatal health services, that is, health education on family planning and other maternal health services. This agreed with response mothers gave regarding the quality of antenatal health care services.

5.2 ECONOMETRIC ANALYSIS AND DISCUSSIONS

In the analysis of correlation matrix of independent variables, some variables were found to be highly correlated (see Appendix 5). Variables were selected for analysis to take care of multicollinearity problem.

As it can be seen from Appendix 5, household size (XFS), number of children (XC), and age of mothers (XAGE) were found to be highly correlated. Thus, only one of them will be included in a regression equation. Variables that have a little or no contribution in improving the efficacy of adjusted R^2 will also be excluded from regression.

LOGIT REGRESSION ANALYSIS

Logit model was fitted to investigate factors affecting the probability of seeking antenatal care or not. The regression results were presented in Table 20.

Table 20

Logit model the probability of attending antenatal clinic.

VARIABLES		COEFFICIENTS	T-VALUES	PARTIAL DERIVATIVE OF PROBABILITY AT MEAN
CONSTANT		0.64	0.21	0.019
ACCESS VARIABLE	DDIST	-0.57	-1.65^{+}	-0.016
ECONOMIC VARIABLE	HHCON	1.13	2.12*	0.034
CHARACTERISTICS OF HOUSEHOLD	XAGE	-0.043	-0.81	-0.013
	ILL	1.57	1.17	0.0454
	ED	1.22	1.69^{+}	0.035
	XWO	-0.55	-0.69	-0.016
	XMS	-1.9	-1.29	-0.055

+ = SIGNIFICANT AT 10%
* = SIGNIFICANT AT 5%
Sample size = 214

The access variable included in the logit model was the distance between home and nearest health facility (DDIST). The coefficient of DDIST was found to have the expected sign with partial derivative of probability -0.016. That is, for a unit increase in distance, the probability of seeking antenatal care reduces by 0.016 keeping other factors constant. This implies that longer distance has a decreasing probability of seeking antenatal care.

Household income (HHCON) was used to examine the impact of economic status on probability of seeking antenatal care. Accordingly, assuming ceteris paribus, for one Birr

increment in household income the probability of seeking antenatal care increases by 0.034. This result was consistent with the findings of Ministry of Finance (1996:201) in Ethiopia.

It can be seen from Table 20 that the probability of seeking antenatal care can significantly be predicted by educational level of mothers. The sign of the coefficient was found to be positive, implying that educational level of mothers (ED) has an increasing probability for seeking antenatal care. The partial derivative of probability with respect to education was also 0.035. That is, having educational background of at least grade seven increase the probability of seeking antenatal care by 0.035. This result is similar to the findings of Lavy and Germain (1993:15), study conducted on Ghanian living standard. However, the result supports only one of the two alternative effects of education on demand for health care services hypothesized by Bitran and Mcinne (1993:34). One may not expect reducing effect of education on antenatal health care demand. This is because health inputs a pregnant woman consumes at home are not satisfactory for health of mother and fetus. Any pregnant mother should attend vaccination and other maternal health services provided at health facilities.

Although not statistically significant, problems of pregnancy (ILL) were found to have an encouraging effect on probability of seeking antenatal care. This was the expected relationship, and supported the work of Gertler van der Gaag (1990:94), study conducted for Cote d'ivoire and Peruvian, and Ministry of Finance(1996) of Ethiopia.

Furthermore, and employment category of mothers affected the probability of seeking antenatal care negatively. Age was highly correlated with the number of children a mother gave birth to. Thus, age of mothers can proxy the number of children (which assumed to proxy women's experience of giving birth) and the effect was found to be negative. However, the coefficient was statistically insignificant.

Demand for antenatal care

Demand function was fitted to pinpoint factors influencing number of visits. In estimation of this model sample selectivity bias was tested by mill's ratio and found to be insignificant. The non attending mothers were not included in the model since non of them replied that they were excluded from the services because of price factors. Table 21 reveals regression results.

Table 21.
Demand equation: Dependent variable, the number of visits

VARIABLES		Coefficients	T-Value
CONSTANT		8	9.71**
ACCESS VARIABLES	XTT	-0.20714E-02	-1.954+
	XWT	-0.122	-1.583
ECONOMIC VARIABLES	XP	-0.10948E-02	-0.057
	HHCON	0.831013E-03	3.176**
QUALITY VARIABLES	QUAL	0.7148	2.00+
	LECT	0.6199	2.54**
CHARACTERISTICS OF HOUSEHOLD	XAGE	0.25932E-01	1.437
	XWO	-0.31885E-01	-0.138
	XMS	-0.34456	-0.964
	ILL	0.239E-01	0.107
	XGP	-0.7867	-13.096**
	EDDUF	0.41359E-01	0.309
	ED	0.51074E-01	0.225

$R^2 = 0.58$
+ = significant at 10%
** =significant at 1%
Sample size = 201

QUALITY VARIABLES

To identify the extent to which the quality variables affect the demand for antenatal care, lecture (health education) provision and quality of maternal health services offered in a health facility during antenatal clinic visits were included in the demand equation. Table 21. reveals that these variables were important determinants of the demand for antenatal care. The sign of the

coefficients of both variables were positive. The effect these quality variables were consistent with the findings of Mwabu et-al (1993:839-840), Lavy and Germain [1994:11], Bitran and Mcinne (1993:13) etc.

ECONOMIC VARIABLES

Cash price charged at antenatal clinic and household income were entered in the demand model to see the influence of economic variables. Although not significant, the relationship between the demand for antenatal care and price was found to be negative. As expected, household income had positive significant effect.

Accordingly, keeping other factors constant, for one Birr increment of household income, demand for antenatal care increases approximately by one visit until maximum visit number is achieved. The effect of economic variables were also similar to the results obtained by Bitran and Mcinne (1993:21), Mwabu et- al (1993:852), and Hammer and Berman (1995:52).

CHARACTERISTICS OF MOTHERS

Educational levels of mothers and household head, marital status, health condition of pregnancy, age of mothers, employment category and gestation period were examined as factors related to antenatal care. The educational status and illness were found to have positive but statistically insignificant influences on demand for antenatal care. Table 21. also depicts that the age of mothers affected the demand for antenatal care positively. This relationship does not support the findings of Bitran and Mcinne [1993:30], and Lavy and Germain [1993:15]. One possible explanation for this could be older mothers attended higher number of visits because of the nature of the relationship between age and pregnancy. That is, pregnancy is more sensitive to complication when mothers conceive after 35 years (Melaku, 1996:37). Another could also be that mothers might have experienced the advantage of attending more antenatal visits.

Employment category of mothers was found to influence the demand for antenatal care negatively. However, it was statistically insignificant. The possible reason for this might be that the organization in which these women were employed might not facilitate conditions for pregnant women to visit antenatal clinic. This finding was consistent with the respondent mothers' view. Some of them replied that they were working in informal sectors like private business job and causal work which do not initiate mothers to attend antenatal care.

Gestation period of the first visit was observed to have significant negative influence on demand for antenatal care. Table 21. depicts that the coefficients of gestation period was -0.7867. This implies that, ceteris paribus, the increment of gestation period by one month reduces antenatal visits approximately by one. This result was consistent with theoretically advisable number of visits during early time of pregnancy (that is once in a month). The result was in line with findings of Njaramba (1994:54).

ACCESS VARIABLES

Waiting time to get antenatal health care services and travel time from home to facility attended were examined to see the effect of accessibility of antenatal care on its demand. These variables were observed to have reducing effect on the demand for antenatal care. The results were as expected and consistent with the findings of Bitran and Mcinne (193:20), Gertler van der Gaag (1990:62).

TEST OF ECONOMETRIC PROBLEMS

The existence of heteroscedasticity makes the estimators of this regression inefficient and their variance to be biased. This invalidate the test of significance (Maddala, 1988:167).

Breusch and Pagan test was employed to test the existence of this problem using LIMDEP computer package and no significant heteroscedasticity problem was found at 5% level of significance.

The presence of auto correlation problem also makes the estimators of the regression inefficient (Gujurati, 1988:363). However, this problem cannot be expected in cross sectional data analysis. Thus, the problem is irrelevant for this study.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY AND CONCLUSIONS

The paper has empirically examined the determinants of demand for antenatal care in Asella town. The demand model used in the study was specified in Chapter Four and its estimation results presented in Chapter Five. Gestation period of the first antenatal visit was found to be the most important factor in reducing the number of visits. Attending antenatal clinic late during pregnancy implies that the women will attend only few antenatal visits during pregnancy.

The result also indicated that as maternal educational level increases, the probability of seeking antenatal care increases as well. In addition, it has been shown that income is an important constraint on the effective use of antenatal care. Relatively low income individuals were found to use less antenatal care services.

The health education provided at facilities and quality of other maternal health services were found to be among the determinants of demand for antenatal care.

Although it was only significant at 10% it was observed that the waiting time reduce demand for antenatal care. Mothers' experience of giving birth as measured by the number of children which was proxied by age of mothers reduces the probability of seeking antenatal care.

Furthermore, other access variables (travel time to health facility attended and/or distance to the nearest health facility) were observed to reduce the use of antenatal care. This implies that improving the accessibility of antenatal care can increase its utilization.

Finally, the results for employment category of mothers were found to bear unexpected sign. Its coefficient was statistically insignificant and the results for individual characteristics show that some of the variables were found to be determinants of demand for antenatal care.

6.2 RECOMMENDATIONS

On the basis of the findings of this study there are some possible policy recommendations.

1. The demand for antenatal care was found to be significantly affected by household income. This result suggests that antenatal demand increases with household income. Thus, governmental and non governmental organizations (who involved in promoting maternal health) have to devise ways to provide the expectant mothers with modest subsidy with aim of increasing antenatal care utilization (eg. making basic maternity drugs available to expectant mothers free of charge).

2. Women and girls should be educated on the importance of attending antenatal clinic early in pregnancy and regular attendance thereafter. The gestation period has been found to have the greatest impact on the level of antenatal care utilization. The most important effective way could be educating young girls on this important aspect. Health workers could be attached to schools to educate the girls on this issue in addition to other maternal related issues.

3. Making antenatal health care services available nearer to home of pregnant mothers to reduce transportation cost and reducing waiting time will likely raise demand for antenatal care services. This implies, improving the efficiency and increasing the number of health facilities with maternity health workers will likely improve the use of antenatal care.

4. Results of quality variables reveal that quality of maternal health services motivate the mothers to attend antenatal care. This implies that the government should find ways of improving the quality of maternal health care services with objective of increasing antenatal health care utilization. This could be possible by improving the composition of health-manpower (e.g. the ratio of doctors to nurses and other health workers) and equip the health facilities with basic maternity equipment and drugs.

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APPENDIX 1

SURVEY QUESTIONNAIRE

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE SCHOOL STUDIES

BUSINESS AND ECONOMICS FACULTY

DEPARTMENT OF ECONOMICS

STUDY OF DEMAND FOR ANTENATAL CARE SERVICES

SURVEY QUESTIONNAIRE FOR MOTHERS

Note to the interviewer - the interviewer should introduce himself (herself)and explain the purpose of the study to the woman.

PART ONE

WOMAN'S INFORMATION ON ANTENATAL CARE

100. How many sons and daughters do you have? _____ sons _____ daughters

	Last child Name _____ Alive -- Died --	The Second child from the last Name_____ Alive -- Died --	The third child from the Last Name _____ Alive-- Died ---
101 How old is (name) ?	_____ months/years	_____ months/years	_____ months/years
102 Did you attend antenatal care for (name)	Yes _____1 No _____2 If not (a) why? _____ _____ (b) then go to question # 111	Yes _____1 No _____2 If not (a) why? _____ _____ (b) then go to question # 111	Yes _____1 No _____2 If not (a) why? _____ _____ ____ (b) then go to question # 111
103 Where did you attend this care?	1 Hospital _____ 2. Clinic(private/public)_____ 3. Health post (Private/public) _____ 4. Pharmacy (private/public) _____ 5. Traditional healer _____ 6. Home of health worker _____ 7. Others (specify) _____	1. Hospital _____ 2. Clinic(private/public)_____ 3. Health post (Private/public) _____ 4. Pharmacy (private/public) _____ 5. Traditional healer _____ 6. Home of health worker _____ 7 .Others (specify)_____	1 Hospital _____ 2. Clinic(private/public)_____ 3. Health post (Private/public) _____ 4. Pharmacy (private/public) _____ 5. Traditional healer _____ 6. Home of health worker _____ 7. Others (specify) _____
104. Which criteria did you use when selecting the facility to attend?	1. The nearest facility to your home _____ 2. Quality of services offered _____ 3. Options offered by employer _____ 4. Past experience _____ 5. Other (specify) _____	1. The nearest facility to your home _____ 2. Quality of services offered _____ 3. Options offered by employer _____ 4. Past experience _____ 5. Other (specify)	1. The nearest facility to your home _____ 2. Quality of services offered _____ 3. Options offered by employer _____ 4. Past experience _____ 5. Other (specify)
105. If more than one mode was used what were the reasons ?	1. Quality of services _____ 2. Accessibility_____ 3. Cost _____ 4. Affiliation to a certain Doctor_____ 5. Other specify) _____	1 .Quality of services _____ 2. Accessibility_____ 3. Cost _____ 4. Affiliation to a certain Doctor_____ 5. Other specify)_____	1. Quality of services _____ 2. Accessibility _____ 3. Cost _____ 4. Affiliation to a certain Doctor_____ 5. Other specify)_____

106. At what gestation period did you go to the Health institution for the first visit?	1. less than 3 months _____ 2. 3 to 6 months _____ 3. 6 to 7 months _____ 4. more than 7 months _____ 5. Don't know _____	1. less than 3 months _____ 2. 3 to 6 months _____ 3. 6 to 7 months _____ 4. more than 7 months _____ 5. Don't know _____	1. less than 3 months _____ 2. 3 to 6 months _____ 3. 6 to 7 months _____ 4. more than 7 months _____ 5. Don't know _____
107. If later than 6 months did you go the facility to ensure access at delivery?	yes _____ 1 No _____ 2	yes _____ 1 No _____ 2	yes _____ 1 No _____ 2
108. During pregnancy of (name) how many times did you visit the health facility?	_____ visits	_____ visits	_____ visits
109. Have you been attending the health facility as advised by health Professionals?	yes _____1 No _____2 If no, what reasons did you have?_____	yes _____1 No _____2 If no, what reasons did you have?_____	yes _____1 No _____2 If no, what reasons did you have?_____
110. Who for the first time told you that you need antenatal care and advice you to go?	1. Husband _____ 2. Other Women _____ 3. Parents _____ 4. From the media _____ 5. other (specify)_____	1. Husband _____ 2. Other Women _____ 3. Parents _____ 4. From the media _____ 5. other (specify) _____	1. Husband _____ 2. Other Women _____ 3. Parents _____ 4. From the media _____ 5 .other (specify) _____
111. During gestation period of (name)was your pregnancy Problematic?	Yes _____1 No _____ 2 If yes, specify the kinds of problems: 1._____ 2._____ 3._____ 4.----------	Yes _____1 No _____2 If yes, specify the kinds of problems: 1._____ 2._____ 3._____ 4. ----------	Yes _____1 No _____2 If yes, specify the kinds of problems: 1._____ 2._____ 3._____ 4._____
112 Where did you deliver (name)?	1. Home _____ 2. Traditional midwife's house _____ 3. Hospital _____ 4. health station /center (Private/public) _____ 5. Health post (private/public) _____ 6. Other (specify)_____	1. Home _____ 2. Traditional midwife's house _____ 3. Hospital _____ 4. health station /center (Private/public) _____ 5. Health post (private/public) _____ 6. Other (specify)_ _____	1. Home _____ 2. Traditional midwife's house _____ 3. Hospital _____ 4. health station /center (Private/public) _____ 5. Health post (private/public) _____ 6. Other (specify) _____

PART TWO

CHARACTERISTICS OF THE HEALTH FACILITY (FOR THE LAST CHILD)

200 On the average how long did you take to travel from home to the nearest health facility?
1. by taxi _____ minutes/hours
2. by Ghari _____ minutes/hours
3. by own car _____ minutes/hours
4. on Foot _____ minutes/hours
5. other (specify) _____

201 On the average how long did you take to travel from home to the health facility where you attended the clinic?
1. by taxi _____ minutes/hours
2. by Ghari _____ minutes/hours
3. by own car _____ minutes/hours
4. on Foot _____ minutes/hours
5. other (specify) _____

202. How much money did you pay for the services offered at the clinic per visit? _____ Birr

203 What mode of transport did you use?
1. by taxi _____
2. by Ghari _____
3. by own car _____
4. on Foot _____
5. other (specify) _____

204. How much money did you spend on transport to the health facility? ____ Birr
205. How long did you wait to be attended at the health facility per visit? _____ minutes/hours
206. What would you have done if you were not waiting for treatment?
_____

207. Were you given any lecture during your health facility visits concerning the following?
1. Breast feeding _____
2. Family planning _____
3. Child birth _____
4. Maternal nutrition _____
5. Care of new born baby _____
6. Expected number of antenatal visits for a normal pregnancy__ (state the number of visits)
7. Gestation period for the first visit for each pregnancy _____(month of Pregnancy)
8. Other (specify)_____

208. How did you assess the lectures given?
   1. Excellent ____ 2. very good _____ 3. good -----
   4. fair _____ 5. poor _____

209. How do you rate the services offered in the health facility?
   1. Excellent ____ 2. very good ____ 3. good ____
   4. fair _____ 5. poor _____

210. Do you have any suggestion(s) that you feel can improve the services of antenatal clinic?
   1. Increase time devoted to health education _____
   2. More laboratory investigation/ equipment _____
   3. Increase number of doctors/Nurses _____
   4. Increase number of hours devoted to antenatal care _____
   5. Privacy should be maintained _____
   6. Other (specify) _____

PART THREE

CHARACTERISTICS OF THE WOMAN

300. Marital status
1. Married ____ 4. Windowed ____
2. Single _____ 5. Separated ____
3. Divorced ____

301. Age _____ years

302. Family size _____

303. Educational Level of
(a) The mother
1. Primary _____ years
2. Secondary _____ years
3. University /College _____ years
4. none _____
5. Other (specify) _____

(b) Head of the household
1 .Primary _____ years
2. Secondary _____ years
3. University /College _____ years
4. None _____
5. Other (specify) _____

304. Which of the following employment category do you belong to?
1. Government _____
2. Private Company _____
3. Self Employment _____
4. Casual Employment _____
5. Housewife _____
6. Other (specify) _____
(I employed ask question # 305,306, and 307, otherwise go to question 308)

305.(1). How much are you paid at main job monthly? ___ Birr
(2). How long do you spend at main job?
____ hours per day,_____ days per week

306.(1). Do you have other job other than main activity? (If no, go to question 307)
(2). How much do you earn at this second job? ____ Birr
(3). How much time did spend at this second job?
_____ hours per day, _____ days per week

307. If married, what is your husband's income per month? _____ Birr

308. Do you have medical insurance?
1. yes _____ 2. No _____

309. If yes, does the insurance cover expenditure on antenatal care?
1. yes _____ 2. No _____

PART FOUR

FOOD EXPENDITURE AND CONSUMPTION

FOOD TYPE	400. **How much did you consume in the last month** ? (value of weekly consumption in Birr)
1 Cereals (teff, barley, wheat, maize, etc.)	
2. Pulses and oilseeds (lentils, cow peas, berbre etc.)	
3. Spices (Abish, Jinjibil etc.)	
4. Milk and milk product	
5. Meat and other animal products (beef, eggs etc.)	
6. Vegetables and fruits (potatoes onion karia, orange etc.)	
7. Drinks and stimulants (Talla, Tej, soft drinks, coffee, chat etc.	

401. Have you consumed any food from your own harvest or from gifts, loans and aid? Yes ___1 No ___2 (If 2, go to question - 402)	consumption from own harvest last seven days?		consumption from gifts/loans in the last seven days?		consumption from food aid in the last seven days?	
	Quantity	value in Birr	Quantity	value in Birr	Quantity	value in Birr

402. Have any member of the household consumed any prepared food or eaten else where against payment in the last seven days? Yes ___1 No ___2 (If 2, go to question __403)	What was the weekly expenditure (in Birr)? ____ Birr
403. Has the household purchased any non food items such as clothes, shoes, fabric kitchen equipment furniture etc.) in the last three months? Yes ___1 No ____2 (If 2, go to question - 404)	What was the total expenditure (in Birr)?___ Birr

404. Have you or any member of your household purchased or sold items like radio tape recorder television chairs tables etc.) over the last year? Yes ___1 No ___2 (If 2, go to question 405)	What is the total expenditure if the items were purchased? ___ Birr	What is the total sale if the items were sold? ___ Birr
405. Has the household purchased items like matches batteries fuel wood soap etc.) in the last month? Yes ___1 No ____2 (If 2, go to question _406)	What was the total expenditure?____ Birr	
406. Has the household paid for items like water bill, electricity bill, telephone bill, rent etc, in the last month? Yes ____1 No ____2 (If 2, go to question - 407)	What was the total expenditure? ____ Birr	

407. How much did the household spend on local transport in the last seven days? ___ Birr

408. How much did the household spend on long distance transport in the last seven days? ____ Birr

409. Can you cover monthly expenditures on your income?
Yes ___1 No ___2

If no, estimate the gap between your income and expenditures?____ Birr

410. What monthly income (net of taxes) would you in your circumstances consider to be:
1. Very low ____ Birr
2. Insufficient ____ Birr
3. Sufficient _____ Birr
4. Good _____ Birr
5. Very good _____ Birr

APPENDIX 2

Population of some zonal towns and migration status in Ethiopia.

Zonal town	Total population	Migrants	Migration Rate
Oromia Region			
Bale	28317	11,864	0.42
Nazret	127101	67,632	0.53
Asella	47203	23,935	0.51
Jimma	88,061	40,556	0.46
Asebe Teferi	18,450	7,682	0.42
Fiche	21,179	7,638	0.36
Amhara Region			
Debre Berhan	38,591	19,922	0.52
Kemise	10,735	5,647	0.52
Dessie	96,649	39,258	0.41
Gonder	111,606	40,056	0.36
South Ethiopia Nation and Nationality Region			
Awasa	68,935	30,420	0.44
Mizan	10,584	4,264	0.4
Soddo	36,130	14,012	0.39
Hosaena	31,662	12,302	0.39
Tigray Region			
Mekele	96,664	54,643	0.56
Adigrat	37,350	18,816	0.5
Adwa	24,463	11,216	0.46
Benishangul Gumuz Region (Asosa town)	11,700	7591	0.65

Source:-The 1994 Population and Housing Census of Ethiopia: result for Oromia Volume III, pp 16-41, South Ethiopia Nation and Nationality Region Volume III, pp 18-25, Amhara Region part III, pp 16-20, Tigray Region Volume I, pp 243-249 etc.

Appendix 3

The major Ethnic groups in Asella.

Ethnic groups	Both sex	Male	Female
Amhara	22758	9804	12954
Sebatbet Guragie	1022	554	468
Soddo Guragie	2870	1302	1568
Siltie Guragie	1697	888	809
Oromo	16863	8356	8507
Werji	38	24	14
Tigraway	1178	576	602
Welaita	153	73	80
Dorzie	36	22	14
Gamo	22	10	12
Gaffa	1	-	1
Konta	1	1	-
Kulo	2	1	1
Others	750	382	368
Total Population	47391	21993	25398

Source:-The 1994 Population and Housing Census of Ethiopia Result for Oromia Region Volume I, Part I, pp 238.

Appendix 4

Zonal town of Ethiopia, by General Fertility Rate (GFR) and Total Fertility Rate (TFR)

Zones	GFR	TFR
Oromia Region	139.5	4.9
Bale	178.9	6.3
Arsi	165.5	5.8
Borena	141.6	4.8
Misrak Harerge	142.7	4.9
Amhara Region		
Misrak Gojam	155.4	5.2
Mirab Gogam	155.4	5.2
Semen Gonder	112.4	3.9
Bahir Dar	64.1	2.4
South Ethiopia Nation and Nationality		
Keficho Shekicho	146.9	5
Sidama	147.9	4.8
Bench Maji	144.2	4.6
Kambata Alabana Tembaro	95.5	3.4
Tigray Region		
Adwa	100.2	4.1
Mekele	108.8	3.9
Koren	108.8	3.9
Adigrat	100.8	3.6
Benishangul Gumuz Region		
Metekel	114.1	3.8
Asosa	94.8	3.2
Region 14 (Addis Ababa)	50.8	1.8
Afar Region	60.1	2.03
Dire Dawa Region	63.9	2.23

Source:-The 1994 Population and Housing Census of Ethiopia: result for Oromia Volume III, pp 77, Addis Ababa Volume I, pp 162, Afar Volume I, pp 101, South Ethiopia Nation and Nationality Volume III, pp 47 etc.

APPENDIX 5

Correlation Matrix of Independent Variables

	XC	XFS	XAGE	XTT	DIST	EHH	HHCON	FW	IWN	ED	XTC
XC	1										
XFS	.83	1									
XAGE	.7	.61	1								
XTT	.18	.23	-.02	1							
DIST	.18	.22	-.02	1	1						
EHH	-.21	-.2	.01	-.28	-.28	1					
HHCON	-.02	.12	.01	.02	.02	.3	1				
FW	-.074	-.1	.12	-.06	-.06	.32	.24	1			
INW	-.001	.05	.29	-.03	-.03	-.1	.02	-.05	1		
ED	-.47	-.4	-.26	-.21	-.21	.538	.16	.43	-.03	1	
XTC	.15	.16	.07	.04	.04	-.168	.1	.003	.25	-.2	1

SIGNIFICANT AT 0.05 IF GREATER THAN 0.1397
SIGNIFICANT AT 0.01 IF GREATER THAN 0.1804

DECLARATION

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

Name Shambu Balcha

Signature

Date June, 1998